1		Supervisor	Federico Agliardi		
Title	The mechanics of modeling of hydro	^r rockslide cree o-mechanical	ep: experimental and numerical interactions in basal shear zones		
TitleThe mechanics of rockslide creep: experimental and numerical modeling of hydro-mechanical interactions in basal shear zonesLarge rockslides evolve through progressive rock failure and strain localization in basal shear zones, with a time-dependent macroscale behavior ("slope creep") anticipating catastrophic collapse. However, forecasting approaches often rely on empirical creep descriptions not accounting for the microscale processes driving failure. In particular, the hydro-mechanical interactions taking place in evolving basal shear zones, and their response to hydrological forcing, especially under climate change, remain elusive.This PhD project, co-supervised by Matteo Ciantia, will investigate how mineral 					
Supervisor webpage: https://www.unimib.it/federico-agliardi					
Votes:					

2	Supervisor Federico Agliardi			
Title	Physics-based Deep Learning approaches for interpretable			
	characterization of alpine mass movement activity			
ZSupervisorrederico AgilardiTitlePhysics-based Deep Learning approaches for interpretable characterization of alpine mass movement activityAlpine environments are affected by different types of mass movements that exhibit different styles of activity, rapidly changing due to global warming and threatening lives and infrastructures. Managing the related risks requires capabilities to rapidly detect and characterize the activity of mass movements over wide areas. During the last decade, deep learning (DL) techniques have been increasingly applied to the detection, classification and segmentation of mass movements, mainly for rapid mapping purposes. However, few DL applications to the characterization of mass movement activity have been proposed, usually lacking strong geomorphological and process-based constraints and thus difficult to interpret. This PhD project will integrate geomorphologically-constrained libraries of remote sensing data (InSAR, optical, thermal) and deterministic modelling results to train DL models able to provide an interpretable automated assessment of mass movement activities over wide portions of the Alps. We seek a candidate with an engineering geological background and programming skills, motivated to work in a multi-disciplinary team to take advantage of remote sensing, deterministic modeling and AI to develop novel approaches to the assessment of mass movement activity in a risk mitigation perspective. The research will be carried out in collaboration with researchers of the CNR-IMATI (Genova, Itay) and the SLF (Davos, Switzerland), where the PhD student will spend at least six months.Supervisor webpage: https://www.unimib.it/federico-agliardi				
Supervisor webpage: https://www.unimib.it/federico-agliardi				

Notes:

3	Supervisor Fabio L. Bonali
Title	4D Analysis of Surface Deformation in Active Volcano-Tectonic
	Regions
This rese caused b stratigrap remote to processes upwelling or the arr stratigrap directions The stud induced b a combin historical modelling (10%), a Period a GeoForsc Volcanote Additiona Internatio MAGMAT INITIATIV and Mana	arch focuses on analysing shallow deformation in volcano-tectonic regions by magmatic intrusions and their interactions with host rocks, considering ohy, topography (including lithostatic loading), pre-existing structures, and ectonic stresses. The primary goal is to enhance the understanding of the s of development of shallow deformation across various scenarios of magma b, including the intrusion of dykes, inclined sheets, their diversion into sills, rest of dykes. These scenarios will take into account diverse settings, such as oblic successions, topographic variations, tectonic contexts, and magma flow s. y areas include Italian volcanoes and Iceland, where surface deformation by magmatic activity has been documented over time. The research involves ation of methodologies, including field and drone surveys (20%), analysis of aerial photographs (15%) that give the time dimension, 3D numerical g using the finite element method (40%), physical-scale analogue modelling nd integration of geophysical data (15%). abroad: 6 months (split into two separate 3-month periods) at thungsZentrum (GFZ) in Potsdam, Germany, collaborating with the ectonics and Volcanic Hazards research group. If funding is available from previous national and international projects, i.e., onal Lithosphere Program (Task Force II project), DEFORMATION AND IC PROCESSES FROM THE LITHOSPHERE TO THE SURFACE, and PNRR VE,HaMMon-EQ: Merging data and AI for improving Seismic Risk assessment agement in populated areas. sor webpage: https://www.unimib.it/fabio-luca-bonali
Notes:	

4		Supervisor	Alberto Bosino
Title	Multi-scale appro	ach to detect a	and map badlands areas
	integrating geom	orphological fi	ield surveys and remotely sensed
	data in different r	norphoclimati	c contexts

Badlands are one of the most complex soil erosion landforms. Surveying and accurate mapping of badlands is fundamental to understanding the spatial distribution of the landforms, producing inventor maps and adopting mitigation strategies or conservation practices. The mapping approach serves as the basis for subsequent studies of the landforms (e.g., susceptibility models, geomorphological dynamics, etc.). As a result, substantial differences in mapping techniques can lead to significant variations in the model results.

The aim of the PhD project is to develop a methodology to univocally map badlands in different morphoclimatic contexts through detailed field surveys and remote sensed data. The geomorphological surveys will be initially conducted in an experimental basin following the rules indicated in the Italian guidelines for geomorphological mapping (Campobasso et al., 2021). The selected study area will be in the Italian Apennines and will serve as a test site to further extend the methodology in other morphoclimatic contexts.

Geomorphological field surveys using innovative techniques and the implementation of geodatabases will be fundamental to the project. In addition, GIS work, dedicated Terrain Analysis on DEM as well as remotely sensed data analysis will be part of the research. The PhD will include 6 months of research abroad.

Supervisor webpage: https://www.unimib.it/alberto-bosino

Notes:

5		Supervisor	Valentina Alice Bracchi	
Title	Sclerochronology and sclerochemistry applied to Quaternary Mediterranean bivalves			
Marine biogenic carbonates (e.g., shells) serve as natural archives of environmental and paleoenvironmental information, providing high-resolution proxy records of past and present ocean climate variability. These records capture changes in temperature, trophic state, oxygen conditions, and heavy metal pollution in benthic environments.				
By analyzing growth increments (sclerochronology) and geochemical signatures (sclerochemistry, including trace elements and stable isotopes) in mollusks— particularly bivalves—it is possible to monitor modern marine environments and reconstruct historical trends in oceanographic conditions over time and space.				
This doctoral project focuses on studying Quaternary bivalves using sclerochronological and sclerochemical techniques to investigate seawater conditions and past oceanographic trends. The research will analyze both modern specimens from the Mediterranean Sea (coastal and deep-sea) and Quaternary fossil records, allowing for comparisons of species that thrived under varying oceanographic conditions and trophic dynamics.				
The candidate will conduct research at the University of Milano-Bicocca, with additional work in specialized laboratories in Italy and abroad (e.g., University of Leipzig, University of Mainz, University of Tromsø). The project includes applying diverse analytical techniques and a six-month international research stay.				
Supervisor webpage: https://www.unimib.it/valentina-alice-bracchi				
Notes:	Notes:			

6		Supervisor	Giancarlo Capitani	
Title	A "nano-to-macro case of Mn minera	" approach to lizations	study critical raw materials: the	
Manganese is listed as a strategic critical raw material in the Final Report of the "Study on the Critical Raw Materials for the EU in 2023". The most important Mn ore is pyrolusite [MnO ₂], but Mn occurs also as braunite [Mn ²⁺ Mn ³⁺ ₆ SiO ₁₂], psilomelane [(Ba,H ₂ O) ₂ Mn ₅ O ₁₀], rhodochrosite [MnCO ₃] and rhodonite [MnSiO ₃]. About 80% of the known world manganese resources are in South Africa, but ~500 billion tons of Mn nodules has been estimated to lay on the ocean floor. However, attempts to exploit Mn nodules were abandoned in the 1970s. Manganese is essential to iron and steel production, where it has no satisfactory substitute; it is used also in aluminium allows, alkaling batteries, resistors, fortilizers and many other applications.				
The proposed thesis will focus on several Mn mineralizations, as those occurring, for instance, at the Fellerech-Otro Mine (Alagna, Italy) or near Lanzada in the Scerscen Valley (Sondrio, Italy). The study will be pursued by means of advanced investigation techniques, such as scanning (SEM) and transmission electron microscopy (TEM), energy (EDS) and wave dispersive (WDS) analysis, electron backscattered diffraction (EBSD) and electron diffraction tomography (EDT). All these techniques are available at the Platform of Microscopy of Milano-Bicocca.				
The study relationsh specific c formation exploration	The study will follow the approach "from nano-to-macro", i.e., studying mineral relationships at the nanoscale to better constrain geological processes. In this specific case, the geological processes involved are those leading to ore mineral formation. Hopefully, the results of this study will contribute to improve ore mineral exploration, exploitation, beneficiation and recycling.			
The resea the follow technique Lille, Frar Czech Re Bayreuth	arch work entails a pe ving foreign laborator es mentioned above: nce (Prof. Hugues Ler public (Prof. Lukáš Pa , Germany (Dr. Nobu	eriod of at least ies acknowledge Unité Matériaux oux); Institute alatinus); Bayer yoshi Miyajima)	six months to spend in one or more of ed as centres of excellence for the c et Transformations, Université de of Physics, Czech Academy of Sciences, isches Geoinstitut, Universität	
Supervisor webpage: https://www.unimib.it/giancarlo-capitani				
Notes:				

7		Supervisor	Valerio Cerantola
Title	The Deep Sulfur C Earth's Deep Geoc	ycle: The Role hemical Proce	of Sulphides and Sulphates in sses
Sulphur, driver of this elem fraction r volatiles, the onset transform mantle el sulphur's complex redox dy fields of s investiga multi-any X-ray diff	though often conside geological, geochemi ent segregated into t esides in the crust ar and geodynamic evo of life. This project a nation in deep geodyn nvironments, using e structural, electronic natural systems, we namics and drives pa synthetic sulphides ar ted at pressure and t vil presses and diamo fraction, Mössbauer, lo will be performed vi	red a minor cor cal, and biologic the core during and mantle, influe olution across va- aims to explore namic settings, xperiments and c, and chemical will reveal how thways of volation thways of volation and sulphates of emperature con nd anvil cells te Emission and Rational colority	estituent of the Earth's interior, is a key cal processes. While large amounts of planetary differentiation, a significant encing redox processes, cycling of est timescales, from core formation to sulphur-bearing compounds' including subduction and modern theory. By systematically mapping transformations in both simplified and the deep sulphur cycle governs Earth's le elements. In particular, the stability different compositions will be ditions of the Earth's interior, using chniques. Analytical methods include aman spectroscopy. Theoretical lations.
The project foresee the joint supervision with Goethe University Frankfurt and includes collaborations at the national and international level. The PhD student is			

includes collaborations at the national and international level. The PhD student is expected to spend a period of 12 months abroad (18 months in case of cotutelle agreement), most of which at the Goethe University Frankfurt as well as the European Synchrotron (France), the Bayerisches Geoinstitut (Germany) or other international institutions linked to the project.

Supervisor webpage: https://www.unimib.it/valerio-cerantola

Notes:

8		Supervisor	Giovanni Crosta	
Title	A global-scale sto	chastic landsl	ide risk model	
Landslide thousand possible of of the mo In order models of granulari and re-in The aim landslides earthqua In order landslide physically calibrate deep lear probabilit apply the	es pose serious risk pr s of lives each year economic risk manage ost promising on a glo to effectively develop capable of estimatin ty, so as to allow for surance companies to of this thesis is to s by using surrogate ke-induced landslide to achieve this goal, inventories in differe y based and/or mach these models for the ming techniques to but sy as a function of the surrogate models to	oblems in moun and causing c ement strategie obal scale. The expected proper insurance of allocate adequination define a stock models capable scenarios. the PhD studen nt geodynamic nine learning m actual inventorie ild surrogate mon of existing stock	tainous areas on a global scale, claiming onsiderable economic damage. Among s, the insurance market is probably one market, it is necessary to have reliable d annual damage with a high spatial ce pricing, as well as to allow insurance late resources for eventual surrenders. astic risk model for different types of e of simulating stochastic climate- and nt will have to; 1) collect and organise and morphological contexts; 2) develop odels for different landslide types and es; 3) use the results of the models with odels that allow to calculate the landslide ng factors (rainfall and earthquake series to	
calculate the landslide probability; 5) implement vulnerability curves for different building types from the literature in the risk model to calculate the expected damage. The PhD student will have to spend a period of 6 months abroad.				
Supervisor webpage: https://www.unimib.it/giovanni-crosta				
Notes:	lotes:			

9		Supervisor	Silvia Mittempergher
Title	Fluid mobility and storage in crustal faults: a field calibration in		
Geophysi porosity o in the reg the brittle with the propose inferred f networks faults. Th and/or in structura time). Mic on miner (20% of field and the scale Additiona framewor	cal and geological obsolof fault zones during gional hydrogeology a e crust result from the effects of meter- to to calibrate average rom geophysical obsological characterized in out the field activity will be the Aosta Valley. Fr I surveys and 3D pho crostructural, geoche alized fractures to ev the time). Modelling of microstructural data of active faults (hund of the Earth Telesco	servations support the seismic cyclo and crustal scale combination of hectometer-scale e hydraulic part ervations, with p crops considered e conducted in the crops considered e conducted in the crops and fault otogrammetric of mical and petrop valuate the actual using discrete fr to estimate rel dreds of meters g field and ana tope-TESI project	ort dramatic changes in permeability and cle, including post-seismic modifications a fluid transfer. Fluid storage and flux in microscale matrix porosity/permeability le fracture networks. In this project we ameters of active seismogenic faults, permeability estimates based on fracture ed analogue to subsurface seismogenic the Italian Alps, in the Adamello massif t networks will be quantified combining outcrop models (field work 20% of the physical investigations will be performed al fracture aperture during fault activity racture networks will be used to upscale iable permeability and porosity data to to kilometers). lytical expenses will be provided in the ct at the INGV.
Supervisor webpage: https://www.unimib.it/silvia-mittempergher			
Notes:			

10		Supervisor	Valter Maggi	
Title	Linking terrestria	l and ice-core	records of MIS 19 high-frequency	
	palaeoclimate var	riability		
palaeoclimate variability Marine Isotope Stage 19 (ca. 790 ka BP) is important in glaciological and terrestrial paleoclimatic research as it is considered one of the closest orbital analogs to the Holocene during the past 800 ka for which ice core records are available. However, millennial and sub-millennial climate variability during MIS 19 is partly erased in ice core dust, water stable isotope and gas (CH ₄) records due to <i>in situ</i> processes of signal alteration and diffusion. This project aims to provide a new, high-resolution (annual to decennial) record of environmental and climate variability from the MIS 19 Pianico-Séllere lacustrine succession (N-Italy), to be correlated and compared to novel and existing Antarctic ice cores from the Beyond EPICA-Oldest Ice and EPICA Projects. Inter-hemispheric correlation will benefit from the Matuyama-Brunhes geomagnetic reversal, reflected by a globally synchronous event in the ¹⁰ Be signal. The Pianico-Séllere archive offers a continuous sequence of over 20,000 varved years containing two tephra, and spans the entire MIS 19, the underlying MIS 20 and overlying MIS 18 to 17. Research will focus on stable (δ^{18} O and δ^{13} C) and cosmogenic isotopes (¹⁰ Be), geochemical (XRF and XRD) and microbotanical proxies especially from interglacial segments recording both the B/M reversal and millennial events of major amplitude, along with a subtle decennial-scale cyclicity. Field work and sampling is estimated to a 10%; scanning and analysis will embrace most of the activity. The project will run within the scientific collaborations with ISP and IGAG CNR institutes. Duration of the period to be spent abroad: 6 months. Additional fundings to support the research are provided by the CLIMADA Project (Prof. Valter Maggi)				
Supervisor webpage: https://www.unimib.it/valter-maggi				
Notes: Pos	otes: Position on "Polar Sciences"			

11
Title
At times modulate and atmo This call constrain India-Asi Analytica target m mercury geochron sampled the caus changes. papers w collabora P. Bouilh P. Ballato of Milano in extern

Supervisor webpage: https://www.unimib.it/pietro-sternai

Notes: Position framed within the 2024-ERC-CoG project "Magmatic Triggering of Cenozoic Climate Changes - MATRICs

12		Supervisor	Pietro Sternai	
Title	Neo-Tethyan Mag	Neo-Tethyan Magmatic CO ₂ Emissions and Climatic Effects:		
	Insights from Me	lt Inclusions a	nd Hg-Te Analysis on rocks from	
	Ladakh (India)			
Ladakh (India) At timescales of millions to tens of millions of years, the geological carbon cycle modulates the storage of carbon into rocks and the release of carbon into the ocean and atmosphere, thereby linking the evolution of climate and life to plate tectonics. This call is framed within the fully funded 2024-ERC-CoG grant MATRICs aimed at constraining the extent to which the closure of the Neo-Tethyan ocean and subsequent India-Asia and Arabia-Asia collision are entailed with the Cenozoic climate trends. Analytical methods include, but are not limited to, studies of Melt Inclusions within target magmatic products (e.g., Raman spectroscopy and/or SIMS), analyses of mercury (Hg) and Tellurium (Te) anomalies within target sedimentary sequences and geochronology (e.g., LA-ICPMS U-Pb zircon and Ar-Ar dating) on available and newly sampled rocks. The measurements will provide rigorous and novel quantifications of the causal relationships between Cenozoic Neo-Tethyan geodynamics and climate changes. Expected work allocation: ~15% field sampling, ~60% analytical work, 25% papers writing. The project, co-supervised by Rosario Esposito, will be held in collaboration with external partners (e.g., J. Koornneef, University of Amsterdam, VU; P. Bouilhol, CRPG-Nancy, University of Lorraine; S. Castelltort, University of Geneva; F. Farina, University of Milano), who will provide access to the sampling field terrains and analytical facilities in external Institutes during the (6-12 months) expected periods abroad.				

Notes: Position framed within the 2024-ERC-CoG project "Magmatic Triggering of Cenozoic Climate Changes - MATRICs

13		Supervisor	Pietro Sternai
Title	The Role of Neo-Tethyan CO ₂ Emissions in Driving Cenozoic Climate Changes: Insights from Melt Inclusions and Hg-Te		
Climate Changes: Insights from Melt Inclusions and Hg-Te Analyses on Tibetan Rock Samples At timescales of millions to tens of millions of years, the geological carbon cycle modulates the storage of carbon into rocks and the release of carbon into the ocean and atmosphere, thereby linking the evolution of climate and life to plate tectonics. This call is framed within the fully funded 2024-ERC-CoG grant MATRICs aimed at constraining the extent to which the closure of the Neo-Tethyan ocean and subsequent India-Asia and Arabia-Asia collision are entailed with the Cenozoic climate trends. Analytical methods include, but are not limited to, studies of Melt Inclusions within target magmatic products (e.g., Raman spectroscopy and/or SIMS), analyses of mercury (Hg) and Tellurium (Te) anomalies within target sedimentary sequences and geochronology (e.g., LA-ICPMS U-Pb zircon and Ar-Ar dating) on available and newly sampled rocks. The measurements will provide rigorous and novel quantifications of the causal relationships between Cenozoic Neo-Tethyan geodynamics and climate changes. Expected work allocation: ~15% field sampling, ~60% analytical work, 25% papers writing. Ther project, co-supervised by Rosario Esposito, will be held in collaboration with external partners (e.g., J. Koornneef, University of Amsterdam, VU; P. Bouilhol, CRPG-Nancy, University of Lorraine; S. Castelltort, University of Geneva; J. Dai, University of Beijing; F. Farina, University of Milano), who will provide access to the sampling field terrains and analytical facilities in external Institutes during the (6-12 months) expected periods abroad.			
caper riser mespager https://www.unimis.r/piero sternar			

Notes: Position framed within the 2024-ERC-CoG project "Magmatic Triggering of Cenozoic Climate Changes - MATRICs

14		Supervisor	Elisa Malinverno	
			(co-supervisor: Daniela Basso)	
Title	Ocean Carbon Dioxide Removal by alkalinity enhancement and its			
	effects on sediments and calcareous benthic microfauna			
TitleOcean Carbon Dioxide Removal by alkalinity enhancement and its effects on sediments and calcareous benthic microfaunaMitigating global warming requires urgent reductions in CO2 emissions and the development of Carbon Dioxide Removal (CDR) strategies. The addition of alkaline substances boosts the ocean buffering capacity, thereby increasing carbon sequestration and counteracting the ongoing ocean acidification. This research will tackle the response of marine sedimentary geochemical environment and associated benthos to ocean alkalinity enhancement by two different techniques: 1) ocean liming and 2) pH-equilibrated alkalinization. The potential alteration of sediment geochemistry (elemental distribution, organic carbon content, stable isotopic signature) and related faunal content (foraminifera and mollusks species distribution, test calcification and chemistry, preservation and diagenesis) will be assessed. For this purpose, a suite of analytical techniques will be used, among which X-ray diffraction (XRD), scanning electron microscopy (SEM), inductively coupled plasma mass spectrometry (ICP-MS), mass spectrometry, and Raman spectroscopy. The research activity may include collaboration in field work for sample collection at representative coastal Mediterranean, Baltic, and north Atlantic sites. Field activity will not exceed 5% of the doctoral program duration. The selected candidate will spend a 6-months period of mobility abroad, at the Hellenic Center of Marine Research (Crete, Greece) and/or at the University of Gothenburg (Sweden). Prof. Daniela Basso will provide co-supervision on the topic of CO2 removal (https://marineco2removal.unimib.it/) and biogeochemistry, and funding through the international Project OACIS and CARHO.Supervisor webpage: https://www.unimib.it/elisa-malinverno				
Supervisor webpage: https://www.unimib.it/elisa-malinverno				
Notes: shortlisted for the Department of Excellence TECLA position on "Monitoring of the effects of ongoing climate warming and mitigation strategies and techniques" (Monitoraggio degli				

of ongoing climate warming and mitigation strategies and techniques" (Monitoraggio degli effetti del riscaldamento climatico in corso e strategie e tecniche di mitigazione)

15		Supervisor	Giovanni Crosta
			(co-supervisor: Roberto Colombo)
Title	Multi-Data Landsl	lide Recognitio	on and Classification: A Machine
	Learning Approach		
Generation of landslide inventories is a complex process which require particular skills if the aim is to reach a comprehensive description of the phenomena. Beyond human generated inventories, which can provide reliable information, AI/ML/DL inventories are often limited to methods which recognize phenomena on the basis of the damage to vegetation (NDVI index). Very little has been done on the automatic extraction of landslides on the basis of digital elevation models concurrently with other datasets (e.g. displacements).			
Building on a large landslide inventory completed at the European Alps scale (ca 160.000 km ²), the PhD candidate will test different algorithms for landslide extraction, by training and validating the model. One more available dataset that could be used is the one prepared by the research group for landslides at the planet scale for Mars. This could be interesting to test for similarities and differences between the two groups of landslides (terrestrial and martian).			
The candidate should already have a background in geomorphology and engineering geology and/or on machine learning methods. She/he will collaborate with the engineering geology group and will take part to remapping some areas and a series of testing. The analysis could include the relationships with permafrost distribution and then introduce the effects of climate changes. The candidate will spend a six-month period at a university and/or research institute where these techniques have been applied on similar problems.			

The funds and extra costs will be made available by the research group, including the CARIPLO project which partially focus on AI/ML/DL techniques.

Supervisor webpage: https://www.unimib.it/giovanni-crosta

Notes: shortlisted for the Department of Excellence TECLA position on "Monitoring of the effects of ongoing climate warming and mitigation strategies and techniques" (Monitoraggio degli effetti del riscaldamento climatico in corso e strategie e tecniche di mitigazione)

16		Supervisor	Sergio Andò
			(co-supervisor: Luca Ferrero; Francesco Saliu)
Title	Floating pumices	as a proxy to editerranean	study anthropogenic plastic Sea

This research focuses on a source to sink analysis of anthropogenic plastic pollution (APP) in the Tyrrhenian and Ionian Sea, from a sedimentary petrology perspective. High-resolution chemical and mineralogical study of floating pumices from Eolian Islands will be used as a geological tracer, to monitor the trajectories of APP from the Tyrrhenian to the Ionian Sea. Sediments from sandy beaches will be analyzed, focusing on light rock fragments such as pumices as well as plastic. Sediment from the dune systems will be used to evaluate wind-driven microplastic spreading from the coast to inland sites. The role of extreme events in the study area (e.g. Mediterranean Hurricane) in plastic dispersal will be also considered, evaluating their effect on the plastic cycle in the sedimentary system. A multi-technical approach will combine optical microscopy, Raman spectroscopy and FTIR analysis.

Sampling campaigns are planned at Capo Milazzo (ME) with the help of Museo del Mare di Milazzo (agreement IRIS 2024-NOECO-0055) and in other localities in Sicily, Calabria and Puglia. The samples collected will be prepared and analyzed in the laboratories of the Provenance Centre. The interaction between atmosphere and sea surface will be supervised by Prof. Luca Ferrero; FTIR analyses will be assisted by Dr. Francesco Saliu. The geophysics of atmospheric and oceanic fluid dynamics controlling plastics dispersal will be assisted by Dr. Enrico Ser-Giacomi, Universitat de les Illes Balears, Palma de Mallorca, Spain, where the PhD will spend his/her period abroad. Additional funding for travelling, meetings and analyses will be provided by the supervisor (Andò 2022-NAZ-0439; Andò 2020-ECOT-0008)

Supervisor webpage: https://www.unimib.it/sergio-ando

Notes: shortlisted for the Department of Excellence TECLA position on "Monitoring of the effects of ongoing climate warming and mitigation strategies and techniques" (Monitoraggio degli effetti del riscaldamento climatico in corso e strategie e tecniche di mitigazione)

17		Supervisor	Elisa Malinverno	
			(co-supervisor: Daniela Basso)	
Title	Climatic shift in t	he Plio-Pleisto	cene from the Southern Ocean	
TitleClimatic shift in the Plio-Pleistocene from the Southern OceanThe research topic focuses on the reconstruction of paleoclimatic-paleoceanographic changes, through proxies from marine sediment cores, for the Plio-Pleistocene, a key geological interval to frame recent climate change.The study area is in the Pacific sector of the Southern Ocean, an area that is very sensible to climatic forcing and also plays a significant role in defining the Earth's climatic response: here, marine sediment cores were obtained during IODP expeditions, have a detailed age model and are available for study. The aim of this research is to define, through different micropaleontological (calcareous nannofossils, diatoms, silicoflagellates) and geochemical (stable oxygen isotopes, trace elements) proxies, the shifts in oceanographic fronts through time, as a function of climatic forcing.The PhD activity will include practical work in the lab for sample preparation, quantitative observations under the light and scanning electron microscope, geochemical analyses, interpretation of the results and integration with shipboard data.The PhD position will possibly lead to a double degree, in co-tutorship with the University of Bremen/Alfred Wegener Institute for Polar Sciences, and include a period spent in Bremen/Bremerhaven to work in collaboration with renown researchers (prof. Frank Lamy, Oliver Esper) dealing with both microfossil and geochemical proxies. Collaboration on microfossil analysis is also available with the University of Portsmouth (Prof. Saavedra-Pellitero) for a short visiting period. Prof. Daniela Basso will co- supervise the application of paleoclimatic proxies. Funds are available for research costs and congresses from the supervisor.				
Supervisor webpage: https://www.unimib.it/elisa-malinverno				

Notes: shortlisted for the Department of Excellence TECLA position on "Study of the evolution of the climate in the past" (Studio dell'evoluzione del clima nel passato)

18		Supervisor	Pietro Sternai	
			(co-supervisor: Claudia Pasquero)	
Title	le Dynamic Topography and The Mantle Forcing on Climate: A			
	Missing Link in Earth System Science			
Missing Link in Earth System ScienceGlobal topography plays a fundamental role in shaping climate, influencing atmospheric circulation and precipitation patterns through orographic effects. While much of Earth's topography arises from isostatic support due to variations in crustal and lithospheric thickness and density, a significant portion of up to ±1-2km results from dynamic forces driven by slow yet vigorous mantle convection. Despite decades of research on the spatial and temporal evolution of such 'dynamic topography', its impact on global climate remains unexplored. This project aims at filling this knowledge gap by quantifying the influence of mantle-induced dynamic topography on past and present-day atmospheric circulation and precipitation patterns. The mantle's contribution to climate patterns will be isolated and quantified using an Earth Model of Intermediate Complexity and/or General Circulation Models forced with different models of global dynamic topography. Results will uncover a hitherto unknown connection between Earth's deep interior and surface environments, offering new opportunities for paleoclimate investigations and insights into how geodiversity and biodiversity have co-evolved throughout Earth's history. Expected work allocation: ~15% bibliographic work, ~60% modeling work, 25% papers writing. Projects will be co-supervised by Prof. Claudia Pasquero and held in collaboration with external partners (e.g., Fred Kucharsky from ICTP, Trieste; Alice Portal from ISAC CNR; Eli Tziperman from Harvard University; Claudio Faccenna, Sascha Brune, and Bernhard Steinberger from the GFZ, Potsdam, Germany) who will provide access to analytical and computing facilities during the (6-12 months) expected periods abroad.Supervisor webpage: https://sites.google.com/site/pietrosternai1/home				

Notes: shortlisted for the Department of Excellence TECLA position on "Study of the evolution of the climate in the past" (Studio dell'evoluzione del clima nel passato)