Università degli Studi di Ferrara

Dipartimento di Studi Umanistici

Ecologia Preistorica

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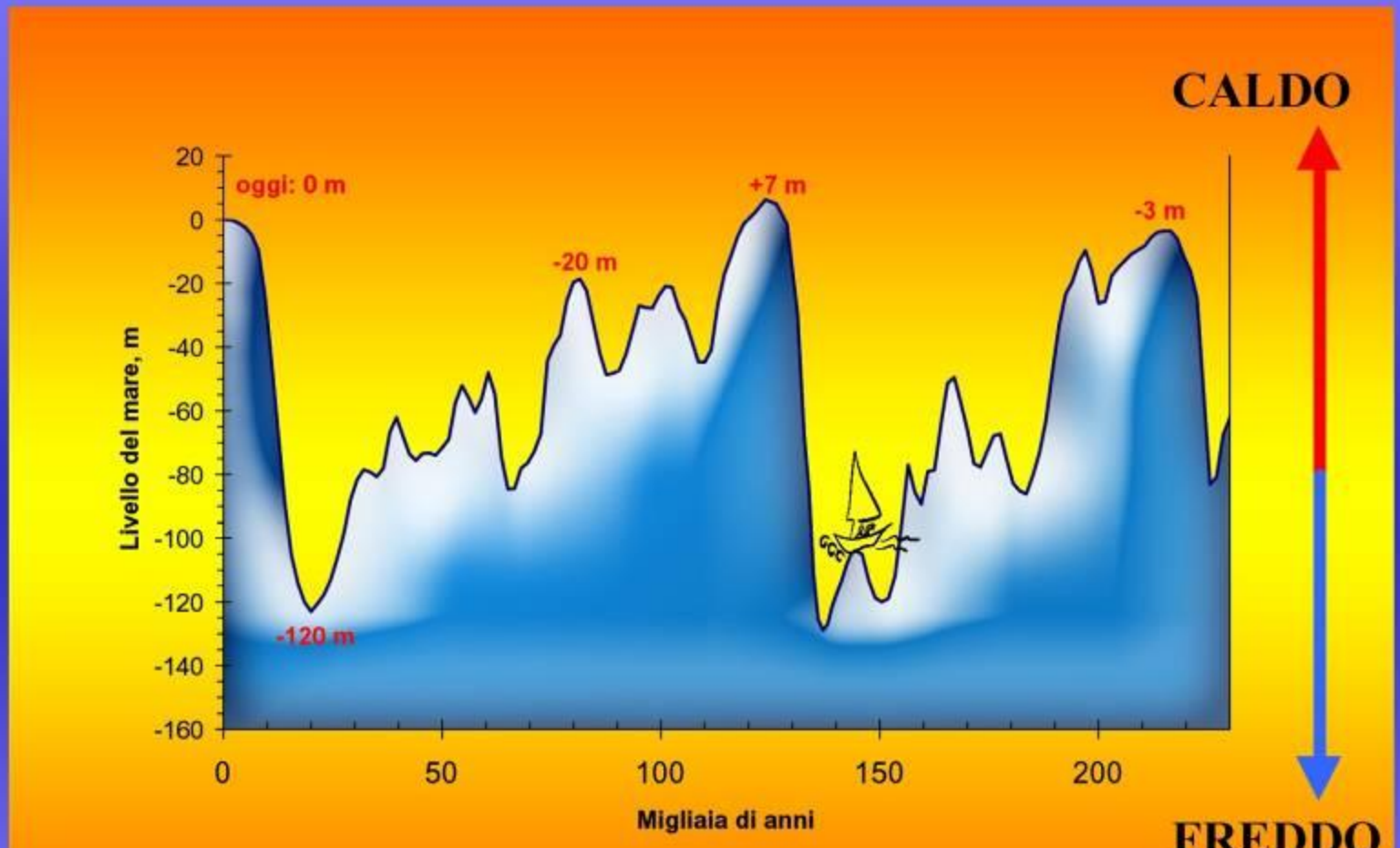
A.A. 2021-2022

Lezione 13 – Quaternario marino

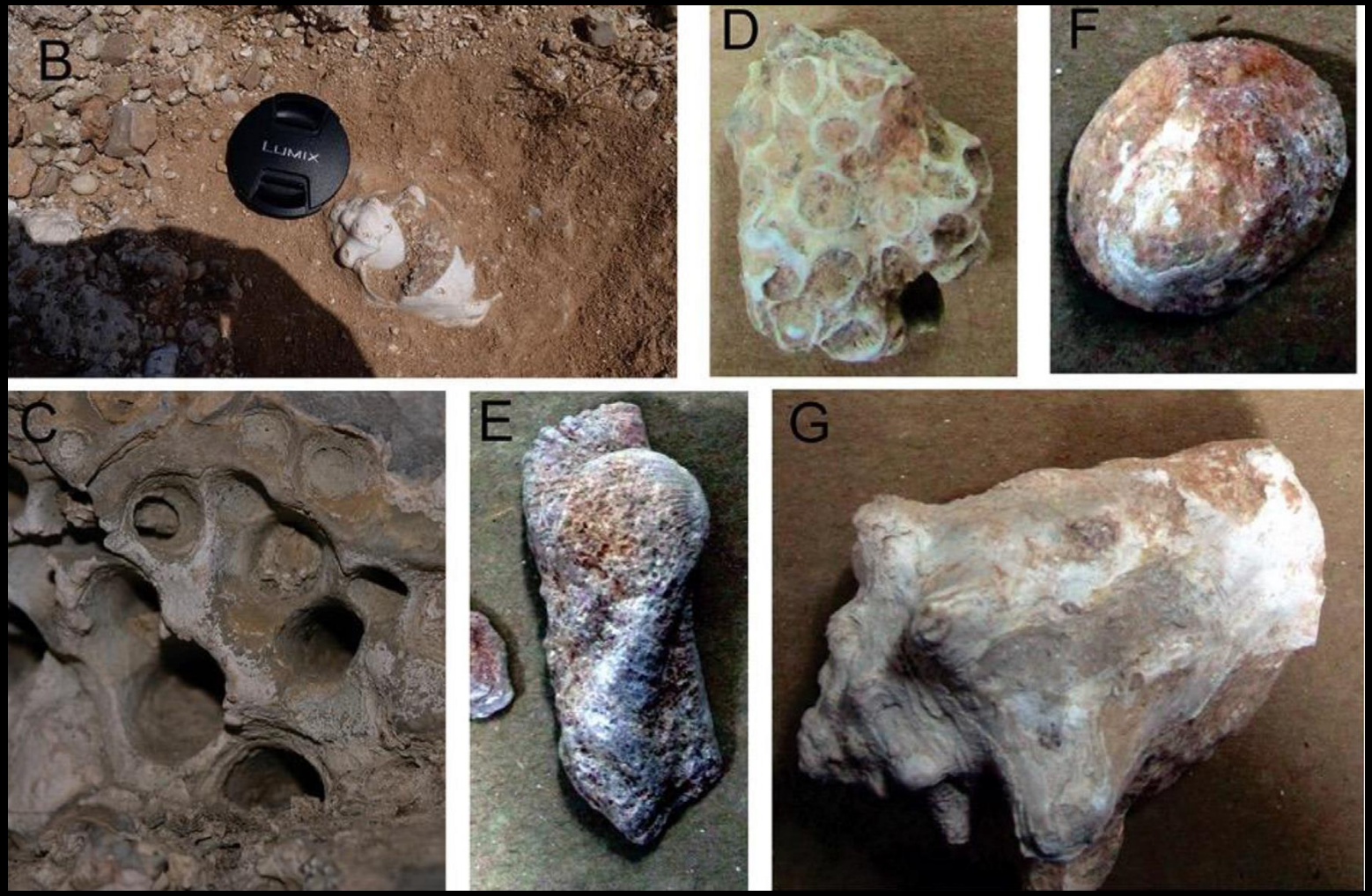

CALDO
FREDDO
oggi: 0 m
-120 m
-20 m
+7 m
-3 m
Livello del mare, m
20
0
-20
-40
-60
-80
-100
-120
-140
-160
0
50
100
150
200
Migliaia di anni

eustatic

Un punto osservato, in connessione con il livello marino mostra una quota, rispetto al msl, che deriva dalla sommatoria delle componenti:

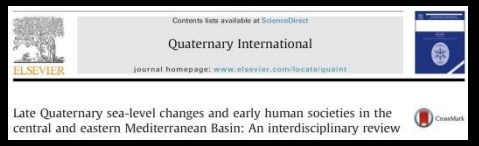
1. **eustatica**
2. **isostatica (glacio + idro)**
3. **tettonica**

Mentre la prima è dipendente dal tempo, le ultime due variano da zona a zona.

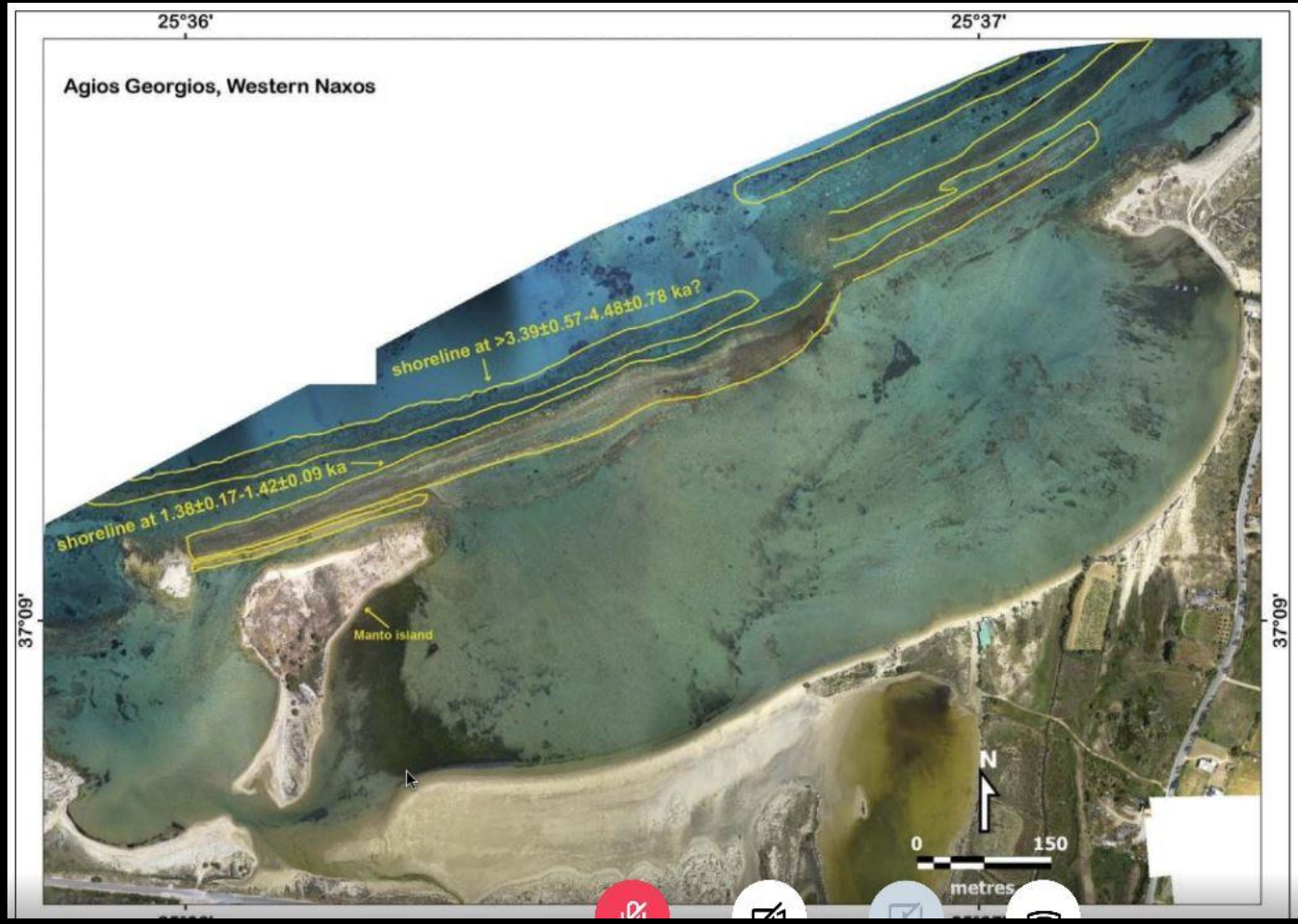


B) MIS 5.5 deposit containing *Strombus latus* (ex *bubonius*); C) *Lithophaga lithophaga* in the marine cave of Bergeggi (Italy). D-G) typical senegalese fauna, from deposits in Mallorca (Spain): D) *Cladocora caespitosa*, one of the few corals in the Mediterranean that can be used to obtain reliable U-series ages; E) *Arca noae*; F) *Patella lusitanica*; G) *Persistrombus latus* (ex *Strombus bubonius*).

Indicators and proxies used to reconstruct past Mediterranean sea levels.



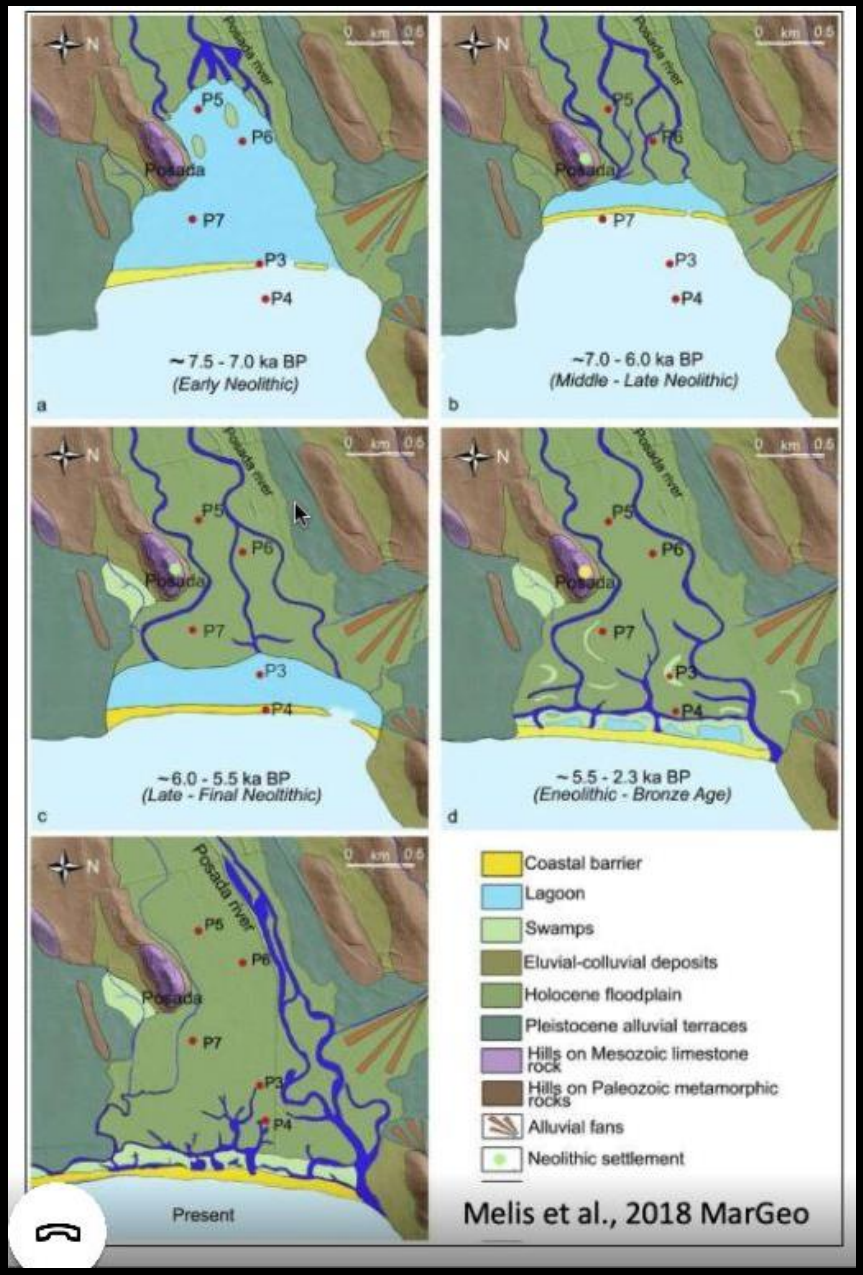
Type of RSL marker	Chronology	Typology	Elements improving RSL estimate
Tidal notches	Late Quaternary	Geomorphological	Fixed biological indicators
Abrasion notch and sea caves	Late Quaternary	Geomorphological	Fixed biological indicators (may be difficult to find due to erosion).
Shore/Abrasion platforms	Late Quaternary	Geomorphological	Biological indicators
Marine terraces	Late Quaternary	Geomorphological/ sedimentary	Fixed biological indicators or sedimentary features
Speleothems	Late Quaternary	Geomorphological/ sedimentary	Fixed biological indicators
Beach deposits	Late Quaternary	Sedimentary	Biofacies, orientation and integrity of shells, sedimentary structures.
Beachrocks	Late Quaternary	Sedimentary	Sedimentary structures, types of cement
Salt-marsh deposits	Holocene	Sedimentary	Faunal assemblages (foraminifera, ostracods, molluscs) and plant remains
Lagoonal deposits	Holocene	Sedimentary	Faunal assemblages (foraminifera, ostracods, molluscs)
River deltas	Holocene	Sedimentary	Sedimentary structures
Fossil fixed bioconstructions	Holocene	Sedimentary	Midlittoral species
Harbour structure (quay, pier, breakwater)	Late Holocene	Archaeological	Fixed biological indicators
Fishtanks	Late Holocene	Archaeological	Preservation of all structural parts, presence of fixed biological indicators
Coastal quarries	Late Holocene	Archaeological	Preservation of the lowest quarry level
Slipways	Late Holocene	Archaeological	Fixed biological indicators
Coastal Water Wells	Holocene	Archaeological	Definition of the ancient water table



How much?

Quantification of coastal modifications

Karkani et al., 2017 Mar.Geo

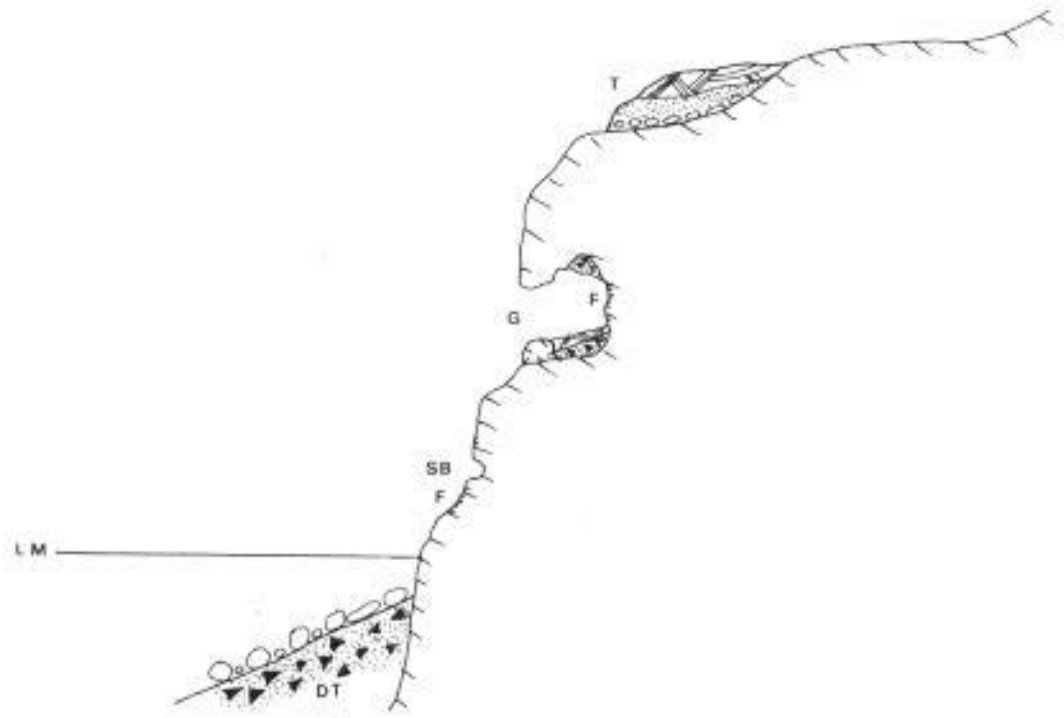

N
0 km 0.5
Posada river
P5
P6
Posada
P7
P3
P4
~7.5 - 7.0 ka BP
(Early Neolithic)
a
~7.0 - 6.0 ka BP
(Middle - Late Neolithic)
b
~6.0 - 5.5 ka BP
(Late - Final Neoltithic)
c
~5.5 - 2.3 ka BP
(Eneolithic - Bronze Age)
d
Present
Coastal barrier
Lagoon
Swamps
Eluvial-colluvial deposits
Holocene floodplain
Pleistocene alluvial terraces
Hills on Mesozoic limestone rock
Hills on Paleozoic metamorphic rocks
Alluvial fans
Neolithic settlement
Melis et al., 2018 MarGeo

Archaeological features partially submerged at Caesarea, Israel. While harbour features are useful sea-level markers, it is important to understand the original function and position of the features.

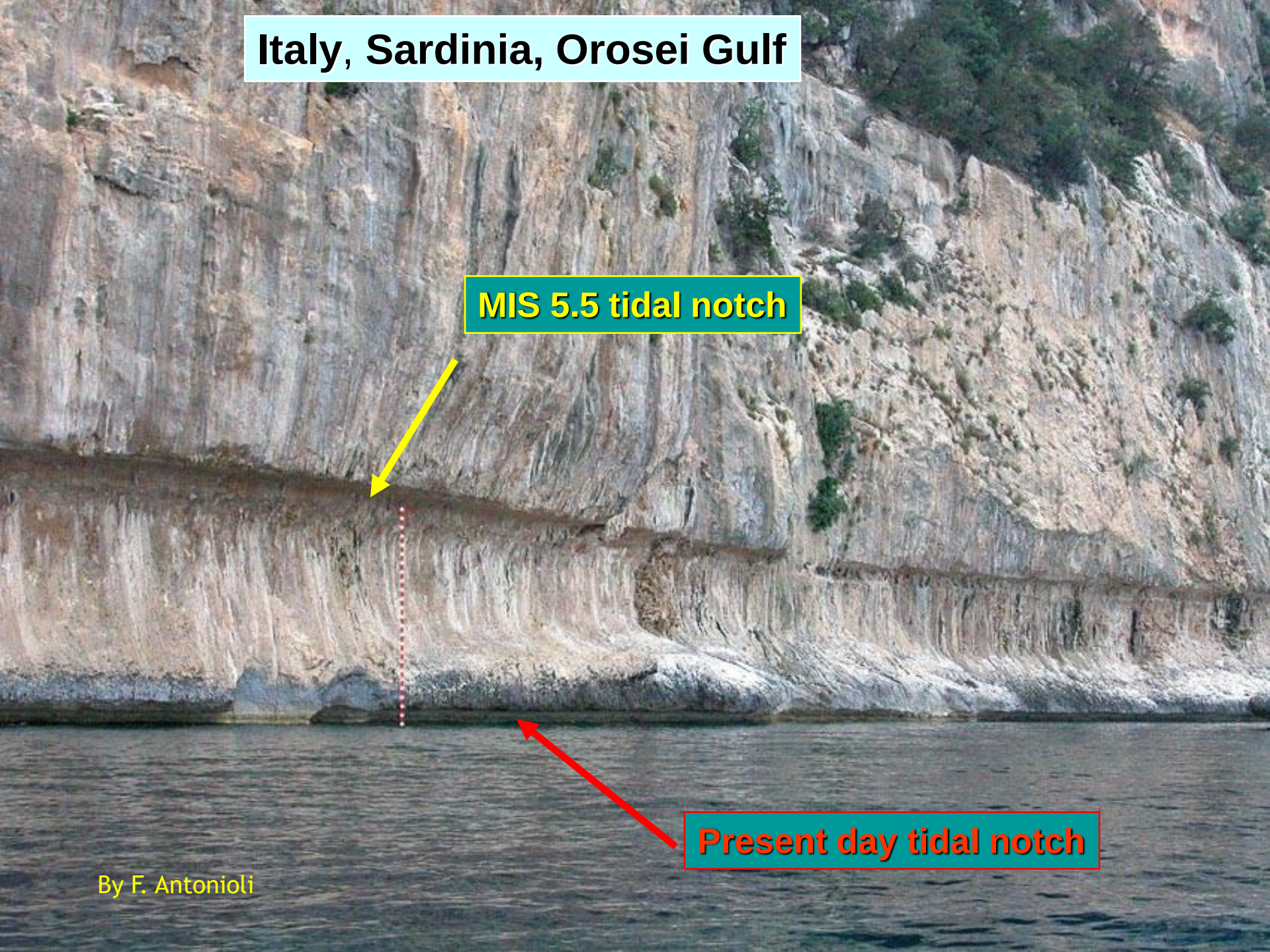
Solco tidale
(tidal notch)

By F. Antonioli

Schema degli effetti di linee di riva su una costa a falesia

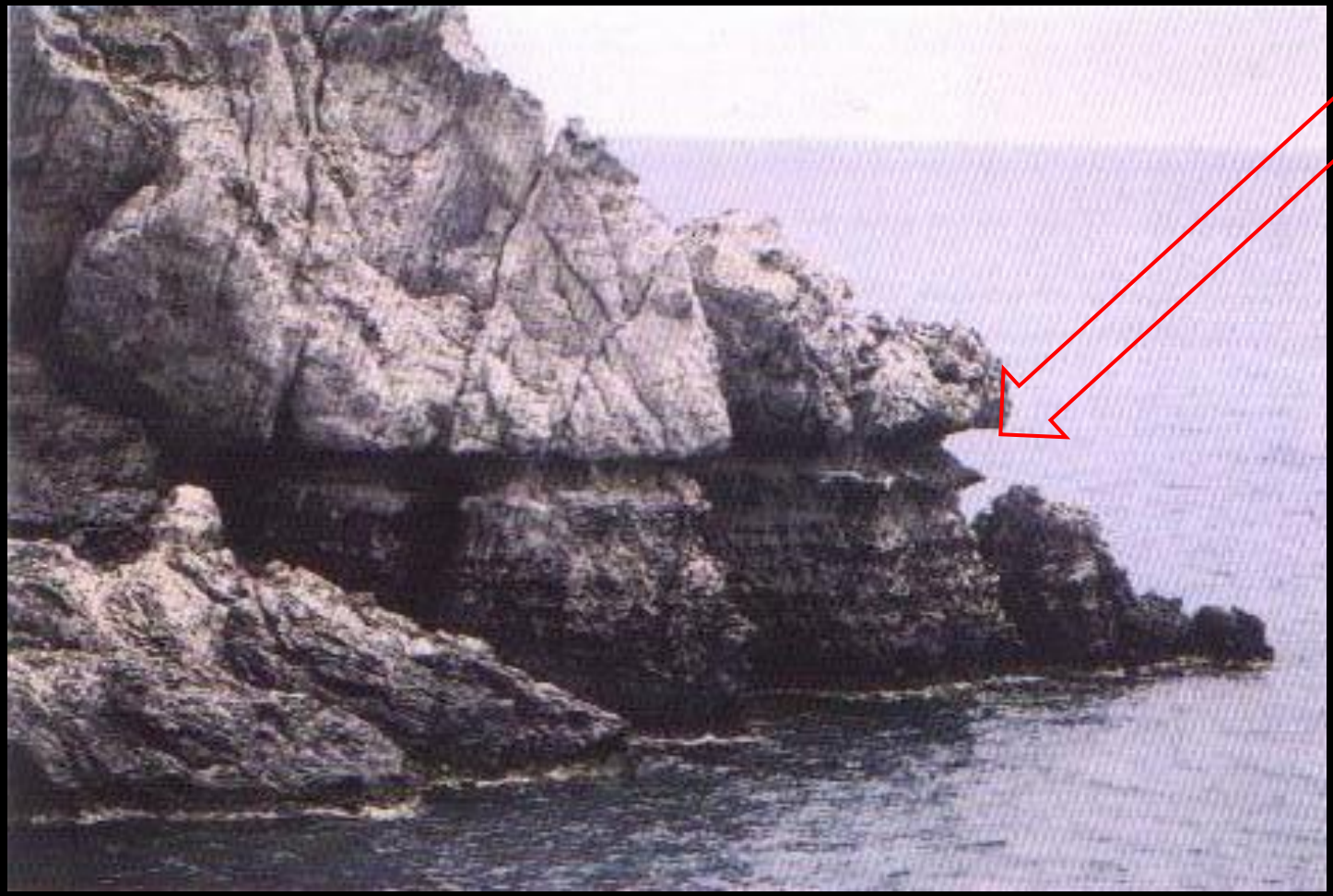


Legenda. T: terrazzo coperto da depositi di spiaggia ed eolici; G: ingrottamenti con fori di litodomi (F) e limitati accumuli di sedimenti litorali; SB: solco di battente; Dt: scarpata detritica sottomarina con elementi elaborati dal moto ondoso.


Italy, Sardinia, Orosei Gulf
MIS 5.5 tidal notch
Present day tidal notch
By F. Antonioli

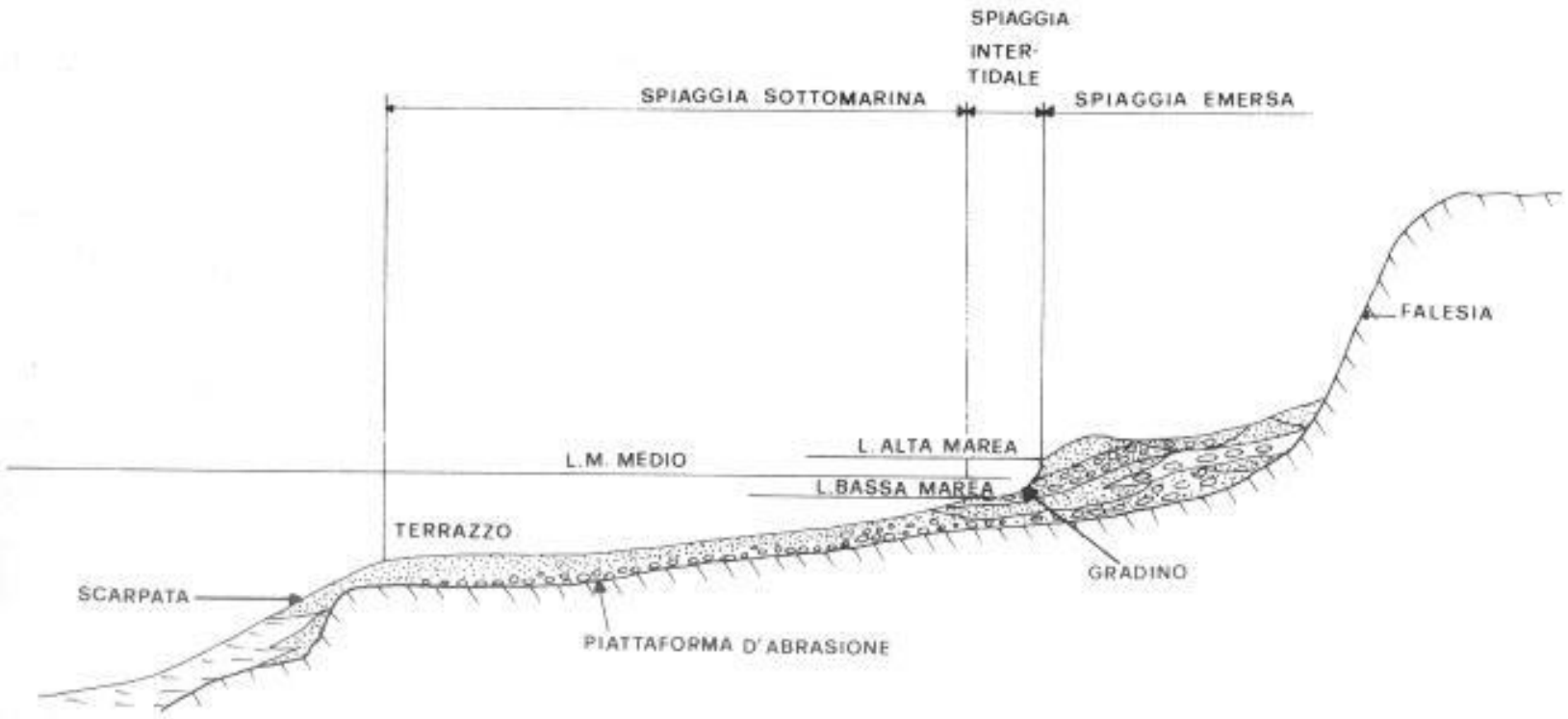
By F. Antonioli

Tidal notch




By F. Antonioli

Depositi litorali lungo una costa che degrada dolcemente



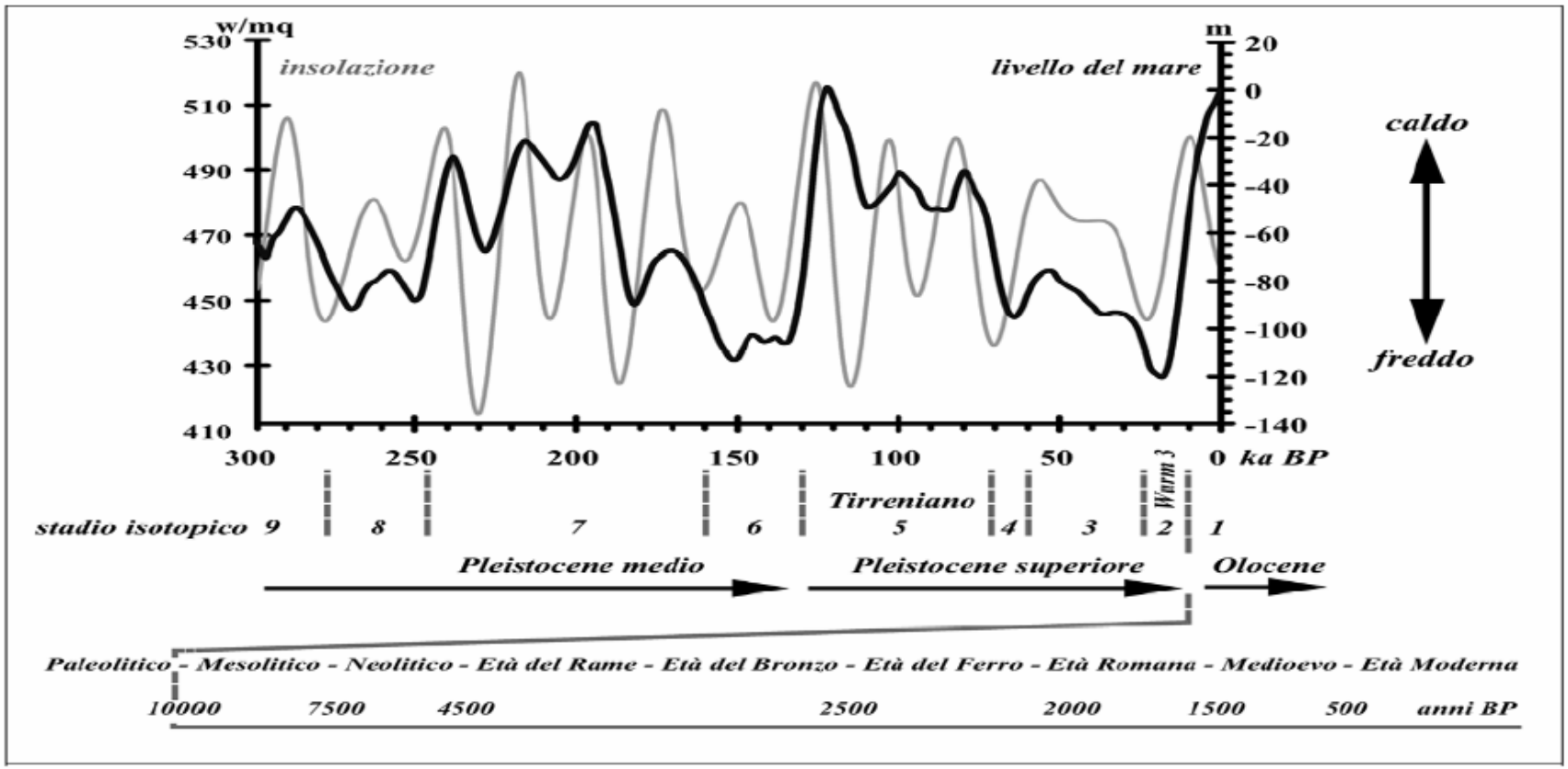
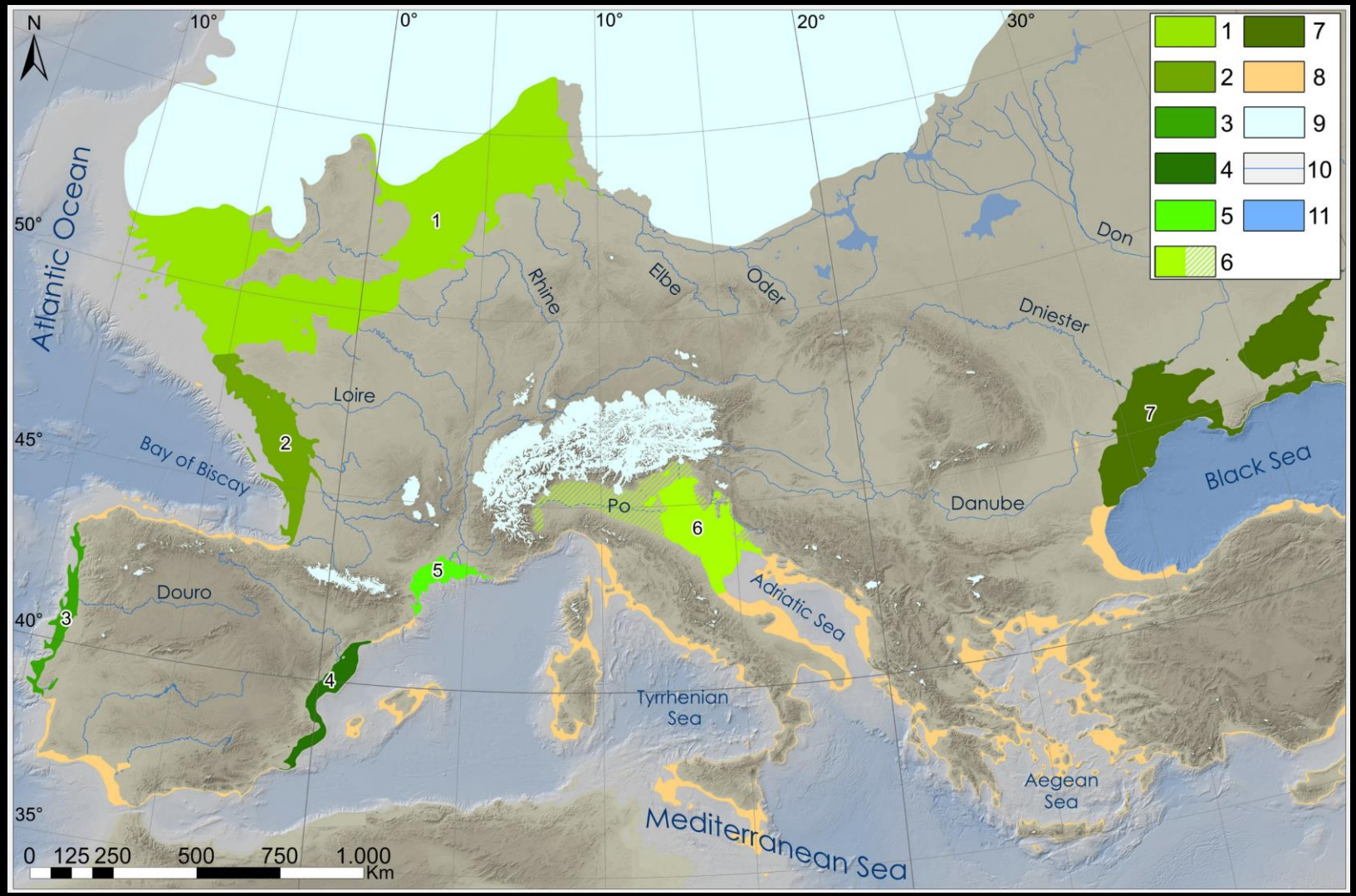
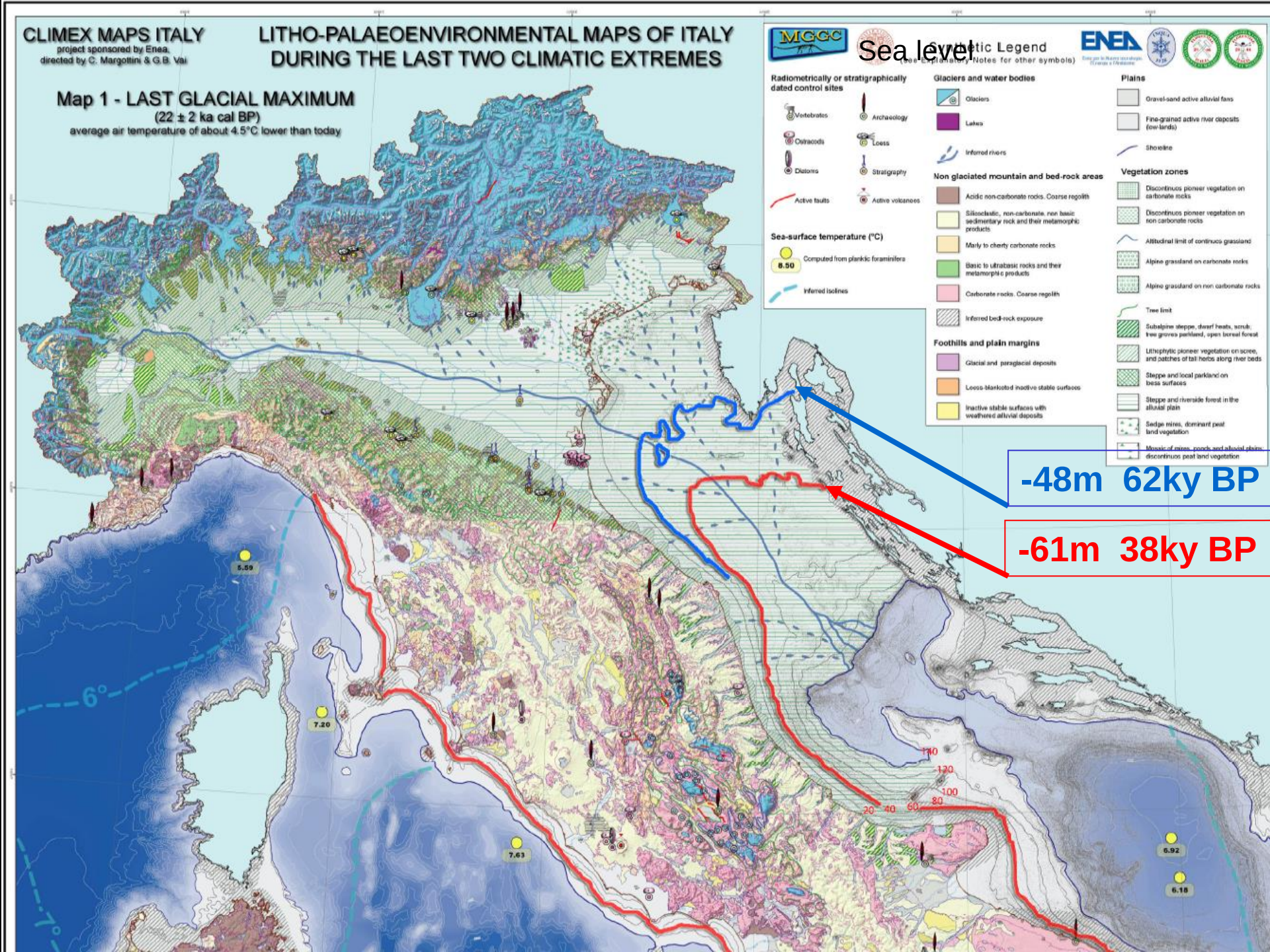


Fig. 2 - Variazioni del livello del mare e dell'insolazione del Pleistocene medio, Pleistocene superiore e dell'Olocene (tratta da Silenzi et al., 2004).



Map of Europe with the largest continental shelves emerged during the Last Glacial Maximum. 1. Doggerland/North Sea, English Channel and Bristol Channel; 2. Bay of Biscay and France Atlantic Coast; 3. North-central Portugal Atlantic Coast; 4. Catalunya and Valencia Coasts; 5. Gulf of Lion; 6. Great Po Plain; 7. Northern Black Sea Coast (Sea of Azov and Chorne Sea); 8. Other LGM emerged areas; 9. Scandinavian and British Islands ice sheets; 10. Mountain Glaciers; 11. Major rivers and lakes.


CLIMEX MAPS ITALY
project sponsored by Enea
directed by C. Margottini & G.B. Vai
LITHO-PALAEOENVIRONMENTAL MAPS OF ITALY
DURING THE LAST TWO CLIMATIC EXTREMES
Map 1 - LAST GLACIAL MAXIMUM
(22 ± 2 ka cal BP)
average air temperature of about 4.5°C lower than today
Sea level
-48m 62ky BP
-61m 38ky BP
5.59
7.20
7.63
6.92
6.18
6°
7°

Ordinamento cronostratigrafico del Pleistocene marino

			Prima Fase	*Seconda Fase*		*Terza Fase*	
						Piani	*Sottopiani*
PLEISTOCENE	SUPERIORE		Monastiriano Tirreniano	Versiliano Tirreniano		Versiliano Tirreniano	Neotirreniano Eutirreniano
	MEDIO		Milazziano	Milazziano		Crotoniano	
	INFERIORE		Siciliano	Siciliano			
				Calabriano	C. 2=Emiliano C. 1	Selinuntiano	Siciliano Emiliano Santerniano
PLIOCENE			Calabriano				

85 scientists from 20 countries of the Network of Mediterranean Experts on Climate and Environmental Change (MedECC) present:

1st SCIENTIFIC ASSESSMENT REPORT ABOUT CLIMATE AND ENVIRONMENTAL CHANGE IN THE MEDITERRANEAN

FOOD SECURITY

Food demand is set to increase as yields of crops, fish and livestock decline

90% of commercial fish stocks are already overfished, with the average maximum body weight of fish expected to shrink by up to **half by 2050**

WATER RESOURCES

Within 20 years, **250+ million people** will be classified as **'water-poor'**

Fresh water availability is to **decrease by up to 15%** among the largest decreases in the world

SEA LEVEL

Sea level rises may exceed 1 metre by 2100, impacting **1/3 OF THE REGION'S population**

Half of the 20 global cities set to suffer most from **sea level rises by 2050** are in the Mediterranean

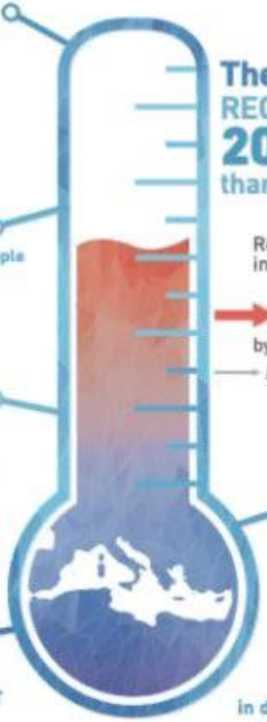
ECOSYSTEMS

The Mediterranean basin is **ONE OF THE MOST PROMINENT hotspots of climate and environmental change**

700+ non-indigenous animal species recorded due to warmer conditions

Increasing water acidification causes **mass deaths of marine species**

Mega fires have destroyed record areas of forest due to climate change



The Mediterranean REGION IS WARMING 20% faster than the global average

Regional temperature increase of **2.2°C** by 2040 with current policies

Paris Agreement's target of 1.5°C

HEALTH AND SECURITY

Increase in **frequency, intensity and duration** of **HEAT WAVES** imply significant **health risks** for vulnerable populations, especially in cities

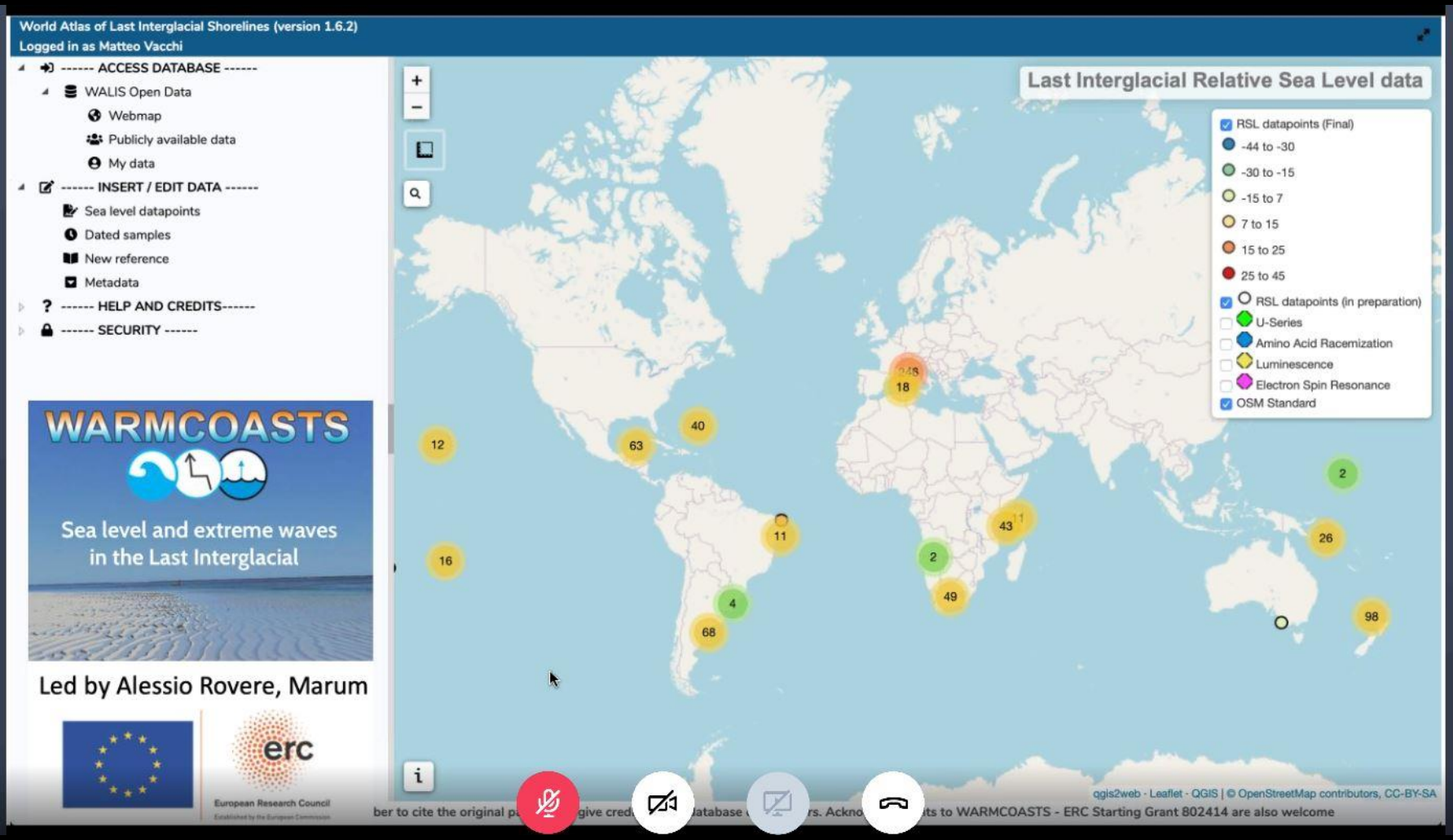
Increasing frequency in droughts since the 1950s has played a **significant role in the current regional crisis**

Conflicts concerning limited natural resources **may increase** large-scale human migrations

MedECC

UN environment

Plan Bleu


World Atlas of Last Interglacial Shorelines (version 1.6.2)
Logged in as Matteo Vacchi
------ ACCESS DATABASE ------
WALIS Open Data
Webmap
Publicly available data
My data
------ INSERT / EDIT DATA ------
Sea level datapoints
Dated samples
New reference
Metadata
------ HELP AND CREDITS------
------ SECURITY ------
WARMCOASTS
Sea level and extreme waves in the Last Interglacial
Led by Alessio Rovere, Marum
European Research Council
Established by the European Commission
Last Interglacial Relative Sea Level data
RSL datapoints (Final)
-44 to -30
-30 to -15
-15 to 7
7 to 15
15 to 25
25 to 45
RSL datapoints (in preparation)
U-Series
Amino Acid Racemization
Luminescence
Electron Spin Resonance
OSM Standard
18
40
12
63
11
16
4
68
43
2
49
2
26
98
qgis2web - Leaflet - QGIS | © OpenStreetMap contributors, CC-BY-SA
ber to cite the original p
give cred
atabase
rs. Ackno
ts to WARMCOASTS - ERC Starting Grant 802414 are also welcome

Burke et al., 2018 PNAS