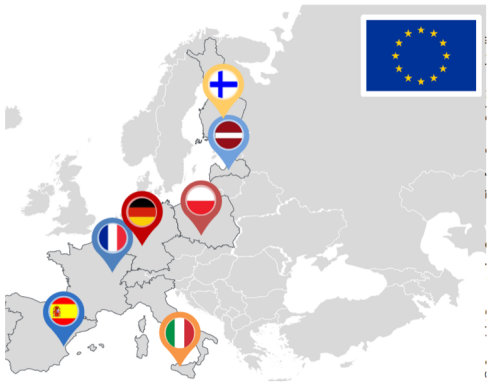
forthem.

Climate and Resources Lab



Climate of the past : lessons for the future?

⇒ acquisition of paleoenvironmental records (marine and terrestrial) to capture climate evolution and variability at different timescale, from short (Quaternary) to long (> 1 Myr)

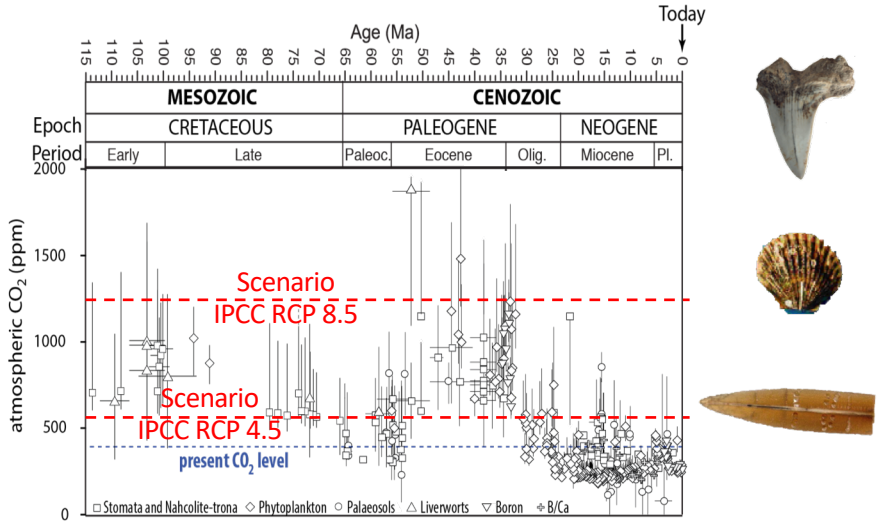
⇒ processes of climate change on these different timescales, from millenia to hundreds of million years and down to the Archean

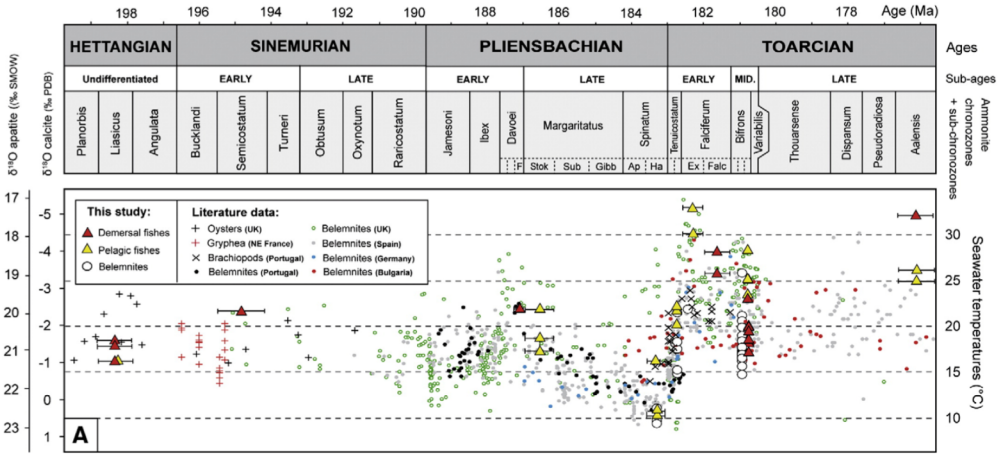
University	Research Lab	Research topic relative to Climate and Ressources	Contact
University of Burgundy	Biogéosciences laboratory	processes that govern long-term (>1 myr) climate change	emmanuelle.puceat@u-bourgogne.fr
University of Burgundy	Biogéosciences laboratory	Long term (Archean to Phanerozoic) regulation of Earth climate - build up of an habitable Planet	christophe.thomazo@u-bourgogne.fr
University of Burgu	Biogéosciences laboratory	Processes that control last glaciation (LGM)extention and termination	jfbuon@u-bourgogne.fr
University of Mainz	Department of Geosciences	Isotope-geochemical Palaeoclimatology/Speleothem Research: The group uses isotope-geochemical methods to reconstruct the climate of the past from various climate archives, in particular speleothems.	scholzd@uni-mainz.de
University of Mainz	Department of Geosciences	Paleontology / Sclerochronology: Our research focuses on high-resolution, precisely temporally aligned reconstruction of climate, environment, ecology and physiology using biogenic hard parts, specifically mollusk shells, teeth and bone using various proxies such as isotopes, trace and minor elements, growth rate as well as micro/nanostructural properties. Besides reconstruction, major efforts are placed on proxy development and optimization.	schoeneb@uni-mainz.de
University of Mainz	Institute of Geography, Geomorphology	Pleistocene palaeoclimatic and palaeoenvironmental development in terrestrial geoarchives	p.fischer@geo.uni-mainz.de
University of Mainz	Institute of Geography, Geomorphology	Extreme events in the Holocene geological records of northwestern and western Greece (Epirus, Ionian Islands, Peloponnese)	a.voett@geo.uni-mainz.de
University of Mainz	Department of Geosciences	Tectonics and Structural Geology Group: Resilience to geological hazards. Particular focii are faults as earthquake sources, fault/shear zones and their role in plate tectonics --> implications for landsacpe evolution and landscape-climate interactions	virginia.toy@uni-mainz.de
University of Mainz	Department of Geosciences	Volcanology: Volcanoes can cause small to large scale environmental changes on Earth. We are broadly interested in how magmatic processes govern volcanic eruptions and how this impinges on the atmosphere. Our research focusses on physicochmemical properties of magma and dissolved gases within, that strongly control the style of volcanic activity and extent of interaction with the atmosphere sytsem.	castroj@uni-mainz.de helo@uni-mainz.de
University of Mainz	Department of Geosciences	Biomineralization: Calcium carbonate biomineralization processes in microalgae (dinoflagellates). The transition of amorphous presursors into crystalline phases inside intracellular compartments is studied to understand the fundamental biochemical processes that determine proxy signals and create new bio-based materials.	jantschke@uni-mainz.de
University of Palermo	Laboratory of Micropaleontology	Impact of climate change on coccolithophores, during late Quaternary and Common Era	alessandro.incarbona@unipa.it

University of Burgundy : Biogéosciences laboratory

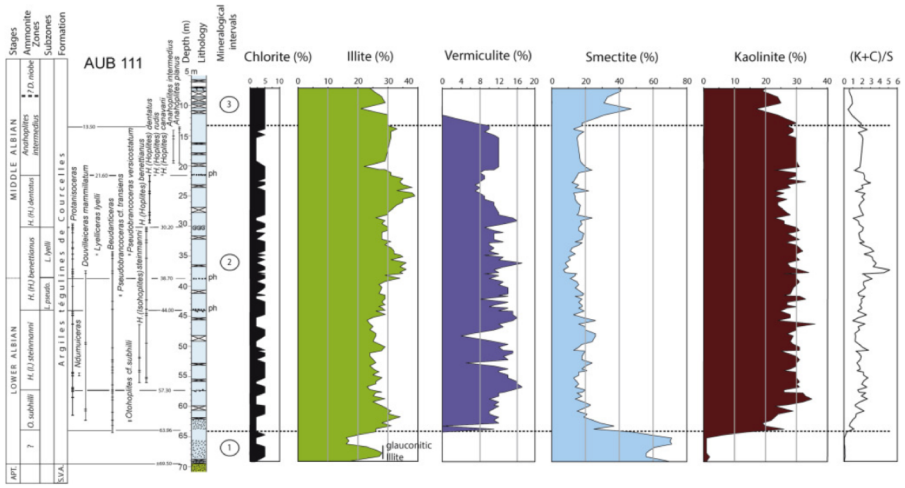
Identify long-term climate evolution

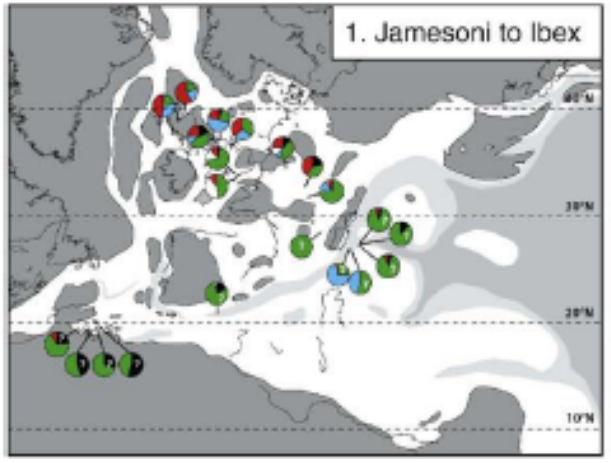
=> reconstruction of **past ocean temperatures** using $\delta^{18}O$ of fish teeth, bivalves, or belemnites





=> reconstruction of **hydrolysis evolution** on continents using clay mineralogy (**humid/arid belts**)



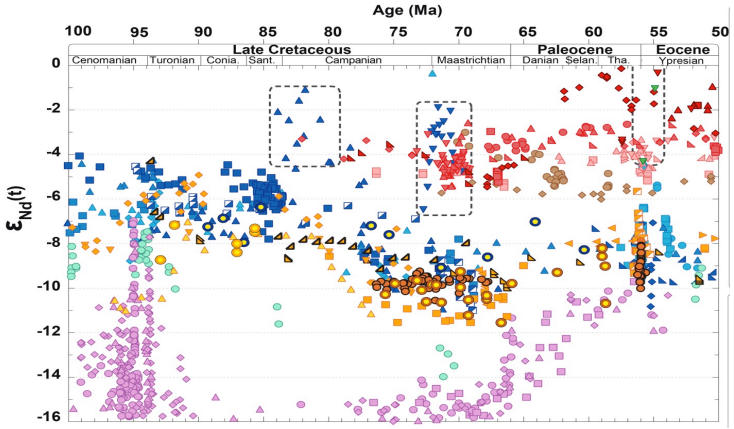


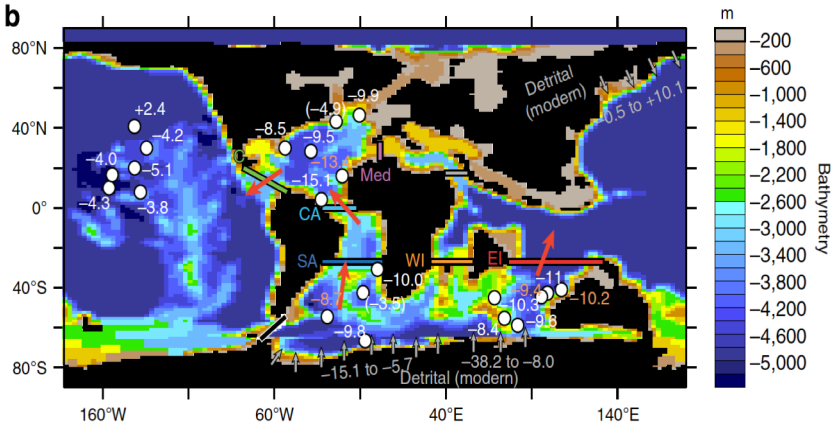
University of Burgundy : Biogéosciences laboratory

Tackle processes that govern multimillion years climate change

=> Constrain the **duration and timing of environmental perturbations** : cyclostratigraphy

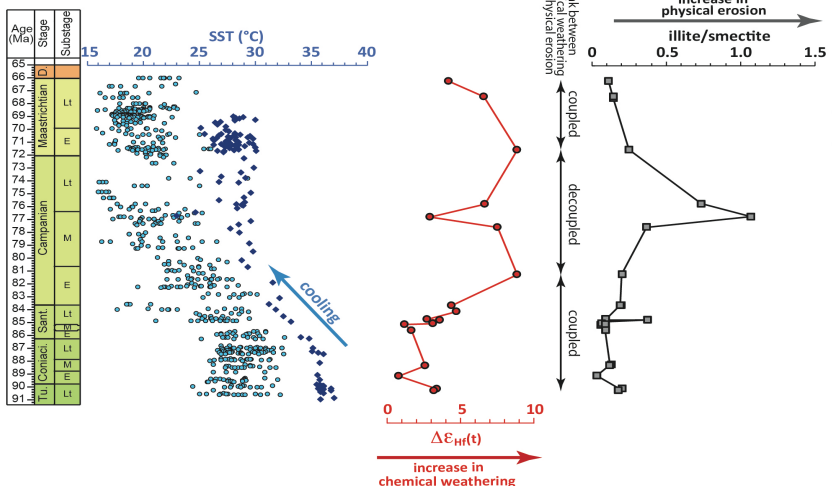
=> Impact of **oceanic circulation changes** in climate evolution (late Cretaceous, Jurassic)
reconstruction of past ocean circulation using Nd isotopes (of fish remains, carbonates, oxydes)





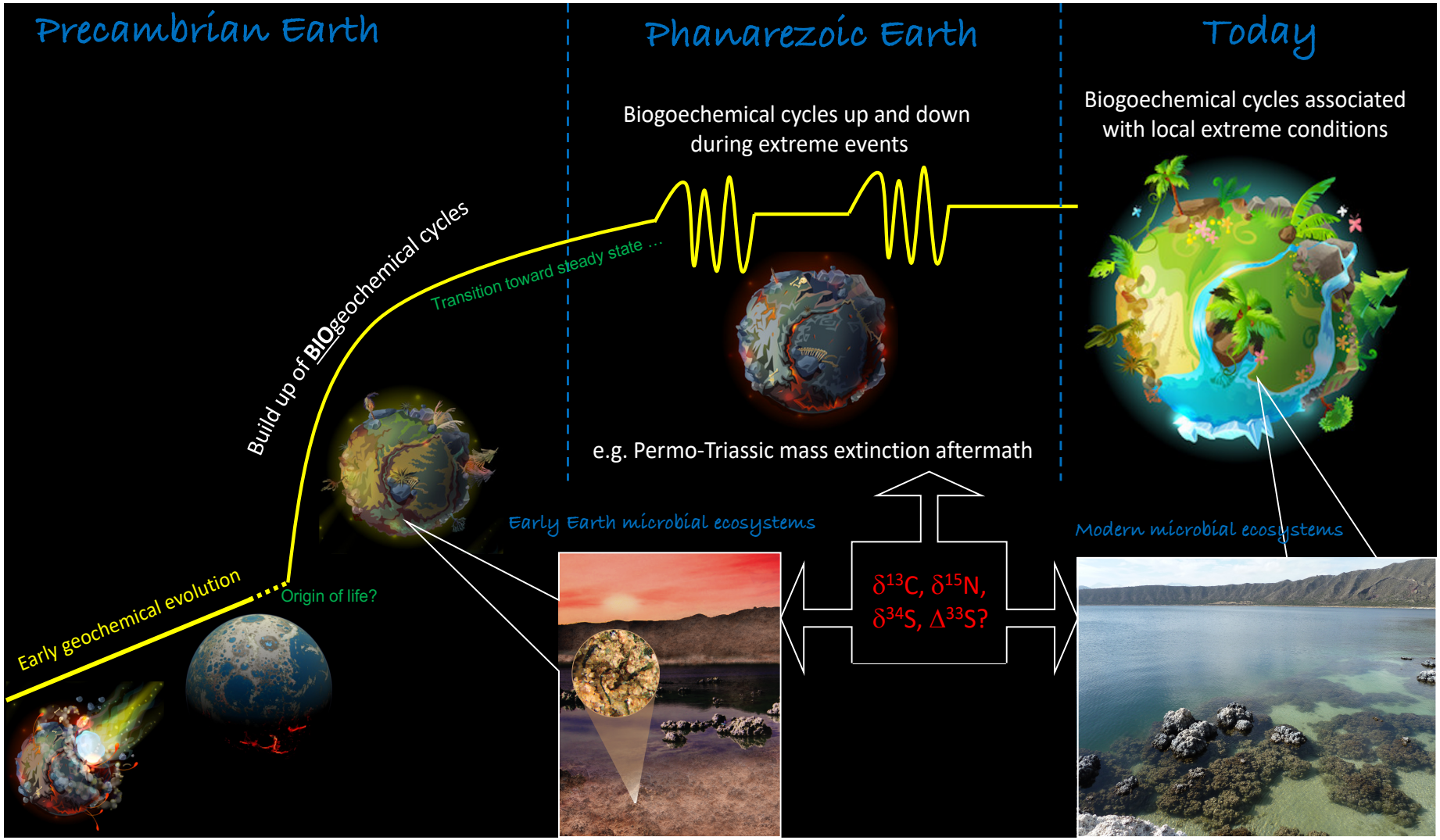
=> Impact of **continental weathering** (through CO_2 consumption) during tectonic uplifts

reconstruction of silicate weathering using combined Hf and Nd isotopes in clays



University of Burgundy : Biogéosciences laboratory

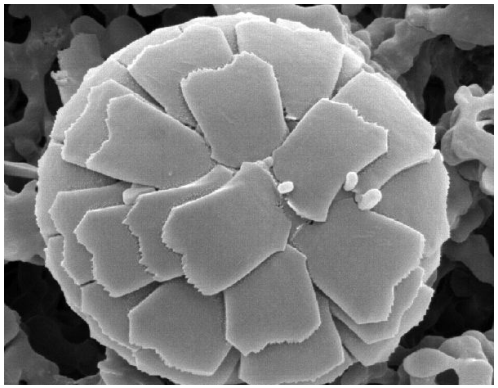
Characterizing interactions of biogeochemical cycles and Earth system



University of Palermo : Micropaleontology laboratory

Impact of climate change on coccolithophore (Quaternary and modern environments)

=> Quantitative **paleoproductivity estimates by coccoliths** over the Holocene



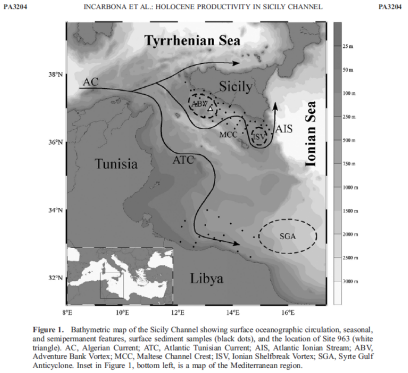
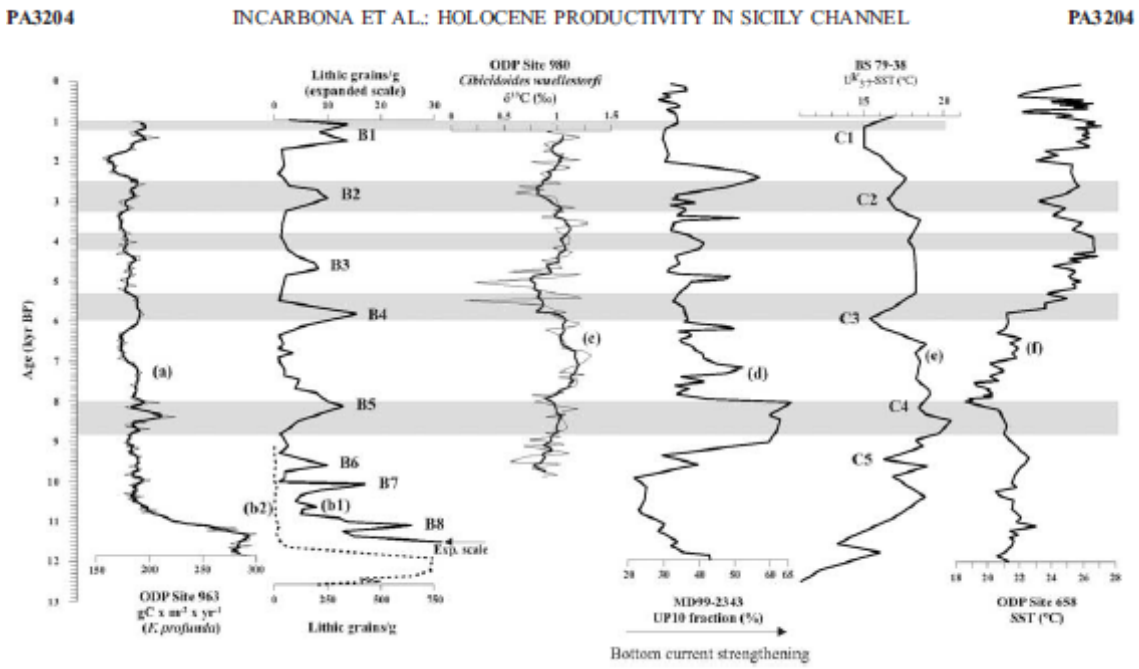


Figure 1. Bathymetric map of the Sicily Channel showing surface oceanographic circulation, seasonal, and semipermanent features, surface sediment samples (black dots), and the location of Site 963 (white triangle). AC, Algerian Current; ATC, Atlantic Tunisian Current; AIS, Atlantic Ionian Stream; ABV, Adventure Bank Vortex; MCC, Maltese Channel Crest; ISV, Ionian Shelfbreak Vortex; SGA, Syrte Gulf Anticyclone. Inset in Figure 1, bottom left, is a map of the Mediterranean region.



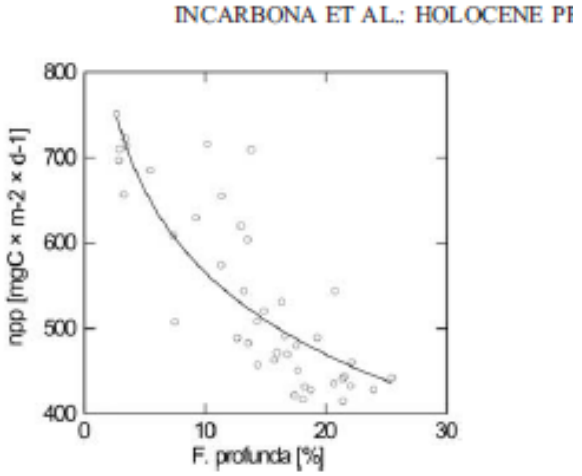


Figure 5. Diagram showing the best nonlinear fit between *F. profunda* percentage values and the last 10 years (October 1997–April 2007) of net primary production data in northern Sicily Strait stations (mgC × m^{-2} × d^{-1}), deduced from satellite imagery. The formula that allows *F. profunda* percentage values to be changed into NPP values is NPP = 885.864 + (−138.963 × LN(*F. profunda*%)).

University of Palermo : Micropaleontology laboratory

Impact of climate change on coccolithophore (Quaternary and modern environments)

=> Testing thermohaline circulation changes and floral and faunal changes over historical times and global warming.

=> Member of the iso2k initiative, PAGES (https://www.pastglobalchanges.org/science/wg/2k-network/projects/iso2k/intro)

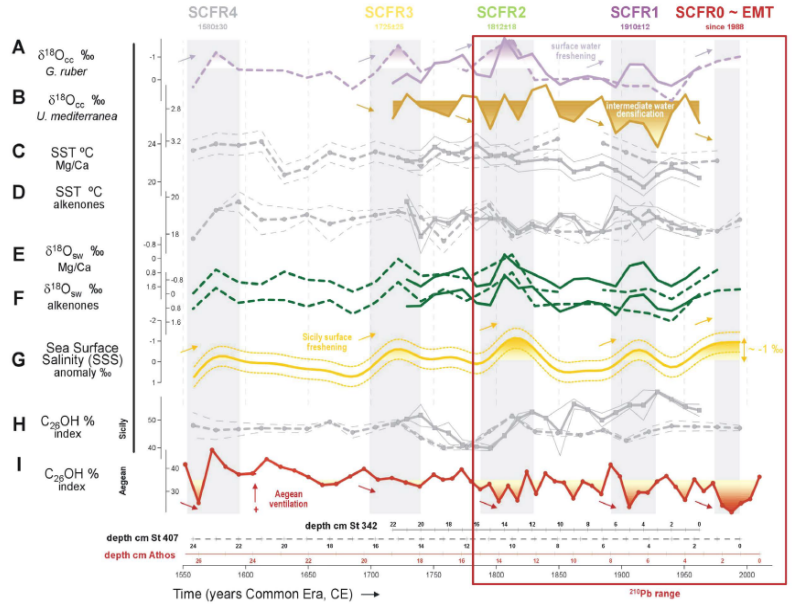


Figure 2. Paleo-dataset in Sicily and Aegean Sea sediments over the last five centuries. Time progression in years of the Common Era (CE). (**A**) $\delta^{18}O_{calcite}$ of *Globigerinoides ruber* and (**B**) *Uvigerina mediterranea* reflecting Sicily Channel surface and bottom water properties, respectively. Sicily Channel SSTs derived from (**C**) the Mg/Ca ratio and (**D**) alkenone palæothermometers Normalized $\delta^{18}O_{sw}$ profiles in the Sicily Channel after temperature correction of (**E**) *G. ruber* Mg/Ca-$\delta^{18}O_{calcite}$ and (**F**) alkenones. (**G**) Resultant salinity anomaly, shown as a 20-year Gaussian low pass filter of the normalized $\delta^{18}O_{sw}$ composite, based on reconstructed oxygen isotopic composition of seawater $\delta^{18}O_{sw}$ in the Sicily Channel (details in Materials and Methods) derived from (**E**) and (**F**). Values above average (−0.1‰) are filled in. Relative proportion of n-hexacosan-1-ol (C_{26}OH) to the sum of C_{26}OH plus n-nonacosane (C_{29}) in (**H**) the Sicily Channel and (**I**) the Aegean Sea sediments. The Eastern Mediterranean Transient (EMT) detected since1988 and similar past anomalies (SCFR1 1910 ± 12, SCFR2 1812 ± 18, SCFR3 1725 ± 25 and SCFR4 1580 ± 30) are shown by bands shaded in grey. In panels (**A–F,G**), dashed lines refer to St 407 and solid lines to St 342. Bands in panels (**C,D,H**) are drawn by using measurement replicates. Core depth-age equivalences are at the bottom of the figure. The box in red shows the time interval within the ^{210}Pb range (see Fig. 4).

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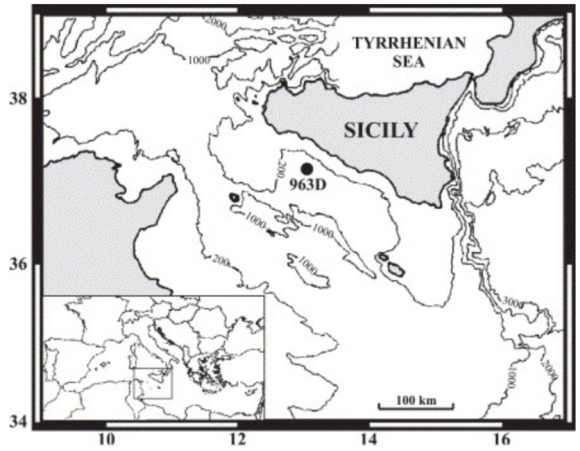
Mediterranean circulation perturbations over the last five centuries: Relevance to past Eastern Mediterranean Transient-type events

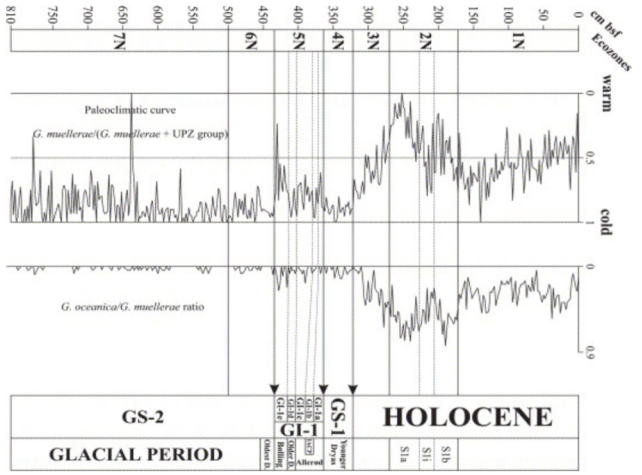
Alessandro Incarbona[1,*], Belen Martrat[2,3,*], P. Graham Mortyn[4,5,*], Mario Sprovieri[6,*], Patrizia Ziveri[4,7,8,*], Alexandra Gogou[9], Gabriel Jordà[10], Elena Xoplaki[11], Juerg Luterbacher[11,12], Leonardo Langone[13], Gianluca Marino[4,14], Laura Rodríguez-Sanz[4,14], Maria Triantaphyllou[15], Enrico Di Stefano[1], Joan O. Grimalt[2], Giorgio Tranchida[6], Rodolfo Sprovieri[1] & Salvatore Mazzola[6]

University of Palermo : Micropaleontology laboratory

Impact of climate change on coccolithophore (Quaternary and modern environments)

=> Paleoenvironmental reconstruction (water column dynamics) by coccoliths in the late Quaternary, in response to suborbital oscillations





E. Di Stefano, A. Incarbona / Marine Micropaleontology 52 (2004) 241–254 247

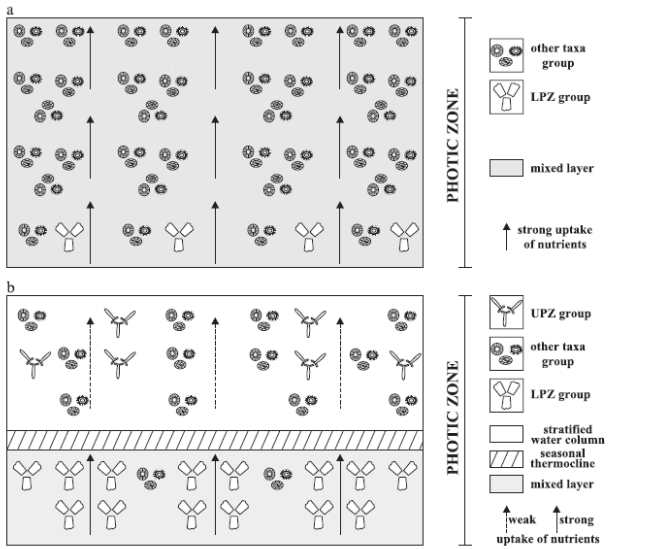
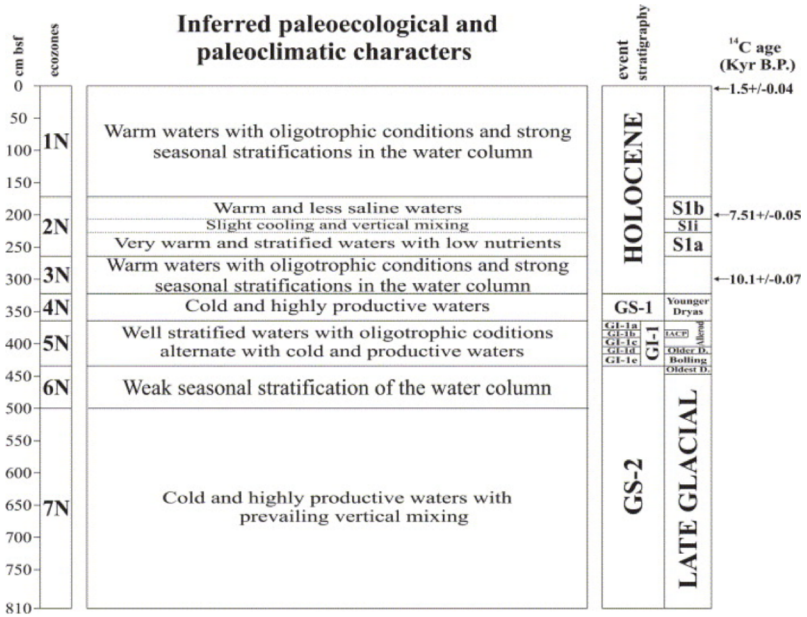


Fig. 3. (a) Schematic vertical distribution of coccolithophores during glacial periods and Younger Dryas. (b) Schematic vertical distribution of coccolithophores during interglacial periods.

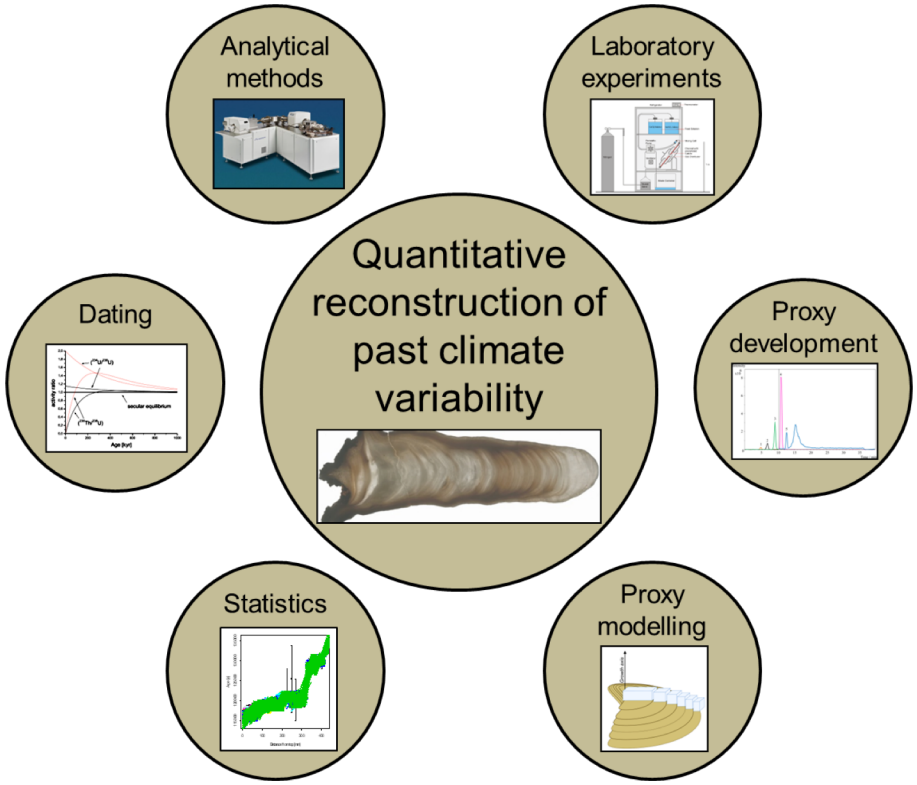


Isotope-geochemical Palaeoclimatology/ Speleothem Research

https://www.geosciences.uni-mainz.de/isotope-geochemical-palaeoclimatology-speleothem-research/

Methodological approach:
Combination of various approaches and techniques to improve existing methods and develop new methods for palaeoclimate reconstruction.

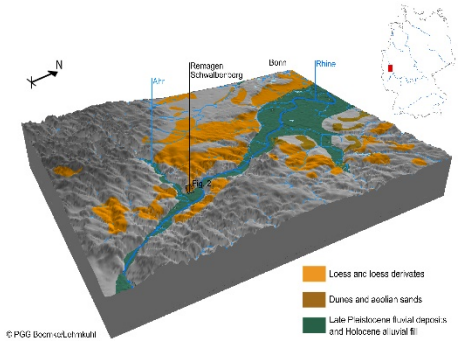
Ultimate goal: Quantitative reconstructions (i.e., absolute temperatures/rainfall amounts instead of warmer/colder or wetter/drier.

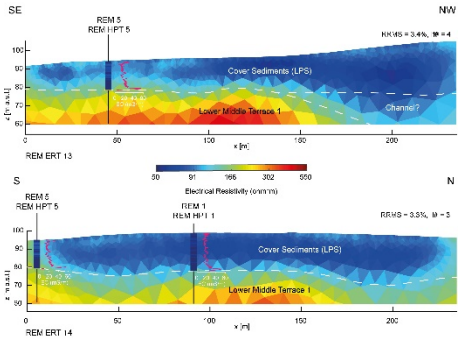


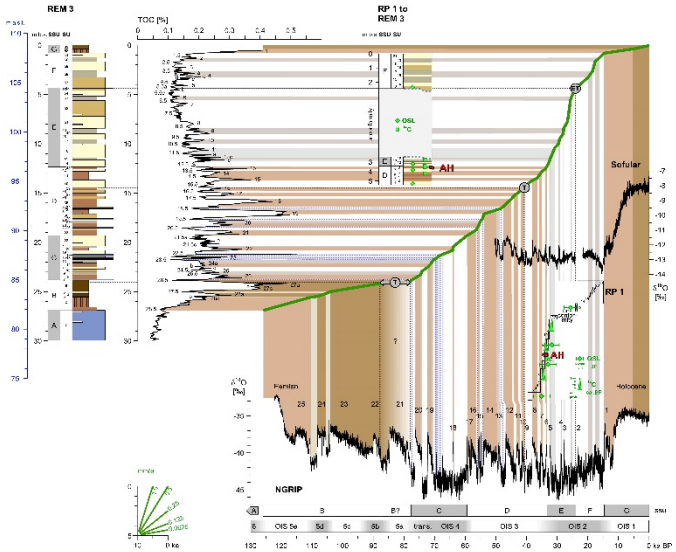
Main climate archive:
Speleothems, but we also study other carbonates

DFG Project "TERRACLIME"

- Reactions of terrestrial systems to the last glacial north Atlantic climate change within high resolution data (since 2017)
- Innovative multi-method approach (geophysics, in-situ borehole, sedimentology, geochemistry)
- High-resolution ^{14}C dating at earthworm-calcite granuals, tephrochronology und luminescence
- Interdisziplinray co-work with RGZM, MONREPOS (palaeolithicum) and MPI-C (luminescence)
- Projekleader: Dr. Peter Fischer, PD Dr. K. E. Fitzsimmons, Prof. Dr. A. Vött







DFG-Project „Rungholt“

- Geophysical, geoarchaeological und archaeological research in the UNESCO-Welterbe „Nordfriesisches Wattenmeer“ (since 2015)
- Reconstruction of the landscape and settlements since 12. Jh. a. D.
- Evidence of stormsurge („Grote Mandränken“ in 1362 u. 1634)
- Interdiscplinarty co-working with CAU Kiel (geophysics), the ALSH and ZBSA Schleswig (archaeology)
- Projektleadership: Dr. H. Hadler, Prof. Dr. A. Vött

ELSEVIER

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Geoarchaeological evidence of marshland destruction in the area of Rungholt, present-day Wadden Sea around Hallig Südfall (North Frisia, Germany), by the Grote Mandrenke in 1362 AD

H. Hadler [a], A. Vött [a], J. Newig [b, †], K. Emde [a], C. Finkler [a], P. Fischer [a], T. Willershäuser [a]

https://doi.org/10.1016/j.quaint.2017.09.013

Abstract

Geophysical and geoarchaeological investigations were carried out in the Wadden Sea of North Frisia (Schleswig-Holstein, Germany) to elucidate major environmental changes that considerably altered the coastal landscape since medieval times. Between the 12th and 14th cent. AD, the present-day tidal flats around the marsh island Hallig Südfall belonged to the historical *Edomsharde* district and its main settlement *Rungholt*. For North Frisia, it is well known that during medieval and early modern times, extreme storm surges caused major land losses associated with a massive landward shift of the coastline. Today, cultural traces like remains of dikes, drainage ditches, terps or even plough marks are still visible in the Wadden Sea and provide evidence of the once cultivated marshland.

DFG-Project „Olympia“

- Geophysical, geoarchaeological und archaeological research int the UNESCO-world heritage ancient Olympia and surrounding areas
- Reconstruction of palaeoconditions and sedimentation since the mid holocene
- Evidence of tectonic events (earthquakes & tsunamis)
- Interdisciplinary co-working with TU Darmstadt (archaeology), University of Freiburg (old history) and ÖAI (archaeology)
- Projectleadership: Prof. Dr. A. Vött