

**MARVIN DEMICOLI**

**To what extent was the Central Mediterranean  
Neolithic a maritime culture?**



**DISSERTATIONS**

**ARCHIVE**

TITLE	To what Extent was the Central Mediterranean Neolithic a Maritime Culture?
AUTHOR	Marvin Demicoli
REFEREE	Nicholas Vella
UNIVERSITY/DEPARTMENT	University of Malta/Department of Classics and Archaeology
DEGREE	* The dissertation is a long essay submitted in partial fulfillment of the requirements for the Preparatory Program for Master of Arts in Archaeology
LANGUAGE	English
YEAR	2009
INTERNAL CODE	DA0008

## LICENSE

### Creative Commons - Attribution-NonCommercial-NoDerivs 3.0 Unported

CREATIVE COMMONS CORPORATION IS NOT A LAW FIRM AND DOES NOT PROVIDE LEGAL SERVICES. DISTRIBUTION OF THIS LICENSE DOES NOT CREATE AN ATTORNEY-CLIENT RELATIONSHIP. CREATIVE COMMONS PROVIDES THIS INFORMATION ON AN "AS-IS" BASIS. CREATIVE COMMONS MAKES NO WARRANTIES REGARDING THE INFORMATION PROVIDED, AND DISCLAIMS LIABILITY FOR DAMAGES RESULTING FROM ITS USE.

#### License

THE WORK (AS DEFINED BELOW) IS PROVIDED UNDER THE TERMS OF THIS CREATIVE COMMONS PUBLIC LICENSE ("CCPL" OR "LICENSE"). THE WORK IS PROTECTED BY COPYRIGHT AND/OR OTHER APPLICABLE LAW. ANY USE OF THE WORK OTHER THAN AS AUTHORIZED UNDER THIS LICENSE OR COPYRIGHT LAW IS PROHIBITED.

BY EXERCISING ANY RIGHTS TO THE WORK PROVIDED HERE, YOU ACCEPT AND AGREE TO BE BOUND BY THE TERMS OF THIS LICENSE. TO THE EXTENT THIS LICENSE MAY BE CONSIDERED TO BE A CONTRACT, THE LICENSOR GRANTS YOU THE RIGHTS CONTAINED HERE IN CONSIDERATION OF YOUR ACCEPTANCE OF SUCH TERMS AND CONDITIONS.

#### 1. Definitions

- a. **"Adaptation"** means a work based upon the Work, or upon the Work and other pre-existing works, such as a translation, adaptation, derivative work, arrangement of music or other alterations of a literary or artistic work, or phonogram or performance and includes cinematographic adaptations or any other form in which the Work may be recast, transformed, or adapted including in any form recognizably derived from the original, except that a work that constitutes a Collection will not be considered an Adaptation for the purpose of this License. For the avoidance of doubt, where the Work is a musical work, performance or phonogram, the synchronization of the Work in timed-relation with a moving image ("synching") will be considered an Adaptation for the purpose of this License.
- b. **"Collection"** means a collection of literary or artistic works, such as encyclopedias and anthologies, or performances, phonograms or broadcasts, or other works or subject matter other than works listed in Section 1(f) below, which, by reason of the selection and arrangement of their contents, constitute intellectual creations, in which the Work is included in its entirety in unmodified form along with one or more other contributions, each constituting separate and independent works in themselves, which together are assembled into a collective whole. A work that constitutes a Collection will not be considered an Adaptation (as defined above) for the purposes of this License.
- c. **"Distribute"** means to make available to the public the original and copies of the Work through sale or other transfer of ownership.
- d. **"Licensor"** means the individual, individuals, entity or entities that offer(s) the Work under the terms of this License.
- e. **"Original Author"** means, in the case of a literary or artistic work, the individual, individuals, entity or entities who created the Work or if no individual or entity can be identified, the publisher; and in addition (i) in the case of a performance the actors, singers, musicians, dancers, and other persons who act, sing, deliver, declaim, play in, interpret or otherwise perform literary or artistic works or expressions of folklore; (ii) in the case of a phonogram the producer being the person or legal entity who first fixes the sounds of a performance or other sounds; and, (iii) in the case of broadcasts, the organization that transmits the broadcast.
- f. **"Work"** means the literary and/or artistic work offered under the terms of this License including without

limitation any production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression including digital form, such as a book, pamphlet and other writing; a lecture, address, sermon or other work of the same nature; a dramatic or dramatico-musical work; a choreographic work or entertainment in dumb show; a musical composition with or without words; a cinematographic work to which are assimilated works expressed by a process analogous to cinematography; a work of drawing, painting, architecture, sculpture, engraving or lithography; a photographic work to which are assimilated works expressed by a process analogous to photography; a work of applied art; an illustration, map, plan, sketch or three-dimensional work relative to geography, topography, architecture or science; a performance; a broadcast; a phonogram; a compilation of data to the extent it is protected as a copyrightable work; or a work performed by a variety or circus performer to the extent it is not otherwise considered a literary or artistic work.

- g. **"You"** means an individual or entity exercising rights under this License who has not previously violated the terms of this License with respect to the Work, or who has received express permission from the Licensor to exercise rights under this License despite a previous violation.
- h. **"Publicly Perform"** means to perform public recitations of the Work and to communicate to the public those public recitations, by any means or process, including by wire or wireless means or public digital performances; to make available to the public Works in such a way that members of the public may access these Works from a place and at a place individually chosen by them; to perform the Work to the public by any means or process and the communication to the public of the performances of the Work, including by public digital performance; to broadcast and rebroadcast the Work by any means including signs, sounds or images.
- i. **"Reproduce"** means to make copies of the Work by any means including without limitation by sound or visual recordings and the right of fixation and reproducing fixations of the Work, including storage of a protected performance or phonogram in digital form or other electronic medium.

**2. Fair Dealing Rights.** Nothing in this License is intended to reduce, limit, or restrict any uses free from copyright or rights arising from limitations or exceptions that are provided for in connection with the copyright protection under copyright law or other applicable laws.

**3. License Grant.** Subject to the terms and conditions of this License, Licensor hereby grants You a worldwide, royalty-free, non-exclusive, perpetual (for the duration of the applicable copyright) license to exercise the rights in the Work as stated below:

- a. to Reproduce the Work, to incorporate the Work into one or more Collections, and to Reproduce the Work as incorporated in the Collections; and,
- b. to Distribute and Publicly Perform the Work including as incorporated in Collections.

The above rights may be exercised in all media and formats whether now known or hereafter devised. The above rights include the right to make such modifications as are technically necessary to exercise the rights in other media and formats, but otherwise you have no rights to make Adaptations. Subject to 8(f), all rights not expressly granted by Licensor are hereby reserved, including but not limited to the rights set forth in Section 4(d).

**4. Restrictions.** The license granted in Section 3 above is expressly made subject to and limited by the following restrictions:

- a. You may Distribute or Publicly Perform the Work only under the terms of this License. You must include a copy of, or the Uniform Resource Identifier (URI) for, this License with every copy of the Work You Distribute or Publicly Perform. You may not offer or impose any terms on the Work that restrict the terms of this License or the ability of the recipient of the Work to exercise the rights granted to that recipient under the terms of the License. You may not sublicense the Work. You must keep intact all notices that refer to this License and to the disclaimer of warranties with every copy of the Work You Distribute or Publicly Perform. When You Distribute or Publicly Perform the Work, You may not impose any effective technological measures on the Work that restrict the ability of a recipient of the Work from You to exercise the rights granted to that recipient under the terms of the License. This Section 4(a) applies to the Work as incorporated in a Collection, but this does not require the Collection apart from the Work itself to be made subject to the terms of this License. If You create a Collection, upon notice from any Licensor You must, to the extent practicable, remove from the Collection any credit as required by Section 4(c), as requested.
- b. You may not exercise any of the rights granted to You in Section 3 above in any manner that is primarily intended for or directed toward commercial advantage or private monetary compensation. The exchange of the Work for other copyrighted works by means of digital file-sharing or otherwise shall not be considered to be intended for or directed toward commercial advantage or private monetary compensation, provided there is no payment of any monetary compensation in connection with the exchange of copyrighted works.
- c. If You Distribute, or Publicly Perform the Work or Collections, You must, unless a request has been made pursuant to Section 4(a), keep intact all copyright notices for the Work and provide, reasonable to the medium or means You are utilizing: (i) the name of the Original Author (or pseudonym, if applicable) if supplied, and/or if the Original Author and/or Licensor designate another party or parties (e.g., a sponsor institute, publishing entity, journal) for attribution ("Attribution Parties") in Licensor's copyright notice, terms of service or by other reasonable means, the name of such party or parties; (ii) the title of the Work if supplied; (iii) to the extent reasonably practicable, the URI, if any, that Licensor specifies to be associated with the Work, unless such URI does not refer to the copyright notice or licensing information for the Work. The credit required by this Section 4(c) may be implemented in any reasonable manner; provided, however, that in the case of a Collection, at a minimum such credit will appear, if a credit for all contributing authors of Collection appears, then as part of these credits and in a manner at least as prominent as the credits for the other contributing authors. For the avoidance of doubt, You may only use the credit required by this Section for the purpose of attribution in the manner set out above and, by exercising Your rights under this License, You may not implicitly or explicitly assert or imply any connection with, sponsorship or endorsement by the Original Author, Licensor and/or Attribution Parties, as appropriate, of You or Your use of the Work, without the separate, express prior written permission of the Original Author, Licensor and/or Attribution Parties.

- d. For the avoidance of doubt:
- i. **Non-waivable Compulsory License Schemes.** In those jurisdictions in which the right to collect royalties through any statutory or compulsory licensing scheme cannot be waived, the Licensor reserves the exclusive right to collect such royalties for any exercise by You of the rights granted under this License;
  - ii. **Waivable Compulsory License Schemes.** In those jurisdictions in which the right to collect royalties through any statutory or compulsory licensing scheme can be waived, the Licensor reserves the exclusive right to collect such royalties for any exercise by You of the rights granted under this License if Your exercise of such rights is for a purpose or use which is otherwise than noncommercial as permitted under Section 4(b) and otherwise waives the right to collect royalties through any statutory or compulsory licensing scheme; and,
  - iii. **Voluntary License Schemes.** The Licensor reserves the right to collect royalties, whether individually or, in the event that the Licensor is a member of a collecting society that administers voluntary licensing schemes, via that society, from any exercise by You of the rights granted under this License that is for a purpose or use which is otherwise than noncommercial as permitted under Section 4(b).
- e. Except as otherwise agreed in writing by the Licensor or as may be otherwise permitted by applicable law, if You Reproduce, Distribute or Publicly Perform the Work either by itself or as part of any Collections, You must not distort, mutilate, modify or take other derogatory action in relation to the Work which would be prejudicial to the Original Author's honor or reputation.

## 5. Representations, Warranties and Disclaimer

UNLESS OTHERWISE MUTUALLY AGREED BY THE PARTIES IN WRITING, LICENSOR OFFERS THE WORK AS-IS AND MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND CONCERNING THE WORK, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF TITLE, MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT, OR THE ABSENCE OF LATENT OR OTHER DEFECTS, ACCURACY, OR THE PRESENCE OF ABSENCE OF ERRORS, WHETHER OR NOT DISCOVERABLE. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES, SO SUCH EXCLUSION MAY NOT APPLY TO YOU.

**6. Limitation on Liability.** EXCEPT TO THE EXTENT REQUIRED BY APPLICABLE LAW, IN NO EVENT WILL LICENSOR BE LIABLE TO YOU ON ANY LEGAL THEORY FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY DAMAGES ARISING OUT OF THIS LICENSE OR THE USE OF THE WORK, EVEN IF LICENSOR HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

## 7. Termination

- a. This License and the rights granted hereunder will terminate automatically upon any breach by You of the terms of this License. Individuals or entities who have received Collections from You under this License, however, will not have their licenses terminated provided such individuals or entities remain in full compliance with those licenses. Sections 1, 2, 5, 6, 7, and 8 will survive any termination of this License.
- b. Subject to the above terms and conditions, the license granted here is perpetual (for the duration of the applicable copyright in the Work). Notwithstanding the above, Licensor reserves the right to release the Work under different license terms or to stop distributing the Work at any time; provided, however that any such election will not serve to withdraw this License (or any other license that has been, or is required to be, granted under the terms of this License), and this License will continue in full force and effect unless terminated as stated above.

## 8. Miscellaneous

- a. Each time You Distribute or Publicly Perform the Work or a Collection, the Licensor offers to the recipient a license to the Work on the same terms and conditions as the license granted to You under this License.
- b. If any provision of this License is invalid or unenforceable under applicable law, it shall not affect the validity or enforceability of the remainder of the terms of this License, and without further action by the parties to this agreement, such provision shall be reformed to the minimum extent necessary to make such provision valid and enforceable.
- c. No term or provision of this License shall be deemed waived and no breach consented to unless such waiver or consent shall be in writing and signed by the party to be charged with such waiver or consent.
- d. This License constitutes the entire agreement between the parties with respect to the Work licensed here. There are no understandings, agreements or representations with respect to the Work not specified here. Licensor shall not be bound by any additional provisions that may appear in any communication from You. This License may not be modified without the mutual written agreement of the Licensor and You.
- e. The rights granted under, and the subject matter referenced, in this License were drafted utilizing the terminology of the Berne Convention for the Protection of Literary and Artistic Works (as amended on September 28, 1979), the Rome Convention of 1961, the WIPO Copyright Treaty of 1996, the WIPO Performances and Phonograms Treaty of 1996 and the Universal Copyright Convention (as revised on July 24, 1971). These rights and subject matter take effect in the relevant jurisdiction in which the License terms are sought to be enforced according to the corresponding provisions of the implementation of those treaty provisions in the applicable national law. If the standard suite of rights granted under applicable copyright law includes additional rights not granted under this License, such additional rights are deemed to be included in the License; this License is not intended to restrict the license of any rights under applicable law.

### Creative Commons Notice

Creative Commons is not a party to this License, and makes no warranty whatsoever in connection with the Work. Creative Commons will not be liable to You or any party on any legal theory for any damages

whatsoever, including without limitation any general, special, incidental or consequential damages arising in connection to this license. Notwithstanding the foregoing two (2) sentences, if Creative Commons has expressly identified itself as the Licensor hereunder, it shall have all rights and obligations of Licensor.

Except for the limited purpose of indicating to the public that the Work is licensed under the CCPL, Creative Commons does not authorize the use by either party of the trademark "Creative Commons" or any related trademark or logo of Creative Commons without the prior written consent of Creative Commons. Any permitted use will be in compliance with Creative Commons' then-current trademark usage guidelines, as may be published on its website or otherwise made available upon request from time to time. For the avoidance of doubt, this trademark restriction does not form part of this License.

Creative Commons may be contacted at <http://creativecommons.org/>.

#### NOTES (ITALIAN)

Quest'opera, oltre ad essere copia di contenuti ufficialmente depositati presso l'Università di riferimento, è protetta da un copyright di tipo Creative Commons che ne permette la libera distribuzione ma ne vieta l'utilizzo commerciale e la modifica dei contenuti. Qualunque citazione di quest'opera deve essere corredata dalla nomina del suo autore Marvin Demicoli, unico proprietario dei diritti ad essa relativi, e del sito [www.archaeologicaltraces.org](http://www.archaeologicaltraces.org) in cui essa è pubblicata da A.T.P.G. editore.





DEPARTMENT OF CLASSICS AND ARCHAEOLOGY  
UNIVERSITY OF MALTA

# To what Extent was the Central Mediterranean Neolithic a Maritime Culture?

By

**MARVIN DEMICOLI**

A long essay submitted in partial fulfillment of the requirements for the  
Preparatory Program for Master of Arts in Archaeology

ARC 3002 (10 ECTS credits)

ID: 422886(M)  
*E-mail: marvindemicoli@gmail.com*

Submitted: 12<sup>th</sup> June 2009

# CONTENTS

	<i>Page</i>
<b>Contents</b>	<b>3</b>
<b>List of Figures</b>	<b>5</b>
<b>List of Tables</b>	<b>5</b>
<b>Acknowledgements</b>	<b>6</b>
<b>1. What is a maritime culture?</b>	<b>7</b>
1.1 Introduction and aims	7
1.2 Chronology	8
1.3 Why use the sea	8
1.4 How to define maritime activity archaeologically?	10
<b>2. Boats and settlement locations</b>	<b>12</b>
2.1 Boats	13
2.2 Seafaring and experimental archaeology	14
2.3 Settlement locations	16
2.4 Settlement locations in relation to daily boat ranges	18
2.5 The scenario on the Maltese and other remote islands	18
2.6 Comments	20
<b>3. Marine resource collection: the case of Grotta dell'Uzzo (Sicily)</b>	<b>21</b>
3.1 Fish and cetaceans	22
3.2 Molluscs and crustaceans	24
3.3 Paleogeography at Grotta dell'Uzzo	27
3.4 Other resources exploited at Grotta dell'Uzzo	28
3.5 Comparison with other Italian sites	28
3.6 Comments	29
<b>4. Displacement of Goods</b>	<b>30</b>
4.1 Pottery	31
4.2 Lithics	35
4.3 Other objects being dispersed	39
4.4 Comments	40

<b>5. Discussion and conclusion</b>	<b>41</b>
5.1 Maritime components of a culture	42
5.2 The South Italian Neolithic	43
5.3 The technological factor	44
5.4 The geographic factor	44
5.5 The subsistence factor	45
5.6 The economic factor	46
5.7 Who was at sea?	47
5.8 Conclusion	49
<b>Reference list</b>	<b>50</b>
<b>Figures</b>	<b>56</b>

## LIST OF FIGURES

<i>Figure</i>	<i>Description</i>	<i>Page</i>
1	Map of favourable coastal configuration in the Mediterranean sea	56
2	Administrative regions of Italy	56
3	Map of the Central Mediterranean showing Early Neolithic sites	57
4	Map of the Central Mediterranean showing Late Neolithic sites	58
5	Daily boat ranges in Central Mediterranean	59
6	Lampedusa in daily boat range relation with neighbouring coasts	59
7	Voyage from Lipari to Malta using the daily boat range method	60
8	The replica of the La Marmotta canoe in action	60
9	Voyage from Pantelleria to Malta by a coastal route	61
10	Location of Grotta dell'Uzzo	62
11	View of the plain of Uzzo and Grotta dell'Uzzo cave	62
12	Percentages of animal remains across time at Grotta dell'Uzzo	63
13	Percentages of fish species in the Early Neolithic at Grotta dell'Uzzo	63
14	Percentages of mollusc species in the Early Neolithic at Grotta dell'Uzzo	64
15	Predicted sea-level change in Western Sicily	64
16	Paleogeography of southern Malta during the Neolithic	65
17	Fish to mammal ratio in Italian Neolithic sites	66
18	<i>Cardium</i> sp. shell, and <i>Cardium</i> impressions on pottery	66
19	Distribution maps of Earliest and Early Neolithic ceramic styles	67
20	Distribution maps of early Middle Neolithic and Late Middle Neolithic ceramic styles	68
21	Distribution maps of Late Neolithic and Early Eneolithic ceramic styles	69
22	Distribution maps of flint and axe raw material sources, and of obsidian from the four central Mediterranean sources	70
23	Raw material exchange network during the Neolithic	70
24	Map showing percentages of Lipari obsidian in the lithic assemblages of Neolithic sites in central Calabria	71
25	Superimposition of the distribution maps of Early Neolithic ceramic styles, raw material sources and flint distribution	72
26	Superimposition of the distribution maps of Late Neolithic ceramic styles (coloured) and obsidian	73

## LIST OF TABLES

<i>Table</i>	<i>Description</i>	<i>Page</i>
1	Main Neolithic Periods	8
2	Boat properties	15
3	Chronology at Grotta dell'Uzzo	22

Cover Picture: Mount Etna (Sicily) seen from the sea (from <http://www.thisfabtrek.com/journey/europe/italy/20070626-palermo/etna-last-look-morning-4.jpg>) and inset, a Kula canoe (from <http://www.art-pacific.com/artifacts/nugueina/massim/kulaprau.htm>)

## ACKNOWLEDGEMENTS

This essay would not have been possible without the guidance and help of several persons. The most special thanks go to my tutor Dr. Nicholas Vella, who was always ready to patiently listen to me and help me, even though I was sometimes hard headed in my arguments. I must also thank him for suggesting and making available resources that could possibly help in the completion of this essay, even when this meant getting the material from abroad.

My thanks go also to Clive Vella for discussing and providing material about lithics. He was crucial in checking my over-imaginative speculations about the subject.

Thanks also to Dr. Anthony Pace for the initial suggestions in tackling the displacement of goods topic.

My deep appreciation goes also to John Pryor, Radomír Tichý and Cyprian Broodbank for answering and providing feedback about my questions.

I must also thank all my lecturers, especially Prof. Anthony Bonanno, for instructing me in archaeology and inspiring me to keep pursuing this area of study. Many thanks also to all my friends who supported me along the way.

# 1. What is a maritime culture?

*“I must go down to the seas again, to the lonely sea and the sky,  
And all I ask is a tall ship and a star to steer her by,  
And the wheel's kick and the wind's song and the white sail's shaking,  
And a gray mist on the sea's face, and a gray dawn breaking...”*

*Sea Fever* by John Masefield (1878 - 1967)<sup>1</sup>

## 1.1 Introduction and aims

The sea can be a substantial boundary. However with the right technology and spirit, it can also be a means of connection. The superior cognitive ability of humans has enabled them to overcome the maritime boundary very early in prehistory. Sea crossings are documented since Palaeolithic times (Broodbank 2006: 99; Bednarik 2002: 4-5). Nevertheless it was only in the Neolithic that our ancestors became bold enough to explore previously uncharted seas. For the Mediterranean region, the Aegean has been proposed as a hub for the development of Neolithic human's seafaring skills (Broodbank 2006: 214-215). With these improved skills the western dispersal of the Neolithic package was made easier. Thus in the Neolithic small and remote islands such as Malta and Lipari, get to be permanently inhabited for the first time (Malone 2003: 37, 41). The fact that these first settlers had to cross the maritime boundary to get to the islands cannot be negated. However, were such journeys just fleeting voyages or did the sea have a more central role for the Neolithic people? What was the perception of the sea and of islands? Can a maritime culture be recognized for the Neolithic? Taking the cue from recent debates on the archaeology of islands, and issues of isolation and insularity,<sup>2</sup> this essay explores the extent to which the sea and its resources were being used in the Neolithic. In particular, attention will be focused on the central Mediterranean that is south-west Italy, Sicily and its surrounding islands including the Maltese Islands.

---

<sup>1</sup> All poems at the beginning of each chapter were obtained from <http://famouspoetsandpoems.com>.

<sup>2</sup> Over the last three decades the role of island archaeology has been the focus of numerous studies (for example: Evans 1973; Cherry 1981, 1990; Fitzpatrick and Erlandson 2006; Rainbird 2007) and debates (for example: Rainbird 1999; Broodbank 1999; Robb 2001a; Fitzpatrick and Anderson 2008).

## 1.2 Chronology

The Neolithic period has different time spans in the regions under investigation. For Southern Italy and Sicily it goes from 6000 BC to about 4000 BC (Pessina and Tiné 2008: 39). The first humans and thus the Neolithic appear on the Maltese islands around 5500BC. However, there the Neolithic period extends to 2500 BC (Trump 2002: 10). For this essay the Sicilian Neolithic chronology will be used, which correlates to the Early Maltese Neolithic.<sup>3</sup> Table 1 shows the major divisions within the Neolithic period as they will be used throughout this essay.<sup>4</sup> The associated main pottery assemblage styles for Sicily, Malta and south-west Italy are also included.

<b>Neolithic Period</b>	<b>Date BC</b>	<b>Sicilian assemblage styles</b>	<b>Maltese assemblage styles</b>	<b>South-west Italian assemblage styles</b>
Early	6100-5000	Pre-Stentinello/ Stentinello	Ghar Dalam	Impressed/ Stentinello
Middle	5000-4500	Stentinello	Ghar Dalam/Grey Skorba	Capri/Trichrome/ Serra d'Alto
Late	4500-4000	Diana	Red Skorba	Diana

**Table 1:** Main Neolithic Periods (adapted from Pessina and Tiné 2008: 39; Trump 2002: 10; Malone 2003: 243)

## 1.3 Why use the sea?

Before seeing the extent of maritime activity in Neolithic times, it would be useful to know why people have used and use the sea. From ethno-historic evidence various reasons can be found for a society to turn to the sea. Subsistence is vital for survival and

---

<sup>3</sup> The Maltese Temple Period (3500-2500 BC) traditionally starting with the Zebbug phase (Trump 2002: 10) is contemporary to Sicilian and regional Eneolithic and thus is not discussed here.

<sup>4</sup> The Neolithic <sup>14</sup>C dates are characterised by large standard deviations, and thus the given date ranges may vary considerably (Leighton 1999: 60, 271-272). The Diana phase is sometimes dated 4000-3500 BC (Malone 2003: 243; Leighton 1999: 269) making it contemporary with the Early Sicilian Eneolithic of San Cono Piano Notaro and the Maltese Zebbug Phase and thus the stylistic influence on Red Skorba (4500-4000) becomes unclear. The dates from Pessina and Tiné (2008) give the Diana phase as 4500-4000 and will be used for this essay since they are the most recently published.

the most obvious use of the sea is for fishing. Although fish do not provide a lot of calories, they are rich in protein and can be basic staple food for a community (Ilahiane and Altschul 2002: 36). Fishing can be complemented by other food production activities such as pastoralism or agriculture. For example, 19<sup>th</sup> century maps show how each of the families on the islands of St Kilda (off north-west Ireland) had its own allotted strip of land, used for pasture and agriculture when fishing was not possible (Fleming 2005: 127-128). Apart from fish, the sea can offer other edible resources. The Seri community of coastal California collected eelgrass as a staple edible maritime plant up till early modern times (Ilahiane and Altschul 2002: 23). More widespread is the collection of molluscs. Although these do not have a high nutritional value they can be important alimentary supplements, and can be treated as delicacies. Apart from their alimentary value seashells can have other uses such as decoration and music (Ricordi 1997: 158). This is a point to which we return below.

Fishing and other marine resource collecting can be done either coastally or in open water. These might reflect on the customs and/or technology used. In the Channel Islands off the Californian coast, for example, 18<sup>th</sup> century Chumash communities conducted fishing expeditions to other islands, while expeditions to the mainland (about 40 km away) were made to gather plant foods (McCawley 2002: 51). Deeper water fishing requires more advanced technological and navigational knowledge. For example, the sturdy Chumash plank canoe was developed over a period of 500 years to make it reliably seaworthy (McCawley 2002: 46) while the boats used by the fishermen of St Kilda were even regarded as collective property (Fleming 2005: 108)

Another important aspect of the sea is its possibility of being a means of connection rather than one of isolation. Land and sea are mutually bonded within lines of visibility and thus link together both conceptually and topographically making the sea a way of communication between regions (Horden and Purcell 2000: 133). Maritime trading can be the result of such possible connections. Traded foreign goods can gain value and become prestige items, as were the Chumash shell beads for example (McCawley 2002: 53). However trading can also be a means of subsistence if food is traded. The occupation

of small islands might be based on trading goods for food with the mainland. For example the Aleut, a historic maritime community of polar North America, traded high protein fish for high calorie foods (grains and legumes) with the mainland (Ilahiane and Altschul 2002: 37). Similarly, the islander communities of Chumash and Gabrielino traded stone tools, baskets and high quality shell beads for food with mainland California. Seasonal occupation might result if the local means of subsistence production are not sufficient.

Other reasons for seafaring can be various. Rituals connected with the sea might result if the sea itself is regarded as divine or because of its sense of mystery and danger (Parker 2001: 38; Jorion 1982: 275-277). Intermarriages between island and mainland communities will result in acculturation, the mutual cultural influence between the two communities. Ethno-historical documentation shows various instances of intermarriages between Chumash and Gabrielino cultures (McCawley 2002: 48). Seafaring must also be viewed as a social activity. Travelling from one place to another would result in specialized knowledge that gains social value when journeys are for example retold or sung so that others can 're-live' them (Farr 2006: 91-92).

#### **1.4 How to define maritime activity archaeologically?**

Although ethno-historic evidence can be very illuminating, for past societies it can only be interpreted in relation to the surviving material remains. Archaeology is thus the only means that can open a window on such a distant past. But how can the aforementioned practices be defined archaeologically? Practices such as intermarriages and ritual can be very difficult to verify unless they leave clearly interpretable traces in the archaeological record. On the other hand the evidence for other maritime practices can be found archaeologically. The most obvious piece of evidence would be finding the boats themselves, thus implying a seaborne community or at least the existence of the possibility of maritime transport. Evidence for marine resource collection including fishing, would be given by the finding of fish bones, shells and other objects of marine origin within human occupation sites. Furthermore analysis on the types of fish and shells collected can indicate seasonal practices and zones of exploitation (coastal or open

water). The location of the sites themselves can be an indication of a maritime oriented society. Coastal or near coastal sites can indicate a link with the sea especially if they are not isolated from each other. The most telling evidence comes from the dispersal of goods. Lithic stone raw materials and other items do not occur naturally everywhere. Their presence in offshore places away from the source is a clear suggestion of seafaring. Pottery is a culturally made artifact that can also reveal information on human movement, especially on the sea.

The rest of this essay will tackle these points one by one in a central Mediterranean Neolithic context. Chapter 2 will look at boat finds and will apply data from experimental archaeology to Neolithic settlement locations. Marine resource collection will be the focus of chapter 3 while chapter 4 will explore the extent of the movement of goods. Finally the last chapter will propose and discuss some conclusions based on the data explored earlier.

## 2. Boats and settlement locations

*“Adrift! A little boat adrift!  
And night is coming down!  
Will no one guide a little boat  
Unto the nearest town?”*

*Adrift! A little boat adrift!* by Emily Dickinson (1830-1886)

Sea crossings require extensive seafaring knowledge as well as a certain degree of wayfinding technology. Wayfinding is the orienting of self in time and space using previous experiential paths (stories, gestures, songs) as opposed to using maps for navigation (Ingold 2000: 231-241, Vella 2001: 44). The success of a seafarer is measured by the ability to return to land. Thus seagoing must be seen in relation to land falling. For coastal seafaring one of the main hazards for a mariner is to make unexpected landfall (Parker 2001: 33). As a result a landscape must be seen as a series of connected landmarks. A landmark can be defined as a transitional place where a new vista opens up while travelling (Ingold 2000: 238). Thus in modern times markers on the land such as lighthouses are crucial for effective navigation. The existence and identification of such structures for the Neolithic central Mediterranean is difficult without targeted surveys of the coasts keeping in mind possible changes in sea levels.

Surprisingly navigation in open seas also has its markers. Fifteenth century English *Sailing Directions* indicate how to navigate through seas by the colour and texture of sea bottom materials (Parker 2001: 33). Fishermen pass down mental maps of surface currents and of the seabed through generations (Parker 2001: 33). However, for the Neolithic such cognitive knowledge can hardly be retrieved. Nevertheless any researcher must acknowledge that no amount of research can compensate for the experiential cognitive knowledge gained through a phenomenological approach.<sup>5</sup> Seafaring knowledge relates also to the type of craft being used. The life of the seafarer depends

---

<sup>5</sup> A phenomenological approach would entail the study of conscious human experiences by reliving them in every day life (Johnson 1999: 114).

also on the efficient use of his craft. Boats types thus tend to change very slowly (Hunter 1994: 263). Once a design is perfected it makes no sense to change it, making traditional boats resist radical design changes. For example throughout the Shetland Islands boat design has remained the same for over a millennium (Hunter 1994: 263).

## **2.1 Boats**

Unfortunately to date only one example of a Neolithic sea craft from the central Mediterranean is known. This comes from the submerged site of La Marmotta on the Lake Bracciano in Italy and consists of a 10 meter long canoe dated to the Early Neolithic (5450 BC) (Fugazzola Delpino and Mineo 1995: 236). This canoe was dug out from a single oak tree trunk and is 1 meter wide at the stern and tapers to 0.8 meter at the bow. On the hull it has four transverse cross braces of oak, 2.5 centimetres high, which possibly acted as ribs to strengthen and stabilize the canoe. Drilled trapezoidal wooden blocks found on the inside were interpreted by Fugazzola Delpino (the excavator) as fastenings for sails while a groove in the centre of the hull could have possibly hosted a sail mast (Fugazzola Delpino and Mineo 1995: 243). Although similar dug out canoes with sails are still in use on the Niger river in Mali (Fugazzola Delpino and Mineo 1995: 244), other evidence for the use of sails in the Neolithic is still lacking (McGrail 2001: 205). Even though the La Marmotta canoe comes from a lake site, its construction and dimensions make it very seaworthy and can give a hint about seagoing craft (Robb 2007: 267).

Further evidence about maritime technology comes from four terracotta boat models about 25 centimetres long, also from the La Marmotta site. One of these boats could be a representation of a more advanced batten boat (Tichý 2001: 214).<sup>6</sup> Similar models have been found on the other side of the Adriatic Sea such as in Serbia and in Thessaly (Greece) (Marangou 1991: 278; Fugazzola Delpino and Mineo 1995: 237). However the function of these models is still unknown. Marangou suggests that they could be fishing

---

<sup>6</sup> A batten boat is constructed from sever planks of wood which are tied or fixed together as opposed to being dug from a single tree trunk (Tichý 2001: 214).

net weights made in a form that corresponds to their function. Other interpretations see them as spindle whorls (Marangou 1991: 281). Due to their floating characteristic Fugazzola Delpino suggests that they were used for ritual offerings sent afloat in the Bracciano Lake (Kunzig 2002: 1).

## **2.2 Seafaring and experimental archaeology**

More exciting evidence about the possibilities of dug out canoes, comes from experimental archaeology. In 1998, Radomir Tichý created a full size replica of the Marmotta canoe, from a single oak trunk using stone tools (Figure 8).<sup>7</sup> In this canoe he (together with his students) was able to travel about 800 kilometers around the coast from Sicily to Spain, proving the sea worthiness of such a craft (Tichý 2001). The canoe was able to keep going in waves up to 2 meters high and although the high seas did put it in difficulty it never turned over (Tichý 2001: 207). The canoe could accommodate as much as fifteen rowers and a helmsman (Tichý 2001: 206), and yet there was still space for a good amount of load. About 100 kg of obsidian together with significant amounts of food and water provisions were carried for most of the journey creating a composite load of about a ton (Tichý 2001: 207, 210).

Alternatively for increased load capacity, separate canoes could be joined into a catamaran (Mc Grail 2001: 205; Fugazzola Delpino as quoted in Kunzig 2002) or towed behind full of goods. In this fashion Chumash fishermen managed to increase the amount of fish to collect and transport (McCawley 2002: 51). The canoe replica with an average speed of 4 km/hr (Tichý 2001: 213) crossed the 31 km straight between Milazzo (Sicily) and the island of Vulcano in about 8 hours (Tichý 2001: 203) giving it a daily range of about 50 km (Tichý 2001: 213). However, if multiple canoes were joined the increased drag would have slowed the boats down.

---

<sup>7</sup> The Marmotta canoe replica experiments were held from August to September, 1998 (Tichý 2001: 203-204).

Another comparable experiment is that conducted by Tzala in 1989 in the Greek Cycadic islands with a smaller reed *papyrella* (Broodbank 2002: 102). Tzala found that moving by sea is just about as efficient as moving by land. Table 2 shows the different properties of early boats as learned from the experiments of Tzala and Tichý. It is assumed that both boat types employed rowers only. The use of sails, although probable, is still not proven. Sails would have considerably increased the speeds and daily ranges.

Attribute	Small Canoe	Marmotta Canoe
Size	4-6 m	10 m
Crew	1-4	10 - 15
Cargo Capacity	150 kg	1000 kg
Maximum Speed	5 km/h	5 km/h
Daily Range	20 km	50 km

**Table 2:** Boat properties (adapted from Broodbank 2002: 102; Tichý 2001: 212-214)

The average weight of a modern (2 year old) dairy cow is 360 kg (Brody, Ragsdale and Turner 1923: 446) which would amount to about six persons (average 60 kg each). Carrying such an animal was thus possible on a Marmotta type canoe since there would still be space for about 9 rowers. The side height of the Marmotta canoe was of 50-60 cm (Fugazzola Delpino and Mineo 1995: 226-227), which probably could sustain a considerable amount of weight.<sup>8</sup>

Although intriguing, these experimental methods have their limitations. The experiments are limited in time and space. The geographical and nautical conditions will vary in different locations and time periods. Although the Tichý experiment did test the canoe in

<sup>8</sup> Tichý's canoe reconstruction had sides 90 cm high since the edges of the Marmotta canoe were heavily eroded by post depositional water action and marine organisms (Tichý 2001: 202; Fugazzola Delpino and Mineo 1995: 227). No data about the draught (actual hull depth below the waterline) was available since a reply from Radomír Tichý was still pending at the time of submission of this essay.

different locations it was restricted to a couple of summer months (Tichý 2002: 200). The marine conditions might have varied since the Neolithic as well. Although it has been shown that modern winds are similar to ancient ones (Murray 1987), coastal geography has changed considerably due to the rising of sea levels (Shackleton, van Andel and Runnels 1984: 309-311, Lambeck: 2004). However the most telling limitation of these experiments is the use of an inexperienced crew which is obviously untrained to exploit marine currents and winds as a hardened seafarer would be.

### **2.3 Settlement locations**

Having good boats would not have been very useful if living inland. This section will consider the location of settlements in the Neolithic central Mediterranean. The degree of indentedness of a coastline can be a physical category affecting maritime activity (Snodgrass 2000: 173-174). An indented coast would offer various safe anchorages as well as landmarks, both crucial for effective seafaring. A method for measuring coastal indentedness was developed by McEvedy and consists of placing a fine grid on map and shading out the coastal squares which have more than half (5-8) their neighbours on a coastal tract (Snodgrass 2000: 173). Figure 1 shows the result of such a method when applied on a Mediterranean map (Broodbank 2006: 219). Interestingly the Central Mediterranean (South-west Italy and Sicily) is quite indented proving that the area was quite suitable for maritime activity. Such a map however must have to be revised taking into account the changes in coastal paleogeography due to eustatic and isostatic factors.<sup>9</sup>

For the central Mediterranean Early Neolithic period several coastal or near coastal sites can be identified (Figure 3). A note should be made that having a coastal location does not necessarily indicate the status and function of the site (Parker 2001: 27). Also the coastal paleogeography might have been different from the current one since in the Early

---

<sup>9</sup> Eustatic factors, caused by the melting of the ice sheets and thus increasing the sea water volume, can account for a rise in sea level of about 16 m from 8000 BP till now (Antonioli 1997: 146). Isostatic variations caused by the uplift or subsidence of the landmasses themselves give a more complicated picture since there are regional variations. Since 8000 BP isostatic uplift of about 16 m occurred in south Calabria and north-east Sicily. North-west Sicily and south-east Sicily did not experience any isostatic variations, while there was possible subsidence in south-west Sicily (Lambeck 2004). In Malta there is observed isostatic subsidence along the south-east coast, show by submerged Bronze Age pits (Fenech 2007: 30).

Neolithic sea levels were still rising after the last glacial maximum (Shackleton, van Andel & Runnels 1984: 310) From the distribution of settlements seen on figure 3 it can be noted that in the south-east part of Sicily there was a cluster of coastal settlements. With this region is associated the Stentinello-type assemblage which is also found diffused throughout Sicily, south Italy and the Maltese Islands (Malone 2003: 251).<sup>10</sup> Is it possible that the diffusion of the Stentinello style was abetted through a maritime route?

Another settlement cluster appears in the Monti Iblei region – the hinterland west of the Stentinello settlement cluster.<sup>11</sup> This region is rich in flint which was extensively distributed, even overseas (Vella 2007: 4-5). Other coastal settlements appear in north-west Sicily (Grotta dell' Uzzo), south Sicily (Grotta del Kronio) and in southern Calabria (Umbro).

Settlements also appear on the smaller islands – Malta, Gozo, Lipari and Lampedusa. The Egadi Islands (Levanzo and Favignana) were already inhabited during the Mesolithic, in which period they formed part of mainland Sicily (Cherry 1990: 189). Favignana remained part of the mainland, while several other small, now submerged islands were present in the region during the Neolithic (Antonioli 1997: 147-153). The presence of a settlement with a Stentinello type assemblage on Lampedusa is quite surprising given its remote location, farthest of the islands around Sicily (Radi 1972 as cited in Tusa 1995: 41). During the Neolithic no settlement is known on Pantelleria (Leighton 1999: 72), although its obsidian was widely exploited throughout the Neolithic (Robb and Farr 2003: 28; Vella 2007: 4) and possible obsidian workstations have been identified on the island (Nicoletti 1997: 261).

The Late Neolithic map is characterized by a reduction in the number of sites (Figure 4). However there was a notable increase in settlements on the Aeolian Islands. Not surprisingly the main cultural assemblage for the Late Neolithic, the Diana ware,

---

<sup>10</sup> The name Stentinello will be used when referring to this cluster of settlements. It must be noted that the actual settlement of Stentinello need not have been of such central importance in the Neolithic since the phase name was only given in the 20<sup>th</sup> century)

<sup>11</sup> The high number of settlements in the south-west part of Sicily might be the result of a research bias in the region

originated on the island of Lipari. Diana and Diana-type pottery was found distributed up to central Italy, all of Sicily and the Maltese islands (Malone 2003: 253). Lipari obsidian also gets to be widely distributed throughout Italy, Sicily and the Maltese Islands (Nicoletti 1997: 262; Robb and Farr 2005: 28).

## **2.4 Settlement locations in relation to daily boat ranges**

Combining the daily boat range method, applied by Broodbank in the Aegean (Broodbank 2000: 102-103), with the data gained from Tichý's experiments (Tichý 2001: 212-214), and applying them to the Early Neolithic central Mediterranean, one gets some interesting results. The daily range used is of 40 km per day where a day is made of 12 hours of constant rowing (Tichý 2001: 206, 208) (Figure 5).<sup>12</sup> All the settlements within the Stentinello cluster fall within daily range of each other.<sup>13</sup> Having settlements within daily navigational range is indicative of transit points situated at convenient ranges from each other which could offer suitable night harbours (Westerdahl 1992: 7). This would be more so if smaller, shorter ranged boats were being used on a more regular basis for fishing or trade. The Egadi Islands were also within daily range of Grotta dell'Uzzo on the Sicilian mainland, where marine resources are documented to have been heavily exploited (Tagliacozzo 1993: 155-160, 187-188).

## **2.5 The scenario on the Maltese and other remote islands**

The Maltese Islands present a different scenario. Even rowing at the highest speed in a Marmotta type canoe would have meant spending at least a night at sea to reach Malta from Sicily (Figure 5).<sup>14</sup> Navigation at night is very possible, especially if one has

---

<sup>12</sup> Tichý calculated the range to be 50 km per day. However the conservative range of 40 km will be applied here taking into account that the performance of the crew would decrease by time and any mishaps that might be encountered at sea.

<sup>13</sup> This would have to be examined within the relative time periods though, since not all sites might have been occupied at the same time

<sup>14</sup> Robb (2001a: 175-176) argues that it is possible to cross the strait between Sicily and Malta in less than 24 hours basing his claim on an account given by Patrick Brydone in 1780. It must be kept in mind that although rowed, Brydone's boat was more technologically advanced than the Marmotta type canoes used in the Neolithic.

knowledge of the stars and how to use them for navigation.<sup>15</sup> The real problem would have been a physical one. The crew would have been exhausted from the constant rowing, albeit one cannot exclude that their bodies could have been conditioned for such a task. A similar scenario is seen for the islands of Lampedusa and Pantelleria where 2 and 3 nights at sea were required to reach the nearest mainland respectively (Figures 6, 7). Lampedusa is closer to the North African coast than to Sicily.<sup>16</sup> A direct journey to Pantelleria or Malta would have required at least 2 nights at sea.

A solution would be to have only half the crew rowing and alternating turns with the other half. However such a method would also mean that the speed is reduced by half, thus taking longer to arrive to the required destination. Another possibility would be the use of sails thus increasing the speed. Such a method would depend on the availability of favourable winds. Whatever the methodology, all imply an advanced knowledge of seafaring.

With the aforementioned data one can estimate the minimum length of time involved for a piece of obsidian from Lipari (Aeolian Islands) to reach Malta through a coastal route, irrespective of the trading method (down-the-line, direct) being employed. With a daily boat range of 40 km the journey would take a minimum of around 9.5 days with only one night in open seas (Figure 7). Similarly a piece of obsidian from Pantelleria would require a minimum of 9 days to be brought to Malta (Figure 8). However in the Pantelleria case 3 whole nights must be spent at sea. The distances from Pantelleria and from Lipari to Malta in a straight line are 215 km and 274 km respectively. The distance following a coastal route is 395 km from Pantelleria and 415 km from Lipari.<sup>17</sup> Given that Pantelleria is closer to Malta than Lipari but its obsidian is much rarer (Nicoletti 1997: 267), it can be argued that Neolithic people were still reluctant to spend whole nights at sea or that the persons specialized to do it were too few with all the social implications that this might have.

---

<sup>15</sup> For example up to the 20<sup>th</sup> century Micronesian mariners used the position of stars in space and time to conduct voyages of hundreds of kilometers across open seas (Ingold 2000: 255).

<sup>16</sup> Data on the Neolithic of north-west Tunisia should be taken into consideration in a Central Mediterranean context. Only the limited data from Camps (1974) were available when writing this essay.

<sup>17</sup> All distances are approximate (source Google Earth 27/03/2009)

## **2.6 Comments**

The settlement locations and seafaring technology of the central Mediterranean Neolithic, fit within a framework of maritime activity. However, to be able to provide better conclusions about coastal configuration and settlement locations, it is important that better regional studies in paleogeography are undertaken. Only after an accurate reconstruction of the submerged Neolithic coasts can information about settlement locations and landmarks be fruitful.

### **3. Marine resource collection: the case of Grotta dell'Uzzo (Sicily)**

*I like to look at fishermen  
And oftentimes I wish  
One would be lucky now and then  
And catch a little fish.  
I watch them statuesquely stand,  
And at the water look;  
But if they pull their float to land  
It's just to bait a hook...*

*Fisherfolk* by Robert William Service (1874 - 1958)

One aspect of a maritime culture is possibly the use of the sea for subsistence. The sea can provide various resources that have an alimentary value. Moreover marine resources, such as seashells have uses that go beyond their alimentary value (Ricordi, 1997: 156). Unfortunately, it is not always easy to find evidence for marine resource collection within the archaeological record since most excavations were not specifically directed towards collecting bio-environmental and bio-zoological remains. Fortunately for the Central Mediterranean Neolithic such archeozoological studies were conducted at the site of Grotta dell'Uzzo in north-west Sicily. Given that this is the only site on which considerable scientific studies have been made, this chapter will focus on it as a case study. Nevertheless tentative comparisons will be made with other sites for which some data are present.

The Grotta dell'Uzzo is a cave situated 65 m above sea level on the San Vito lo Capo peninsula in the north-west of Sicily (Figure 10). The cave is about 45 m high at its mouth and is 50 m deep (Tagliacozzo, 1993a: 2) (Figure 11). Excavations were conducted between 1975 and 1983, both within the cave itself and in the talus immediately outside the cave (Mannino et al., 2007: 119).

These excavations yielded a sequence of deposits spanning from the Mesolithic to the Middle Neolithic, making the Uzzo cave a key site in understanding the transition from the Mesolithic to the Neolithic (Tagliacozzo, 1993a: 8-17). Table 3 shows the chronological sequence at Grotta dell'Uzzo.

Period	Date
Mesolithic 1	8120 BC
Mesolithic 2	6570 BC
Mesolithic – Neolithic transition	6180 BC
Neolithic 1 (Early Neolithic)	6000 BC
Neolithic 2 (Middle Neolithic)	4800 BC

**Table 3:** Chronology at Grotta dell'Uzzo (all dates are absolute  $^{14}\text{C}$  dates except that for Neolithic 1 phase which is relative) (adapted from Tagliacozzo 1993a: 11-17).

Archeozoological studies have shown a notable increase in marine resource collection at the transition from the Mesolithic to the Neolithic and further increasing throughout the Neolithic (Tusa 1995: 42). The interpretation of the reason behind the increase in marine resource collection remains a matter of debate. The different taxa found can be grouped into two groups: fish and molluscs.

### 3.1 Fish and cetaceans

Figure 12 shows the variations over time between the main animal species found at Grotta dell'Uzzo. The hunting of fish for subsistence starts increasing in the Mesolithic-Neolithic transitional phase and continues increasing in the Early Neolithic phase. The fish types being caught were *Epinephelus* sp. (grouper) 80.4%, *Muraena helena* (eel) 6%, *Dentex dentex* 2.7% and others found only in very small amounts (Figure 13). The majority of the fish being caught are of the grouper species and are on average large in size some possibly being well over 10 kg (Tagliacozzo 1993a: 156). Among the other species caught there are *Sparus aurata* (gilt-head sea bream), *Diplodus sargus* (white sea bream), *Labrus merula* (wrasse) and *Lophius piscatorius* (angler fish) (Tagliacozzo

1993a: 155). Most of these species live mainly in coastal waters, reefs and shallow waters with rocky bottoms rich in vegetation, similar to those at Uzzo today (Tagliacozzo 1993a: 155, 187). This might indicate that fishing was limited only to the coastal regions and that deeper water fishing was not practiced. However a number of large cetacean bones have also been recovered from the Early Neolithic strata. Among these are dolphins (*Delphinus delphis* (common dolphin), *Globicephala* cfr. *Melaena* (long finned pilot whale), *Gramphus griseus* (Risso's dolphin)) and whales (*Physeter catodon* (sperm whale), *Balenoptera* sp. (rorqual whale)), the latter being one of the biggest sea mammals in the Mediterranean reaching lengths of over 20 m (Tagliacozzo 1993a: 106; 1997: 243). Hunting these large cetaceans in open seas would have required very specialized boats and fishing equipment, none of which has survived at Grotta dell'Uzzo. Fragments of the common sea turtle (*Caretta caretta*) which lives in shallow current-less water have also been found. The sea turtle was noted also at Cala dei Genovesi on Levanzo (Tagliacozzo 1993a: 154).

A similar situation is attested in the Middle Neolithic with the main fish type still being the *Epinephelus* sp. (grouper) 94%. The *Mauraena helena* (eel), *Diplodus sargus*, *Labrus merula*, *Sciaena umbra* (brown meagre), *Spondylisoma cantharus* (black sea bream) and *Sparus pagrus* (Couch's Seabream), merely make 1% each of the total fish collected. There is also a reduction in the number of species being caught to only 7 compared to the 14 of the previous phase (Tagliacozzo 1993a: 187-189). In the late Middle Neolithic there is a slight decrease in the amount of fish bones recovered. However, this might be due to the fact that the cave was now being used as an animal shelter and not for habitation anymore. This is indicated by the increase in domestic animal remains as well as from calcitic spherulites from animal faecal matter (Mannino *et al.* 2007: 130).

Studies on the grouper fish vertebrae growth-rings of the transitional and Early Neolithic phases revealed that fish were being caught throughout the year. Moreover, in the spring (46.2%) and summer seasons (30.7%) fishing was practiced more extensively while there was a slight decrease in the winter months (23.1%) (Tagliacozzo 1993a: 117). This might indicate that the people at Uzzo were reluctant to venture out into the sea at this time of

the year. However since this study was conducted only on the more common grouper species it is possible that other fish species were hunted in winter to compensate.

The fishing techniques are not known. However various fishing hooks, either hook shaped or double pointed, were found in the Neolithic strata. The hooks were made out of bone or of boar tusks (Tagliacozzo 1993a: 159). These suggest fishing with a line and bait attached to the hook. Nevertheless, the huge predominance of the grouper species suggests fishing with harpoons. The grouper, which hide in rock cavities, were possibly spear fished by breath diving fishermen with harpoons, perhaps with microlithic blades attached to them (Tagliacozzo 1993a: 187). At Grotta dell'Uzzo a large number of flint geometric microliths were found in the Neolithic layers, some of which were possibly harpoon points (Tagliacozzo 1993a: 187). Evidence for deep sea fishing is also present at the Lipari acropolis site where deep sea tuna bones have been found (Villari 1997: 224).

### **3.2 Molluscs and crustaceans**

Another sea resource which survives fairly well in the archaeological record are sea shells. Although marine molluscs are richer in proteins compared to their terrestrial counterparts their nutritional value is still quite low compared with other foods (Ricordi 1997: 159). For example the 60 calories which occur in every 100 grams of marine molluscs are quite low when compared to the 140 calories per 100 grams of legumes, 250 calories per 100 grams of fish and the 300 calories per 100 grams of meat (Ricordi 1997: 160). This means that about 700 oysters or 400 limpets or 1400 cockles are needed daily by a person to survive (Bailey 1978 as quoted in Richards and Schutling 2004: 445-446). This implies that sea molluscs must be treated more as a dietary supplement rather than an exclusive means of subsistence.

The majority of the mollusc species collected at Grotta dell'Uzzo consisted of *Patella rustica* (brown limpet), *Patella caerulea* (rayed Mediterranean limpet), *Monodonta turbinata* (toothed topshell), *Monodonta articulata* (articulate topshell), *Patella ferruginea* (giant Mediterranean limpet) and *Gibulla divaricata* (topshell). All these

molluscs are rocky shore and intertidal and are still found in the region today, except the large *Patella ferruginea*, which is now very rare (Mannino *et al.* 2007: 121). 74.7% of the Early Neolithic molluscs at Grotta dell'Uzzo were of the *Patella* (limpet) species, 14.5% *Monodonta*, 2.9% *Gibulla*, and 7.9% other species (Tagliacozzo 1993a: 156) (Figure 14). The same trend is observed in the Middle Neolithic. However there was a reduction in the number of shells collected in general. For the Early Neolithic about 8491 shells were recovered while for the later Neolithic only 1638 were found (Tagliacozzo 1993a: 156, 188).

The *Monodonta* species was exploited more in the Mesolithic while in the Neolithic the *Patella* species becomes more common. Possibly the *Monodonta* was over exploited in the Mesolithic (Mannino *et al.* 2007: 130). The *Monodonta* is easier to collect since it has a larger shell which is easy to grasp. Conversely the flat shell of the *Patella*, and its ability to firmly attach itself to the rocks, make it somewhat more difficult to collect.<sup>18</sup>

Oxygen isotope levels in the *Monodonta* species vary according to the season of collection. Isotope analysis on the Uzzo molluscs revealed that in the transitional Mesolithic-Neolithic phase there was a shift towards autumn and winter collecting as opposed to the yearly collecting in the previous phase (Mannino *et al.* 2007: 129). In the Early Neolithic there was a broadening of the seasons of collection but there was still an absence of the summer months. By the Middle Neolithic the inter-tidal shellfish were being collected in autumn and winter only (Mannino *et al.* 2007: 130). This should be seen in relation with the seasonal fishing patterns. During the winter months fish were being hunted less while the collection of shellfish increased. This suggests that shellfish were indeed being exploited as dietary supplements in the seasons when other foods were less available.

Albeit not so numerous, crustacean remains were also collected at Grotta dell'Uzzo. These consisted of crab claws and pincers of *Eriphia*, *Portunus* and *Cancer*, the last two

---

<sup>18</sup> An analysis of the Grotta dell'Uzzo lithic artefacts might show blades (possibly specialized) used for such shell collection and extraction tasks. At Coppa Nevigata (northern Puglia), some of the lithic artefacts have been linked to mollusc consumption (Pessina and Tiné 2008: 108).

being rarer in all phases (Tagliacozzo 1993a: 112, 156, 188). Echinoids (sea urchins) start being found in Neolithic, but due to their low preservation qualities, they are rare (Tagliacozzo 1993a: 156,188).

Apart from their alimentary value, seashells have various other uses. Small marine shells like the *Columbella rustica* (dove shell) are not edible but served an ornamental artistic purpose (Ricordi 1997: 161). Several examples of perforated *Columbella* shells and truncated and perforated *Mitra* shells were found in all Neolithic strata at Grotta dell'Uzzo (Tagliacozzo 1993a: 112, 156, 188). In the transitional phase two perforated and transversally incised *Columbella rustica* shells were found (Tagliacozzo 1993a: 112, Ricordi 1997: 161). The perforated shells probably served as necklace beads or pendants and were strung through for suspension. In the Middle Neolithic a pendant cut from a *Nassarius gibbosulus* (dog whelk) shell was found (Tagliacozzo 1993a:188).

The symbolic value of shells, and worked shells could lead them to be objects of prestige, magic and trade. The Cumash and Gabrielino shellbeads were so valuable as to be used as a sort of currency (McCawley 2002: 52), while in the Pacific Melanesian islands exchange of only symbolic shell armbands and pendants took place between islands hundreds of kilometres apart (Malinowski 1922: 81). Trade in *Spondylus gaederopus* (thorny oyster) shell bracelets, armbands, pendants and cylindrical beads was very common in the European Neolithic, with a distribution network spanning from south-east Europe to north-west Europe (Pessina and Tiné 2008: 127). *Spondylus gaederopus* is a species found in the Aegean, and in various parts of the Mediterranean including Calabria, Sicily and Malta (Pessina and Tiné 2008: 127; Mifsud 1995: 183).<sup>19</sup> Unfortunately, evidence for shell trade in the central Mediterranean is very limited since little research has been done in this regard. However, an imported *Glycymeris* (dog cockle) shell armband was found on the inland site of Stretto Partanna in Sicily (Pessina and Tiné 2008: 128).

---

<sup>19</sup> Several shell buttons, shell pendants and beads, as well as heaps of *Spondylus* sp. shells were recovered from many of the (later) Temple period sites on Malta (Evans 1971)

Elsewhere in the central Mediterranean, shells were found at Megara Hyblea and within the ditch at Stentinello (Leighton 1999: 67-69). At Skorba (Malta) a shell pierced for suspension and others for food were found in the Għar Dalam phase (Early Neolithic) (Trump 1966: 24), and a cockle (*Cardium*) and a winkle (*Littorina*), both pierced for suspension, in the Grey Skorba phase (Middle Neolithic) (Trump 1966: 28). From the Red Skorba phase (Late Neolithic) pierced shells of a cockle, a winkle and a cowrie (*Cypraea*), were found. The cowrie was worn out on its underside, possibly due to long continued friction with its owner chest (Trump 1966: 34).

### **3.3 Paleogeography at Grotta dell'Uzzo**

The presence of large sea mammals within the Uzzo deposits might indicate quite advanced fishing and seagoing practices. However, before coming to any conclusion one must consider the paleogeography during the Neolithic period. During the Late Mesolithic and Neolithic periods the sea level had not yet stabilised to its current level. During the Neolithic period the sea level was from 10 to 16 meters lower than it is today (Antonioli 1997: 146, Lambeck 2004: 1584; see footnote 9 in chapter 2) (Figure 15). This revealed an extensive underwater terrace around various parts of the San Vito lo Capo peninsula. This marine shelf is currently situated at 15 m below sea level. This means that during the Neolithic this shelf was at sea level or only at a maximum of 2 m below it (Antonioli 1997: 153). Such a near surface platform would have greatly aided coastal fishing since fish could be reeled in or harpooned while standing on it. The fact that only shallow water fish species were found at Uzzo lends support to this argument. The large cetaceans could have easily been beached animals that were gladly foraged by the people at Uzzo. The beaching of large sea mammals is still relatively common in the region up to modern times (Tagliacozzo 1993b: 99).

A similar situation might have been present in the bay in front of Għar Dalam on Malta. Neolithic sea level in Malta was from 21 m to 9 m lower than the present one (Fenech 2007: 30-31). An underwater terrace now at a depth of 10-20 m would have been exposed in Neolithic times (Figure 16). Unfortunately, since the site of Għar Dalam was not

excavated rigorously little can be said about marine resource collection on it. Although shell beads, a shell pendant, pierced *Cypraea lurida* shells and a v-perforated *Spondylus* button were collected from the site of Ghar Dalam, they are from unstratified contexts and can date from the Neolithic up to modern times (Evans 1971: 20).

### **3.4 Other resources exploited at Grotta dell'Uzzo**

Marine resources were not an exclusive alimentary source in the Neolithic of Grotta dell'Uzzo. Other terrestrial animal species were being exploited (figure 12). In the Early Neolithic red deer amounted to 40% of all the faunal remains showing that hunting, although in decline, was still important in this period. Fox and wild cat remains amount to 10% and 6% of the faunal record respectively. However this period is characterised by a steady if slow increase of ovicaprines 12% and cattle 3.5%, both introduced already domesticated. The ovicaprines were being killed at a young age indicating that their prime use was as a meat source. Few domestic pig and wild boar remains have also been recovered (Tagliacozzo 1993a: 236-237)

Ovicaprines remain rise sharply in the Middle Neolithic reaching peaks of 75% of the faunal remains. About half of the ovicaprids were killed before 2 years of age but the rest were adults possibly exploited for their milk. Domestic cattle and pig also increase to 4.4% and 17% of the faunal assemblage. Conversely wild deer decline to just 5% indicating the growing importance of the domestic animals and the transformation towards food production (Tagliacozzo 1993a: 237-238).

### **3.5 Comparison with other Italian sites**

As already mentioned, little archeozoological data are available for other central Mediterranean sites. General comparisons can only be made with 16 other Italian Neolithic sites, but keeping in mind the different methodologies employed. Only at Grotta Continenza in Abruzzo is a similar fish to mammal ratio observed. However Grotta Continenza is situated on a lake shore as opposed to the seashore environment at

Grotta dell'Uzzo. Nevertheless, at both sites fishing and mollusc gathering started as a Mesolithic tradition and continued to play an important role in the Neolithic. Albeit to a lesser degree, fishing also played an important role at the marine site of Scamuso, and less so at Favella della Corte (Tagliacozzo 2005: 435) (Figure 17).

In Puglia cockles (*Cardium?*), rayed Mediterranean limpets (*Patella caerulea*) and top shell (*Monodonta*) were being collected in the Early Neolithic as shown at Coppa Nevigata where snail heaps including land snails (*Helix*) were found. These were gathered from a coastal or lagoon environment and there is evidence of fishing (Skeats 2005: 77).

### **3.6 Comments**

Thus from the above data it appears that the Early Neolithic of Grotta dell'Uzzo was characterised by high diversification of resources similar to that of hunter gatherers (Tusa 1995: 42). However the Neolithic people were also open to the incoming domesticated species which were slowly adopted and eventually became a crucial element in the Middle Neolithic.

## 4. Displacement of goods

*... If half my ships came home from sea,  
And brought their precious freight to me,  
Ah, well! I should have wealth as great  
As any king who sits in state,  
So rich the treasures that would be  
In half my ships now at sea ...*

*My Ships* by Ella Wheeler Wilcox (1850 – 1919)

A sure marker of maritime movements is the dispersal of material goods from one place to another especially onto islands. Displacement of goods denotes the movement of material objects, be they raw materials, finished tools, pottery or any other object, into places where they do not occur naturally or are not produced within the local culture. Since material objects do not usually travel out of their own accord, human agency can be identified as the prime perpetrator of this displacement. In this chapter the term ‘dispersal of goods’ will be preferred over ‘trade’ since the latter might imply the modern free trade concept where one item is exchanged for another item of equal value (Robb and Farr 2003: 24). Although such a trading practice cannot be denied, other factors could have accounted for the movement of goods. Trade, exchange, new settlements and gift giving can be few of the reasons why humans disperse goods. The term dispersal will be used since it does not imply any social conditions through which goods were being moved. Nevertheless it must be acknowledged that the social aspects of such dispersals must have been the factors initiating and promoting the dispersal in the first place. There is also the possibility that more importance was attached to the social relations acquired and maintained through travelling than through the acquisition of the material goods themselves (Robb and Farr 2005: 25). This chapter will take a look at the dispersal of objects which are identifiable archaeologically, the most common being pottery and

lithics (stone tools). Other more perishable objects which were surely being circulated as well, but which unfortunately do not survive archaeologically, will be discussed briefly.

#### **4.1 Pottery**

For many years archaeologists have used pottery assemblages as the sole cultural product to differentiate between one culture and another. Similarly the displacement of pottery was used to identify migrations, invasions and movement of people or trade. Although such explanations have been challenged, pottery still remains a telling criterion in identifying human movement.

In the central Mediterranean ceramics appear for the first time in the Early Neolithic. The first ceramic types are identified as the Archaic Impressed wares which include cardial impressed pottery, and are seen from Puglia and west Sicily. Impressed wares appeared first in western Greece and the Balkans and eventually moved westwards, where they became more prominent (Leighton 1999: 61, Fugazzola Delpino, Pessina and Tiné 2004: 14). They are characterised by badly fired coarse forms sometimes with impressed decorations done by finger impressions, pinching of the clay, or finger-nail impressions; or incised decorations done with a pointed instrument or a sea shell (Fugazzola Delpino, Pessina and Tiné 2004: 20). Decorations cover the whole pot surface (Cipolloni Sampò 1993: 338, Robb 2007: 163). In western Sicily impressed wares have been recently found at Grotta dell'Uzzo, Grotta dell'Kronio and some other sites dating from 6000 BC. This style is known as Pre-Stentinello (Pessina and Tiné 2008: 46) (Figure 19a).

Cardial impressed pottery takes its name from the *Cardium* (cockle) shell with which the impressions were presumably made and forms part of the different regional impressed pottery styles. Cardial impressed pottery is found from south-east Italy, west and north Sicily, throughout the Tyrrhenian Italian coast up to Liguria, Corsica and Sardinia (Malone 2003: 251, Tiné 2002: 156; Pessina and Tiné 2008: 40-59). Shell impressions on pottery can be of two types. Impressions done with the distal, toothed part of the shell create an undulated impression while impressions made by combining the two vulvae of

the shells result in elongated impressions with undulated borders (Figure 18). The link between the use of a marine shell (*Cardium*) for pottery decoration, and its occurrence on coastal sites is also intriguing since it suggests a functional use for marine shells or possible value attached with the *cardium* shells.

From Liguria (north-west Italy) Cardial ware (as it starts to be known) rapidly dispersed along southern France, Spain, Portugal, and even north Morocco (Robb 2007: 163).<sup>20</sup> Interestingly it always appears first on coastal sites before being taken up inland.<sup>21</sup>

Possibly an early evolution from the first impressed wares, are the Stentinello I wares, found throughout Sicily, southern Calabria, and the Sicilian islands (including Malta) (Figure 19b). A Stentinello type assemblage can consist of large, rather coarse storage vessels, medium sized cooking pots and smaller delicately burnished fine vessels. The pottery is decorated by incised geometric impressions such as zigzags, diamonds, cord impressions, lines and eye motifs (Leighton 1999: 62). In many cases there is evidence of coloured paste used to exalt the incised decorations. Colours could vary from white to yellow and red and varied according to regional tendencies (Pessina and Tiné 2008: 81).

Although Stentinello pottery is characterised by similar stylistic motifs, there are some regional variations that have been tentatively divided into six regional assemblages: western Calabria (Acconia, Nicotera), southern Calabria (Umbro), Etna (Trefontane, Poggio Rosso), south-east Sicilian coast (Stentinello, Megara Hyblaea, Matrensa), Malta (Ghar Dalam, Skorba), and western Sicily (Monte Kronio, Grotta dell'Uzzo) (Leighton 1999: 61-62). For example, in the Maltese Islands Stentinello type pottery, associated with pottery from the Ghar Dalam phase, does not contain the elaborate diamond and V shape motifs found in eastern Sicily and Calabria and is more similar to the Western Sicilian sub-assemblages (Robb 2007: 181, Leighton 1999: 62). Moreover, Monte Kronio pottery is also possibly attested in a few unstratified sherds from the Mixta caves in Gozo

---

<sup>20</sup> Modern administrative regions in Italy are shown in figure 2.

<sup>21</sup> Zilhão calculated that in the western Mediterranean, Cardial ware spread westwards at the rate of 60,000 km<sup>2</sup> per generation, 30 times greater than the maximum observed ethnographically for gradual settlement expansion. He suggests a swift maritime colonization as an explanation for such a rapid dispersal (Zilhão 2001: 14184)

(Veen and van der Blom 1992: 18). A few sherds associated with the site of Trefontane (Etna region) were also found at Skorba (Trump 1966: 45-46, 2002: 39).

Interestingly the presence of Stentinello type pottery is initially most evident on coastal sites from Calabria, Lipari, Sicily, Malta and Lampedusa (Cipolloni Sampò 1993: 342). This could suggest a tendency towards a maritime dispersal of people and thus pottery. On the other hand, thin section analysis has revealed that local clay sources were being used for the production of pottery and that the actual vessels were dispersed only over relatively short distances (Robb 2007: 184). This suggests movement of people or ideas as well as the dispersal of the pots themselves. If such was the case then the social variables mitigating the dispersal must have been crucial. Social factors can vary widely. However, since Stentinello type pottery spans over 2000 years (6000-4000 BC), it is also important to identify and distinguish temporal variations from spatial ones (Leighton 1999: 62).<sup>22</sup>

By the middle of the 6<sup>th</sup> millennium BC, painted (bichrome and trichrome) wares start appearing in Sicily contemporary with Stentinello II wares (Figure 20a). These were probably introduced from south east Adriatic Italy, where painted pottery developed earlier (early 6<sup>th</sup> millennium BC) (Robb 2007: 166, 170). Painted Trichrome ware vessels are usually small bowls, multi-handled jugs and shallow dishes, and are decorated with zigzags, curvilinear motifs in red bands and rays bordered in black (Leighton 1999: 63) and with flame patterns in the Lipari-Capri types (Malone 2003:275). Trichrome pottery is mostly found in southern Italy (Capri style). It is also present at the site on the Lipari acropolis, where the Neolithic record starts with this phase. On the other hand, painted pottery is less frequent in Sicilian sites with the exception of Megara Hyblaea, Roccapalumba and Stretto di Partanna (Cipolloni Sampo 1993: 353).

In the early fifth millennium BC, possibly evolving from the earlier Trichrome wares, was the elaborately painted pottery of the Serra d'Alto style (Figure 20b). Forms include

---

<sup>22</sup> Tiné (2002), and Pessina and Tiné (2008) attempt to distinguish between the different styles and phases within the Stentinello period. Stentinello I is dated 5800-5500 BC while Stentinello II is dated 5500-4500 BC (Pessina and Tiné 2008: 40-41)

cups, bowls and jars with intricately folded and scrolled lug handles. Most vessels are painted but small unpainted jars also occur (Leighton 1999: 65). Serra d'Alto pottery is mostly found in south-east Italy, but was also common in eastern Sicily and Lipari. In Malta only one Serra d'Alto sherd was recovered from Skorba where this period is associated with the Grey Skorba phase (Trump 1966: 45-46, 2002: 39) (Figure 14). It has been suggested that Serra d'Alto pottery was manufactured in a number of "centers" in south Italy from where it was distributed (Malone 2003: 275).

The Late Neolithic sees a shift towards the monochrome vessels of the Diana wares (named after the type site of Contrada Diana, Lipari). These seem to be characterised by a considerable interregional uniformity in pottery styles (Malone 2003: 278). The defining characteristics of the Diana wares are a shiny reddish look, a lack of surface decoration and spool or lug handles (*anse a rochetta*) (Robb 2007: 171). Diana-type assemblages have a very wide distribution on sites from the Maltese Islands in the south up to central Italy (Figure 21a). Albeit the overall similarity of the Diana wares, there are discernable regional variations. For example, the Bellavista style in Puglia has darker greyish wares (Robb 2007: 171), and a close form bowl from Skorba (Red Skorba phase) had its lugs placed vertically rather than horizontally as was the norm (Trump 2002: 30).

Dispersal of actual vessels should be considered in relation to the logistics of carrying the pottery vessels. Although there are isolated cases of the use of pottery by nomadic cultures,<sup>23</sup> statistics show that 75% of nomadic societies prefer less fragile containers such as leather skins, to carry their goods (Arnold 1988: 118). Moreover, if the means of transportation was the sea, terracotta vessels would have to be firmly secured together since they are more likely break due to the rocking of the boats. In Venezuela, farmers carry pots by tying them securely together and pack them with grass, pine-needles or cloths to prevent breakage (Arnold 1988: 110). One cannot exclude that a similar method was used in the central Mediterranean Neolithic. Furthermore, some Neolithic storage vessel forms were coarse and more friable and therefore not particularly easy to stack on a cart, or a boat, indicating that they may not have been primarily intended to be

---

<sup>23</sup> For example at Nabta Playa in the western deserts of Egypt (Close 2001: 95).

transported around filled with goods.<sup>24</sup> On the other hand there is ample ethnographic evidence for the transport of pottery, carrying it on a person's back or using beasts of burden. Among the Nurar (Pakistan) pots are attached to a camel's back with ropes inserted through lug handles on the pot (Arnold 1988: 110). Could the Diana-type lug handles been used for a similar purpose during transport?

Nevertheless the logistic limitation must be kept in mind and so it is possible to infer that vessels would not have been dispersed unless value was attached to the vessel itself. Such could be the case of the finer Stentinello and Trichrome (Serra d'Alto) vessels which are more limited in quantity. They required high quality clay, skilled technology of production, modelling, firing and decorating (Malone 2003: 287). Interestingly they are found distributed throughout the central Mediterranean and Italy up to the Alpine regions, often in ritual or burial contexts (Robb 2007: 170; Malone 2003: 287; Cipolloni Sampò 1993: 354). However, they are also found in everyday contexts on most of the sites as well (Robb 2007: 170). Examining the contexts of deposition thus becomes crucial in an attempt to define the value given to the objects and thus the social factors underlying the dispersal of goods.

## **4.2 Lithics**

Within the central Mediterranean stone tools are perhaps the most studied artefact class when it comes to overseas dispersal, trade and exchange (Robb 2007: 186; Robb and Farr 2005: 35). Lithics which were being dispersed from known sources include flint and obsidian as well as polished stone axes. Similarly to pottery, lithics have been studied in terms of their technical descriptions such as size, weight and form. Only recently have the social aspects of extraction, reduction transportation and usage of lithics have been

---

<sup>24</sup> The use of a *travois* type of sledge rather than a cart is more probable since evidence for wheeled transport in the central Mediterranean Neolithic is absent. The first archaeological evidence for wheeled transport dates to the 3500 BC in Syria while in Europe (in Poland) the earliest evidence dates to 3400 BC (Bakker *et al.* 1999).

analysed within the *chaine opératoire* model (Robb 2007: 186; Vella 2006: 88, Vella in press: 15).<sup>25</sup>

Within the central Mediterranean, high quality flint occurs naturally only in the chalk deposits of south-east Sicily, in the Monti Iblei region (Vella 2007: 9). The nearest other flint outcrop is at Gargano in the north of Puglia (Malone 2003: 280-283). Throughout the Neolithic, Monti Iblei flint is found distributed throughout Sicily, Lipari, Southern Calabria and Malta (Robb and Farr 2005: 28) (Figure 22a). It is usually associated with tools that required a particular form or a retouched cutting edge (Robb 2007: 189). Flint from other localized sources could have been exploited and dispersed even overseas (Vella 2007: 10). Unfortunately no chemical fingerprinting has been conducted on Monti Iblei flint, with sourcing analysis being based on human judgment (Vella 2007: 11).

Obsidian is a black volcanic glass which produces very sharp edges when broken. It also occurs only in restricted locations within the central Mediterranean. These are the island of Pantelleria, the island of Lipari, the island of Palmarola and in the Monte Arci region on the island of Sardinia (Bigazzi, Oddone and Radi 2005: 4-5). Obsidian started being used for lithics in the Early Neolithic, though it might have been used even in the Late Mesolithic (Robb 2007: 193). Contrary to flint, obsidian has been chemically sourced. This sourcing has shown that only obsidian from Lipari and Pantelleria was being dispersed in the central Mediterranean (Nicoletti 1997: 260). Pantellerian obsidian distribution is limited to western Sicily, Malta, Lampedusa and northern Tunisia. However some flakes do occur sporadically in the Italian peninsula. At Grotta dell'Uzzo Pantellerian obsidian makes up to 40% of the lithic assemblage while in Malta it reaches a maximum of 30% in the Grey Skorba phase (Pessina and Tiné 2008: 237). Lipari obsidian on the other hand is more widely distributed throughout all of Sicily, Malta, north Tunisia, all of the Italian peninsula and even into coastal south-east France and the Balkan coast (Nicoletti 1997: 262-263; Robb and Farr 2005: 36) (Figure 22b). The

---

<sup>25</sup> The *chaine opératoire* model views lithics within a series of analytical steps of production, procurement, consumption and discarding (Vella 2006: 325).

dispersal of obsidian seems to have increased throughout the Neolithic, from low levels in the Early Neolithic to higher ones in the Diana phase (Robb 2007: 192-193).<sup>26</sup>

The dispersal of obsidian from these island sources clearly points towards maritime activity. The Acconia survey conducted in central Calabria, has shown that on the west Calabrian coast more than 90% of the lithic assemblage consisted of Lipari obsidian while on the east Calabrian coast the values fall below 40% and down to 10% of the lithic assemblage in Puglia (Ammerman 1985: 99) (Figure 24). Such values suggest direct maritime procurement from Lipari itself for the west coast sites, as opposed to down-the-line trade following a land route from Sicily to Calabria. Ammerman concludes that had a land route been taken, the values on the east and west Calabrian coasts would have been similar since they are practically equidistant from the straits of Messina and have similar landscape features (Ammerman 1985: 98). The Bova Marina survey of the south Calabrian coast yielded similar results, where on the sites of Umbro and Penitenziaria 93% of the lithics were of obsidian (Robb 2002, 2001b). This shows that these locations were within the range of direct interaction with the Lipari sources (Robb and Farr 2005: 37).<sup>27</sup>

By contrast the obsidian lithics at Skorba amounted to 40% of the lithic assemblage in the Ghar Dalam phase and go down to 8% in the Red Skorba phase (Vella 2006: 322). However at Skorba, Pantellerian obsidian was frequent during the Neolithic but Lipari obsidian was still the most common (Vella 2007: 17; Trump 2002: 66-67).<sup>28</sup> At the farthest reaches of the Lipari obsidian range, such as on the Adriatic coasts of Italy and Croatia the obsidian amounts go below 1%. This suggests that at these sites direct procurement was not taking place and down-the-line trade was taking place. Interestingly, obsidian on the Adriatic coast is predominantly from Lipari as opposed to

---

<sup>26</sup> There seems to be a general trend to view lithics outside their time contexts (for example Leighton 1999; Robb and Farr 2005; Robb 2007). Thus analysis of lithics is made on combined lithic groups from different phases rather than separating them according to the time periods.

<sup>27</sup> The range of direct interaction is defined by “an area within which sites, within the time range considered, derived 30% or more of their obsidian from the same specific source” (Renfrew and Dixon 1976 as quoted in Robb and Farr 2005: 37).

<sup>28</sup> Lipari obsidian completely takes over Pantellerian obsidian during the (later) Temple period (Trump 2002: 67).

Sardinia or Palmarola which are closer following a land route through the Apennines. Lipari is the closest source only if a maritime route is followed, showing that travelling by sea was probably preferred as it required less energy (Robb 2007: 193).

Obsidian cores seem to have been pre-prepared on Lipari before being distributed (Robb 2007: 196). Interestingly, certain sites on the west Calabrian coast seem to have been more involved in obsidian reduction than others (Ammerman 1985: 81). Similarly at Palinuro (southern Campania), Mulino Sant'Antonio (Campania), Passo di Corvo (Puglia), Gaione (Reggio Emilia) and other sites in Toscana had high amounts of Lipari obsidian (some up to 90%) despite their distance from the source (Robb 2007: 193-196). This suggests that such sites were more active within the obsidian procurement and redistribution exchange networks.

The percentages in the number of flakes must be seen in relation to the weight of the lithic artifacts. At Umbro and Penitenziaria where more than 92.9% and 88.7% of the lithics were obsidian respectively, the composite weight of the artifacts amounted to less than a kilogram (Farr 2002: 33). Estimates show that possibly only between 25 and 100 g of obsidian were needed every year and that throughout the 400-year existence of Penitenziaria, only about 10 kg of obsidian would have been introduced to the site (Robb 2007: 197-198; Farr and Robb 2001: 25).<sup>29</sup> Such a small amount would mean that each year a core the size of a golf ball would have sufficed for the community (Robb 2007: 198). By comparison, the 1.7 kg Pantelleria core and the 0.4 kg Lipari core found at Skorba (Trump 2002: 66), could have provided flakes for another 17-68 and 4-16 years respectively.<sup>30</sup> If true, such values indicate that the demand of obsidian may have been fairly low and at the raw material may not have been a prime mover for 'trade' as commonly held. Unless obsidian was highly prized beyond its functional value, maritime journeys could not have been undertaken just to 'trade' in such small quantities

---

<sup>29</sup> These estimates are based on the assumption that obsidian was deposited in equal amounts throughout the sites and thus one can generalise for the whole site by excavating just a portion of it (Farr and Robb 2001: 25). In archaeology, this is not the case since artefacts are not usually discarded at random. Thus the liability of such estimates becomes questionable.

<sup>30</sup> The number of persons inhabiting a site at one time must also be taken in consideration. Robb (2007: 197) calculated 20 individuals at living at Penitenziaria and this amount (20 individuals) is used here for the tentative estimates on the Skorba cores.

suggesting that other objects may have been moving as well. However ethnographic examples of the Kula have showed that Melanesians were regularly undertaking sea voyages of hundreds of kilometers in open seas, just to exchange shell bracelets and pendants which only have a symbolic value (Malinowski 1923: 81).<sup>31</sup>

The actual value attached to obsidian artefacts can be hinted at by use-wear analysis of the flakes. At Umbro and Penitenziaria in Calabria, obsidian was being casually reduced and flakes were discarded in a fairly reduced state even though the supply was high (Farr and Robb 2001: 25). Similarly at Skorba, with a much lower level of importation, the flakes were being reduced till completely exhausted (Vella 2007: 18). One implication of this is that obsidian tools were used only for a few tasks, perhaps only for making tools from other materials such as bone or wood or for limited functions such as shaving, scarification, circumcision and sacrifice (Farr and Robb 2001: 25, 28).

Polished ground stone axes are another type of stone tool being distributed in the central Mediterranean. Axes can vary in size but usually weigh between a 0.25 kg to 0.5 kg (Robb 2007: 206). Their uses could range from wood working (possibly including canoe building) to general purpose tools. In the central Mediterranean raw materials for such axes include basalts from the Etna region and the Monti Iblei, and greenstone from northern Calabria (Figure 22a). Such materials can be polished, a practice which seems to have been common in the Neolithic. Axes from all these sources are found throughout Sicily, Calabria and Malta (Leighton 1999: 77). Axes have been associated with males and presumably every adult male had an axe (Robb 2007: 206), possibly giving axes more value than flint and obsidian within the exchange networks.

### **4.3 Other objects being dispersed**

As argued before, lithic tools alone may not have sufficed to maintain Neolithic exchange networks. Among the other types of materials being dispersed is red ochre. For example,

---

<sup>31</sup> The Kula was an extensive form of exchange between tribes within the Melanesian islands of New Guinea (Malinowski 1922: 81)

in Malta, red ochre was found inside the Żebbuġ phase tombs, even if it does not occur naturally on the island.<sup>32</sup> Clay was certainly being imported on Lipari since the island lacks good quality clay sources (Leighton 1999: 77), while at other places local clay would not have been adequate.<sup>33</sup> Shells and shell ornaments could also have been objects of trade. So were a host of other organic materials such as skins and hides, fat, herbs, fur and feathers (Leighton 1999: 77; Robb 2007: 197). Other finished goods could have consisted of reed basketry and clothes. Salt could also have been moving, either priced as a spice or as a way to preserve foods for the long journeys (Pessina and Tiné 2008: 241-242). Unfortunately most of these materials do not normally leave traces in the archaeological record.

Beyond the material goods, customs, stylistic trends and beliefs could also have been spread along Neolithic seaways. Trade in privileges, titles and non-material possessions, such as knowledge of magic or of a dance, were common practice within the pacific island societies of the Kula (Malinowski 1922: 185-186).

#### **4.4 Comments**

The dispersal of goods in the central Mediterranean appears to have been part of a regional trend towards mobility. For example, in the Early Neolithic, the distribution of flint, Sicilian basalts and Calabrian greenstone seems to lie within the range of the Stentinello type pottery (Figure 25). Similarly, in the Late Neolithic, the distribution of Lipari obsidian is paralleled by the distribution of Diana type pottery (Figure 26). This clearly indicates links between the distribution of the different materials or styles, suggesting complicated exchange networks that were possibly being run by a restricted group of people. Whatever the logistics of exchange, during the Neolithic, the central Mediterranean was interlinked by a web of exchange comprising various materials most of which were imported over the sea (Figure 23).

---

<sup>32</sup> Żebbuġ phase pottery is stylistically linked with the Sicilian Eneolithic San Cono Piano Notaro pottery style, suggesting that it is later than the Neolithic. See note on problems with dates in chapter 1.

<sup>33</sup> Experimental archaeology has shown that clay from Umbro and Penitenziaria has a high sulphur content giving the pots a rotten egg like smell (Michelaki 2004: 45), suggesting that clay could have been imported on these sites.

## 5. Discussion and conclusion

*I thought that my voyage had come to its end  
at the last limit of my power, that the path before me was closed,  
that provisions were exhausted  
and the time come to take shelter in a silent obscurity.  
But I find that will knows no end in me.  
And when old words die out on the tongue,  
new melodies break forth from the heart;  
and where the old tracks are lost,  
new country is revealed with its wonders.*

*Closed Path* by Rabindranath Tagore (1861 - 1941)

Before answering the question set in the title of this essay, it is necessary to define the key term. What constitutes a maritime culture? The term culture is in itself already very elusive (Hunter 1994: 261). One way to define culture in archaeology is as a collection of assemblages which are in turn composed of sub-assemblages made of collections of artefacts (Renfrew and Bahn 2004: 118-119). In more tangible terms, an artefact would for example, be a pot or a lithic, while a group of artefacts coming from an archaeological site would compose a sub-assemblage. While the sub assemblage reflects the material remains left by a particular group (for example a village), a larger regional community would produce an assemblage. Similar assemblage patterns that reflect societal behaviour on a wider interregional scale would finally be considered as an archaeological culture (Renfrew and Bahn 2004: 119). Archaeology gives a very specific view of a culture since it is concerned only with the material remains. The latter are just a result of social, psychological, economical and religious subsystems within a wider holistic concept of a culture (Johnson 1999: 23).<sup>34</sup>

---

<sup>34</sup> This definition of a “culture” is very general. However, further discussions about the concept of culture are beyond the scope of this essay.

## **5.1 Maritime components of a culture**

Although various cultures would have elements pointing towards the use of the sea, it is difficult to find one culture which is entirely maritime other than in folklore (Hunter 1994: 262). By analogy, Hunter (1994: 262) asks whether a future archaeologist would be justified to define modern society as an airborne culture from the study of airport distribution, aircraft typology, hangars, aircraft disaster sites and runway configurations. Thus it is more appropriate to look at the maritime component of a culture as a side specialisation, within the broader aspect of the culture. The extent of a population's maritime component can depend on factors such as geography, subsistence, economy and administration (Hunter 1994: 262). The availability of adequate seafaring technology can be added as another factor. The more a population relied on the sea, the more can be learned from studying its maritime components. As seen throughout this essay, for the central Mediterranean Neolithic, various aspects of a possible maritime component can be made out.

## **5.2 The South Italian Neolithic**

Archaeologically, the Neolithic is usually recognised by the appearance of domestic animals, cultivated plants, sedentary societies and the appearance of ceramic vessels. This pattern seems to be the case for the central Mediterranean. Certainly already from the Early Neolithic, agriculture and pastoralism were at the basis of subsistence for most of the central Mediterranean Neolithic sites (Pessina and Tiné 2008: 200). The agricultural and pastoral components of the Neolithic appear to have been introduced as one 'package', first in the Early Neolithic (wheat, spelt, oats, cows, sheep, goats, pigs) followed by a further increase in plant species (barley, broad beans, peas, bitter vetch, bread and club wheat) in the Middle Neolithic (Pessina and Tiné 2008: 200, 212; Costantini and Costantini 1997: 256). Interestingly such a Neolithic package together with the first impressed wares, appear first on the coastal and alluvial plains and only at a later stage on the more inland hill areas (Pessina and Tiné 2008: 199-200). Such a pattern is first observed in south-eastern Italy giving the first evidence of the Neolithic in Italy at

about 6100 BC. Assemblage similarities suggest that the Neolithic was introduced into Italy from Greece through a maritime route (Pessina & Tiné 2008: 28). From south east Italy this Neolithic 'package' diffused northwards into Adriatic Italy and westwards into Calabria and Sicily, again suggesting movement along a maritime or coastal route (Pessina & Tiné 2008: 28-29).

### **5.3 The technological factor**

Notwithstanding the fact that actual evidence for seafaring technology is absent in the central Mediterranean, the dug-out canoe from La Marmotta and the archaeological experiments done with its replica have shown that Neolithic boats were capable of quite considerable feats. With daily ranges of up to 50 km, travelling by boat could have been relatively faster if not easier than travelling by land. Although Tzala showed that land and sea travel in the Aegean required an equal amount of energy (Broodbank 2002: 102), the same cannot be assumed for the central Mediterranean. The mountainous terrain of northern and east Sicily together with the lower Apennine Mountains of Calabria, would possibly have made maritime or coastal travel easier. Although on a chart a maritime route might be longer, in reality it could have been more favoured. Distances are relative to the amount of energy employed in traversing them (Parker 2001: 29). Keeping in mind that land travel would have had to be done on foot possibly with the aid of beasts of burden and a sledge (there is no evidence for wheeled transport; see footnote 24 in chapter 4), it would come as no surprise that maritime travel was preferred.

### **5.4 The geographic factor**

Settlement location ties with the importance of geographic location as a factor within a maritime component of a culture. Neolithic sites within the central Mediterranean show prevalence towards coastal locations. Although a settlement near the coast does not necessarily mean a maritime connection, the sheer amount of coastal sites is quite indicative. The Early and Middle central Mediterranean Neolithic map is characterised by a large number of settlements on the Sicilian coast especially the eastern coast,

suggesting intense maritime activity in the region. The wide distribution of the Stentinello-type pottery associated with this region is indicative of the key role the area was playing. Is it possible that the area served as a filter through which most of the Sicilian and island sites received the Neolithic 'Package'? By the Late Neolithic the Aeolian Islands seem to take over in the number of settlements and importance, a fact corroborated by the wide dispersal of the material culture (Diana-type pottery, obsidian) from this region.

Apart from offering safe anchorages, coastal settlements may have acted as landmarks have been used to provide information about the location at sea (Parker 2001: 25). The visibility of settlements from the sea would depend on each particular's settlement location, but for example smoke from a fire could possibly be seen even from far off shore. Alignment of landmarks can indicate clearing lines or transits showing that a particular location or hazardous zone has been reached or passed, or to gauge distances off from the land (Parker 2001: 35). For example the bell tower on l'Île d'Yeu, in Bretagne (France), has been used for such seafaring purposes since at least the sixteenth century (Parker 2001: 34). This might show that buildings or settlements might not necessarily have been erected with a seafaring intention but rather that mariners will model their mental maps to use and accommodate any available landmark. On the other hand, it is also possible that some landmarks were purposely erected to aid seafaring (Parker 2001: 36).

Identification of possible landmarks in the Central Mediterranean Neolithic would entail a detailed survey of the coasts and a re-examination of the available coastal sites, possible even from a seaborne point of view. Moreover, the changes in sea levels and coastal geography must be pointed out and always kept in mind when analysing coastal or possible submerged sites. Notwithstanding the current scarcity of research on possible Neolithic landmarks, the central Mediterranean does have a prominent notorious landmark towards which to steer: Mount Etna. Mount Etna is visible from most parts of Sicily, southern Calabria and from a considerable distance off shore (Horden and Purcell 2000: 127), even at night when the volcanic activity is high (Robb 2001a: 187). In good

weather conditions, this mountain could have served as an emergency point towards which to steer when thrown off course.<sup>35</sup>

### **5.5 The subsistence factor**

With the current available archaeozoological evidence, only at Grotta dell'Uzzo can a maritime subsistence component be identified. The reliance on fish, molluscs and hunted animals at Grotta dell'Uzzo is suggestive of a continuation with the Mesolithic traditions on the site (Pessina and Tiné 2008: 213). However even here, domestic animals and cultivated cereals appear from the Early Neolithic onwards as well. Domestic animals eventually replace the wild species in the Middle Neolithic while the amount of agricultural crops slowly increases (Costantini and Costantini 1997: 257). Fishing and marine resource collection at Grotta dell'Uzzo was certainly aided by the lower sea level and paleogeography.

The relationship with the newly introduced Neolithic subsistence methods is still not clear. Is it possible that an Early Neolithic hunter-fisherer community at Grotta dell'Uzzo, was just obtaining cereals and domestic animals from their 'Neolithic' neighbours? Such a scenario could have resembled the practice of Chumash islanders of trading shell beads for grains and food with mainland communities (McCawley 2002: 52, see chapter 1). On the other hand the tendency to highly diversify subsistence strategies might suggest that the inhabitants of Grotta dell'Uzzo were more likely to experiment with the newly introduced agriculture and animal breeding, themselves (Tusa 1995: 42). Since detailed faunal studies are not available for other central Mediterranean sites, it is not possible to gauge the role of fishing within the expansion of the Neolithic. Is it possible that remote islands started being visited during fishing voyages, only to be seasonally inhabited at first? Such questions can only be answered with future research.

---

<sup>35</sup> The islands of Marettimo (Egadi) and Pantelleria were also used as landmarks in Roman times. Pantelleria has a height of 836 m above sea level making it an excellent landmark. On the other hand the relatively low lying Maltese Islands (253 m above sea level) just barely qualify as landmarks (Arnaud 2007: 23). The importance of Marettimo as a landmark in the Neolithic, must be checked against the completely different paleogeography of the Egadi Islands.

For now Grotta dell'Uzzo remains an isolated case whose maritime subsistence strategy cannot be generalised to the rest of the central Mediterranean Neolithic.

## **5.6 The economic factor**

While central Mediterranean Neolithic subsistence factors do not suggest a diffused maritime component, economic factors clearly show otherwise. From the Early Neolithic onwards, diverse materials such as pottery, obsidian and flint start being circulated over considerable distances within the central Mediterranean (Leighton 1999: 72-74). From its exclusive island origins, obsidian is dispersed throughout the central Mediterranean, and beyond. A maritime route was very possibly being followed, at least within the closer areas of the central Mediterranean. The high percentages of Lipari obsidian in sites on the west Calabrian coast suggest direct procurement from Lipari, even though they are not the closest shores to the island (northern Sicily is closer) (Pessina and Tiné 2008: 238). Similar is the case of the eastern Sicilian Stentinello type sites. However, in more distant places (such as Malta, eastern Calabria, Puglia, the Italian Adriatic and Tyrrhenian coasts amongst others) the percentages drop indicating other ways of acquisition other than direct procurement. Albeit to a lesser degree, obsidian from the island of Pantelleria was also being dispersed in western Sicily, Malta and North Africa. Direct procurement from the western Sicilian sites was probably the case, shown by the high percentages on west Sicilian sites. Moreover, Pantelleria appears to have been left uninhabited throughout the Neolithic (Leighton 1999: 72).

A considerable number of inland sites occur in Sicily during the Early and Middle Neolithic. Most of these sites are linked with Stentinello pottery styles. However, although far from the shore, these hinterland sites were still playing a role within the exchange networks.<sup>36</sup> The inland sites in southern Sicily lie within the flint rich Monti Iblei region. Throughout the Neolithic Flint from this region was dispersed throughout Sicily and even reached the Maltese and Aeolian island groups (Pessina and Tiné 2008:

---

<sup>36</sup> It would be useful to study the possibility whether such inland sites were in the vicinity of navigable watercourses in the Neolithic. Such a study was beyond the scope of this essay at this stage.

235). Similarly the sites at the foot of Mount Etna where the place of origin of basalts used for polished axes. These basalt tools are also found throughout Sicily and the surrounding islands while Green stone from the Calabrian hinterland was also being dispersed as far south as the Maltese islands (Pessina and Tiné 2008: 235). As shown in figure 25, the dispersal of material from these inland sites lies within the range of diffusion of the Stentinello pottery style. Could this suggest a controlled network of exchange centred around the east Sicilian coastal communities who were interacting with hinterland communities and then dispersed these materials along the maritime routes? A parallel scenario can be observed in the Late Neolithic distribution of obsidian from Lipari, the increase in the number of Aeolian sites and the wide dispersal of associated Lipari Diana pottery style (Figure 26). Were the Aeolian Islands in the Late Neolithic spearheading the maritime trade networks?

### **5.7 Who was at sea?**

From the evidence reviewed in this essay it emerges that the central Mediterranean Neolithic has most maritime components, especially economic and geographic ones, within its cultures. The next question would be: who was travelling on the sea? Was seafaring the job of a particular group of individuals within most of the communities or were there specialised communities with a higher inclination towards seafaring? Both cases seem possible depending on the time period and location.

Throughout the central Mediterranean Neolithic, present evidence points towards a diffused maritime component. As already pointed out for the Early and Middle Neolithic, the sites on the east coast of Sicily can possibly be identified as having a strong maritime component. It could be possible that these communities were ‘controlling’ the networks of exchange or were playing a perpetrating role within them. In the Late Neolithic the focus of maritime activity seems to shift towards the Aeolian Islands, from where the networks of exchange were being mostly influenced. Lipari seems to have had a continuous central role both as a producer of obsidian and as a receiver of foreign goods indicated, for example, by the large quantities of Serra d’Alto pottery arriving on it

(Pessina and Tiné 2008: 47). General obsidian import trends from Serra del'Palco show that in periods when there was a decrease in Lipari obsidian an increase in Pantelleria obsidian imports is noted. Comparative data are available only from the site of Skorba (Malta) and a similar trend in imports is surprisingly noted (Nicoletti 1997: 266). This would possibly imply that the acquisition of imported objects was not based only on the local needs but also on what was being circulated within regionally controlled trade networks. A general decrease in imports is observed in the Eneolithic period of Serra del'Palco. Could this suggest a collapse of the Neolithic maritime exchange networks leading to the apparent isolation of the Maltese Islands in the contemporary Temple period?

An alternative scenario to a diffused maritime cultural component would be that only the communities near the points of transit were engaging in maritime activity. Thus for example locations such as Messina would be a possible maritime enclave, joining the island of Sicily with Italy. Material from Italy would arrive in Sicily via this enclave and then be dispersed via land based routes to the rest of the island. Archaeologically such a scenario would be shown by high imported artefact percentages within the enclave and falling off with increasing distance from it (Renfrew and Bahn 2004: 377). This is clearly not the case of the eastern Sicilian sites since most contain similar high amounts of both imported pottery and obsidian. The only way for this to happen would have been that these sites were all interacting directly with the sources via a maritime route.

On the other hand, the enclave scenario might have been the case of the southern Italian sites that although distant from the sources on Lipari manifest high percentages of obsidian when compared to their regional counterparts. Thus, these regional specialists would have obtained obsidian from the source on Lipari or from communities re-distributing it in Calabria or eastern Sicily, possibly through a maritime route, and then re-distribute obsidian within their home territory creating a central place of re-distribution. The trade specialists could either be controlling the amount of re-distribution themselves or else just middlemen acting independently from the suppliers and receivers (Renfrew and Bahn 2004: 376).

For more distant or isolated places down-the-line trade would be the most probable scenario. The current evidence seems to suggest that the Maltese Islands were being reached by imports but not so frequently as the east Sicilian sites for example. Thus the role of the archipelago within the regional maritime exchange network still remains unclear. Certainly it was enjoying influx from both western Sicily as indicated by Pantelleria obsidian and eastern Sicily as indicated by pottery styles and Lipari obsidian. A better study of fall off curves for 'traded' materials would be able to verify or disprove these suggested mechanisms in which objects were being dispersed.

## **5.8 Conclusion**

This essay tried to explore different aspects within the central Mediterranean Neolithic that could have a maritime connection. More questions have been raised than answers provided. Definitely the whole is greater than the sum of the parts. Archaeological evidence can only give a glimpse on what was happening in the central Mediterranean Neolithic. The static artefacts produced by archaeology can hardly show the dynamics that brought them to be where they are found (Johnson 2004: 49-50). It remains in the hands of the researcher to attempt to join the different parts, find the invisible paths and make the unseen connections, creating a *gestalt* wholeness that gives a clearer picture of the Neolithic past.

For the central Mediterranean Neolithic the influence of a maritime component is strongly felt. Just as modern society would not be the same without its airborne component, so, I would argue, would the central Mediterranean Neolithic have been completely different without its maritime component. Thus by studying this often neglected aspect of the Neolithic, one can make another step in understanding the central Mediterranean in its totality.

## Reference list

Ammermann, A. J., 1985, *The Acconia survey: Neolithic Settlement and the Obsidian Trade*, London: University of London

Antonioli, F., 1997, Problematiche relative alle variazioni recenti del livello del mare e sue interazioni con le comunità preistoriche in Sicilia, in Tusa, S., (ed), *Prima Sicilia: alle origini della società Siciliana*, Palermo: Ediprint, pp 146-155

Arnaud, P., 2007, Islands under question: the Maltese Archipelago, Pantelleria and Marettimo and their contexts in classical Antiquity, in Bonanno A., and Militello, P., (ed), *Interconnections in the Central Mediterranean: The Maltese Islands and Sicily in History: Proceeding of the Conference St Julians, Malta, 2nd and 3rd November 2007*, KASA, pp 21-36

Arnold, D., 1988, *Ceramic Theory and Cultural Process*, Cambridge: Cambridge University Press

Bakker, J.A., Kruk, J., Lanting, A.E., and Milisauskas, S., 1999, The earliest evidence of wheeled vehicles in Europe and the Near East, *Antiquity*, 73 pp 778-790

Bednarik, R., 2002, *The maritime dispersal of Pleistocene humans*, <[http://mc2.vicnet.net.au/user\\_files/m/mariners/myfiles/newsletters/dispersal.pdf](http://mc2.vicnet.net.au/user_files/m/mariners/myfiles/newsletters/dispersal.pdf)> (downloaded 6/11/2008)

Brody, S., Ragsdale, A.C., and Turner C.W., 1923, The rate of growth of the dairy cow II: growth in weight after the age of two years, *Journal of General Physiology*, iii, 623, pp 445-499

Broodbank, C., 1999, The insularity of island archaeologists: comments on Rainbird's "Islands Out of Time", *Journal of Mediterranean Archaeology*, 12(2), pp 235-239

Broodbank, C., 2002, *An Island Archaeology of the Early Cyclades*, Cambridge: Cambridge University Press

Broodbank, C., 2006, The origins and early development of Mediterranean maritime activity, *Journal of Mediterranean Archaeology*, 19(2), pp 199-230

Camps, G., 1974, *Les Civilisations Préhistoriques de l'Afrique du Nord et du Sahara*, Paris: Dion

Cherry, J.F., 1981, Patterns and process in the earliest colonisation of the Mediterranean Islands, *Proceedings of the Prehistoric Society*, 47, pp 41-69

Cherry, J.F., 1990, The first colonization of the Mediterranean islands: a review of recent research, *Journal of Mediterranean archaeology*, 3(2) pp 145-221

- Cippolloni Sampó, M., 1993, Il Neolitico nell' Italia Meridionale e in Sicilia, in Guidi, A., and Piperno, M., (eds), *Italia preistorica*, 2<sup>nd</sup> Ed, Roma: Editori Laterza, pp 334-365
- Costantini, L., and Costantini, B., 1997, La domesticazione vegetale: piante spontanee e piante coltivate, in Tusa, S., (ed), *Prima Sicilia: alle origini della società Siciliana*, Palermo: Ediprint, pp 255-258
- Evans, J.D., 1971, *The Prehistoric Antiquities of the Maltese Islands: a Survey*, London: The Athlone Press
- Evans, J.D., 1973, Islands as laboratories of culture change, in Renfrew C., (ed), in *The Explanation of Culture Change: Models in Prehistory*, Pittsburgh: University of Pittsburgh Press, pp 517-520
- Farr, H., 2002, The Penitenziaria lithic assemblage, in Robb, J., *Bova Marina Archaeological Project Survey and Excavations Preliminary Report, 2002 Season*, Cambridge: University of Cambridge, pp 33-36
- Farr, H., 2006, Seafaring as social action, *Journal of Maritime Archaeology*, 1, pp 85-99
- Farr, H., and Robb, J., 2001, The Neolithic lithic assemblage, in Robb, J., *Bova Marina Archaeological Project Survey and Excavations Preliminary Report, 2001 Season*, Cambridge: University of Cambridge, pp 24-26
- Fitzpatrick, S.M., and Anderson, A., 2008, Islands of isolation: archaeology and the power of aquatic perimeters, *Journal of Island and Coastal Archaeology*, 3(1), pp 4-16
- Fitzpatrick, S.M., and Erlandson, J.M., 2006, The archaeology of islands and coastlines, *Journal of Island and Coastal Archaeology*, 1(1), pp 1-3
- Fleming, A., 2005, *St Kilda and the Wider World: Tales of an Iconic Island*, Cheshire: Windgather Press
- Foxhall, L., 2004, *Bova Marina Archaeological Project: Preliminary Report, 2004 Season*, Leicester: University of Leicester
- Fenech, Katrin, 2007 *Human-induced changes in the environment and landscape of the Maltese islands from the Neolithic to the 15<sup>th</sup> century AD as inferred from a scientific study of sediments from Marsa, Malta*, Oxford: BAR International Series
- Fugazzola Delpino, M.A., and Mineo, M., 1995, La piroga Neolitica del lago di Bracciano ("La Marmotta I"), *Bullettino di Paleontologia Italiana*, 86, pp 197-266
- Fugazzola Delpino, M.A., Pessina, A., and Tiné, V., 2003, *La Civiltà dell'Argilla: le Prime Comunità dell'Neolitico*, Caserta: Imago Media

Horden, P., and Purcell, N., 2000, *The Corrupting Sea: a Study of Mediterranean History*, Oxford: Blackwell publishers

Hunter, J.R., 1994, 'Maritime culture': notes from the land, *International Journal of Nautical Archaeology*, 23(4), pp 261-264

Ilahiane H., and Altschul J.H., 2002, Islanders and mainlanders: a critical review of the anthropological literature, in Altschul J.H. and Grenda D.R., (eds), *Islanders and Mainlanders: Prehistoric Context for the Southern California Bight*, Tucson: SRI Press, pp11-40

Ingold, T., 2000, *The Perception of the Environment: Essays in Livelihood, Dwelling and Skill*, London: Routledge

Johnson, M., 1999, *Archaeological theory: an introduction*, Oxford: Blackwell Publishing

Jorion, P., 1982, Priest and the fishermen: Sundays and weekdays in a former 'theocracy', *Man*, 17, pp 275-286

Kunzig, R., 2002, La Marmotta, *Discover*, Nov 2002, 23(11)

Lambeck, K., Antonioli, F., Purcell, A., and Silenzi, S., 2004, Sea-level change along the Italian coast for the past 10,000 yr, *Quaternary Science Reviews*, 23, pp 1567-1598

Leighton, R., 1999, *Sicily before History: An Archaeological Survey from the Palaeolithic to the Iron age*, London: Duckworth

Malinowski, B., 1922, *Argonauts of the Western Pacific: an Account of Native Enterprise and Adventure in the Archipelagoes of Melanesian New Guinea*, London: Routledge

Malone, C., 1999, Processes of colonization in the Central Mediterranean, *Accordia Research Papers*, 7, pp 37-59

Malone, C., 2003, The Italian Neolithic: A Synthesis of Research, in *Journal of World Prehistory*, 17(3), pp 235-312

Mannino, M.A., Thomas, K.D., Leng, M.J., Piperno, M., Tusa, S., and Tagliacozzo, A., 2007, Marine resources in the Mesolithic and Neolithic at the Grotta dell'Uzzo (Sicily): evidence from isotope analyses of marine shells, *Archeometry*, 49(1), pp 117-133

Marangou, C., 1991, From Middle Neolithic to Early Bronze Age: Consideration of early boat models, in *TROPIS Symposia Proceedings, IV*, pp 277-293

McCawley, W., 2002, A tale of two cultures: the Chumash and the Gabrielino, in Altschul J.H. and Grenda D.R., (eds), *Islanders and Mainlanders: Prehistoric Context for the Southern California Bight*, Tucson: SRI Press, pp 41-65

Mc Grail, S., 2001, *Boats of the World: from the Stone Age to Medieval Times*, New York: Oxford University Press

Mickelaki, K., 2004, The ceramic technology analysis, in Foxhall, L., *Bova Marina Archaeological Project Preliminary Report, 2004 Season*, Leicester: University of Leicester, pp 41-47

Mifsud, C., 1995, Molluski, in Sultana, J., (ed), *Flora u Fawna ta' Malta*, Floriana: Dipartiment għall-Harsien tal-Ambjent, pp165-188

Murray, W.H., 1987, Do modern winds equal ancient winds, *Mediterranean Historical Review*, 2, pp 139-167

Nicoletti, F., 1997, Il commercio preistorico dell'ossidiana nel Mediterraneo ed il ruolo di Lipari e Pantelleria nel piu' antico sistema di scambio, in Tusa, S., (ed), *Prima Sicilia: alle Origini della Societa Siciliana*, Palermo: Ediprint, pp 259-270

Parker, A.J., 2001, Maritime landscapes, *Landscapes*, 2(1), pp 22-41

Pessina, A., and Tiné, V., 2008, *Archaeologia del Neolitico: L'Italia tra VI e IV millenio a.C.*, Rome: Carocci Editore

Rainbird, P., 1999, Islands out of Time: Towards a critique of Island Archaeology, *Journal of Mediterranean Archaeology*, 12(2), pp 216-234

Rainbird, P., 2007, *The Archaeology of Islands*, Cambridge: Cambridge University Press

Richards, M.P., and Schutling R.J., 2004, Against the grain? A response to Milner *et al* (2004), *Antiquity*, 80, pp 444-458

Ricordi, P., 1997, Le conchiglie nella preistoria in Sicilia, in Tusa, S., (ed), *Prima Sicilia: alle origini della societa Siciliana*, Palermo: Ediprint, pp 157-172

Renfrew, C., and Bahn, P., 2004, *Archaeology: Theories, Methods and Practice*, (4<sup>th</sup> edition), London: Hudson

Robb, J., 2001a, Island identities: ritual, travel and the creation of difference in Neolithic Malta, in *European Journal of Archaeology*, 4(2), pp 175-202

Robb, J., 2001b, *Bova Marina Archaeological Project Survey and Excavations Preliminary Report, 2001 Season*, Cambridge: University of Cambridge

Robb, J., 2007, *The Early Mediterranean Village*, Cambridge: Cambridge University Press

Shackleton, J.C., van Andel, T.H., and Runnels C., 1984, Coastal paleogeography of the central and western Mediterranean during the last 125,000 years and its archaeological implications, *Journal of Field Archaeology*, 11 pp 307-314

Skeates, R., 2005, *Visual Culture and Archaeology: Art and Social Life in Prehistoric South-East Italy*, London: Duckworth

Snodgrass, A.M., 2000, Prehistoric Italy: a view from the sea, in Ridgway, D., Serra Ridgway, F.R., Pearce, M., Herring, E., Whitehouse R.D., and Wilkins J., eds., *Ancient Italy in its Mediterranean Setting: Studies in Honour of Ellen Macnamara*. Accordia Specialist Studies on the Mediterranean, 4, London: Accordia Research Institute, pp 171-77.

Tagliacozzo, A., 1993a, Archeozoologia della Grotta dell'Uzzo, Sicilia, in *Bullettino di Paleontologia Italiana*, 84(2), Supplemento

Tagliacozzo, A., 1993b, I mammiferi dei giacimenti pre e protostorici Italiani: Un inquadramento paleontologico e archeozoologico, in Guidi, A., and Piperno, M., (eds), *Italia preistorica*, 2<sup>nd</sup> Ed, Roma: Editori Laterza, pp 67-97

Tagliacozzo, A., 1997, Dalla caccia alla pastorizia: la domesticazione animale. Le modificazioni economiche tra il Mesolitico ed il Neolitico e l'introduzione degli animali domestici in Sicilia, in Tusa, S., (ed), *Prima Sicilia: alle origini della società Siciliana*, Palermo: Ediprint, pp 227-248

Tagliacozzo, A., 2005, Animal husbandry in the Early-Neolithic, in Central-Southern Italy, in Munibe, *Antropologia-arkeologia*, 57, pp. 429-439

Tichý, R., 2001, Appendix 1: Monoxylon Expeditions, in *Expedice Monoxylon: Procházime z mladší doby Kamenné*, Hradec Králové, Společnost experimentální archeologie Hradec Králové a JB Production, pp 198-216

Tiné, S., 1997, Il Neolitico della Sicilia da un punto di vista peninsulare, in Tusa, S., (ed), *Prima Sicilia: alle origini della società Siciliana*, Palermo: Ediprint, pp 157-172

Tiné, V., 2002, Le *facies* a ceramica impressa dell'Italia meridionale e della Sicilia, in Fugazzola Delpino, M.A., Pessina, A., and Tiné, V., *Le Ceramiche Impresse nel Neolitico Antico: Italia e Mediterraneo*, Rome: Istituto Poligrafico e Zecca dello Stato, pp 131-165

Trump, D.H., 1966, *Skorba*, London: Oxford University Press

Trump, D.H., 2002, *Malta: Prehistory and Temples*, Malta: Midsea Books

Tusa, S., 1995, From hunter-gatherers to farmers in western Sicily, in Leighton, R. (ed), *Early Societies in Sicily*, pp 41-55

Tusa, S., 1997, Origine della societa' agro-pastorale, in Tusa, S., (ed), *Prima Sicilia: alle origini della societa Siciliana*, Palermo: Ediprint, pp 173-192

Veen, V., and Blom van der, A., 1992, *The first Maltese: Origins, Character and Symbolism of the Ghar Dalam culture*, Holland: Fia

Vella, C., 2006, Emerging aspects of interaction between prehistoric Sicily and Malta from the perspective of lithic tools, in Bonanno, A., and Militello, P., *Malta in the Hybleans, the Hybleans in Malta Malta negli Iblei, gli Iblei a Malta: Proceedings of International Conference Catania, 30 September, Sliema 10 November 2006*, KASA, pp 82-95

Vella, C., 2007, Report on the lithic tools of Sicilian origin on the prehistoric site of Skorba, Malta, in Bonanno A., (ed), *Malta and Sicily: miscellaneous research projects*, KASA, pp 5-50

Vella, C., in press, *Distribution patterns of imported lithic tools in Early Neolithic Skorba*, in Zammit, M.A. and Mallia, J., (eds), *Ta' Hagraat and Skorba: Ancient Monuments in a Modern World*, Malta: Heritage Malta

Vella, N.C., 2001, A maritime perspective: looking for Hermes in an ancient seascape, in Dendrinis J., and Harris J., (eds), *The Greek Islands and the Sea: proceedings of the first International Colloquium held at the Hellenic Institute, Royal Holloway, University of London 21-22 September 2001*, Surrey: Porphyrogenitus, pp 33-58

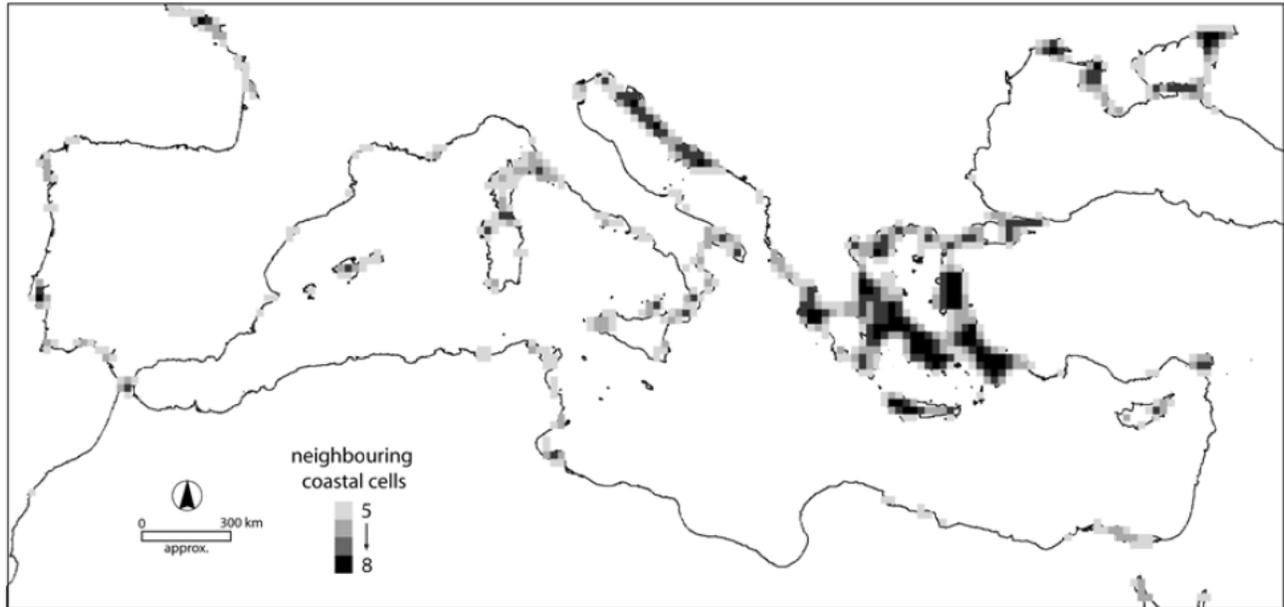
Villari, P., 1997, Il ruolo della fauna nella preistoria Siciliana: caccia, pesca, domesticazione, allevamento, in Tusa, S., (ed), *Prima Sicilia: alle origini della societa Siciliana*, Palermo: Ediprint, pp 223-226

Webster, G.S.,1996, *A Prehistory of Sardinia 2300-500*, Sheffield: Sheffield Academic Press

Westerdahl, C., 1992, The maritime cultural landscape, *International Journal of Nautical Archaeology*, 21, pp 5-14

Zilhão, J., 2001, Radiocarbon evidence for maritime pioneer colonization at the origins of farming in west Mediterranean Europe, in *Proceedings of the National Academy of Sciences of the United States of America*, 98(24), pp 14180-14185

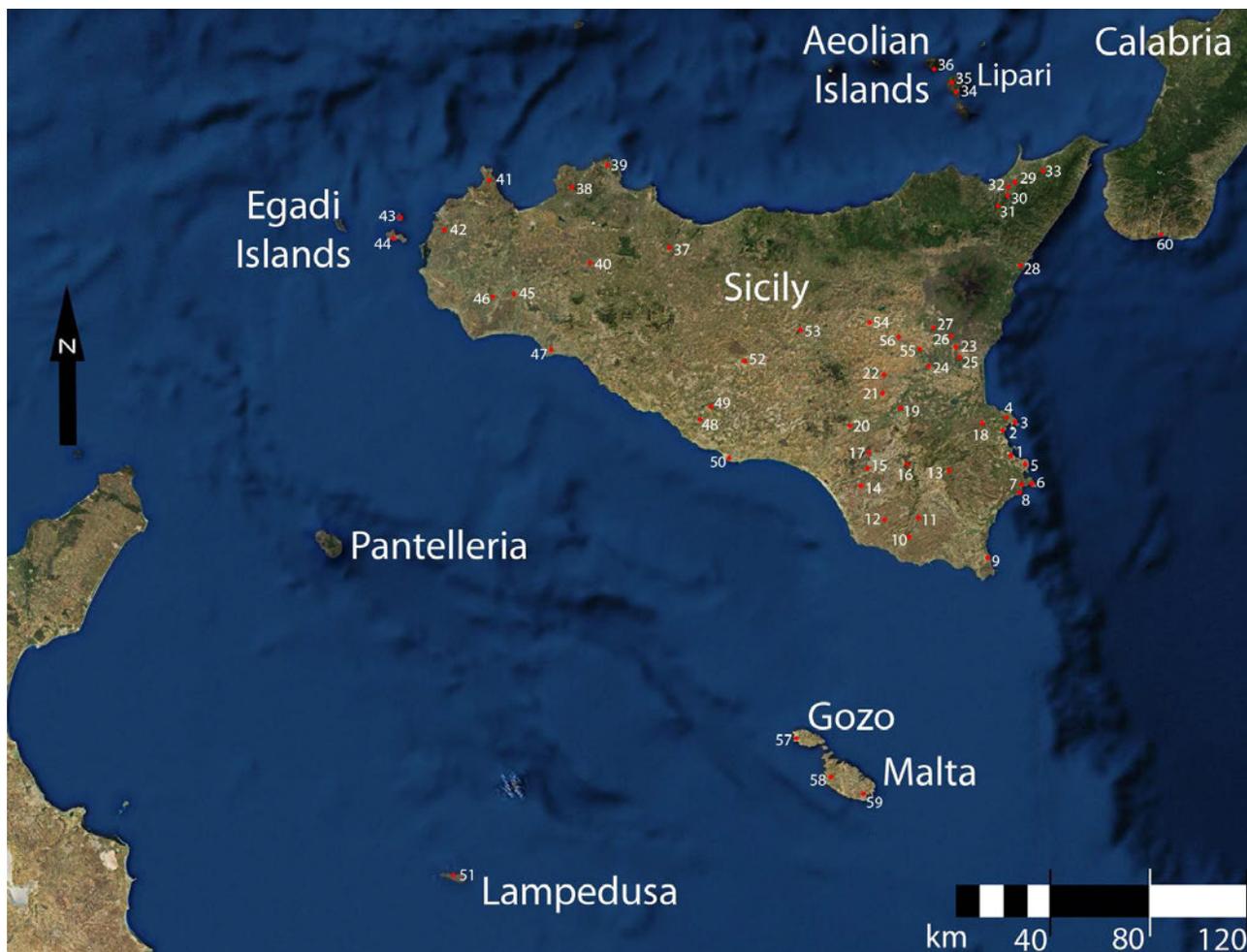
# Figures



**Figure 1:** Areas of favourable coastal configuration in the Mediterranean sea, using squares 25 km across. Increasingly dark shading indicates coastal squares having five or more adjacent squares also coastal (adapted from Broodbank 2006: 219)



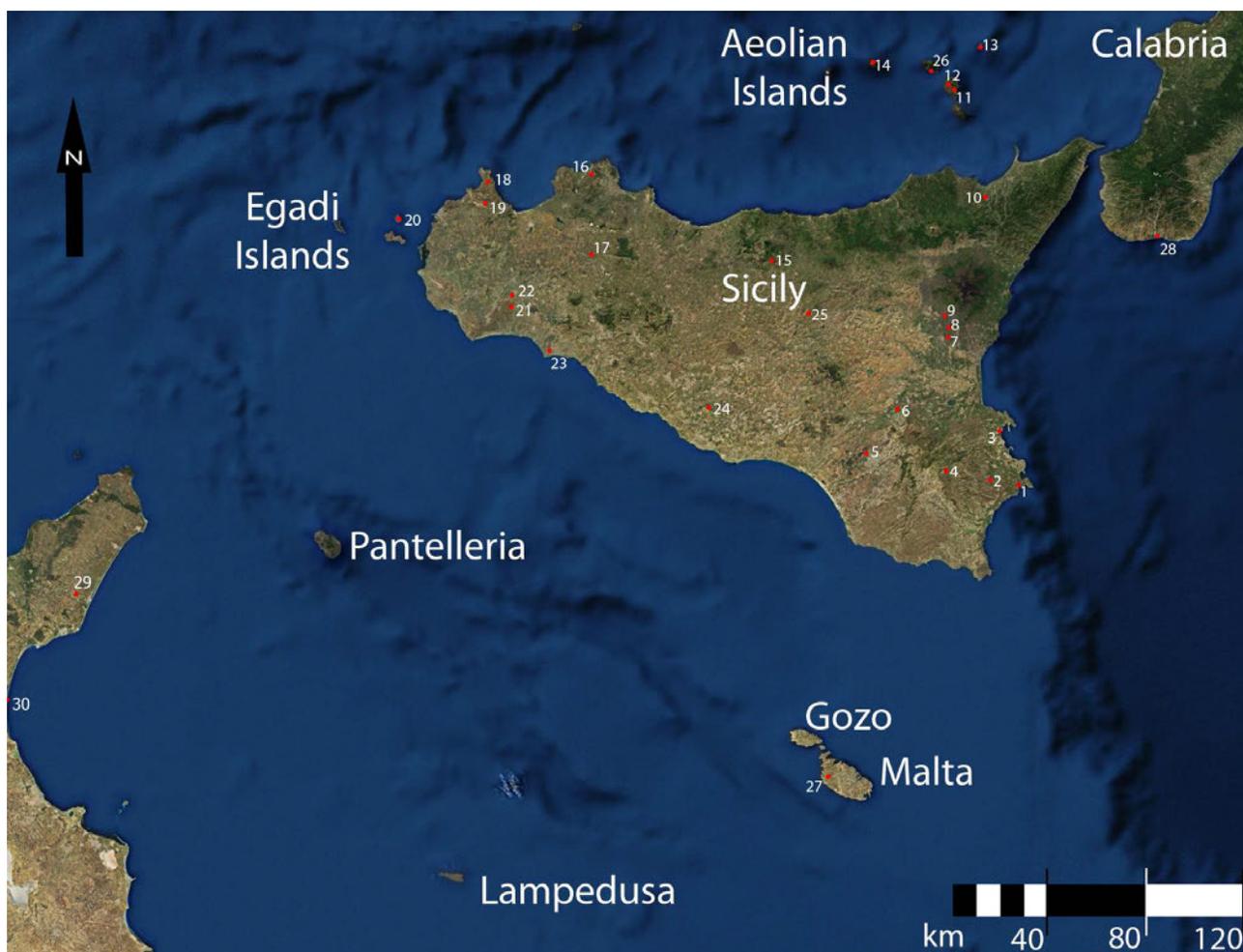
**Figure 2:** Administrative regions of Italy (from [http://commons.wikimedia.org/wiki/Atlas\\_of\\_Italy](http://commons.wikimedia.org/wiki/Atlas_of_Italy))



**Figure 3:** Map of the Central Mediterranean showing Early Neolithic sites (adapted from Tusa 1997; Robb *et al* 2001; Trump 2002; Base map ©2008 Yahoo! Inc; composite image Marvin Demicoli)

**Site legend:**

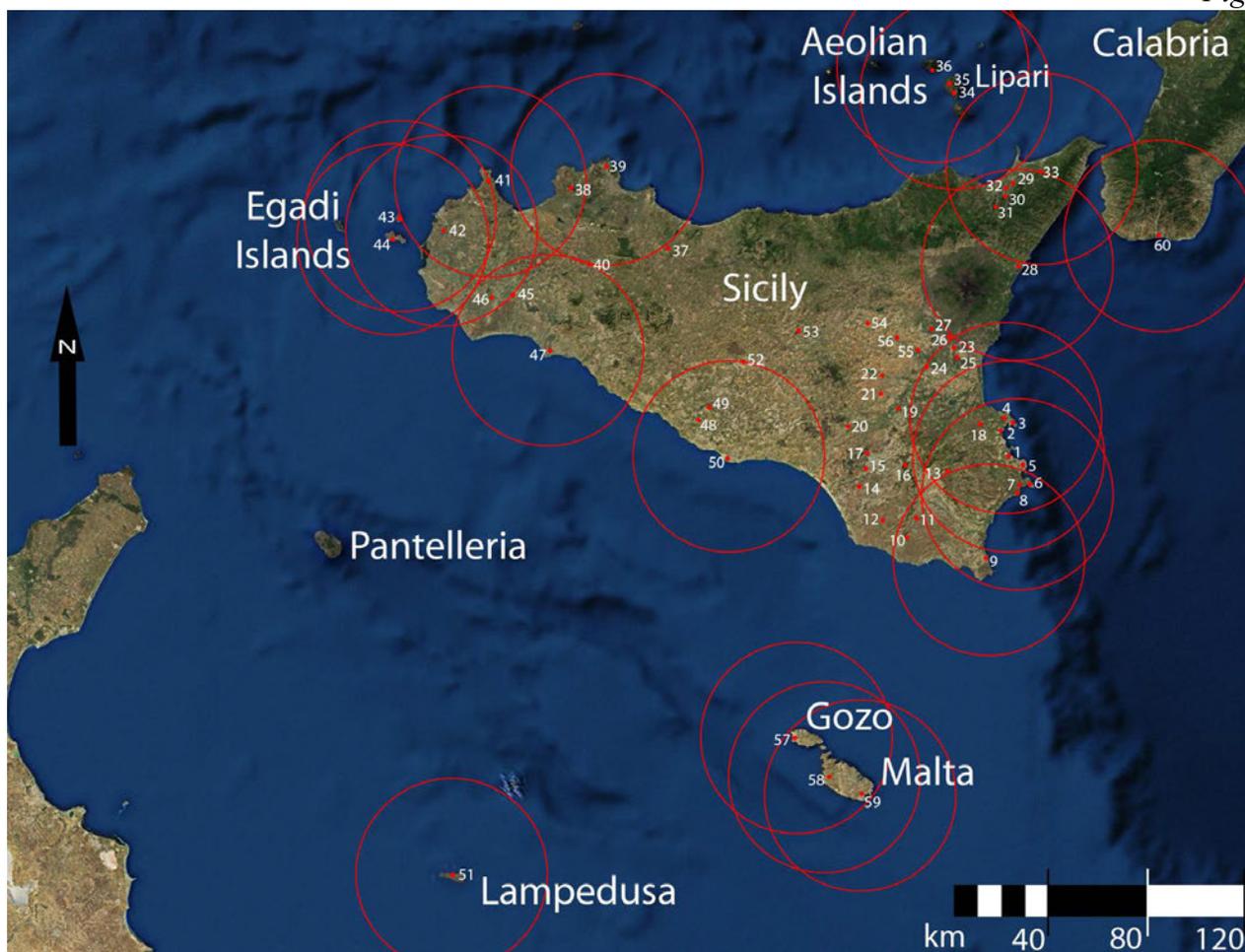
1	Stentinello	21	Torricella	41	Grotta dell' Uzzo, Grotta dei Ciaravelli
2	Megara Hyblaea	22	Monte Alfone	42	Grotta Maiorana
3	Punta Castelluzzo	23	Fontana di Pepe	43	Grotta di Cala del Genovese
4	Monte Gisira	24	Perriere Sottano	44	Grotta d'Oriente
5	Terruazza, Arenella	25	Valcorrente	45	Stretto-Partanna
6	Capa Santa Panagia	26	Trefontane, Poggio Rosso	46	Nivolelli
7	Matrensa	27	Fontanazza	47	Grotta dell' Kronio
8	Ognina	28	Naxos	48	Piano Vento
9	Lago Morghella	29	Limina	49	Grotta Zubbia, Grotta Infame Diavolo
10	San Francischello	30	Riparo della Sperlinga	50	Pizzo Caduta, Casalichio - Agnone
11	Bruca	31	Abacaum	51	Cala Pisana
12	Paolina	32	Rocca di Pietro Pallio	52	Serra del Palco
13	Grotta Masella	33	Motta	53	Rocche
14	Tatappi, Pantanelli	34	Contrada Diana	54	Agira
15	Pirrone	35	Castellaro Vecchio	55	Poggio Monaco
16	Calaformo	36	Rinicedda	56	Muglia Bassa
17	Poggio Biddini	37	Grotta Geraci	57	Mixta
18	Petraro di Melili	38	Grotte dei Puntali	58	Skorba
19	Palike	39	Grotta Regina	59	Ghar Dalam
20	Caltagirone	40	Giacomobello	60	Umbro, Penitenziaria



**Figure 4:** Late Neolithic Sites (adapted from Tusa 1997; Robb *et al* 2001; Trump 2002; Camps 1974; Base map ©2008 Yahoo! Inc; composite image Marvin Demicoli)

**Site legend:**

1	Matrensa	16	Grotta impisu
2	Grotta del Conzo, Grotta della Chiusazza, Grotta Palombara	17	Grotta Favarotte
3	Megara Hyblaea	18	Grotta dell' Uzzo
4	Grotta Masella	19	Grotta del Cavallo
5	Poggi Biddini	20	Grotta di Cala del Genovese
6	Palike	21	Castello della Pietra
7	Salinelle di San Marco	22	Stretto-Partanna
8	Biancavilla	23	Grotta del Kronio
9	Adrano	24	Grotta Zubbia, Grotta Infame Diavolo
10	Basico	25	Contrada Marcato
11	Acropoli, Contrada Diana, Predio Megna	26	Fossa delle Felci, Serro del Brigadiere
12	Castellaro Vecchio, Mulino a Vento, Piano Conte, Spatarella	27	Skorba
13	La Calcara, Piano Cardosi, Piano Quartara, Timpone del Corvo	28	Umbro
14	Capo Graziano	29	Korba
15	Grotta del Vecchiuzzo	30	Hergla

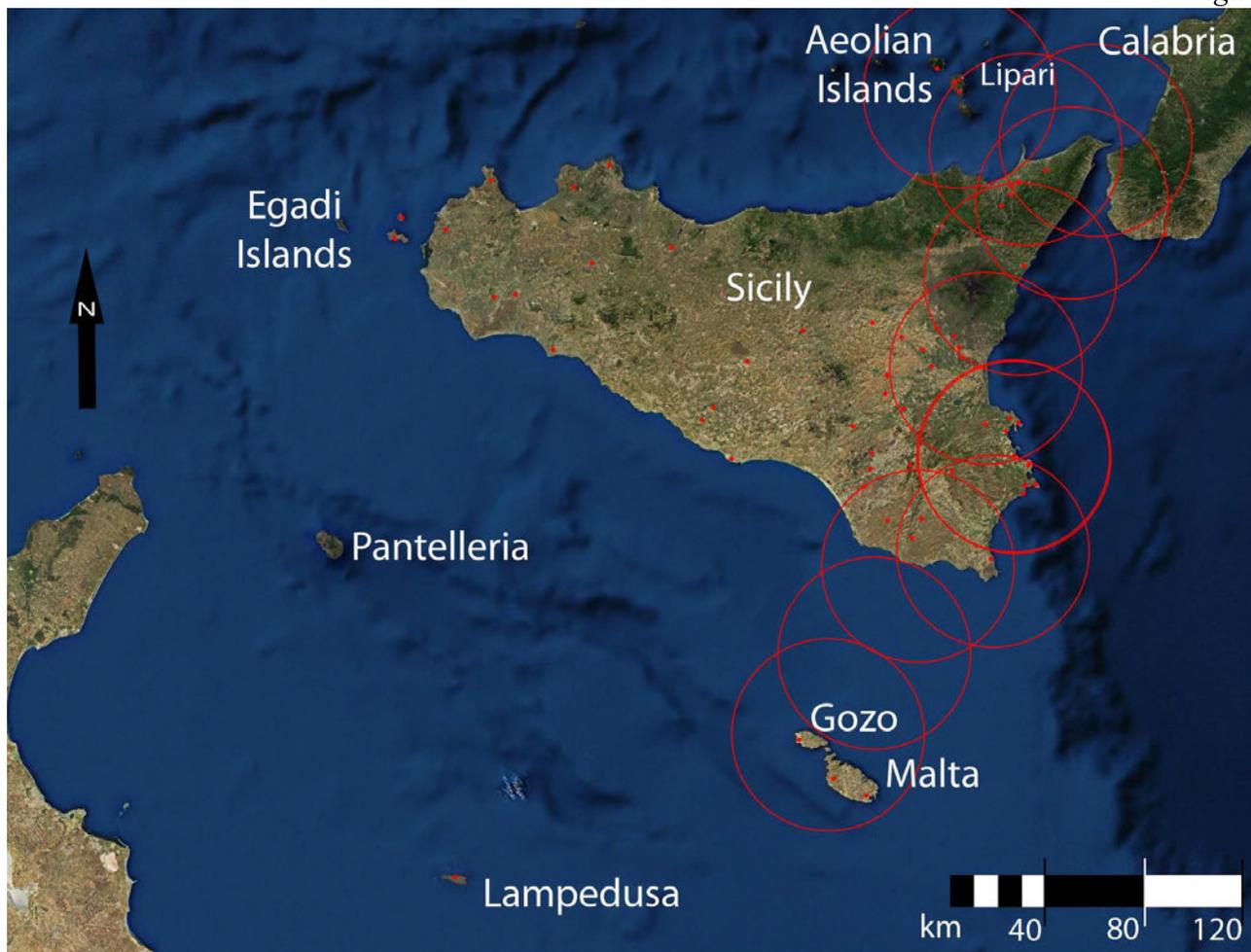


**Figure 5:** Daily boat ranges in Central Mediterranean (composite image Marvin Demicoli)

Each red circle has a radius of 40 km and represents the daily range a boat would have in any direction from the centre.



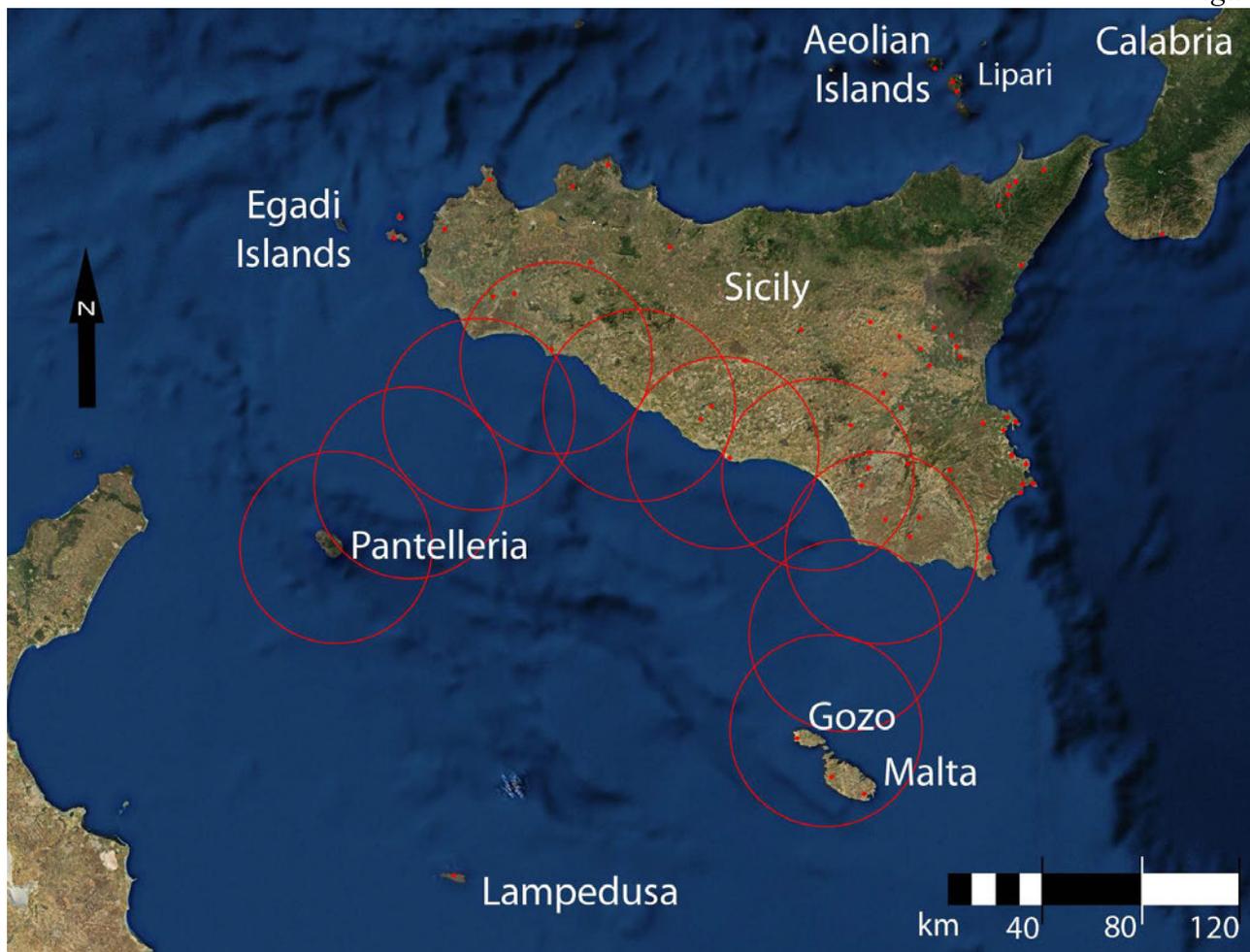
**Figure 6:** Lampedusa in daily boat range relation with neighbouring coasts (composite image Marvin Demicoli)



**Figure 7:** Voyage from Lipari to Malta using the daily boat range method (composite image Marvin Demicoli)



**Figure 8:** The replica of the La Marmotta canoe in action (Tichý 2001: 200)



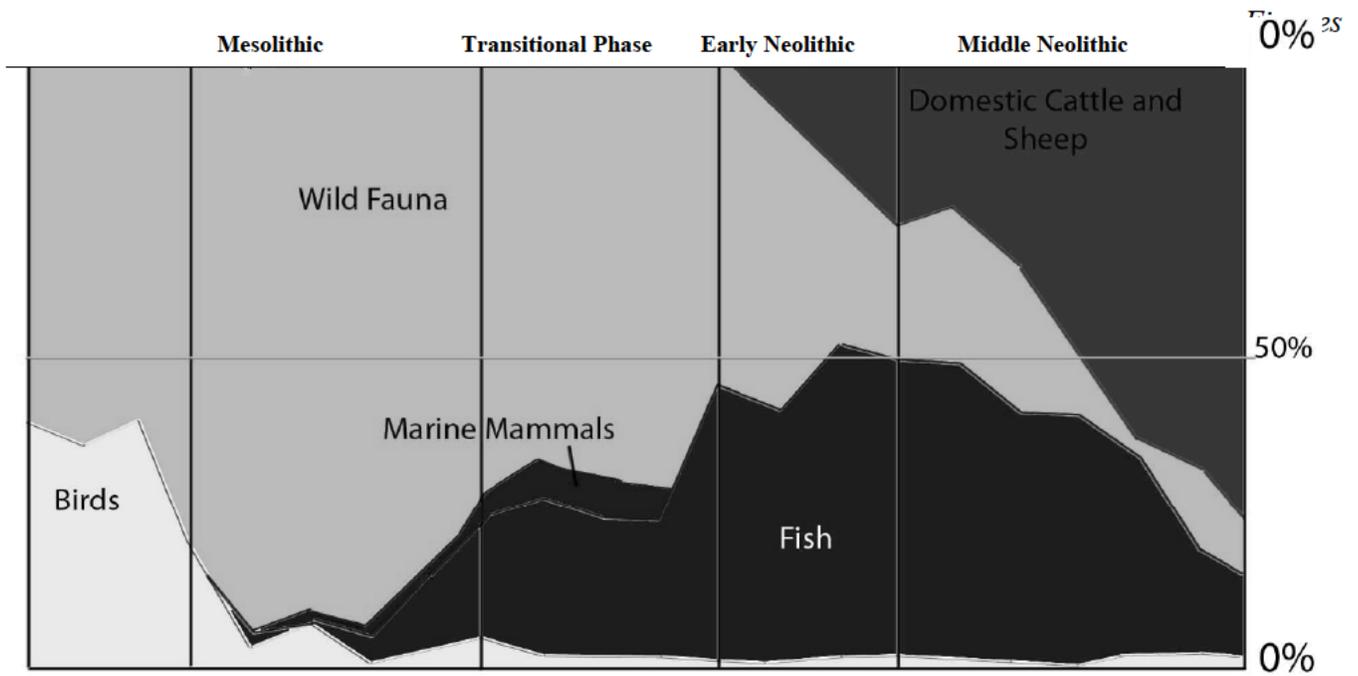
**Figure 9:** Voyage from Pantelleria to Malta by a coastal route (composite image Marvin Demicoli)



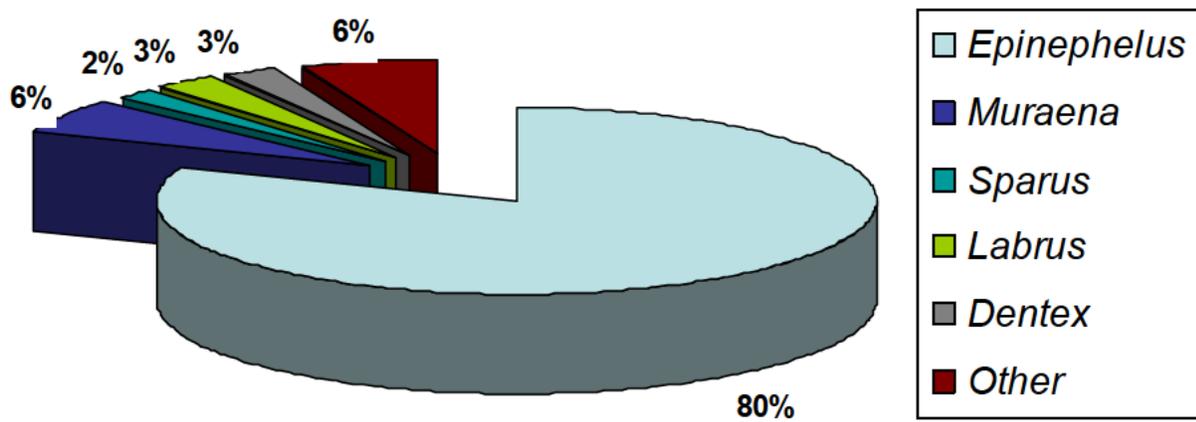
**Figure 10:** Location of Grotta dell'Uzzo (composite image Marvin Demicoli)



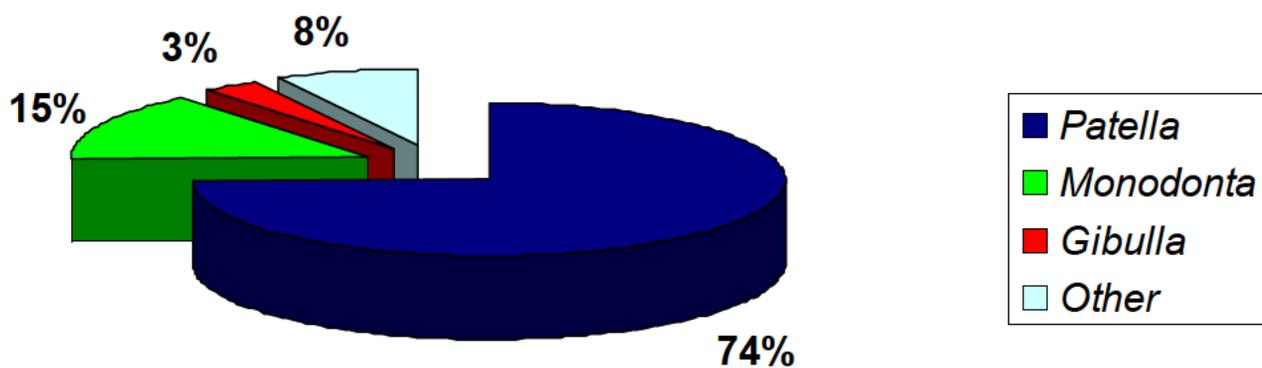
**Figure 11:** View of the plain of Uzzo and Grotta dell'Uzzo cave (right) (Tagliacozzo 1993: 4)



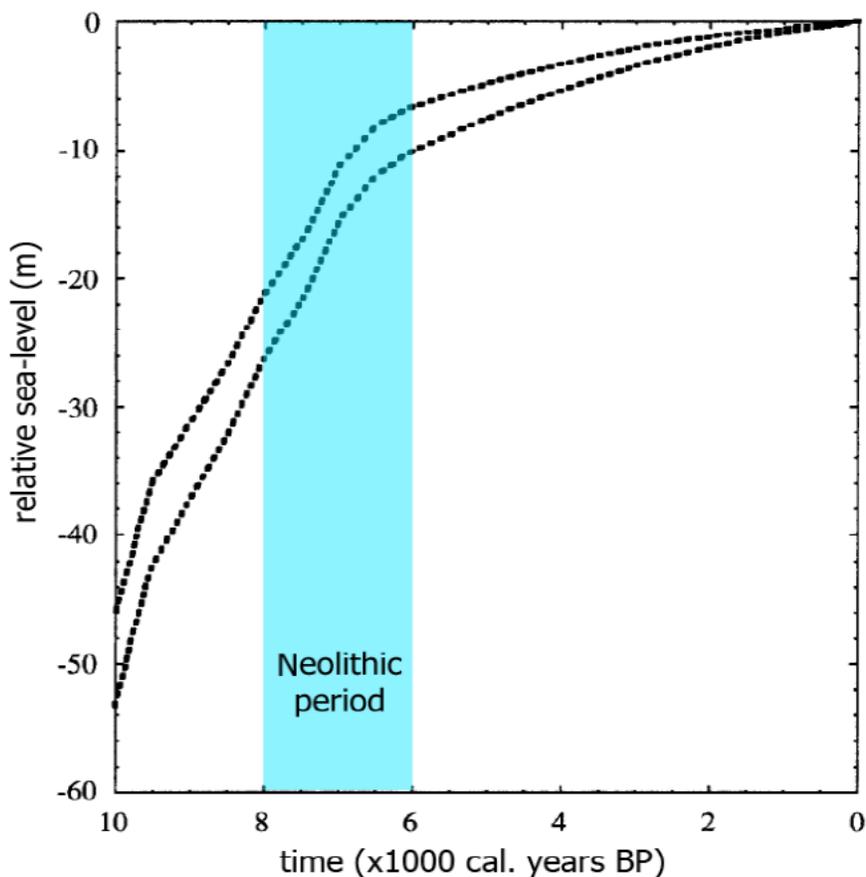
**Figure 12:** Percentages of animal remains across time at Grotta dell'Uzzo (adapted from Tagliacozzo 1993a: 216 and Tusa 1995: 43)



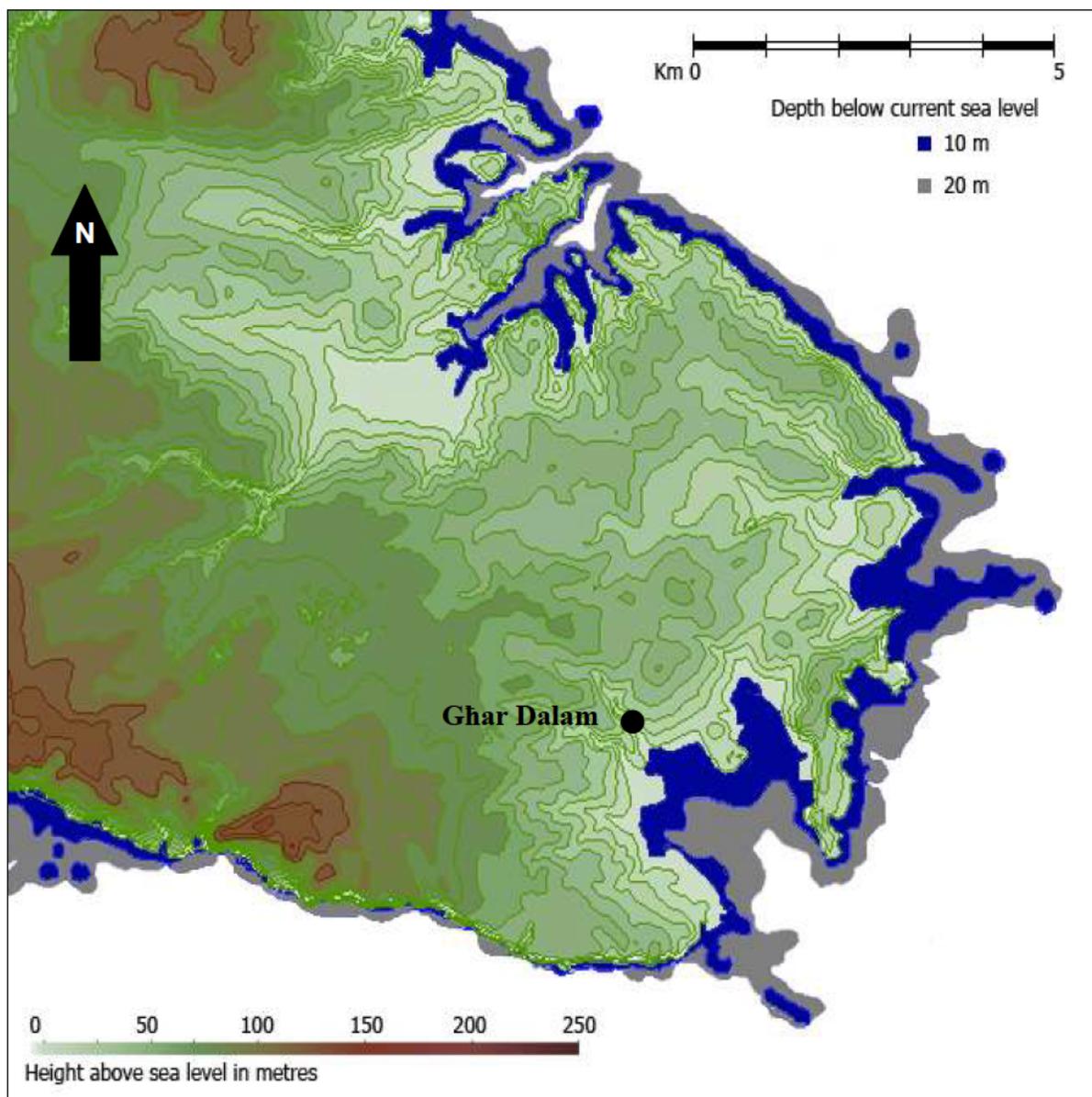
**Figure 13:** Percentages of fish species being caught in the Early Neolithic at Grotta dell'Uzzo (adapted from Tagliacozzo 1993a: 155)



**Figure 14:** Percentages of mollusc species being collected in the Early Neolithic at Grotta dell'Uzzo (adapted from Tagliacozzo 1993a: 156)

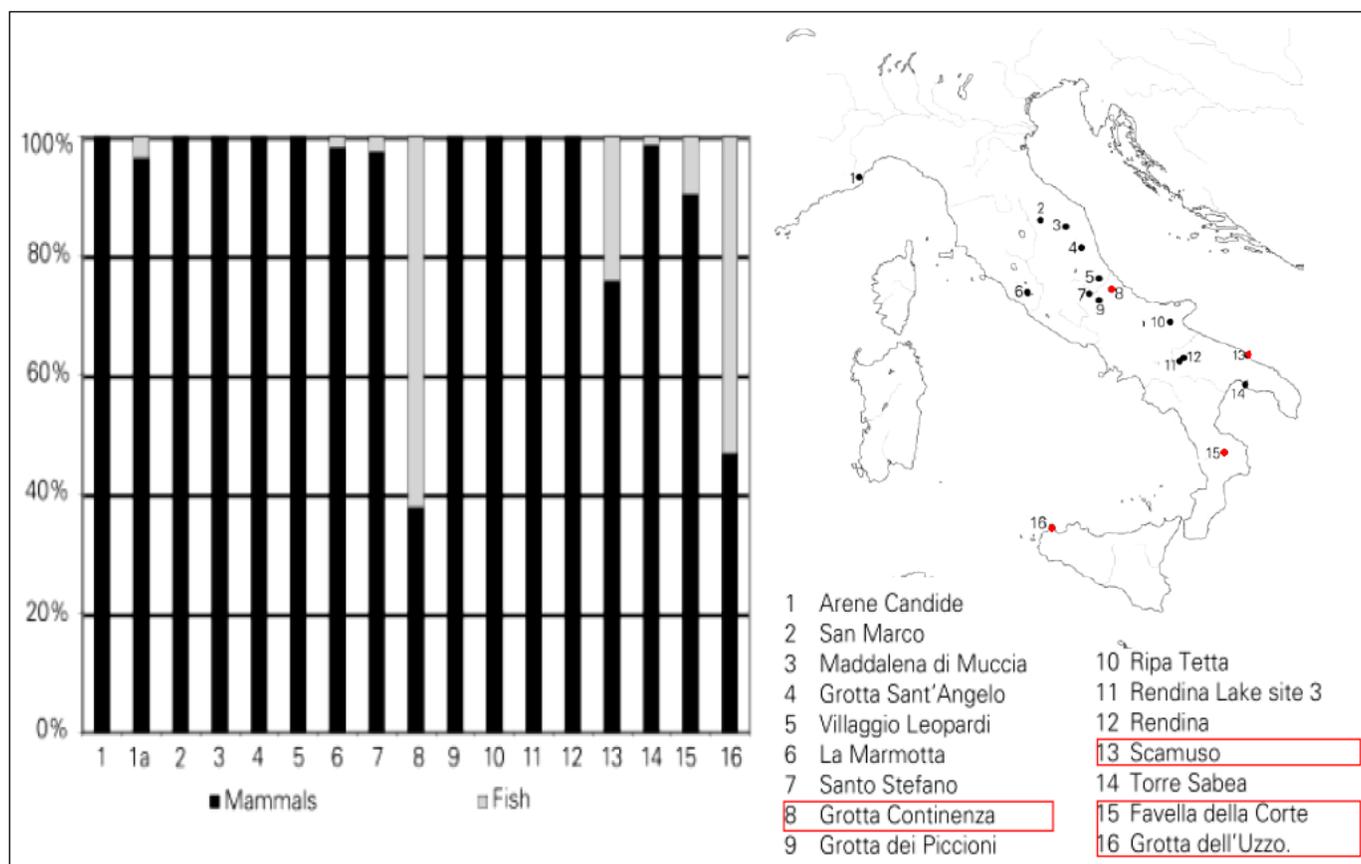


**Figure 15:** Predicted sea-level change in Western Sicily. The upper and lower limits of sea level change are shown by the dashed lines. The shaded area represents the Neolithic period (adapted from Lambeck 2004: 1584)

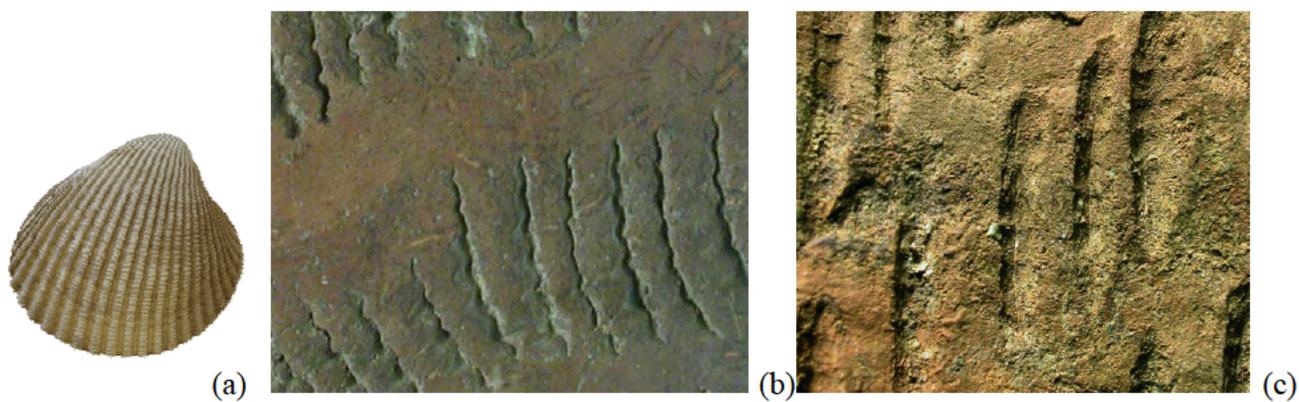


**Figure 16:** Paleogeography of southern Malta during the Neolithic (Base map ©2009 MEPA map server, composite image Marvin Demicoli, based on data from Lambeck 2004 and Fenech 2007: 30-31)

The area shaded in blue is today at 10 metres below sea level but would have been above sea level in 6000 BP, while the area shaded in grey is today at 20 metres below sea level but would have been above sea level in 8000 BP

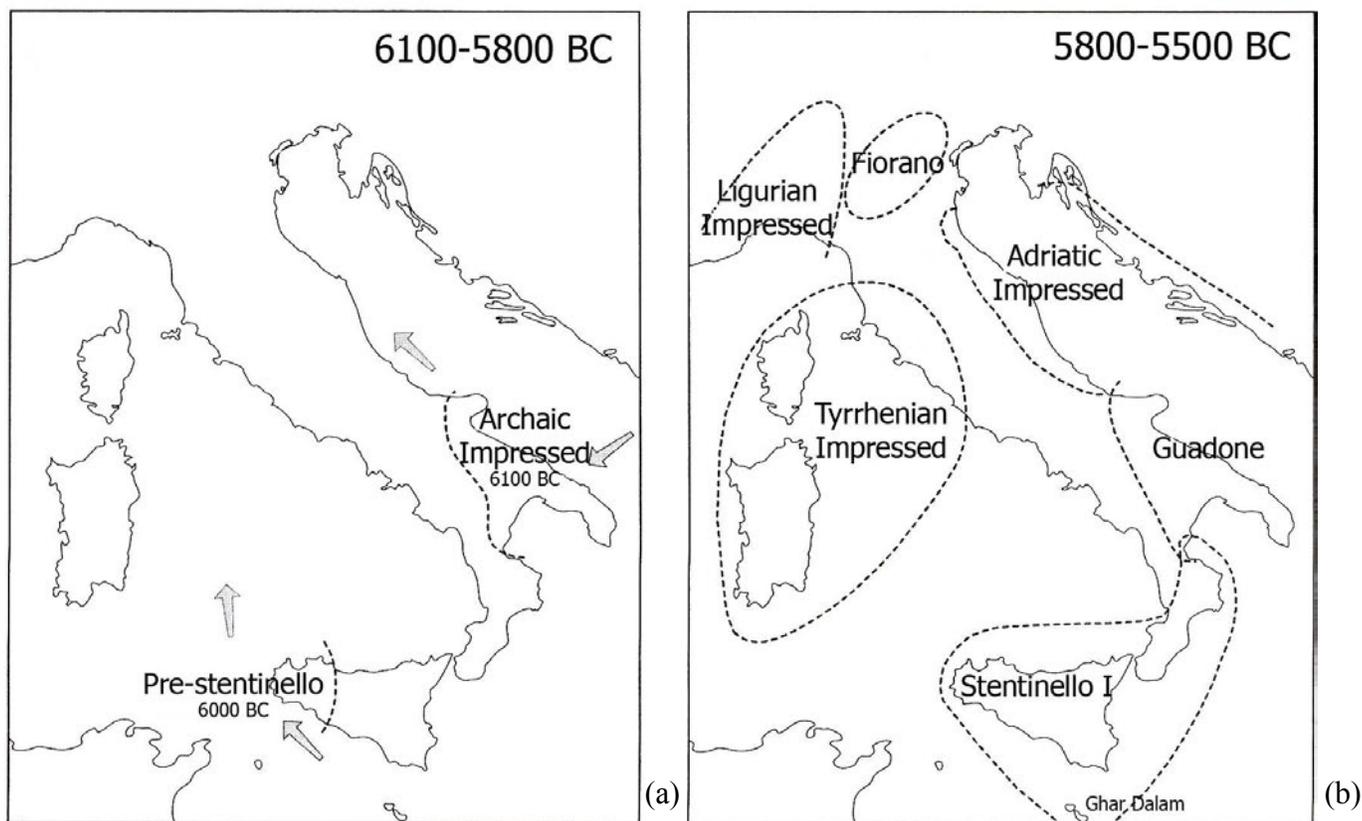


**Figure 17:** Fish to mammal ratio in Italian Neolithic sites (adapted from Tagliacozzo 2005)

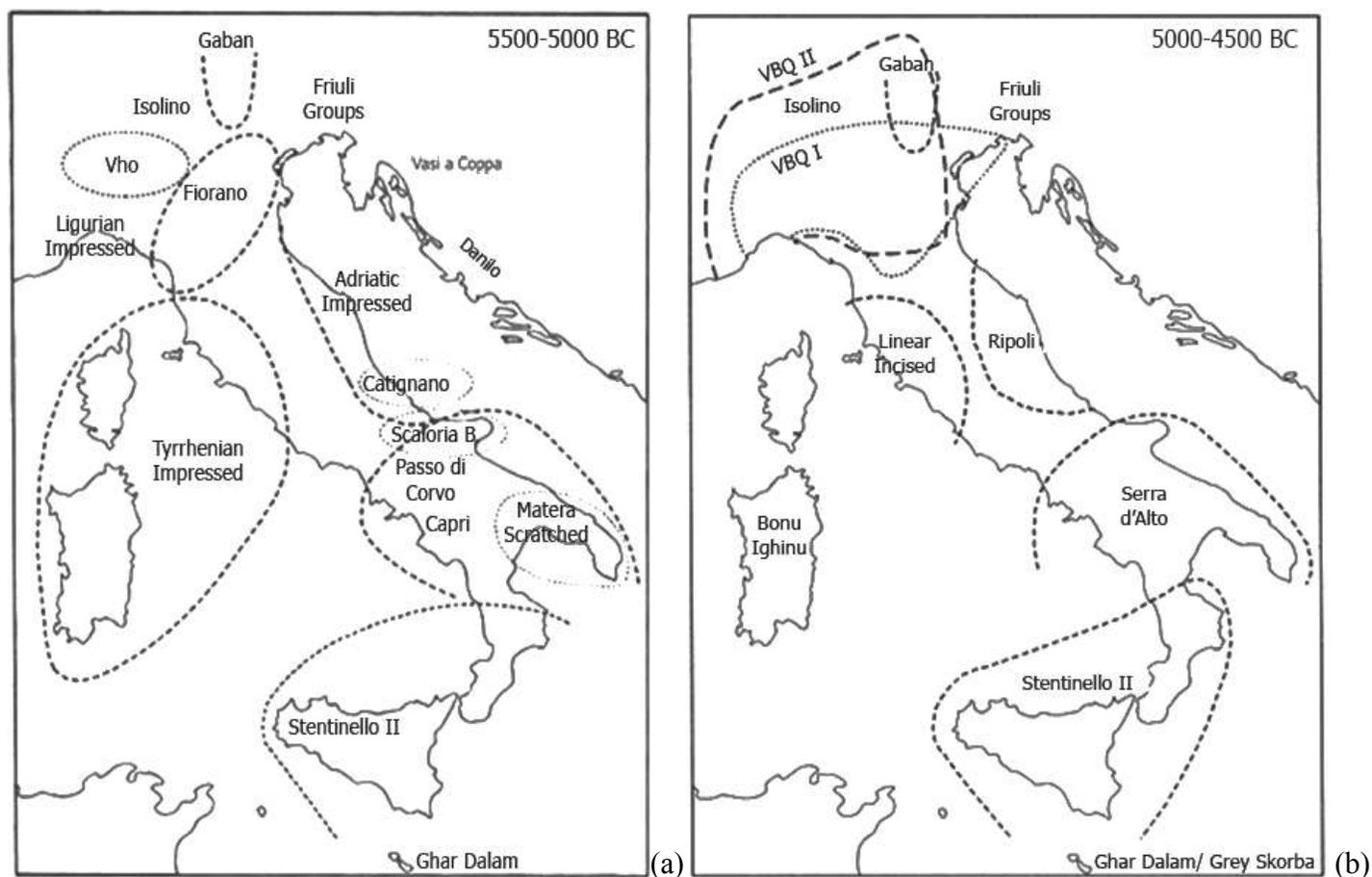


**Figure 18:** (a) *Cardium* sp. shell, and *Cardium* impressions on pottery with (b) single toothed end, and (c) bivalve toothed end (Fugazzola Delpino, Pessina and Tiné 2004: 20;

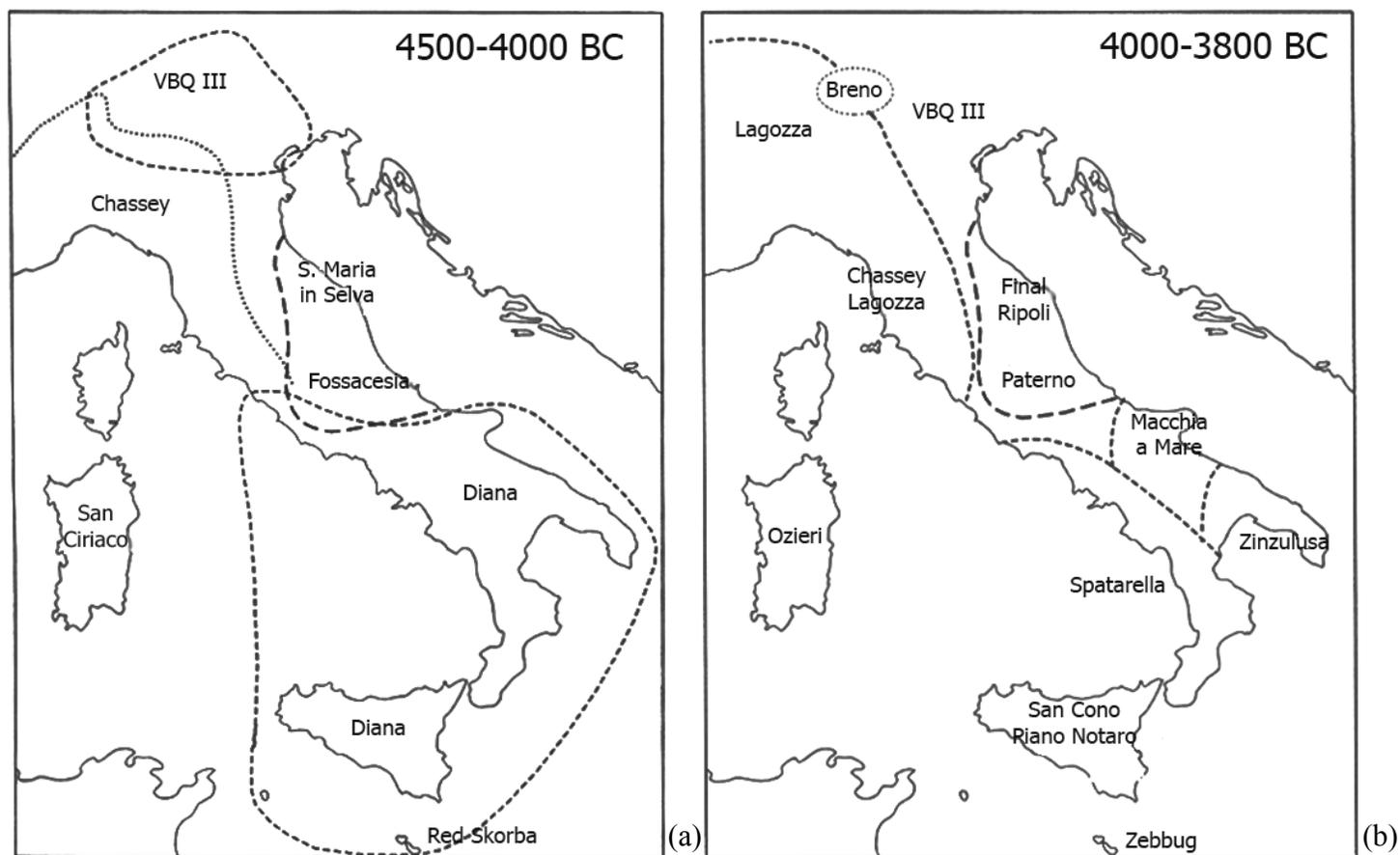
[http://www.dfw.state.or.us/MRP/shellfish/bayclams/images/cockle\\_web\\_ODFW.gif](http://www.dfw.state.or.us/MRP/shellfish/bayclams/images/cockle_web_ODFW.gif))



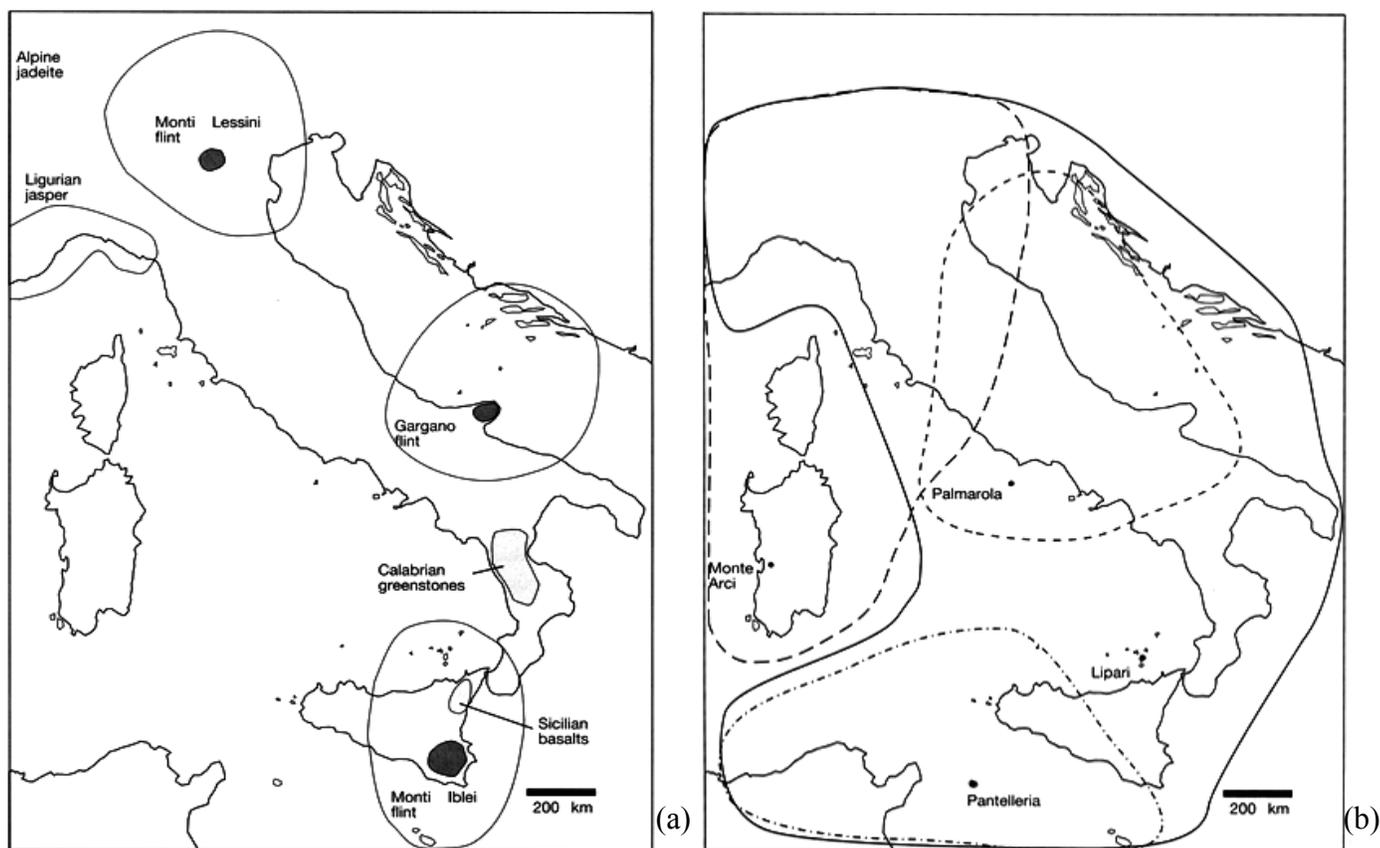
**Figure 19:** Distribution map of (a) Earliest and (b) Early Neolithic ceramic styles (translated from Pessina and Tiné 2008: 40)



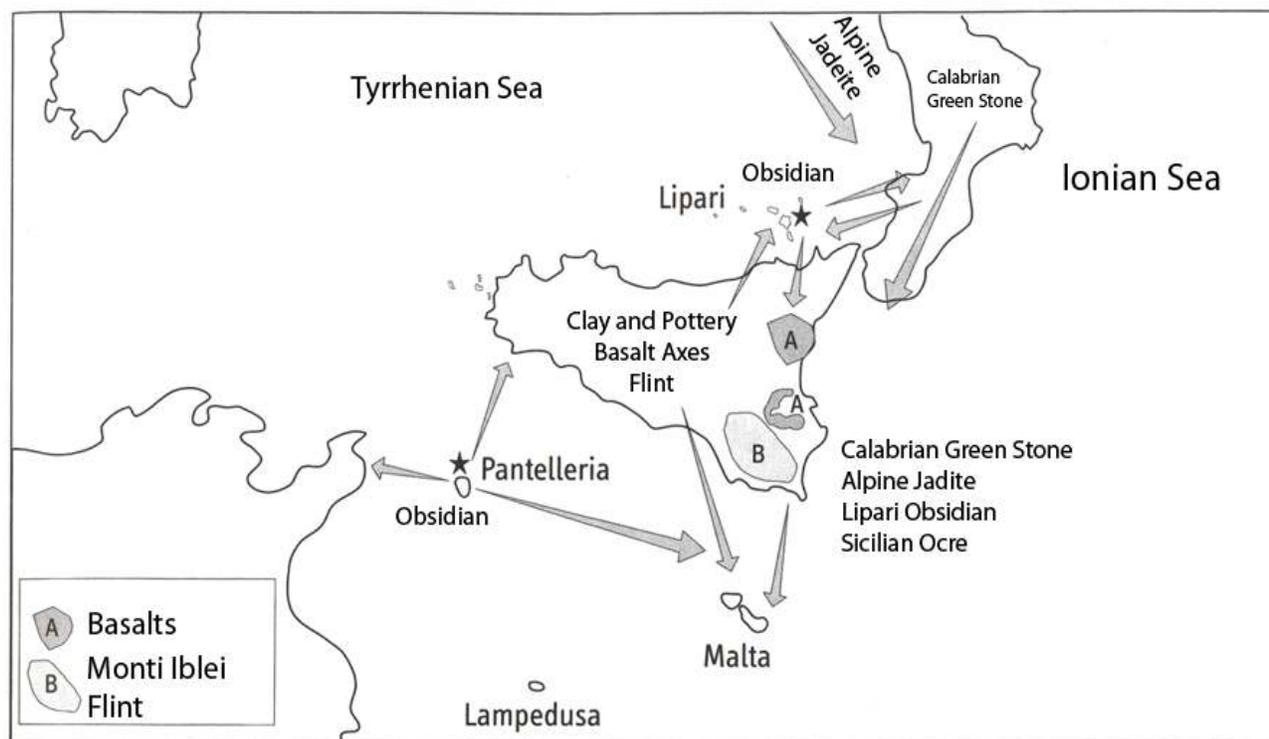
**Figure 20:** Distribution map of (a) early middle Neolithic and (b) late Middle Neolithic ceramic styles (translated from Pessina and Tiné 2008: 41)



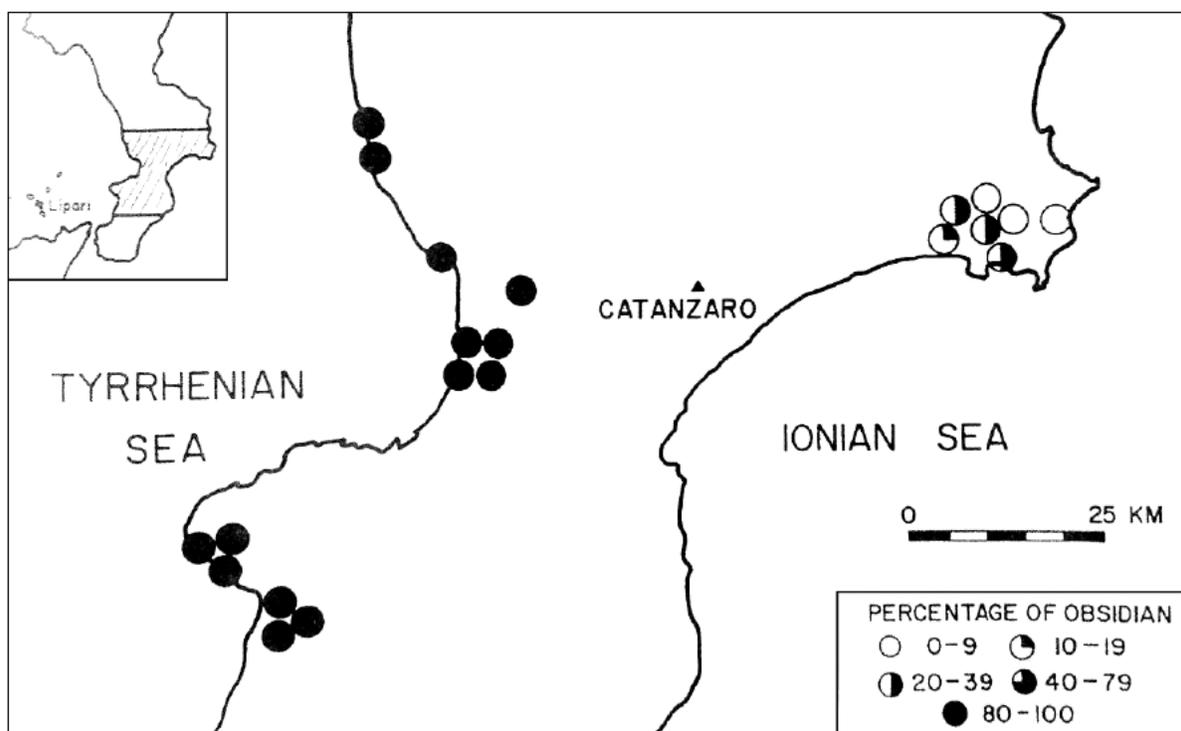
**Figure 21:** Distribution map of: (a) Late Neolithic ceramic styles and (b) Early Eneolithic ceramic styles (translated from Pessina and Tiné 2008: 41)



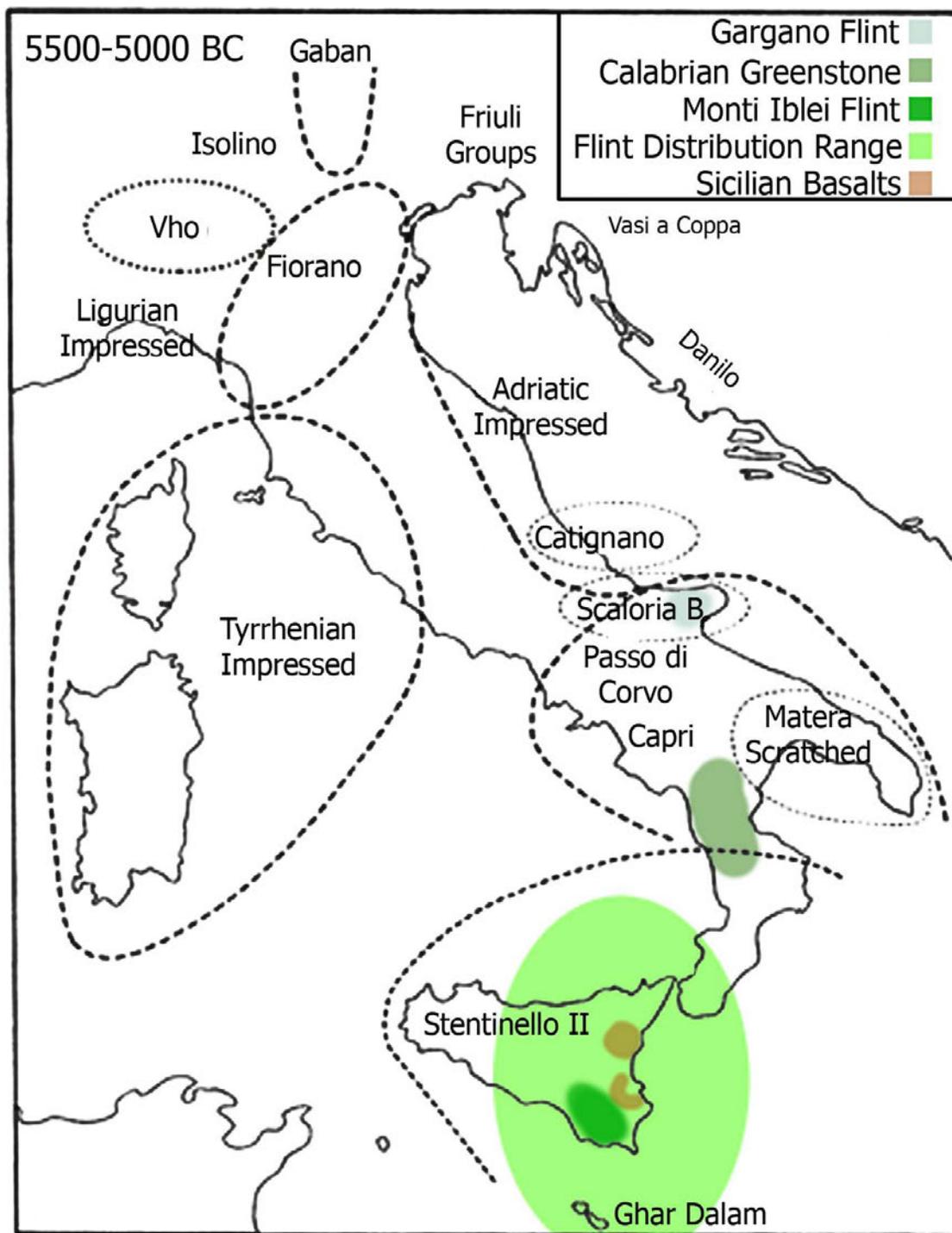
**Figure 22:** Distribution map (a) flint and axe raw material sources; (b) obsidian from the four central Mediterranean sources (Robb and Farr 2005: 28)



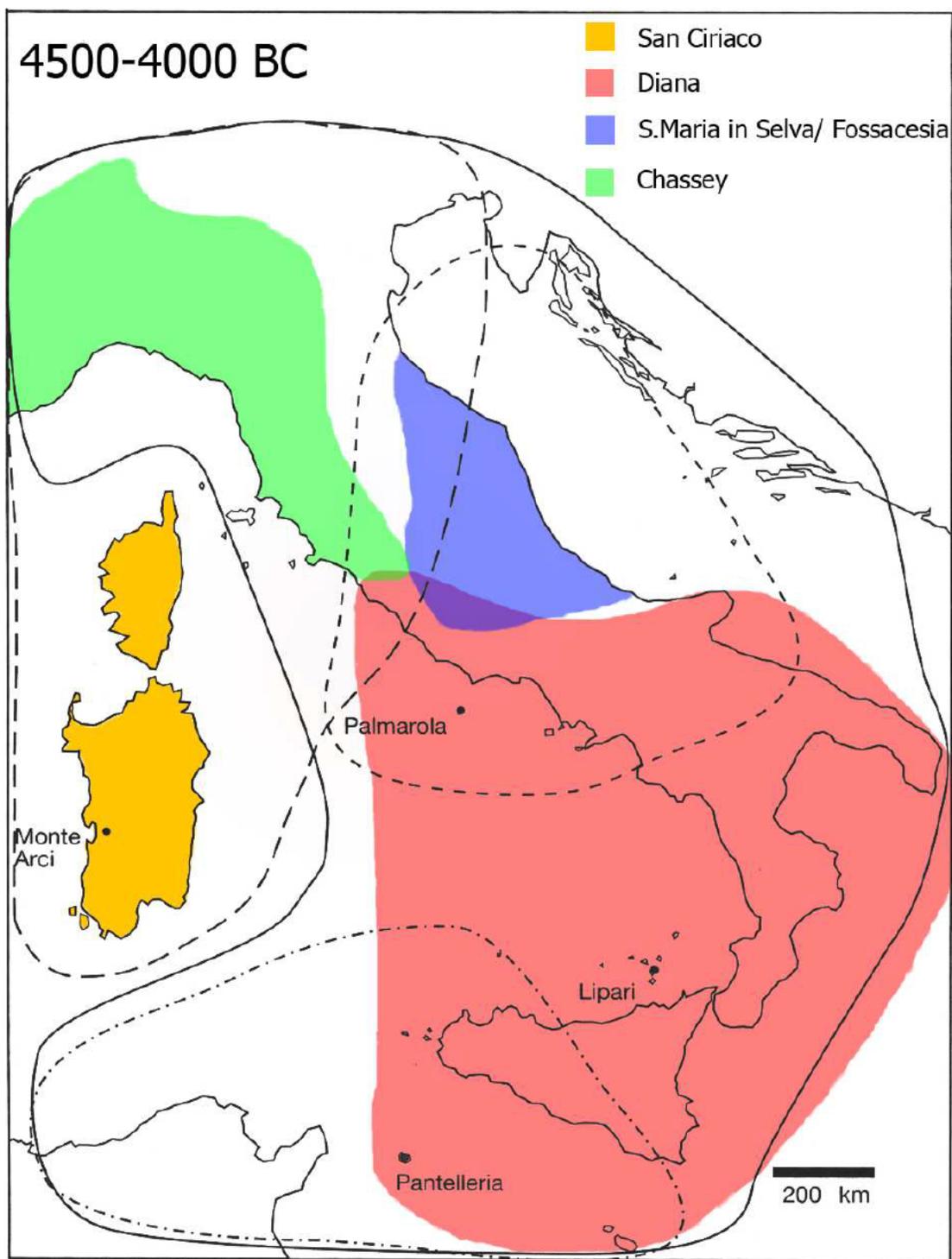
**Figure 23:** Raw material exchange network during the Neolithic (translated from Pessina and Tiné 2008: 235)



**Figure 24:** Map showing percentages of Lipari obsidian in the lithic assemblages of Neolithic sites in central Calabria (Ammerman 1985: 99)



**Figure 25:** Superimposition of the distribution maps of early Neolithic ceramic styles, raw material sources and flint distribution (coloured) (adapted from Pessina and Tiné 2008: 40, 235; Robb and Farr 2005: 28)



**Figure 26:** Superimposition of the distribution maps of late Neolithic ceramic styles (coloured) and obsidian (adapted from Pessina and Tine 2008: 41; Robb and Farr 2005: 28)