

# Annual report on 2019 paleoclimatic activities at CNR-DSSTTA

## INTRODUCTION AND MOTIVATION

In the last century, our society has entered an epoch of global changes, during which humanity has fully acquired the ability to significantly modify the planetary environment. This new period has been named *Anthropocene*, to underline the relevance of humans as a factor of global planetary change. Human population has grown exponentially, the length of life has increased more rapidly than since the dawn of humanity, extreme poverty is still way too widespread but it has been reduced as never before. At the same time, we have forced huge biodiversity losses, polluted air, waters and soils, disrupted the nitrogen cycle, and induced global climatic changes by the emission of greenhouse gases such as carbon dioxide and methane. Climate change can combine with the other hazards, favoring the interplay of multiple risks with potentially dramatic consequences.

Under such circumstances, the only way to address the new challenges generated by climate change is to increase our quantitative knowledge of the Earth System, disentangling to multiple interacting processes governing its dynamics on all space and time scales, by means of measurements, monitoring and modelling, and develop the abilities to estimate future conditions to provide guidance for implementing mitigation and adaptation measures.

To provide meaningful estimates of future conditions, we need global and regional models, such as those developed by many climate centers in the world (including CNR) and collected for example in the CMIP and CORDEX international programs. However, the climate system is terribly complex, and a full understanding of its workings is still unreached. In particular, models have still troubles in properly dealing with climates that are significantly different from the current one, and in determining the conditions under which the Earth System can reach – and pass through – a tipping point such as collapses in the ocean circulation, generalized permafrost thaw and massive methane emission, or the collapse of the marine biological pump owing to ocean acidification.

Here, the knowledge of past climates can come to help, providing quantitatively measured and measurable “analogues” for what can come in the future. Intense climate changes such as those occurred at the Paleocene-Eocene Thermal Maximum (PETM), or the Eocene-Oligocene cooling, or the many rapid deglaciation warming transitions at the end of the series of glacial maxima in the last million years, with their accompanying short-term fluctuations, provide a glimpse of the possible futures and of the tipping points of the planetary climate system, and can help improving climate models providing a knowledge window on the fully nonlinear processes characterizing the Earth System.

The paleoclimatic research community of DSSTTA CNR, here represented by the Paleoclimate Working Group, is active on many of these themes, and in particular, it focuses on three main issues: (a) the dynamics of climate during the Holocene and the glacial-interglacial cycles across the two main climate system reorganizations of the Quaternary (i.e., the Mid-Brunhes Event and the Middle Pleistocene Transition), with a specific attention on the Mediterranean, Antarctic and Arctic regions; (b) the dynamics of rapid climate transitions (e.g., glacial terminations and sub-millennial scale variability) and extreme (warm) climate from the Permian to today; and (c) the investigation and calibration of chemical and biological proxies to reconstruct terrestrial and marine climate conditions in the past.

The report that follows briefly summarizes the research activities done in 2019.

## 1. ONGOING PROJECTS 2019

### 1.1. Paleoclimatic-environmental archives

#### 1.1.1. Ice records

Project	Brief description	Time scale	CNR-Institute	Partner
<b>Beyond EPICA Oldest Ice Core: 1,5 Myr of greenhouse gas – climate feedbacks - 'Beyond EPICA' (H2020 #815384)</b>	The overarching scientific objective driving Beyond EPICA is to obtain quantitative, high-resolution ice- core information on climate and environmental changes over the last 1.5 Myr, crossing the enigmatic reorganization of the climatic system of the Middle Pleistocene Transition.	Last 1.5 Myr	ISP	AWI UKRI-BAS IPEV ENEA CNRS UU NPI SU UBERN UCPH ULB
<b>The Italian contribution to the project "Beyond EPICA - Oldest Ice" (PNRA16_00124)</b>	This proposal is the Italian national contribution to the H2020 Coordination and Support Action (CSA) "Beyond EPICA - Oldest Ice". The national consortium consists of five leading Italian institutes in the reconstruction of the past climate through ice cores. The challenge will be to prepare the ground for obtaining a 1.5 million-year-old ice core from East Antarctica.	Last 1.5 Myr	ISP	University of Firenze, Bicocca, Bologna, ENEA
<b>Study of the Solar Forcing over the Holocene from a new Dome C Ice Core (SOLARICE) – (PNRA16_00008 - A2)</b>	SOLARICE is a multi-year Franco-Italian scientific initiative aimed at retrieving and studying a late Holocene ice climate record from Concordia Station (East Antarctic Plateau). The objective of this project is to propose a new reconstruction of solar activity based on a high resolution 10Be record. We will implement a multiproxy approach and quantify markers that characterize the evolution of the past local temperature, humidity sources, volcanic forcing, biomass burning and dust sources. The SOLARICE initiative provides an important contribution to the IPICS priorities (past 2k) and Antarctic 2k (within PAGES 2K).	Last 2 kyr	ISP	CEREGE, LGGE, LSCE University of Milan, Venice, Rome, Parma
<b>C3 – Caves Cryosphere and Climate</b>	This project aim at the monitoring and study of permanent ice deposit in caves, with a special focus on the frozen ground of the Julian Alps, a maritime alpine chain located in the easternmost sector of the Alps. Drilling and ice coring performed during the 3 years of the project allowed to face dating issues both using traditional methodologies e.g. <sup>14</sup> C and pollen analysis)	Last 11 kyr	ISMAR	CAI – Società Alpina delle Giulie Trieste, Servizio Geologico della Slovenia,

and new techniques. Particularly, the study of cryogenic calcite to decipher the distribution of the "frozen ground" during the course of Holocene is one of the main application.

Parco  
Naturale  
delle  
Prealpi  
Giulie

### 1.1.2. Marine records

Project	Brief description	Time scale	CNR-Institute	Partner
<b>Geochemical signals in Antarctic biogenic carbonates for paleoceanographic reconstructions (GRACEFUL) – (PNRA16_00069)</b>	GRACEFUL project tackles critical aspects of the Antarctic climate change through a multi-disciplinary international research effort. Specifically, it aims at reconstructing changes in seawater temperature, pH and carbonate saturation state, nutrient content and water mass circulation in the past using a highly innovative approach.	Holocene last 100-200 yrs	<b>ISP</b>	ENEA ISPRA University of Padova, Trieste
<b>Glacioeustatic sea level and climatic change in Sardinia during the Quaternary</b>	The project aims at contributing in defining the future scenarios of the projections of sea level rise induced by global warming, through the reconstruction of the evolution of the coastal landscape of Sardinia. The study is based on the litho-morphostratigraphic and geochronological investigation of the ancient shore lines related to eustatism and the dynamics of marine erosion.	Pleistocene- Holocene	<b>IGAG</b>	UniSS
<b>Paleoclimate implications during LGM from sedimentary records along the Antarctic continental margin, Ross Sea (PNRA-PEA2015)</b>	This research has been designed to reconstruct the paleoclimate implications in a peculiar area of the Ross Sea off Coulmann High during LGM. The main purpose was to discriminate the different contributions from the EIAS and WAIS ice sheets, the Ross Ice Shelf and the ocean input in an ice-proximal marine setting. A multi-proxy study of several sediment cores comprising sediment characterization and REEs compositional analyses allowed to constrain the precise extent of the ice sheets during LGM.	LGM	<b>IGAG</b>	ISP University of Siena
<b>Testing the role of Mediterranean thermohaline circulation as a sensor of transient climate events and shaker of North Atlantic Circulation (TIMED) (REP-683237) - ERC Consolidator Grant, Horizon 2020, Excellent Science, Associate Partner Organisation ISMAR-CNR</b>	An innovative approach, based on both well-established and newly-developed analytical methods will be applied to characterize, qualitatively and quantitatively, past changes in the Mediterranean thermohaline circulation (MedTHC) dynamics. Specific time windows representing very different transient periods (18-14 ka; 9.5-6.5 ka and the last 2 kyr) will be targeted in order to understand the distinctive role that individual forcing mechanisms exerted in controlling MedTHC changes.	Last 18 kyr	<b>ISMAR</b>	University of Barcelona
<b>RECONstrucción de las comunidades de MAR</b>	RECOMARES aims to identify which variables explain the changes in the	Last 200 yrs	<b>ISMAR</b>	CSIC Barcelona

<p><b>Profundo en Márgenes Continentales Ibéricos en las últimas décadas/siglos (RECOMARES) - MINISTERIO DE CIENCIA, INNOVACIÓN y UNIVERSIDADES - SRTI201800X094066IV0.</b></p>	<p>communities and diversity, short-medium term oscillations of species living in the outer shelf and slope in the Mediterranean/Cantabrian seas, analysing both natural variability and human impact.</p>			<p>ENEA Centro Ricerche Santa Teresa</p>
<p><b>Human-Induced Changes Compromising the open ocean: generating Understanding from Paleooceanography (HICCUP) - MINISTERIO DE CIENCIA, INNOVACIÓN y UNIVERSIDADES - RTI2018-095083-B-I00.</b></p>	<p>The main goal of the project is to obtain quantitative information on the evolution of the main global parameters affecting the oceans: warming, acidification and oxygenation, all from a paleo-oceanographic perspective, with emphasis on the last centuries (anthropogenic impact) and the last glacial / interglacial cycle, based on geochemical analysis of sediments from the Mediterranean Sea.</p>	<p>Last centuries and last glacial / interglacial cycle</p>	<p><b>ISMAR</b></p>	<p>CSIC Barcelona University of Barcelona</p>
<p><b>The Po-Adriatic Source-to-Sink system (PASS): from modern sedimentary processes to millennial-scale stratigraphic architecture (PRIN)</b></p>	<p>The proposed research project (PASS) aims at establishing a framework in which different disciplines are combined in a unified working procedure that integrates for the first time sequence stratigraphy, sediment provenance and a quantitative assessment of modern sedimentary processes. PASS will quantitatively assess sediment fluxes across a ~1,000 km long, source-to-sink system by applying a multiscale sequence-stratigraphic method to the chronologically well-constrained, post-glacial succession of the Po-Adriatic region.</p>	<p>Last 17 kyr</p>	<p><b>ISMAR ISP</b></p>	<p>UniBO</p>
<p><b>Past and present sedimentary dynamic in the ROSS Sea: a multidisciplinary approach to study the continental SLOPE (ROSSLOPE II) – (PNRA13_AN2.01)</b></p>	<p>The project aims to investigate the present and past water circulation from sedimentary sequences of the outer shelf and continental slope to the West and East of the Iselin Banks (Ross Sea). Data processing based on multidisciplinary analyses allowed us to identify the main factors that are conditioning and have conditioned the sedimentation processes in the study area during the glacial and interglacial periods.</p>	<p>Late Quaternary</p>	<p><b>ISMAR</b></p>	<p>University of Trieste, Bicocca INGV OGS</p>
<p><b>Benthic biodiversity and ecosystem functioning of the Deep ROSS SEa in a changing Southern Ocean (BEDROSE) – (PNRA)</b></p>	<p>The project BEDROSE aims at evaluating the response of the deep-sea biota, the impact on biodiversity and on ecosystem functioning of the climate variability by comparing the results obtained from the ROSSMIZE cruise (Ross Sea Marginal Ice Zone, X Antarctic Expedition, 1994-1995). The results of this research will allow: i) identifying mechanisms and potential extent of the impact of climate change in the deep Antarctic ecosystems and ii) providing elements for a sound management of this region and iii) evaluating ecological implications at wider spatial scale.</p>	<p>Last 25 yr</p>	<p><b>ISMAR</b></p>	<p>Uni Politecnica Marche, Università di Cagliari, Università di Genova, ISPRA</p>

### 1.1.3. Terrestrial records

Project	Brief description	Time scale	CNR-Institute	Partner
<b>Romanelli Cave – Grandi Scavi Sapienza</b>	The project aim is the critical revision of the lith-, chrono and morpho-stratigraphy of the Romanelli Cave in Apulia, southern Italy, representing a key site of the Italian Paleolithic. The paleoclimatic study is based on a multi-proxy, morphological, stratigraphic, geochronological, paleontological and geochemical analyses.	Last 270 kyr	<b>IGAG</b>	UniRoma Sapienza
<b>Contributing to the project Europeo NeuMed-Uuniversity of Siena (DTA.AD001.297)</b>	The project aims at reconstructing the ancient landscape of the south-western Maremma Toscana area, in Tuscany, central Italy, and, specifically, at individuating the changing in the lagoon, pond, fluvial stream and coastal line sub-systems induced by the natural and anthropogenic factors.	Holocene-historical times	<b>IGAG</b>	UniSI
<b>Coastal line evolution and its impact on the human settlement (DTA.AD001.272)</b>	Study of the human-environment interactive system in the area of the Laguna di Salpi, southern Italy, within the framework of the European project Life on the lagoon: reconstructing the biography of human landscape dynamics on the Salpi Lagoon-Italy (supported by National Endowment for Humanities, USA), and of the Tiber delta.	Holocene-historical times	<b>IGAG</b>	UniFG, McGill University, Davidson College
<b>DIAMOND “Neolithic Demography and hydrological change In Apulia” (Accordo CNR/MoS biennio)</b>	The aims of the DAIMOND project is to reconstruct the hydrological variability during the Lower Holocene and assess its potential role as driving environmental factors of the cultural and demographic evolution of the Neolithic of the Apulian and Montenegro regions. The study is based on stable isotope (O and C) data from speleothems collected and the statistical analyses of the radiocarbon data collected in both regions.	Lower Holocene	<b>IGAG</b>	Montenegro Science Ministry
<b>Climatic change and environmental evolution of the Plio-Pleistocene lake system of the L’Aquila Basin</b>	The project aims to reconstruct the paleoenvironmental and paleoclimatic history from the late Pliocene-Lower Pleistocene lacustrine succession of the San Nicandro Formation (AQ) hosted in L’Aquila Basin, central Italy, through a multi-proxy approach that integrates, sedimentological, micropaleontological, tephrochronological, bio-geochemical and magnetostratigraphical investigations.	~1.6-3.0 Ma	<b>IGAG ISMAR</b>	University of Roma-3, Pisa, Firenze and Gif-sur-Yvette and INGV
<b>FUTURE “Fucino Tephrochronology Unites</b>	The general objective of FUTURE is to assemble a high-precision 40Ar/39Ar	Last 430 kyr	<b>IGAG IGG</b>	UniPI

<b>Quaternary Records” (MIUR – PRIN 2017)</b>	dated tephrochronological record for the last ~430 kyr anchored to a detailed paleoclimate multiproxy record that may be regionally to globally spread via tephrostratigraphic, paleomagnetic and cosmogenic nuclide peak synchronization and paleoclimatic alignments.			UniRoma-Sapienza UniNA
<b>Quantitative reconstruction of climate parameters from pollen records in the Alpine elevational ecogradients</b>	This project explores the potential of pollen data as quantitative proxy to provide insight on the climate change in the high mountain systems. Holocene pre-anthropogenic records are primary selected from the Alpine belts and the sensitivity to climate parameters (TJan, TJuly, Pann) is tested against the regional response of biodiversity in the subalpine and alpine belts, especially by tree species.	Holocene	<b>IGAG ISAC</b>	UniMI-Bicocca
<b>Timing and dynamic of the Glacial Termination IX</b>	The project aims to provide a contribution to the knowledge on the role played by the orbital forcing and other factors driving the Pleistocene Glacial Termination (T-#). The goal is to reconstruct, at high temporal resolution, the quantitative temperature variation through the T-IX (ca. 805-790 ka), by means geochemical and geochronological analyses of the lacustrine sediments, spanning the 810-770 ka interval, hosted in the Sulmona Basin (central Italy).	810-770 ka	<b>IGAG IGG</b>	University of Pisa, Melbourne Gif-sur-Yvette
<b>HELPING - Hydrological Evolution of Past INterGlacial</b>	The HELPING project aims to reconstruct at high temporal resolution the hydrological and environmental evolution of the past interglacial period spanning the 420-370 kyrs period, corresponding to Marine Isotope Stage (MIS) 11. The study is accomplished by geochemical and geochronological analyses, to be performed on sediment from a specific interval of the lacustrine succession hosted in the Sulmona Basin (central Italy).	420-370 ka	<b>IGAG IGG</b>	University of Pisa and CNRS Gif-sur-Yvette and INGV
<b>Rapid ecosystem response to millennial climate variability throughout MIS 3 and at the onset of the Last Glacial Maximum. A project of resolving the Lake Fimon record 40 to 20 kyrs ago with a pass of 80 years (ERC-Success)</b>	Lake Fimon (Vicenza, N-Italy) offers a unique record of continuous lake sediments across the last extreme cold phases affecting boreal forest and open terrestrial ecosystems, 40 km aside from the culminating Alpine glaciers. High-resolution analysis of palaeoecological proxies offers insight on Tjan, Tjuly, Pann and on ecological factors (fire frequency and regime) experienced by the terrestrial and freshwater biota at the approaching of Heinrich Events 3 and 2.	40-20 ka	<b>IGAG IGG</b>	UniBO

<p><b>Dating Glacial Landforms by Cosmogenic Nuclides (Slovenian research Agency: BI-TR/18-21-003)</b></p>	<p>This project includes the application of cosmogenic nuclide dating techniques to date glacial deposits and estimate long-term denudation rates in Slovenia and Turkey with the aim to reconstruct the climate at the time of glaciations. The study areas include the Italian-Slovenian Julian Alps and the coastal northern Dinaric Alps of Velebit mountain, in Croatia. The overall goal of the prospective research project is to assess the Late Quaternary paleoclimate of the Adriatic and Eastern Mediterranean regions.</p>	<p>Late Quaternary</p>	<p><b>ISMAR</b></p>	<p>Slovenia</p>
<p><b>Sedimentary and palaeoenvironmental evolution of the central Veneto Plain</b></p>	<p>The project is aimed at study the climatic and sedimentary factors that drove the evolution of the fluvial systems of the Veneto Plain through multiproxy analysis including sedimentology, provenance, micropalaeontology, palynology and geochronology.</p>	<p>Pleistocene</p>	<p><b>IGG IGAG</b></p>	<p>UniPD</p>
<p><b>Evolution of the Alpine glacial systems during the LGM</b></p>	<p>The chronological and stratigraphic study of the Alpine end-moraine systems is carried out in order to understand the evolution of the Alpine glaciated systems during the LGM. The multidisciplinary study is supported by exposure and radiocarbon datings and facies analysis.</p>	<p>Late Pleistocene</p>	<p><b>IGG</b></p>	<p>UniTO ETH Austrian Geological Survey</p>
<p><b>Links between human and environment during the late Quaternary in the Iraqi Kurdistan)</b></p>	<p>Study of palaeoclimatic and palaeoenvironmental conditions in the Iraqi Kurdistan during the Quaternary and their link with the record of the human development and occupation, through integration of geoarchaeological, geomorphological and geochemical data.</p>	<p>Late Pleistocene - Holocene</p>	<p><b>IGG</b></p>	<p>UniMi-Statale UniUD</p>
<p><b>Study on the Carnian Pluvial Episode (CPE)</b></p>	<p>Study of a Carnian (Late Triassic) important phase of global climate change, coincident with a time of major biological turnover (dinosaurs, calcareous nannofossils, and conifers). Identification of the main changes in the geological record worldwide during this interval and study of the synchronous Large Igneous Province volcanism.</p>	<p>Late Triassic</p>	<p><b>IGG</b></p>	<p>University of Padova, Leeds, Bristol, Göttingen, Ferrara, München, Chengdu, Bolzano and Trento Museum</p>
<p><b>Euregio project "The end-Permian mass extinction in the Southern and Eastern Alps: extinction rates vs taphonomic biases in different depositional environments" (2016-2019)</b></p>	<p>Biostratigraphic and paleoclimatic study (paleobotany and palynology) of the Permian–Triassic boundary interval</p>	<p>Permian–Triassic boundary interval</p>	<p><b>IGG</b></p>	
<p><b>"MAMPFT" - Mikrosproren an Makropflanzen-Fossilien der</b></p>	<p>Paleobotanical and palynological study of Permian and Lower and Middle</p>	<p>Permian-Triassic</p>	<p><b>IGG</b></p>	<p>University of Padova, München,</p>

<b>Trias", South Tirol Museum project (2019-2021)</b>	Triassic stratigraphic section and related Fossil Lagerstätten.			Bolzano Museum
<b>Italian Long-Term Ecological Research Network (LTER-Italy) (<a href="http://www.lteritalia.it">http://www.lteritalia.it</a>)</b>	LTER-Italy includes terrestrial, freshwater and marine ecosystems distributed throughout our country, with a marked trans-ecodomain approach. At the LTER-Italy sites, ecological observations are carried out at the multidecadal scale, appropriate to support understanding and management of the environment. LTER represents one of the main tools for analyzing how ecosystems change over time, and for describing and interpreting natural variability as opposed to 'man-made' variability. the ecological information, from local to global scale, becoming a scientific reference for policy makers.		<b>ISMAR</b>	See website

## 1.2. Methodological development

<b>Multiproxy calibration of climate warming in the last 200 yrs – pollen and tree rings over instrumental series</b>	The project explores multiproxy calibration with quasi-annual resolution, by analyzing lake records and dendroclimatic series in Trentino region (Italian Alps), which are compared with modelled instrumental records for the last 200 yrs. Obtained time series of reconstructed climate parameters are submitted to correlation analysis in order to infer multiproxy calibration. The proximity of a new ice-core with annual resolution in the area (Ortles – CNR/ISP) draws further attention for a next step of the project.	Holocene	<b>IGAG ISAC</b>	UniMI-Bicocca
---	---	----------	----------------------	---------------

## 1.3. Third mission

<b>Connecting Science with Society - EU-PolarNet (H2020 #652641) (<a href="https://cordis.europa.eu/project/id/652641/it">https://cordis.europa.eu/project/id/652641/it</a>)</b>	The EU-PolarNet is aimed at establishing an ongoing dialogue between policymakers, business and industry leaders, local communities and scientists. The increase of mutual understanding and the identification of new ways of working will deliver economic and societal benefits. The results of this dialogue will be brought together in a plan for an Integrated European Research Programme. This will be co-designed with all relevant stakeholders and coordinated with the activities of other polar research nations beyond EU		<b>ISP</b>	See website
--	--	--	------------	-------------

## 1.4. Conservation and networking

<b>ICE-Memory</b>	It is an international research project recognized by UNESCO. The aim of this project is to create a sanctuary for non-polar ice core samples in Concordia, the Franco-Italian research station in Antarctica, in order to allow future generations of scientists to continue to analyze		<b>ISP</b>	Ca' Foscari CNRS IRD IPEV
-------------------	--	--	------------	------------------------------------



	them. Ice memory's international team plans to drill 20 glaciers over the next two decades.	
<b>Svalbard Snow Network (SnowNet) - consolidating and expanding the network for future actions (SSF)</b>	The project aim is to support two workshops on snow science to build upon the expertise gained during the initial workshop (Poland, 2015, project number 246731/E10) and pilot project funded by SSF (2016, project number 257636/E10, C2S3) in which we gathered researchers with different scientific backgrounds working directly or indirectly with snow on Svalbard.	<b>ISP</b>
<b>CHANGE (Climate, Hydrology AND Alpine GlaciErs) - H2020-Marie Sklodowska Curie Action-IF-2017-793403</b>	One part of the project aims at understanding the influence of rock permeability on subglacial hydrology and glacier motion by using state-of-the-art glaciological field techniques and glacio-hydrological model in collaboration with Aarhus University (Denmark). The other part of the project deals with analyses of climate observations and climate projections data with the aim to reconstruct past variations and make future projections of the equilibrium line altitude of glaciers in the European Alps also in cooperation with UNESCO-ICTP.	<b>ISMAR</b>

## 2. MEETING AND WORKSHOP ORGANIZATION

<b>Title</b>	<b>Institute</b>
Workshop – La dinamica del clima nell'ultimo ciclo glaciale-interglaciale Organized by the Working Group “Dinamica del Paleoclima” 17-18 June 2019 - Centro Congressi dell'Area di Ricerca CNR di Bologna	<b>DSSTTA</b>
EMS 2019 (UP2.4) The cryosphere and cold region processes in the global climate system <a href="https://meetingorganizer.copernicus.org/EMS2019/session/33619">https://meetingorganizer.copernicus.org/EMS2019/session/33619</a>	<b>ISMAR</b>
INQUA 2019- Dublin, Ireland, 25-31 July 2019. Session: Quaternary climate dynamics peculiar to the Mediterranean region ( <a href="http://www.inqua2019.org/">http://www.inqua2019.org/</a> ). Convenors: De Rita F., Magri D., Lirer F.	<b>ISMAR</b>
Svalbard snow network workshop 22 – 25 October 2019, Warsaw, Poland.	<b>ISP</b>
Aumento del livello marino: cause, effetti, impatti e scenari attesi sulle coste nel 2100. Giornata di studio svoltasi il 13 Dicembre 2019 presso il CNR, Aula Marconi. <a href="http://www.aiqua.it/index.php/attivita/eventi-aiqua/45-aumento-del-livello-marino-cause-effetti-impatti-e-scenari-attesi-sulle-coste-nel-2100">http://www.aiqua.it/index.php/attivita/eventi-aiqua/45-aumento-del-livello-marino-cause-effetti-impatti-e-scenari-attesi-sulle-coste-nel-2100</a>	<b>IGAG</b>
Pre-Conference field trip “Lacustrine deposits of the late Piacenzian-Gelasian L'Aquila intermontane basin (central Italy)”. 34th International meeting of sedimentology. Sedimentology to face societal challenges on risk, resources and record of the past. L'Aquila September 8th-9th 2019	<b>IGAG</b>
Short Summer School - Geological archives of past warm periods from Central Italy and their potential for climate research: Scientific context, analytical methods and future potential from the study of ancient lake basins of the Central Apennine (Italy). Cities Partnerships Programme London-Rome, UCL, Sapienza, CNR-IGAG. Sulmona (AQ), May 28-29 2019.	<b>IGAG</b>
34th IAS Meeting of Sedimentology, Rome 10-13 September 2019. 5.6 Session: Sedimentary Processes, Stratal Architecture and Stratigraphy of Alluvial Systems. Convenors: Ghinassi M. (University of Padua, Italy); Colombera L. (University of Leeds, UK); Fielding C. (University of Nebraska-Lincoln, USA), Mancini M. (CNR- IGAG, Rome)	<b>IGAG</b>
EGU2019 Session: Mountain Glaciations and their diversity - Glacial landforms and their palaeoclimatic interpretation. Convenors: Winkler S., Iturrizaga L., Kight L., Monegato G., Reitner J.	<b>IGG</b>
INQUA 2019- Dublin, Ireland, 25-31 July 2019. Session: Mountain glaciations and their diversity: Challenge and potential ( <a href="http://www.inqua2019.org/">http://www.inqua2019.org/</a> ). Convenors: Winkler S., Monegato G., Reitner J.	<b>IGG</b>

### 3. PAPERS (2019)

References	Topic	Institute
1. Amato, V., Aiello, G., Barra, D., Caporaso, L., Caruso, T., Giaccio, B., Parisi, R. & Rossi, A. (2019). Holocene paleogeographic evolution of an ancient port city of the central Mediterranean area: Natural and anthropogenic modifications from Salerno city, southern Italy. <i>Geoarchaeology</i> , in press.	Terrestrial record	IGAG
2. Argiriadis, E., Denniston, R. F. & Barbante, C. Improved Polycyclic Aromatic Hydrocarbon and n-Alkane Determination in Speleothems through Cleanroom Sample Processing. <i>Analytical Chemistry</i> 91, 7007-7011, doi:10.1021/acs.analchem.9b00767 (2019).	Terrestrial record	ISP
3. Barbaro, E. et al. Characterization of the water-soluble fraction in ultrafine, fine, and coarse atmospheric aerosol. <i>Science of the Total Environment</i> 658, 1423-1439, doi:10.1016/j.scitotenv.2018.12.298 (2019).	Observation and monitoring	ISP
4. Badino, F., Pini, R., Ravazzi, C., Margaritora, D., Arrighi, S., Bortolini, E., Figus, C., Giaccio, B., Lugli, F., Marciani, G., Monegato, G., Moroni, A., Negrino, F., Oxilia, G., Peresani, M., Romandini, M., Ronchitelli, A., Spinapolice, E.E., Zerboni, A. & Benazzi, S. (2019). An overview of Alpine and Mediterranean palaeogeography, terrestrial ecosystems and climate history during MIS 3 with focus on the Middle to Upper Palaeolithic transition. <i>Quaternary International</i> , in press.	Terrestrial record	IGAG IGG
5. Bartiromo, A., Graziano, R., Raspini, A., Bravi, S. (2019). A new terrestrial plant-rich Fossil-Lagerstätte from the middle Cenomanian (Late Cretaceous) of the Apennine Carbonate Platform (Magliano Vetere, southern Italy): Depositional and palaeoenvironmental settings. <i>Sedimentary Geology</i> , 388, 37-65.	Terrestrial record	IGG
6. Bellucci, L., Biddittu, I., Brilli, M., Conti, J., Germani, M., Giustini, F., Iurino, D.A., Mazzini, I., Sardella, R. (2019). First occurrence of the short-faced bear <i>Agriotherium</i> (Ursidae, Carnivora) in Italy: Biochronological and palaeoenvironmental implications. <i>Italian Journal of Geosciences</i> 138 (1), 124-135.	Terrestrial record	IGAG
7. Bini M., Zanchetta G., Perşoiu A., Cartier R., Català A., Cacho I., Dean R. J., Di Rita F., Drysdale R. N., Finnè M., Isola I., Jalali B., Lirer F., Magri D., Masi A., Marks L., Mercuri A. M., Peyron O., Sadori L., Sicre M-A., Welc F., Zielhofer C. and Brisset E., (2019). The 4.2 ka BP Event in the Mediterranean Region: an overview. <i>Climate of Past</i> , 15, 555–577, <a href="https://doi.org/10.5194/cp-15-555-2019">https://doi.org/10.5194/cp-15-555-2019</a>	Marine and Terrestrial record	ISMAR
8. Boccali C., Žebre M., Colucci R.R. (2019) Geometry and paleo-ice content of rock glaciers in the southeastern Alps (NE Italy - NW Slovenia) <i>Journal of Maps</i> , 15-2, 346-355.	Terrestrial record	ISMAR
9. Burgay, F. et al. Fe <sup>2+</sup> in ice cores as a new potential proxy to detect past volcanic eruptions. <i>Science of the Total Environment</i> 654, 1110-1117, doi:10.1016/j.scitotenv.2018.11.075 (2019).	Ice record	ISP
10. Calcagnile, L., Sardella, R., Mazzini, I., Giustini, F., Brilli, M., D'Elia, M., Braione, E., Conti, J., Mecozzi, B., Bona, F., Iurino, D.A., Lembo, G., Muttillio, B., Quarta, G. (2019). New radiocarbon dating results from the upper paleolithic–mesolithic levels in Grotta Romanelli (Apulia, southern Italy). <i>Radiocarbon</i> , 61 (5), 1211-1220.	Terrestrial record	IGAG
11. Camuffo, D. (2019). <i>Microclimate for Cultural Heritage – Measurement, Risk Assessment, Conservation, Restoration and Maintenance of Indoor and Outdoor Monuments</i> . Third Edition. Elsevier, Amsterdam, New York, 582 pages. ISBN: 978-0-444-64106-9.	Methodological development	ISAC
12. Català, A., Cacho, I., Frigola, J., Pena, L. D., and Lirer, F., (2019). Holocene hydrography evolution in the Alboran Sea: a multi-record and multiproxy comparison. <i>Clim. Past</i> , 15, 927–942, <a href="https://doi.org/10.5194/cp-15-927-">https://doi.org/10.5194/cp-15-927-</a>	Marine record	ISMAR

2019		
13. Cerrato, R., Salvatori, M. C., Gunnarson, B.E., Linderholm, H.W., Carturan, L., Brunetti, M., De Blasi, F., Baroni, C. (2019). A <i>Pinus cembra</i> L. tree-ring record for late spring to late summer temperature in the Rhaetian Alps, Italy. <i>Dendrochronologia</i> , 53, 22-31.	<b>Terrestrial record</b>	<b>ISAC IGG</b>
14. Chaabane, S., Lopez Correa, M., Ziveri, P., Trotter, J., Douville, E., McCulloch, M., Taviani, M., Linares, C., Montagna, P. (2019). Elemental systematics of the calcitic skeleton of <i>Corallium rubrum</i> and implications for the Mg/Ca temperature proxy. <i>Chemical Geology</i> , 524, 237-258.	<b>Methodological development</b>	<b>ISP</b>
15. Chiarini, F., Ravaoli, M., Capotondi, L. (2019). Interannual variability of vertical particle fluxes in the Ross Sea (Antarctica). <i>Nature Conservation</i> , 34, 417- 440.	<b>Marine record</b>	<b>ISMAR</b>
16. Coccioni, R., Frontalini, F., Catanzariti, R., Jovane, L., Rodelli, D., Rodrigues, I., Sprovieri, M., Savian, J.F., Giorgioni, M., Galbrun, B., Montanari, A., Bice, D.M., Roberts, A.P. (2019). Paleoenvironmental signature of the Selandian-Thanetian Transition Event (STTE) and Early Late Paleocene Event (ELPE) in the Contessa Road Section (Western Neo-Tethys). <i>Palaeogeography, Palaeoclimatology, Palaeoecology</i> , 523, 62-77.	<b>Marine record</b>	<b>IGG</b>
17. Colucci R.R., Guglielmin M. (2019) Climate change and rapid ice melt; suggestions from abrupt permafrost degradation and ice melting in an alpine ice cave. <i>Progress in Physical Geography</i> . 43: 4, 561-573.	<b>Ice record</b>	<b>ISMAR</b>
18. Colucci R.R., Forte E., Žebre M., Maset E., Zanettini C., Guglielmin M. (2019). Is that a relict rock glacier? <i>Geomorphology</i> , 330, 177-189.	<b>Terrestria</b>	<b>ISMAR</b>
19. Columbu, A., Drysdale, R., Hellstrom, J., Woodhead, J., Cheng, H., Hua, Q., Zhao, J. Montagna, P., Pons- Branchu, E., Edwards, R.L. U-Th and radiocarbon dating of calcite speleothems from gypsum caves (Emilia Romagna, North Italy). <i>Quaternary Geochronology</i> , 52, 51-62.	<b>Terrestrial record</b>	<b>ISP</b>
20. Corella, J. P. et al. Holocene atmospheric iodine evolution over the North Atlantic. <i>Climate of the Past</i> 15, 2019-2030, doi:10.5194/cp-15-2019-2019 (2019).	<b>Ice record</b>	<b>ISP</b>
21. Cuny-Guirriec, K., Douville, E., Reynaud, S., Allemand, D., Bordier, L., Canesi, M., Mazzoli, C., Taviani, M., Canese, S., McCulloch, M., Trotter, J., Rico-Esenaro, S., Sanchez-Cabeza, J-A., Ruiz-Fernández, A., Carricart- Ganivet, J., Scott, P., Sadekov, A., Montagna, P. (2019). Coral Li/Mg thermometry: Caveats and constraints. <i>Chemical Geology</i> , 523, 162-178.	<b>Methodological development</b>	<b>ISP</b>
22. Di Rita F., Lirer F., Margaritelli G., Michelangeli F., Magri D., (2019). Climate and human influence on the vegetation of Tyrrhenian Italy during the last 2000 years: new insights from microcharcoal and non-pollen palynomorphs. <i>Geografia Fisica e Dinamica del Quaternario</i> , 42 (2), in press	<b>Marine record</b>	<b>ISMAR</b>
23. Feltracco, M. et al. Free and combined L- and D-amino acids in Arctic aerosol. <i>Chemosphere</i> 220, 412-421, doi:10.1016/j.chemosphere.2018.12.147 (2019).	<b>Ice record</b>	<b>ISP</b>
24. Fontana A., Monegato G., Rossato S., Poli M.E., Furlani S., Stefani C. (2019). Carta delle Unità geologiche della pianura del Friuli Venezia Giulia alla scala 1:150.000 e note illustrative. Regione Autonoma Friuli Venezia Giulia - Servizio Geologico, Trieste, 80 pp., 1 foglio allegato.	<b>Terrestrial record</b>	<b>IGG</b>
25. Franceschi, M., Dal Corso, J., Cobianchi, M., Roghi, G., Penasa, L., Picotti, V., Preto, N. (2019). Tethyan carbonate platform transformations during the Early Jurassic (Sinemurian–Pliensbachian, Southern Alps): Comparison with the Late Triassic Carnian Pluvial Episode. <i>Geological Society of America Bulletin</i> , 131, 1255-1275.	<b>Marine record</b>	<b>IGG</b>
26. Francescone, F., Lauretano, V., Bouligand, C., Moretti, M., Sabatino, N., Schrader, C., Catanzariti, R., Hilgen, F., Lanci, L., Turtù, A., Sprovieri, M., Lourens, L., Galeotti, S. (2019). A 9 million-year-long astrochronological record of the early-middle Eocene corroborated by seafloor spreading rates. <i>Geological Society of America Bulletin</i> , 131(3-4), 499 - 520.	<b>Marine record</b>	<b>IGG</b>

27. Furlanetto G., Garozzo L., Brunetti M., Ravazzi C. (2019) - Ecological climatology along an elevational transect in the outer belt of the European Alps: modern pollen, vegetation and climate. <i>Alpine and Mediterranean Quaternary</i> 32 (2), 117-130.	<b>Terrestrial record</b>	<b>IGAG ISAC</b>
28. Furlanetto G., Ravazzi C., Badino F., Brunetti M., Champvillair E., Maggi V. (2019) - Elevational transects of modern pollen samples: Site-specific temperatures as a tool for palaeoclimate reconstructions in the Alps. <i>The Holocene</i> , 29 (2), 271-286.	<b>Terrestrial record</b>	<b>IGAG ISAC</b>
29. Giaccio, B., Leicher, N., Mannella, G., Monaco, L., Regattieri, E., Wagner, B., Zanchetta, G., Gaeta, M., Marra, F., Nomade, S., Palladino, D.M., Pereira, A., Scheidt, S., Sottili, G., Wonik, T., Wulf, S., Zeeden, C., Ariztegui, D., Cavinato, G.P., Dean, J.R., Florindo, F., Leng, M.J., Macri, P., Niespolo, E., Renne, P.R., Rolf, C., Sadori, L., Thomas, C. & Tzedakis, P.C. (2019). Extending the tephra and palaeoenvironmental record of the Central Mediterranean back to 430 ka: A new core from Fucino Basin, central Italy. <i>Quaternary Science Reviews</i> 225, 106003.	<b>Terrestrial record</b>	<b>IGAG IGG</b>
30. Giorgioni, M., Jovane, L., Rego, E.S., Rodelli, D., Frontalini, F., Coccioni, R., Catanzariti, R., Özcan, E. (2019). Carbon cycle instability and orbital forcing during the Middle Eocene Climatic Optimum. <i>Scientific Reports</i> , 9, 9357.	<b>Marine record</b>	<b>IGG</b>
31. Isola, I., Ribolini, A., Zanchetta, G., Bini, M., Regattieri, E., Drysdale, R., Hellstrom, J., Bajo, P., Montagna, P., Pons-Branchu, E. (2019). Speleothem U/Th age constraints for the Last Glacial conditions in the Apuan Alps, northwestern Italy. <i>Paleogeography, paleoclimatology, paleoecology</i> , 518, 62-71.	<b>Terrestrial record</b>	<b>IGG ISMAR</b>
32. Isola, I., Zanchetta, G., Drysdale, R., Regattieri, E., Bini, M., Bajo, P., Hellstrom, J., Baneschi, I., Lionello, P., Woodhead, J., Greig, A. (2019). The 4.2 ka event in the central Mediterranean: new data from a Corchia speleothem (Apuan Alps, central Italy). <i>Climate of The Past</i> , 15 (1), 135 – 151.	<b>Terrestrial record</b>	<b>IGG</b>
33. Leicher, N., Giaccio, B., Zanchetta, G., Wagner, B., Francke, A., Palladino, D.M., Sulpizio, R., Albert, P.G. & Tomlinson, E.L. (2019). Central Mediterranean explosive volcanism and tephrochronology during the last 630 ka based on the sediment record from Lake Ohrid. <i>Quaternary Science Reviews</i> 226, 106021.	<b>Terrestrial record</b>	<b>IGAG</b>
34. Lirer F., Margeritelli G., Alberico I., Bonomo S., Capotondi L., Cascella A., Di Rita F., Ferraro L., Insinga D.D., Magri D., Pelosi N., Petrosino P., Vallefucio M., (2019). Climatic variability over the last two millennia in the Mediterranean area: a review from marine paleoarchives. <i>Geografia Fisica e Dinamica del Quaternario</i> , 42 (2), in press	<b>Marine record</b>	<b>ISMAR</b>
35. Maffezzoli, N. et al. A 120 000-year record of sea ice in the North Atlantic? <i>Climate of the Past</i> 15, 2031-2051, doi:10.5194/cp-15-2031-2019 (2019).	<b>Ice record</b>	<b>ISP</b>
36. Mancini M., Vignaroli G., Bucci F., Cardinali M., Cavinato G.P., Di Salvo C., Giallini S., Moscatelli M., Polpetta F., Putignano M.L., Santangelo M., Sirianni P. (2019). New stratigraphic constraints for the Quaternary source-to-sink history of the Amatrice Basin (central Apennines, Italy). <i>Geological Journal</i> , doi.10.1002/gj.3672.	<b>Terrestrial record</b>	<b>IGAG</b>
37. Mannella, G., Giaccio, B., Zanchetta, G., Regattieri, E., Niespolo, E.M., Pereira, A., Renne, P.R., Nomade, S., Leicher, N., Perchiazzi, N. & Wagner, B. (2019). Palaeoenvironmental and palaeohydrological variability of mountain areas in the central Mediterranean region: A 190 ka-long chronicle from the independently dated Fucino palaeolake record (central Italy). <i>Quaternary Science Reviews</i> 210, 190-210.	<b>Terrestrial record</b>	<b>IGAG IGG</b>
38. Mannella, G., Zanchetta, G., Regattieri, E., Perchiazzi, N., Drysdale, N. R., Giaccio, B., Leng, M.J. & Wagner, B. (2019). Effects of organic removal techniques prior to carbonate stable isotope analysis of lacustrine marls: a case study from palaeo-lake Fucino (central Italy). <i>Rapid Communications in Mass Spectrometry</i> 34: 8623, doi.org/10.1002/rcm.8623.	<b>Methodological development</b>	<b>IGAG IGG</b>
39. Martens, J., Wild, B., Pearce, C., Tesi, T., Andersson, A., Bröder, L., & Cronin,	<b>Ice record</b>	<b>ISP</b>

T. M. (2019). Remobilization of old permafrost carbon to Chukchi Sea sediments during the end of the last deglaciation. <i>Global biogeochemical cycles</i> , 33(1), 2-14		
40. Mazzocchi, M.G., Capotondi, L., Freppaz, M., Lugliè, A., Campanaro, A. (Eds). 5. Italian Long-Term Ecological Research for understanding ecosystem diversity and functioning. Case studies from aquatic, terrestrial and transitional domains. <i>Volume speciale Nature Conservation</i> , 34, 1-524.	<b>Terrestrial and Marine records</b>	<b>ISMAR</b>
41. Montagna, P., Taviani, M. (2019). Mediterranean Cold-Water Corals as Paleoclimate Archives. In: Orejas C., Jiménez C. (eds) <i>Mediterranean Cold-Water Corals: Past, Present and Future</i> . <i>Coral Reefs of the World</i> , vol 9. Springer, Cham.	<b>Marine record</b>	<b>ISP</b>
42. Nowak, E., Mette, W., Petti, F.M., Roghi, G., Kustatscher, E. (2019). Palynology, microfacies and ostracods of the Permian–Triassic boundary interval in the Rosengarten/Catinaccio Massif. <i>Austrian Journal of Earth Sciences</i> , 112/2, 103 – 124.	<b>Marine record</b>	<b>IGG</b>
43. Pleuger, E., Goiran, J.-P., Mazzini, I., Delile, H., Abichou, A., Gadhoun, A., Djerbi, H., Piotrowska, N., Wilson, A., Fentress, E., Ben Jerbania, I., Fagel, N. (2019). Palaeogeographical and palaeoenvironmental reconstruction of the Medjerda delta (Tunisia) during the Holocene. <i>Quaternary Science Reviews</i> , 220, 263-278.	<b>Terrestrial record</b>	<b>IGAG</b>
44. Preto, N., Bernardi, M., Dal Corso, J., Gianolla, P., Kustatscher, E., Roghi, G., Rigo, M. (2019). The Carnian Pluvial Episode in Italy: History of the research and perspectives. <i>Bollettino della Società Paleontologica Italiana</i> , 58 (1), 2019, 35-49.	<b>Marine record</b>	<b>IGG</b>
45. Ravazzi C., Badino F., Castellano L., De Nisi D., Furlanetto G., Perego R., Zanon M., Dal Corso M., De Amicis M., Monegato G., Pini R., Vallé F. (2019) - Introduzione allo studio stratigrafico e paleoecologico dei laghi intramorenici del Garda. In (a cura di M. Baioni, C. Mangani, M.G. Ruggiero) <i>Le Palafitte. Ricerca, Conservazione, Valorizzazione</i> . Collana Palafitte/Palaffittes/Pfahlbauten/Pile Dwellings/Palafitte. SAP – Società Archeologica. ISBN: 978-88-99547-29-5. Pp. 167-183.	<b>Terrestrial record</b>	<b>IGAG IGG</b>
46. Ravazzi, C., Pini, R., De Amicis, M., Castellano, L., Comolli, R.; Abu El Khair, D., Furlanetto, G., Marsetti, D., Perego, R. (in press) - Palaeoecological archives unraveling the early land-use history at the emergence of the Bronze Age settlement of Bergamo (Italian Alps). <i>Review of Palaeobotany and Palynology</i> . DOI: 10.1016/j.revpalbo.2020.104205.	<b>Terrestrial record</b>	<b>IGAG</b>
47. Regattieri, E., Giaccio, B., Mannella, G., Zanchetta, G., Nomade, S., Tognarelli, A., Perchiazzi, N., Vogel, H., Boschi, C., Drysdale, R.N., Wagner, B., Gemelli, M. & Tzedakis, P. (2019). Frequency and dynamics of millennial-scale variability during Marine Isotope Stage 19: Insights from the Sulmona Basin (central Italy). <i>Quaternary Science Reviews</i> 214, 28-43.	<b>Terrestrial record</b>	<b>IGG IGAG</b>
48. Roman, M. et al. High speed-low volume automated ICP-QMS method for determination of Mg/Ca in biogenic calcite. <i>Journal of Analytical Atomic Spectrometry</i> 34, 764-773, doi:10.1039/c8ja00396c (2019).	<b>Methodological development</b>	<b>ISP</b>
49. Sardella, R., Iurino, D.A., Mecozzi, B., Sigari, D., Bona, F., Bellucci, L., Coltorti, M., Conti, J., Lembo, G., Muttillio, B., Mazzini, I. (2019). Grotta Romanelli (Lecce, Southern Italy) Between Past and Future: New Studies and Perspectives for an Archaeo-geosite Symbol of the Palaeolithic in Europe. <i>Geoheritage</i> , 11 (4), 1413-1432.	<b>Terrestrial record</b>	<b>IGAG</b>
50. Segnana, M. et al. Holocene vegetation history and human impact in the eastern Italian Alps: a multi-proxy study on the Coltrondo peat bog, Comelico Superiore, Italy. <i>Vegetation History and Archaeobotany</i> , doi:10.1007/s00334-019-00749-y (2019).	<b>Terrestrial record</b>	<b>ISP</b>
51. Spolaor, A. et al. Diurnal cycle of iodine, bromine, and mercury concentrations in Svalbard surface snow. <i>Atmospheric Chemistry and Physics</i> 19, 13325-13339, doi:10.5194/acp-19-13325-2019 (2019).	<b>Ice record</b>	<b>ISP</b>
52. Taviani, M., Angeletti, L., Foglini, F., Corselli, C., Nasto, I., Pons-Branchu, E.	<b>Marine record</b>	<b>ISP</b>

Montagna, P. U/Th dating records of cold-water coral colonization in submarine canyons and adjacent sectors of the southern Adriatic Sea since the Last Glacial Maximum. <i>Progress in Oceanography</i> , 175, 300-308.		
53. Taviani, M., Vertino, A., Angeletti, L., Montagna, P., Remia, A. (2019). Paleocology of Mediterranean Cold-Water Corals. In: Orejas C., Jiménez C. (eds) <i>Mediterranean Cold-Water Corals: Past, Present and Future. Coral Reefs of the World</i> , vol 9. Springer, Cham.	Marine record	ISP
54. Vallè F., Furlanetto G., Pini R., Brunetti M., Maggi V., Ravazzi C. (in press) - Reconstructing the Last 3000 yrs climate change in N-Italy from fossil pollen archives. <i>Geografia Fisica e Dinamica Quaternaria</i> , 42 (2).	Terrestrial record	IGAG ISAC
55. Vallè F., Furlanetto G., Maggi V., Pini R., Ravazzi C. (in press) - Concepts and methodology to quantitatively reconstruct climate from pollen data. <i>Geografia Fisica e Dinamica Quaternaria</i> , 42 (2).	Terrestrial record	IGAG
56. Vignaroli G., Mancini M., Bucci F., Cardinali M., Cavinato G.P., Moscatelli M., Putignano M.L., Sirianni P., Santangelo M., Ardizzone F., Cosentino G., Di Salvo C., Fiorucci F., Gaudiosi I., Giallini S., Messina P., Peronace E., Polpetta F., Reichenbach P., Scionti V., Simionato M., Stigliano F. (2019) Geology of the central part of the Amatrice Basin (central Apennines, Italy). <i>Journal of Maps</i> , 15, 193– 202, doi.org/10.1080/17445647.2019.1570877.	Terrestrial record	IGAG
57. Wagner, B., Vogel, H., Francke, A., Friedrich, T., Donders, T., Lacey, J.H., Leng, M.J., Regattieri, E., Sadori, L., Wilke, T., Zanchetta, G., Albrecht, C., Bertini, A., Combourieu-Nebout, N., Cvetkoska, A., Giaccio, B., Grazhdani, A., Hauffe, T., Holtvoeth, J., Joannin, S., Jovanovska, E., Just, J., Kouli, K., Kousis, I., Koutsodendris, A., Krastel, S., Lagos, M., Leicher, N., Levkov, Z., Lindhorst, K., Masi, A., Melles, M., Mercuri, A.M., Nomade, S., Nowaczyk, N., Panagiotopoulos, K., Peyron, O., Reed, J.M., Sagnotti, L., Sinopoli, G., Stelbrink, B., Sulpizio, R., Timmermann, A., Tofilovska, S., Torri, P., Wagner-Cremer, F., Wonik, T. & Zhang, X. (2019). Mediterranean winter rainfall in phase with African monsoons during the past 1.36 million years. <i>Nature</i> 573, 256-260.	Terrestrial record	IGAG IGG
58. Zangrando, R. et al. Free phenolic compounds in waters of the Ross Sea. <i>Science of the Total Environment</i> 650, 2117-2128, doi:10.1016/j.scitotenv.2018.09.360 (2019).	Marine record	ISP

#### 4. ONGOING Ph.D THESIS

##### Istituto di Scienze Polari (ISP)

**Francois Burgay** - PhD in Science and Management of Climate Change  
*Development of new iron speciation methods for ice core analysis*

**Giuliano Dreossi** - PhD in Science and Management of Climate Change  
*A recent past temperature reconstruction based on oxygen and hydrogen stable isotopes in Alpine ice cores*

**Federico Scoto** - PhD in Science and Management of Climate Change  
*Halogens in ice core as potential proxies for past sea ice reconstructions*

**Elena Argiriadis** - PhD in Science and Management of Climate Change  
*The Early Impact of Agriculture- How Humans Have Been Affecting Climate for Thousands of Years*

**Delia Segato** - PhD in Science and Management of Climate Change  
*Long-term sea ice reconstruction through halogens speciation in polar ice cores*

**Alessio Nogarotto** - PhD in Polar Sciences  
*Coupling of marine and ice records for sea ice reconstructions*

### **Istituto di Scienze Marine (ISMAR)**

**Costanza del Gobbo** - PhD in Earth System Physics at the ICTP and University of Trieste

*Paleoclimatic simulation of small scale weather patterns in the southeastern Alps at the end of the LGM*

**Helena Checa Sancez**— PhD in SCIENZA E TECNOLOGIA PER LA FISICA E LA GEOLOGIA (Dottorato Internazionale) at Dipartimento di Fisica e Geologia Università degli Studi di Perugia (in Co-tutela con l'Università di Barcellona) (XXXIII ciclo)

*Characterizing deep-ocean circulation changes in central Mediterranean during key climate transitions through micropaleontological and geochemical tools*

**Sergi Trias Navarro**- PhD in Scienze della Terra e del Mare at Dipartimento di Scienze della Terra e del Mare, University of Palermo (XXXIII ciclo)

*Changes in Mediterranean Thermohaline Circulation during key climate transitions and its impact in the Atlantic Meridional Overturning Circulation*

### **Istituto di Geoscienze e Georisorse (IGG)**

**Sarah Kamleitner** – PhD in Earth Science ETH Zurich

*Timing and extent of LGM glaciers N and S of the Alps*