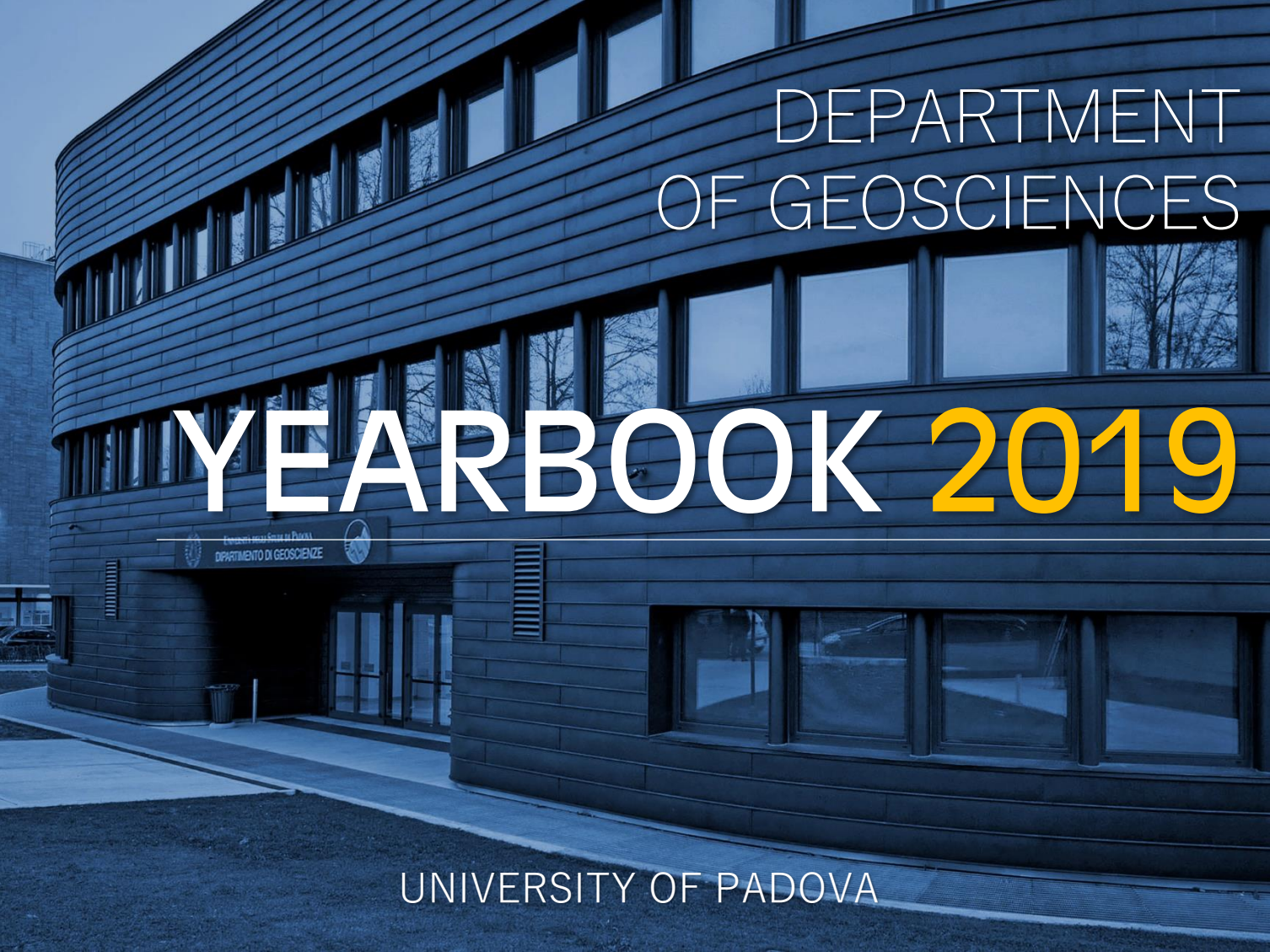

DEPARTMENT
OF GEOSCIENCES
YEARBOOK 2019
DIPARTIMENTO DI GEOSCIENZE
UNIVERSITY OF PADOVA

A word from our Director

As the Director, I think it is time to commence a tradition that will hopefully represent a staple for the Department of Geosciences, namely, the publication of a Department Yearbook. It is intended not only as a promotional tool for the Department at both the national and international level, but also as a reference point for the University and social communities in a city that hosts one of the main studies and research centres for Geological Sciences nationwide, and beyond. This Yearbook aims at providing an overview of the people working at the Department of Geosciences, as well as a report on its teaching programs, research products and third-mission proposals.

In 2019, the Department of Geosciences provided teaching to 177 students for the bachelor's degree in Geological Sciences and 93 students for the master's degree in Geology and Technical Geology. In addition, the Department has an international Ph.D. program in Geosciences, which in 2019 counted on 42 Ph.D. students (among which 11, i.e., about 30%, were international). In the same year, the 13 Full Professors, 30 Associate Professors and 14 researchers of the Department also provided extensive teaching in geosciences for several further bachelor's and master's degrees at the University of Padova. The Department was also the main organizer of four Summer Schools.

The Department also counted on 29 post-doc researchers, of which 9 were international (again, about 30%), witnessing a strong international research environment. Extremely positive is the balance of the Department in terms of international research fund raising, with two active ERC projects (one is a Consolidator Grant and the second is a Starting Grant), 11 collaborative H2020 research projects and 3 Marie Skłodowska-Curie Individual Fellowships.

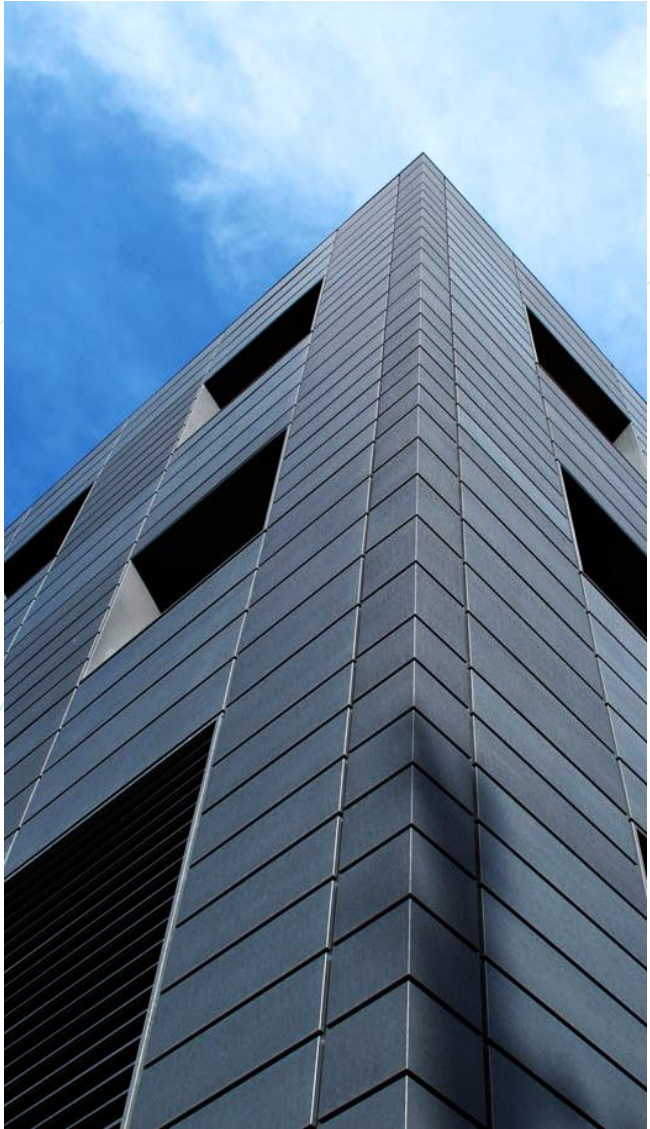
At the national level, the Department had 10 active research projects funded by the Ministry of Education, University and Research (5 PRIN projects, 4 Antarctica-related projects, 1 SIR project). Further 7 active projects were supported by public national institutions (e.g., National Civil Protection, Basin Authority of the Eastern Alps, Veneto Region). Finally, 9 active projects were funded and/or supported by private companies and private foundations.

The Department hosts the CIRCe Centre, the only centre in Italy for the investigation of cement materials and the formulation of construction binders. In 2019, the Department counted on 22 research laboratories, supporting internal and collaborative research projects and delivering a volume of approximately 7000 sample preparations and 5000 analyses. Such a huge laboratory work provided a total of nearly 100 papers published in international journals out of 194 total papers published by the Department in 2019 in international scientific journals.

In terms of research collaborations, in 2019 the Department of Geosciences had about 50 national collaborations, 70 European collaborations and about 30 extra-European collaborations with several exchanges all over the world. In addition, the Department organized 18 weekly research seminars, some of which were also open to the public.

As regards the Department's outreach, 20 public events related to science divulgation were organized in 2019. To introduce young students to the world of geology, an open week was also organized, during which about 120 students from several primary and secondary schools were hosted by the Department and involved in five different practical activities. In addition, the Department played a leading role during the European Researchers' Night (Veneto Night) and organized the event entitled "Women in Science" at the Botanic Garden of the University of Padova.

The Department of Geosciences owns extensive collections of Italian and foreign rocks, fossils and minerals housed in the Museum of Geology and Paleontology, and in the Museum of Mineralogy. Such a huge scientific and cultural heritage has its roots in the old collections of the Natural History Museum of the University of Padova, founded in 1733 thanks to the donation by Antonio Vallisneri Jr.



Besides the scientific activities, carried out by Italian and foreign researchers from all over the world, the Museum's staff, coordinated by the CAM (Centro di Ateneo per i Musei), carries on an intense activity of public engagement with the fruitful support of the Department's researchers. Finally, in 2019 the Department delivered a very important number of scientific papers, of which 194 were published in peer-review international journals. The very high number of publications in high-impact journals significantly contributed to the "Earth and Environmental Sciences" being ranked first in Italy in the Nature Index international ranking.

Prof. Fabrizio Nestola

Head of the Department of Geosciences

HISTORY *by L. Capraro*

The Veneto Region hosts a rich and renowned geological heritage, including world-famous paleontological sites such as Bolca, located between Vicenza and Verona, which has been exploited and studied since the XVI century. It is therefore not surprising that the University of Padova played a fundamental role in promoting and advancing the development of modern Geology, as we know it. Many were the Scholars of our University who rendered immeasurable service to the advancement of Earth Sciences. Among these it is worth mentioning Gerolamo Fracastoro, who proposed a correct interpretation on the formation of fossils back in the XVI century; Antonio Vallisneri Sr., medic and keen naturalist in the early 1700s, who explained important geological phenomena with a modern approach; and especially Giovanni Arduino, who interpreted correctly in 1750 the organization of rock strata and proposed a first subdivision of the geologic time. The teaching of Earth Sciences at the University of Padova dates back to 1734, when Antonio Vallisneri Jr. bestowed to the "Magistrato dei Riformatori dello Studio di Padova" the extensive naturalist collections previously owned by his late father, which included an enormous amount of fossils, rocks and minerals. In view of that, the course of study in "Storia Naturale Speciale" was established, this representing the ancestor of the modern Natural Sciences curriculum. Separation between biological (i.e., Zoology and Comparative Anatomy) and non-biological sciences occurred in 1869, when Giovanni Omboni was awarded the Chair of Mineralogy and Geology. In 1883, the geo-mineralogic collection, hitherto stored in the main building of the University (Palazzo del Bo), were further subdivided into a mineralogic and a geologic collection and transferred to Palazzo Cavalli, where they are presently hosted.

The former Chair of “Storia Naturale Speciale” was accordingly converted and split into an Institute and Museum of Mineralogy (Chair Ruggero Panebianco) and an Institute and Museum of Geology (Chair Giovanni Omboni). In the 1980s, Institutes were reformed into Departments, with further separations between the former institutions. At that time, indeed, Geosciences at the University of Padova were structured into three separate Departments, these being: the Department of Mineralogy and Petrology and the Department of Geology, Paleontology and Geophysics, both located at Palazzo Cavalli, and the Department of Geography, which was hosted in a separate building. In 2007, the Departments housed at Palazzo Cavalli merged into the Department of Geosciences, which is nowadays located in a building launched in late 2010. Since 2012, the Department also includes Physical Geographers previously afferent to the Department of Geography.

FABRIZIO NESTOLA
Head of the Department

NICOLA SURIAN
Vice-Head of the Department

EDDA FASSARI
Head of the Administrative Staff

BERNARDO CESARE
Coordinator of the Teaching Programs

PTA - Technical and Administrative Staff

ADMINISTRATION

EDDA FASSARI
Head of the
Administrative staff

ANNA RITA BASTIANELLI

LAURA CORAIN

CRISTINA MAGRO

MARIA LETIZIA MINOTTO

GIADA MIOTTO

MICHELA NORDIO

AMABILE PELOI

SERVICES TO TEACHING, POST-LAUREAM, RESEARCH AND OUTREACH

EDDA FASSARI
Head of Service
(ad interim)

ANGELA DE FALCO

ELISA FACCIOLO

MARZIA PEGOLOTTI

SARA VETTORE

TECHNICAL AND IT SERVICES

MARIA ORNELLA ROSSIN

BRUNO CIERVO

ANTONELLA RASSU *

NICOLA PRATICELLI

* Photo not published on request of the employee

LABORATORIES AND SPECIALIZED SERVICES


CARLOTTA BETTO


SANDRA BOESSO


STEFANO CASTELLI


MARCO FAVERO


GIAMPAOLO GIRARDI


NICOLA MICHELON


DARIA PASQUAL


LEONARDO TAURO


FEDERICO ZORZI

Full Professors

GILBERTO ARTIOLI

My research interests are: the materials science of alternative and green building materials; Reuse and recycle of industrial materials for circular economy; solidification and stabilization of contaminated soils; the materials science of cultural heritage

ALESSANDRO CAPORALI

My research interests are: Solid Earth Physics, Seismology; Seismic sources; Interpretation of space geodetic data for the measurement of surface deformation; Reference frames; Precision positioning; GNSS technology

ALBERTO CARTON

Geomorphological investigations with particular attention to geomorphological surveying and mapping glacial and periglacial morphogenesis applications of geomorphology to slope stability investigations and hazard and risk processes in high-mountain.

GIORGIO CASSIANI

My research interests are: Geophysical methods for environmental applications; Seismological micro-scale zoning and other soil dynamics uses of exploration geophysics; Integration of hydrological modeling with geophysical methods; Geomechanics for environmental applications.

BERNARDO CESARE

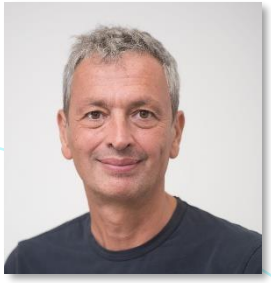
I work on metamorphic petrology, with special interest for: High-grade metamorphism and partial melting of pelitic rocks; Origin of Granites; Fluid and melt inclusions; Petrologic mineralogy.

FRANCESCA DA PORTO

My research interests are: Seismic vulnerability; Analysis, intervention and monitoring of historic and modern masonry buildings, RC structures and bridges; Development of procedures for large scale assessment of seismic risk.

GIULIO DI TORO

I investigate earthquake physics and faulting by integrating: Field studies of seismogenic fault zones; Rock deformation experiments; Microstructural/geochemical investigations of natural and experimental fault zone products.



SILVANA MARTIN

My research interests are: Structural setting of the Alps; Geodynamics of subduction zones; Paleoseismogenic faults and material, Monitoring and dating alpine rock avalanches and landslides

FABRIZIO NESTOLA

My research interests are: Mineralogy under extreme conditions of pressure and temperature; Geothermobarometry of diamond-inclusion systems; Carbon phases in meteorites.

GIORGIO PENNACCHIONI

My research interests are: Exhumed paleoseismic (pseudotachylyte-bearing faults); Nucleation and localization in ductile shear zones; Microstructures in mylonitic zones; Fluid-rock interaction in the ductile field.

CRISTINA STEFANI

My research interests are composition and provenance of terrigenous sediments (sand composition and transparent heavy mineral associations) in different geological contexts for paleogeographic and paleoclimatic reconstructions.

NICOLA SURIAN

My research interests are: Geomorphic response to extreme flood events and assessment of flood hazard; Sediment dynamics and estimate of bedload transport in large gravel-bed rivers; Channel adjustments and their evolutionary trajectory and prediction of future scenarios

MASSIMILIANO ZATTIN

My research interests are: Applications of thermochronology to tectonic evolution of orogenic chains, basin analysis, provenance studies and paleogeographic reconstructions; Feedbacks between tectonics, erosion, sedimentation and climatic variations.

Associate Professors

CLAUDIA AGNINI

My research field is micropaleontology and I particularly focus on the study of calcareous nannofossils both as biostratigraphic and paleoceanographic tools.

LAPO BOSCHI

I study how waves propagate in complex media, and apply this knowledge to a number of different fields of research, within the general domains of acoustics and seismology. I am interested in wave-based imaging in geology; sound localization in acoustics; acoustic display.

LUCA CAPRARO

My research focuses on reconstructing the stratigraphy and climatic evolution of the Central Mediterranean during the Pliocene and Pleistocene based on the study of onland marine sediments from Southern Italy.

MARIA CHIARA DALCONI

My research activity focuses on mineralogy applied to the study of industrial materials and their impact on the environment. I mainly use powder diffraction technique to characterize raw materials, industrial materials and their by-products and wastes.

ANDREA D'ALPAOS

I am a hydraulic engineer who studies the biomorphodynamic evolution of coastal and fluvial landscapes in response to climate change and human interferences, through field observations, laboratory experiments, and mathematical modeling.

PAOLO FABBRI

My research field includes: Geostatistics in hydrogeology; Hydrogeology of geothermal areas; Hydrogeological parameterization of aquifers.

MANUELE FACCENDA

I am a solid earth geophysicist working on numerical simulations of plate tectonics and mantle convection processes. I aim at improving our understanding of the Earth's dynamics by reproducing the complex interplay of different geological processes.

MARIO FLORIS

My research field includes: Probabilistic and deterministic modeling of rainfall-induced landslides; GIS-based landslide hazard analysis; Remote sensing techniques in landslide identification and characterization; A-DInSAR techniques for subsidence and landslide analyses.

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ALESSANDRO FONTANA

I am a geomorphologist and Quaternary geologist with interest in the evolution of the alluvial and coastal environments and in the geoarchaeological aspects.

ELIANA FORNACIARI

My research interests are upper Cretaceous-Cenozoic calcareous nannofossil biostratigraphy, biochronology and paleoecology with special reference to tempo and mode of the extinction/recovery pattern of nannofossils during environmental perturbations.

ANTONIO GALGARO
My research interests are: Geothermics; Artificial Intelligence; Machine learning; Landslides risk, early warning and monitoring.

MASSIMILIANO GHINASSI
I am a clastic sedimentologist working mainly on alluvial and coastal deposits. I aim at improving models to interpret the sedimentary record by linking sedimentary products with modern processes and experiments.

LUCA GIUSBERTI
I study foraminifera as tools for investigating the climatic variability in the Cretaceous and Paleogene. Secondarily, I am currently working on several aspects of Italian Cretaceous and Paleogene Fossil-Lagerstätte.

LARA MARITAN
I work on minero-petrographic application to cultural heritage materials and sites, archaeometry, new mix design for sustainable brick production.

ANDREA MARZOLI
My research interests are: Igneous petrology; Large Igneous provinces; Alkaline magmatism; Mass extinctions.

MATTEO MASSIRONI

My research interests are: Exploration and geology of planetary surfaces and small bodies of the Solar System; Geological mapping including Remote Sensing, GIS and 3D modelling; Fault architectures and regional tectonics.

CLAUDIO MAZZOLI

Petrography applied to archeological materials, and stone deterioration. New building materials using industrial waste. Petrography and geochemistry of carbonates in paleoclimate studies. Radon risk. Metamorphic petrology and monazite geochronology.

STEFANO MONARI

I focus on all aspects of paleontology of Mesozoic bivalves and gastropods, including systematics, phylogenetic analysis, stratigraphical significance, paleoecology and paleobiogeography.

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PAOLO MOZZI

My research fields are: Geomorphology; Quaternary geology; geoarchaeology; palaeopedology; alluvial, glacial and lagoon landforms and deposits; geomorphological mapping; mapping of Quaternary deposits.

PAOLO NIMIS

My research fields are: Thermobarometry and geochemistry of mantle rocks and diamonds; Mafic-ultramafic-hosted seafloor massive sulfide deposits; Alpine copper metallogeny and provenancing.

LEONARDO PICCININI

My research focuses on applied geology and hydrogeology.

NEREO PRETO

My research fields are: Stratigraphy, sedimentology and cyclostratigraphy of carbonate platforms; isotopic geochemistry; petrology and diagenesis of carbonates aimed at paleoclimatic reconstructions and modelling the depositional architecture of carbonate platforms.

MANUEL RIGO

My cross-disciplinary research aims to decipher the evolution of the Earth, evaluating the role of the oceanic processes in the global climate and environmental changes on modern and geological timescales.

GABRIELLA SALVIULO

The main research topic concerns the application of iron oxide nanoparticles for waters and soils remediation from heavy metals and the role of soils mineralogical composition in the pollutants release.

RAFFAELE SASSI

My research fields are: Petrology, tectono-metamorphic evolution of crystalline basements; crystal chemistry of micas; Geothermics; Cultural Heritage materials.

PAOLO SCOTTON

My research focuses on: Debris Flows; Snow avalanches; Geothermal heat exchange.

LUCIANO SECCO

As a structural crystallographer, I study the relationships between structure and chemical composition of crystals at various PT conditions. I study the crystal-chemistry of silicates, oxides and phosphates of alpine pegmatites and carbonates related to Triassic hydrothermal events.

ALBERTA SILVESTRI

My research activity focuses on archaeometric studies of ancient glass (vessels, mosaic tesserae, stained glass and glazes), aiming at identifying raw materials, production technologies and alteration processes.

RICHARD SPIESS

Understanding the significance of microstructures within terrestrial and extraterrestrial rocks. Study of microstructures within experimentally formed and deformed rock analogues. Metamorphic petrology. Geodynamics. Microstructures in all materials.

DARIO ZAMPIERI

brittle tectonics (kinematic analysis of faults, transfer zones, natural fracture systems, active tectonics, geological structure of geothermal fields, rockslide hazard), geological mapping, geodynamics of the Adria plate, humans as geomorphic agents.

Assistant professors

ANNA BREDA

Facies analysis and sequence stratigraphy of clastic and mixed sedimentary successions of continental to shallow-marine environments in terms of depositional processes and stratigraphic architecture.

ROBERTO GATTO

All aspects of paleontology of Mesozoic and Cenozoic benthic molluscs, especially gastropods, including systematics, paleoecology, paleobiogeography and evolution.

CHRISTINE MEYZEN *

Tectonic, magmatic, and hydrothermal processes at mid-ocean ridges. Composition, evolution and dynamic of the earth's mantle. Formation of the oceanic lithosphere and crustal evolution at ridges.

* Photo not published on request of the employee

RTDa

LUCA CARTURAN

I am a specialist of the alpine cryosphere. My research activity is devoted to the monitoring, understanding and modelling of the climate-related changes of the Alpine cryosphere and their effects on mountain hydrology.

NICOLA CENNI

I am a geophysics working mainly in multi-techniques geodetic monitoring to study processes as subsidence, the present tectonic pattern in the Mediterranean area, and landslide movements. The time series analysis methods are arguments for my research.

ELOISA DI SIPIO

My main research interests are geothermal energy resources, geophysics application to geothermal studies, petrophysical characterization of lithological materials and hydro-geological characterization (e.g. saltwater intrusion, isotope geochemistry).

MARCO FRANCESCHI

My main research focus is the three-dimensional modelling of, e.g., carbonate platforms or comets. Quantification of geometric parameters of these geological bodies unveils processes that would remain otherwise undetected.

VALERIO OLIVETTI

My main research interests are tectonics, orogenic processes, quantification of erosion, thermochronology.

RTDb

OMAR BARTOLI

My research interests are: High temperature metamorphism; Crustal melting and granite formation; Melt inclusions in magmatic and metamorphic rocks; P-T-t evolution of high-grade metamorphic terranes; Volatiles in crustal magmas.

SIMONE BIZZI

Fluvial Geomorphology in particular: the use of emerging remote sensing technology to develop model of sediment transport, sediment connectivity and fluvial processes in general. The use of this knowledge to support river management.

JACOPO BOAGA

I'm an applied geophysicist. My research interests concerns mainly engineering and environmental geophysics such geophysics for natural hazard scenarios, electrical and electro-mag.

TELEMACO TESEI

My research interests are: Structural geology of faults and shear zones; Experimental rock mechanics and earthquake mechanics; Microtectonics.

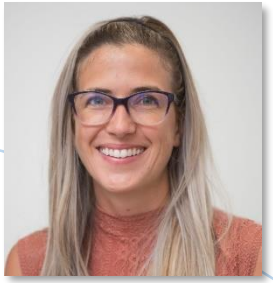
LUCA VALENTINI

I work on design, characterization and modelling of sustainable building materials based on clay and industrial waste.

POST-DOCs

RICCARDO BIONDI

I use remote sensing to investigate extreme atmospheric events such as severe convection and volcanic clouds.



BRUNA BORGES-CARVALHO

My research interests are: Anatexis at high to ultra-high temperature and ultra-high pressure conditions; Melt and fluid inclusions in peritectic garnet; Volatile contents of granitic magmas; Fluid regime of the deep crust.

ANDREA BRENNA

I am a fluvial geomorphologist. My research interests focus on sediment dynamics in gravel-bed rivers, and responses of mountain streams to high-magnitude hydrological events.

CATERINA CANOVARO

My research is focused on the study of ancient copper and bronze artefacts. The main goal is to establish the geological origin of the metal employed, by investigating each sample from a mineralogical, metallurgical, chemical and isotopic point of view, with the intent to deduce the issues of trade, the commercial relationships and the movements of objects.

CARLOTTA CAPPELLI

My research interests are: Calcareous nannoplakton evolution and biostratigraphy, with focus on early Eocene global warming and following transition to the middle Eocene global cooling; Determining relationship between paleoclimatic/paleoceanographic changes and evolution.

SILVIA CATTO'

I work on low-temperature thermochronology (AFT and U-Th/He) applied both in structural geology (e.g. evolution of the Transantarctic Mountains of Antarctica) and in sedimentary basins (sediment provenance and geological-climatic evolution of East Greenland).

CHIARA COLETTI

My main research interests are: Cultural Heritage decay and climate change; Green solutions for new mix design recycling waste; Radon occurrence in soils, rocks, and construction materials.

LUCA COLLANEGA

My main research interest is tectonics, with a special focus on the use of 3D seismic data to image complex fault patterns.

GIORGIA DALLA SANTA

My main research interests are: Shallow geothermal systems for building conditioning, mechanical and permeability effects induced by freezing-thawing processes in sediments, sediments and rocks thermal properties; FEM modelling of fluid and heat transfer processes in porous media.

ALBERT DE MONTSERRAT NAVARRO

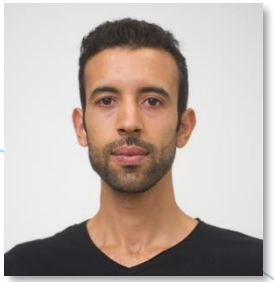
My major research interest is in computational geodynamics.

BARBARA DE TOFFOLI

My research interests are: Fluid circulation in the Martian crust and terrestrial analogue sites; Analysis of percolating fracture systems; Sedimentary volcanism; Water resurgences and degassing centers identification in a search for life perspective.

HASSAN EZ-ZAKI

My research interests are focused on the use of natural resources and by-products such as calcium carbonate, slag, calcined clays, etc. in cementitious materials to study their effect on the fresh and hardened states.



MICHELE FONDRIEST

I am a structural geologist. I focus my research on fault and rock mechanics with extensive field work approach and some laboratory experiments.

ENRICO GARBIN

My research interests are: Cement, lime and alkali activated binders. Mechanics of construction materials; Mechanics and structural retrofitting of modern and historic structures; Special applications: neutron shielding mortars and geothermal grouts and slurries.

OMAR GIANOLA

My research interests are: Origin and evolution of oceanic and continental crust; Geochemical differentiation of mantle-derived magma; Origin of anatectic crustal melts; Transport of melts through mantle and crus; Formation of crust-mantle transition zones.

RODRIGO ALFONSO GOMILA OLMOS DE AGUILERA
I am a Structural Geologist. My area of interest and research is the dynamic interaction between hydrothermal fluids and fault-zones in the crust at seismogenic structural levels.

ELŻBIETA LASOTA
I study severe weather monitoring using Radio occultation and ground-based GNSS observations, geovisualisation, machine learning.

BENJAMIN MARY
I study soil-plant interactions for water using geophysics.

MARTHA GIOVANNA PAMATO
I study unique samples forming in the deep Earth, such as inclusions in diamond. I also conduct experiments to determine the properties of mantle minerals. My research goal is to understand the structure, composition and evolution of the Earth.

LUCA PENASA
My research interests are: Planetary geology; Small bodies; 3D geological modelling; Data science applications to geology; Python programming for geosciences; Dynamical modelling of brittle deformation.

ELENA MERCEDES PEREZ-MONSERRAT
My research interests are: Ancient bricks technologies; Built heritage resilience; Interdisciplinary studies; Multianalytical approaches; Archaeometry; Traditional and eco-friendly building materials.

RICCARDO POZZOBON
My research focuses on planetary geology and structural geology. The main topics are 3D geo-modeling of planetary surface/subsurface, structures related to diapirism, mud volcanism and lava tubes and planetary analogues.

GIULIA RICCI
I am an archaeological scientist working on the diagnostic of Cultural Heritage encouraging interdisciplinary connections. My current research is the characterization and radiocarbon dating of historical mortars aiming at contributing to the cultural valorization of the built heritage.

LIVIO RONCHI
I am mostly interested in the evolution of alluvial plains linked to the last marine transgression.

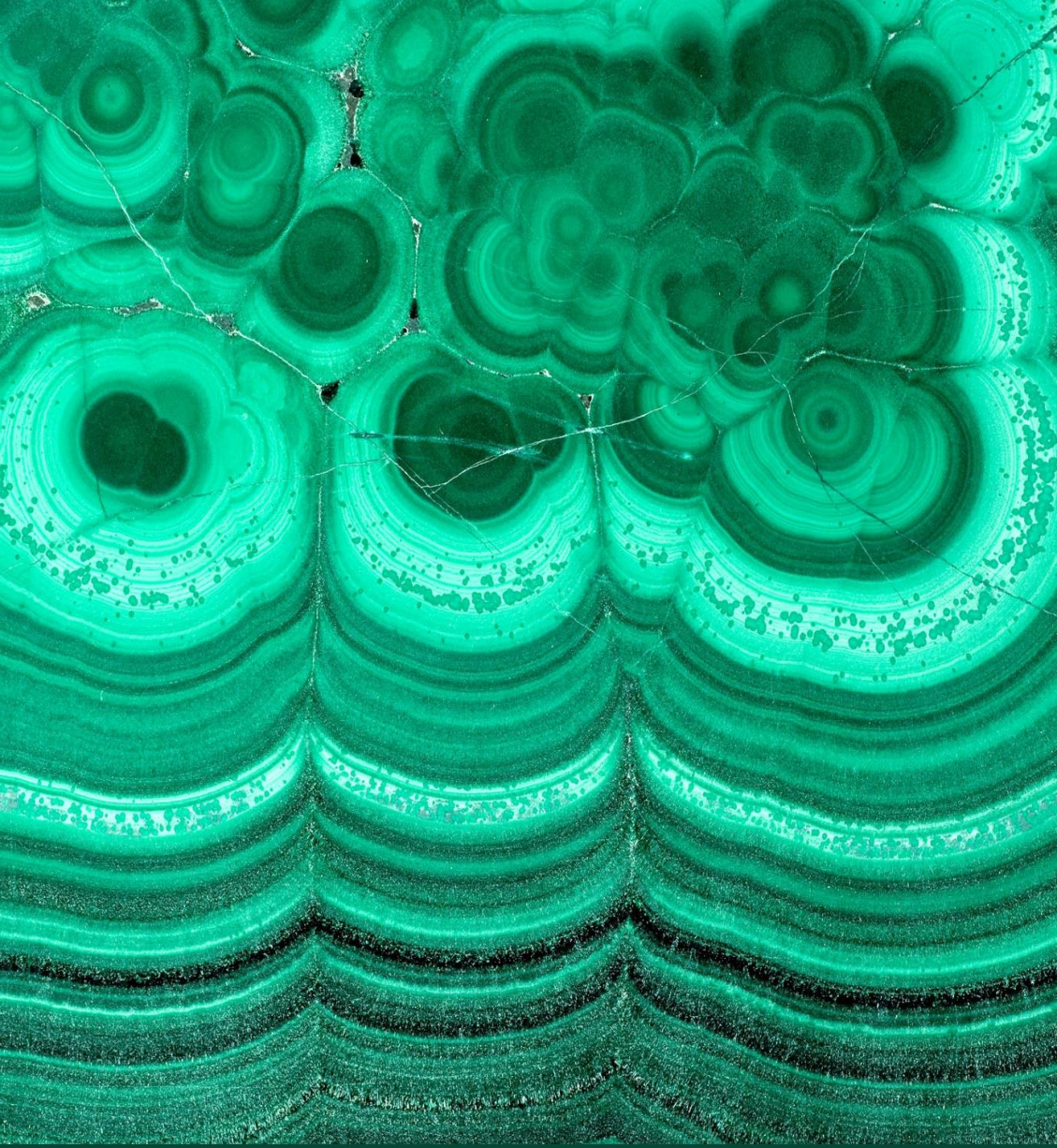
SANDRO ROSSATO
I am a geomorphologist interested in the evolution of Alpine valleys and alluvial plains in the late Quaternary. I mainly work in geological mapping, DEM analyses and geochronological investigations.

ALESSANDRO SGARABOTTO
I work on numerical modelling of meandering fluvial channels to predict spatial distribution of sedimentary facies.

PIERRE-YVES TOURNIGAND
I use Radio Occultation technique to detect volcanic ash clouds.

BRANDON VANDERBEEK
My research focuses on improving seismic imaging strategies to better constrain the anisotropic structure of Earth's interior.

JIANFENG YANG
I am a geodynamicist working on the numerical modeling of subduction zone dynamics and intraplate volcanism. I apply the petrological-thermo-mechanical models to study the complex dynamics in the Mediterranean region.



Ph.D. students

JACOPO AMALFITANO (cycle XXXII)
Supervisors: L. Giusberti, G. Carnevale, E. Fornaciari
Ttitle: The Cenomanian-Turonian ichthyofaunas from the Scaglia-type succession of Northeastern Italy.

ILARIA BARONE (cycle XXXIII)
Supervisors: G. Cassiani, J. Boaga, C. Strobbia
Title: Seismic surface analysis and inversion: development and testing of tomographic algorithms.

ELENA BELLIZIA (cycle XXXIV)
Supervisors: M. Ghinassi, A. D'Alpaos
Title: Sedimentary facies variability along fluvial and tidal meanders: examples from the Holocene Venetian Plain.

ANDREA BOSCAINI (cycle XXXV)
Supervisors: A. Marzoli, N. Preto, J. Davis
Title: Age, duration, and origin of the Wrangellia large igneous province and implications for the Carnian Pluvial Event.

Dr. GIANLUCA CADELANO (cycle XXXV)
Supervisors: A. Galgaro, A. Bernardi, G. Dalla Santa
Title: Innovative solutions for ground heat exchangers.

MANFREDO CAPRIOLO (cycle XXXIII)
Supervisors: A. Marzoli, R. J. Newton
Title: Carbon in the Central Atlantic Magmatic Province and its implications for the end-Triassic mass extinction

PIETRO CARPANESE (cycle XXXV)
Supervisor: F. da Porto
Title: Seismic risk assessment on a territorial scale based on bayesian approaches and machine learning

VALERIA CASCONE (cycle XXXIV)
Supervisors: J. Boaga, L. Boschi
Title: Ground motion seismic monitoring by the use of distributed low cost sensors

XUE CHEN (cycle XXXIV)
Supervisor: M. Floris
Title: Testing multi-temporal InSAR techniques for geohazards analysis and assessment in different geological and geomorphological environments.

OLIVER CHRIST (cycle XXXV)
Supervisors: F. Nestola, F.E. Brenker
Title: Extraterrestrial diamonds in ureilites and meteorites

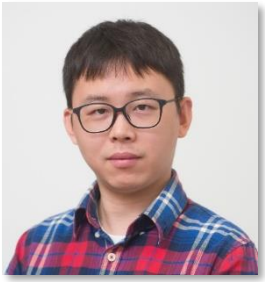
SILVIA CONTESSI (cycle XXXIII)
Supervisors: M. Dalconi, G. Artioli
Title: Mineralogy and geochemistry of solidified metal-contaminated soil: case studies and leaching behavior.

MARTA COSMA (cycle XXXII)
Supervisors: M. Ghinassi, A. D'Alpaos, N. Mountney
Title: Stratal patterns and sedimentary facies in tidal point bars.

MARCO CRIVELLARO (cycle XXXII)
Supervisors: B. Cesare, O. Bartoli, A. Acosta-Vigil
Title: Deciphering the polymetamorphic history of the Jubrique Sequence (Betic Cordillera, Spain).

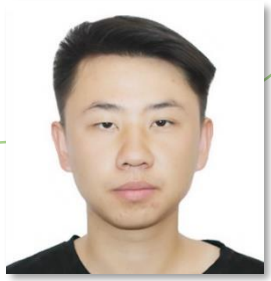
NICO DALLA LIBERA (cycle XXXII)
Supervisors: P. Fabbri, F. Tateo, D. Pedretti
Title: The natural background level (NBL) problem: a hydrogeochemical study on the natural occurrence of arsenic located in the Veneto Region (NE, Italy).

LUCA DEL RIO (cycle XXXIV)
Supervisors: G. Di Toro, M. Moro, M. Fondriest
Title: Mechanism of formation of slip surfaces in carbonate-built rocks: seismic faulting vs. deep seated gravitational slope deformation.



YIXING DU (cycle XXXIII)
Supervisor: M. Rigo
Title: Integrated studies on Upper Triassic conodonts: biostratigraphy, evolution, and extinction.

WEI FENG (cycle XXXV)
Supervisors: G. Di Toro
Title: Investigation of seismic slip in experimental faults under hydrothermal conditions.



MARIE GENGE (cycle XXXIII)
Supervisors: M. Zattin, B. Vendeville, C. Witt
Title: Tectonic evolution of the North-Central Patagonia: a thermochronological approach.

AMINOU ISSOUFOU (cycle XXXV)
Supervisor: G. Cassiani
Title: Subsoil characterization using seismic reflection: advanced techniques.

XIA LI (cycle XXXII)
Supervisor: M. Zattin
Title: From bedrock to sediments: insigths on Ross Sea ice-flow dynamics inferred from detrital data.

YIKAI LIU (cycle XXXV)
Supervisors: G. Artioli, L. Valentini, M. Dalconi
Title: Studies on the ionic transports in soil-binder systems.
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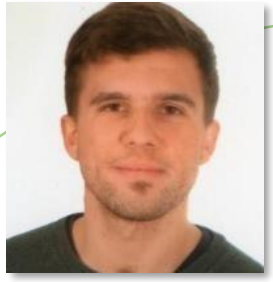
ROSALIA LO BUE (cycle XXXIV)
Supervisor: M. Faccenda
Title: Inverse geodynamic modelling with the adjoint method.
.

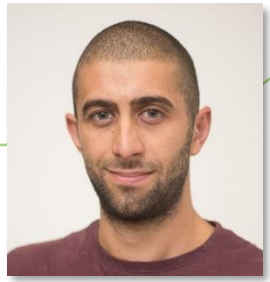
SOFIA LORENZON (cycle XXXIV)
Supervisors: F. Nestola, P. Nimis
Title: Peering into the deep Earth through diamonds.

ARIANNA MARCOLLA (cycle XXXIII)
Supervisors: P. Mozzi, C. Stefani, A. Miola
Title: Late Quaternary paleoenvironmental reconstruction of the Venetian Plain from multi-proxy analysis.



LUDOVICO MASCARIN (cycle XXXV)
Supervisor: L. Valentini
Title: Sustainable binders for emerging countries: numerical and experimental analysis of alkali-activated calcined clays.

SIMONE MASOCH (cycle XXXV)
Supervisors: G. Di Toro, J. Cembrano, G. Pennacchioni
Title: Structure, evolution and deformation mechanisms of large displacement seismogenic faults in the continental crust.



SIMONE MOLINARI (cycle XXXII)
Supervisors: G. Salviulo, F. Vianello, C. Carbone
Title: Chromium and arsenic removal from contaminated water: environmental application of maghemite nanoparticles (samns).

JACOPO NAVA (cycle XXXII)
Supervisors: M. Massironi, L. Folco, E. Palomba
Title: Mineralogical composition and geological features of c-type asteroids inferred from meteorites and space missions data.

SIMONE PAPA (cycle XXXII)
Supervisors: G. Pennacchioni, L. Menegon
Title: The pseudotachylyte-mylonite association: an insight into the mechanics of deep earthquakes.

LEONARDO PASQUALETTO (cycle XXXIV)
Supervisors: P. Nimis, F. Nestola
Title: Genesis and thermobarometry of inclusions in diamonds from Voorspoed kimberlite (South Africa).

RODOLFO PEREGO (cycle XXXIII)
Supervisors: A. Galgaro, S. Pera
Title: Shallow geothermal systems sustainability through a holistic approach: the Canton Ticino (CH) test site.

ALICE PUPPIN (cycle XXXV)
Supervisors: A. D'Alpaos, M. Marani
Title: Marsh biomorphodynamics under natural and anthropogenic changes through field observations and their modelling interpretation.

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FRANCESCO RAPPISI (cycle XXXIV)
Supervisor: M. Faccenda
Title: Micro and macro scale geodynamic and seismological modelling of convergent margins.

CINZIA SCAGGION (cycle XXXIV)
Supervisors: G. Artioli, N. Carrara, C. Scheib
Title: Advanced analytical diagnostics applied to human osteological remains.

APSARA SHARMA DHAKAL (cycle XXXV)
Supervisor: L. Boschi
Title: Constraining the source of earthquake using time reversal seismic data.

PAWEL MICHAL SLUPSKI (cycle XXXV)
Supervisors: B. Cesare, O. Bartoli, J. Majka
Title: Former melt inclusions from (U)HP gneisses of the Scandinavian Caledonides.

TOFFOL GIOVANNI (cycle XXXV)
Supervisors: G. Pennacchioni, L. Menegon
Title: Interaction between coseismic brittle deformation and ductile flow in the lithosphere.

ILARIA TOMASI (cycle XXXV)
Supervisors: M. Massironi, C. Meyzen, F. Sauro
Title: Formation processes and evolution of large size lava tubes.

TORRESAN FILIPPO (cycle XXXIII)
Supervisor: L. Piccinini
Title: Sustainability assessment of geothermal exploitation by numerical modeling.

ALLYSON VIGANO' (cycle XXXIV)
Supervisor: C. Agnini
Title: Are calcareous phytoplankton affected by the onset of the Antarctica Ice-Sheet at the Eocene – Oligocene transition?

YANG ZHICHENG (cycle XXXIV)
Supervisors: A. D'Alpaos, M. Marani, S. Silvestri
Title: Analysis of the eco-geomorphodynamic evolution of the Venice Lagoon through remote sensing observations and ancillary field surveys.

ALBERTO ZONTA (cycle XXXV)
Supervisor: F. da Porto
Title: Development of seismic isolation systems for industrial racks.

Projects and funding

PROJECTS AND FUNDING *by N. Surian*

What kind of research projects are going on in the Department? Which funding schemes support such projects? Addressing these points helps to better understand the scientific research that is carried out by the staff of the Department.

66 projects are going on during this year. The projects cover a very wide range of research topics and span from curiosity-driven science to applied science. Good examples of curiosity-driven research are two ERC projects, “NEWTON - NEw Window inTO Earth’s iNterior” and “NOFEAR - New outlook on seismic faults: from earthquake nucleation to arrest”. Examples of applied science are “GEO4CIVHIC - Most Easy. Efficient and Low Cost Geothermal Systems for Retrofitting Civil and Historical Buildings” (EU H2020) and “Understanding of admixture control on rheology, hydration and development of mechanical resistance in cement and concrete” (funded by MAPEI). Overall, the on-going research projects highlight two aspects. First, new research areas have been established over the last years (e.g. planetary geoscience). Second, applied research is receiving progressively more attention. The present research strategy of the Department is described by the “Project for the Development of the Department” (2018- 2022), a project that gives great emphasis to the role of Geosciences in the Anthropocene and to the link between science and society.

A wide range of funding schemes supports our research. Funds come from the European Commission, the Italian Ministry of University and Research (MIUR), University of Padova, public institutions and agencies, private foundations and companies.

Besides, the staff is involved in some international projects (e.g. IODP - International Ocean Discovery Program; EX-AQUA, a project of the International Union for Quaternary Sciences; ECZ Dry, Italy-Israel Scientific and Technological Cooperation Programme). 17 projects are funded by EU Commission: 2 ERC projects (1 Consolidator Grant and 1 Starting Grant); 8 Collaborative projects (H2020); 3 Marie Skłodowska-Curie Individual Fellowships. 10 projects are funded by MIUR: 5 PRIN projects; 3 projects dealing with Antarctica; 1 SIR project. 10 projects are supported and carried out in collaboration with public institutions, such as the National Civil Protection, the Basin Authority of the Eastern Alps, the Veneto Region. 9 projects are funded or supported by private companies (e.g. MAPEI and De Beers) and foundations (Cariparo and Cariplo). Overall, these funding schemes show that the Department is successful and attractive (as Host Institution) for very competitive projects (specifically ERC grants and MSCA fellowships), has established solid research networks at national and international level (respectively PRIN and H2020 projects), and has good and increasing interaction with public and private sectors.

Finally, where research is carried out? Is research focused on some specific areas of the Earth? As expected several study sites are in north-eastern Italy (e.g. Dolomites. Venetian and Friulian Plain. Venice Lagoon) but we have studies going on in many other regions of the Earth (Africa. Asia. North and South America. Australia. Antarctica) and on planets (Mars and Mercury).

Title	P.I./participant	Funding body	Budget (€)
New outlook on seismic faults: from earthquake nucleation to arrest	G. Di Toro	EU - ERC	1.963.800
NEw Windown inTO Earth's iNterior	M. Faccenda	EU - ERC	1.466.030
GEO4CIVHIC "Most Easy. Efficient and Low Cost Geothermal Systems for Retrofitting Civil and Historical Buildings"	A. Galgaro	EU – H2020	680.000
CHEAP GSHPs	A. Galgaro	EU – H2020	680.000
Airport-sCAle seveRe weather nowcastinG project (CARGO)	R. Biondi	EU - H2020 SESAR	58.200
Improving Thermal Efficiency of horizontal ground heat exchangers (ITER)	E. Di Sipio	EU – H2020 MSCA	159.461
PLANetary MAPping project (PLANMAP)	M. Massironi	EU – H2020 - COMPET	1.499.620
Europlanet 2024 (EPN2024)	M. Massironi	EU – H2020 – INFRAIA	153.055
GLOBAQUA - Managing the effects of multiple stressors on aquatic ecosystems under water scarcity	G. Cassiani	EU	126.932
Development of a Decision Support System for Improved Resilience and Sustainable Reconstruction of historic areas to cope with Climate Change and Extreme Events based on Novel Sensors and Advanced Modelling Tools (HYPERION)	C. Mazzoli	EU – H2020	433.270
Galileo Reference Center - Member States	A. Caporali	EU – H2020	40.000
GROWING: Geophysical Roots Observation for Water savING in arboriculture. viticulture and agronomy	B. Mary	EU – H2020 MSCA	251.000
Sulphide Inclusions in Diamonds: A Window into The Earth's Interior Through Time (SINDIA)	M. Pamato	EU – H2020 MSCA	168.277
Bricks manufacturing technologies to increase built heritage resilience and to raise common identities of peoples (CLAYONRISK)	Elena M. Pérez-Monserrat	EU – H2020 MSCA	171.473
Petrophysics (Physical Properties/Downhole Measurements)	J. Boaga	IODP International Ocean Discovery Program	Research agreement
Wsl visiting fellowship	J. Boaga	Swiss Federal Research Institute WSL	Research agreement
ECZ-Dry: New technologies to monitor the Earth Critical Zone in water-limited ecosystems.	G. Cassiani	Italy-Israel Scientific and Technological Cooperation Programme (Sci. Track 2018)	400.000
EX-AQUA: Palaeohydrological extreme events: evidences and archives	A. Fontana	INQUA - International Union for Quaternary Sciences	16.000
Mechanism of seismic rupture propagation in the Longmen Shan fault belt, China	G. Di Toro	Natural National Science Foundation of China	20.000

Dynamics of transitional settings from Cretaceous to Eocene in the Southcentral Pyrenees	M. Ghinassi	MCIU. Spanish Government	Research agreement
Mineral reactivity. A key to understand large-scale processes: from rock forming environments to solid waste recovering/lithification	G. Artioli	MIUR– PRIN	648.900
WATer mixing in the critical ZONe: observations and predictions under environmental changes – WATZON	G. Cassiani	MIUR- PRIN	581.580
A new global volcanic-driven carbon cycle perturbation at the Norian/Rhaetian Boundary. Late Triassic	M. Rigo	MIUR- PRIN	310.070
The Dynamic Mass Transfer from Slabs to Arcs - Dynastars	B. Cesare	MIUR- PRIN	73.000
Intraplate deformation. magmatism and topographic evolution of a diffuse collisional belt: Insights into the geodynamics of the Arabia-Eurasia collisional zones	M. Zattin	MIUR- PRIN	79.935
Dating of the tectonic activity along the Transantarctic Mountains Front	V. Olivetti	MIUR- PNRA	84.000
Bioconstructional organisms from the Ross Sea under Climate Change: ecosystems and 'oasis' of biodiversity to monitor and protect (BIOROSS)	C. Mazzoli	MIUR- PNRA	168.200
"Origine ed impatto dei gas serra in Antartide" (Source and impact of greenhouse gasses in Antarctica. SENECA)	R. Sassi	MIUR- PNRA	164.500
Carbon recycling during melting of the continental crust: implications for the long-term geochemical cycle	O. Bartoli	MIUR- SIR	431.000
Knowledge based approach for the conservation, restoration and mitigation of seismic risk of Cultural Heritage buildings stricken by the Central Italy earthquake (2016) AND Application of structural health monitoring techniques and methodologies for the assessment of cultural heritage buildings and sites	F. Da Porto	University of Guangzhou - Frame Agreement on Research Project Supported by CIPAR (2019-20)	240.000
Impatto delle nubi vulcaniche sulla variabilità atmosferica – Progetto STARS	R. Biondi	University of Padova	180.000
MapFly	P. Mozzi	University of Padova	67.500
The Pliocene-Quaternary succession of the Venetian-Friulian area: new insights of the landscape evolution from the Zanclean transgression to the Present	C. Stefani	University of Padova	14.000
Faunal recovery after mass extinctions: gastropod evolution and palaeobiogeography in the aftermath of end-Triassic and early Toarcian extinction events	R. Gatto	University of Padova	11.400
Spatial variability of glacier reaction to the current climatic changes in the Eastern Italian Alps and issues for long-term monitoring strategies	A. Carton	University of Padova	28.500

The geological record of deep earthquakes: the association pseudotachylyte-mylonite	G. Pennacchioni	University of Padova	28.500
Subsidence zonation through space-borne SAR interferometry as a tool for geomorphological and geological mapping in coastal plain environments	M. Floris	University of Padova	21.000
An experimental physical model for the study of thermal energy exchange between a geothermic probe and the surrounding environment	P. Scotton	University of Padova	10.517
Ground motion seismic monitoring by the use of distributed low-cost sensors	J. Boaga	University of Padova	26.000
3D reconstruction of the shape of solid inclusions in garnet	B. Cesare	University of Padova	28.000
Tracking the Greenland ice sheet dynamics during Eocene and Oligocene: a multi-proxy approach	V. Olivetti	University of Padova	27.000
Fluid-fluxed crustal melting: looking for the evidence	O. Bartoli	University of Padova	25.000
Il ciclo profondo delle specie volatili: processi. flussi e metasomatizzazione profonda del mantello	M. Faccenda	University of Padova	47.186
Dal mondo greenhouse al mondo icehouse: la transizione Eocene-Oligocene in Zelandia	C. Agnini	University of Padova	47.574
SEA LEAPS: SEA-LEvel rApid PulseS during the Holocene marine transgression	A. Fontana	University of Padova	47.574
Trasporto solido in eventi alluvionali estremi	N. Surian	University of Padova	47.574
Rapporti tettonica/sedimentazione nella successione syn-rift dell'Horda Platform (Mare del Nord settentrionale)	A. Breda	University of Padova	47.574
Proprietà reologiche di argille calcinate	L. Valentini	University of Padova	47.574
Fluvial and tidal meanders of the Venetian-Po plain: from hydrodynamics to stratigraphy	M. Ghinassi	CARIPARO Foundation	265.000
Lombardy-based Advanced Meteorological Predictions and Observations (LAMPO)	R. Biondi	CARIPLO Foundation	200.000
Progetto Esecutivo 2019-2021 DPC-ReLuis	F. da Porto	National Civil Protection	127.200
Seismic vulnerability analysis at a urban scale of buildings owned by the municipality	F. da Porto	Municipality of Padova	39.000
Research activities connected with the management of bridges of the urban network	F. da Porto	Municipality of Padova	39.000
Venezia 2021: Programma di ricerca scientifica per una laguna regolata	A. D'Alpaos	Provv. Interreg. per le Opere Pubbliche di Veneto, T. Alto Adige e Friuli Venezia Giulia	179.875

Geological-hydraulic modeling and identification of risk scenarios of the landslide phenomenon of the Busa del Cristo. Perarolo di Cadore. Belluno"	A. Galgaro	Regione Veneto	40.000
Permafrost monitoring in Trentino Alto Adige	A. Carton	Trento Province	Research agreement
Integrated river management of mountain streams	N. Surian	Basin Authority of the Eastern Alps	40.000
Estimate of bedload transport in the Parma River basin	N. Surian	ARPA Emilia Romagna	10.000
Caratterizzazione chimico-fisica di olivine carbonatate per valutazione di possibili utilizzi	G. Artioli	ENI Spa	75.500
Valutazione di materiali polimerici di varia natura. forniti da ENI. in impasti di leganti idraulici	G. Artioli	ENI Spa	50.000
Controllo delle prestazioni e della reologia nelle moderne formulazioni dei leganti per l'edilizia	G. Artioli	MAPEI Spa	450.000
Experimental testing of Legnobloc hollow block panel	F. da Porto	ECAM RICERT s.r.l.	32.000
Studio di analisi e consulenza sul processo di produzione di rivestimenti ceramici	G. Artioli	Gruppo Piazzetta Spa	50.000
Thermobarometry of xenocrysts and diamonds from Cullinan. Kimberley and Voorspoed mines (South Africa)	P. Nimis	DeBeers Group Services (Pty) Ltd	Research agreement
Collaboration agreement with the Gemological Institute of America	F. Nestola	Gemological Institute of America	12.000 USD
Studio idrogeologico della frana di Lamosano in Comune di Chies d'Alpago (BL)	L. Piccinini	Regione Veneto	30.000
Carta delle unità geologiche della pianura del Friuli Venezia Giulia	C. Stefani	Serv. Geol. Regione Autonoma Friuli Venezia Giulia	200.819

Laboratories

LABORATORY FACILITIES *by M.C. Dalconi*

The Department of Geosciences hosts several laboratory facilities and an array of specialized research equipment. The facilities are available for internal projects and collaborative research, training courses and for commercial enquires.

Complex computational modelling and data analysis can be carried out by means of a high performance computing cluster which employs parallel processing.

Field-portable instrumentations are available for on-site measurements.

Laboratory activities are supported by a technical staff composed of 8 technicians.

The Department also hosts laboratory facilities of IGG-CNR (Institute of Geosciences and Earth Resources - Consiglio Nazionale delle Ricerche) in regime of active collaboration.

In 2019 a total of 22 Departmental laboratories were active in supporting internal and collaborative research projects delivering an average volume of approximately 6800 sample preparations and 4700 analyses.

Data collected at departmental laboratories contributed to nearly 100 papers published in international journals in 2019.

The majority of analyses has been devoted to internal research projects. A consistent part of analyses pertained to collaborative research with other academic institutes, museums and with industry.

Educating activities have been largely supported by sample-preparation laboratories.

The most active laboratories for sample preparation were the Thin Section Preparation laboratory and the suite of laboratories for paleontological preparation. Thin Section Preparation laboratory delivered a total of nearly 2000 sample preparations, the majority (70%) to support internal research projects. Paleontological preparation laboratories delivered nearly 4500 sample preparations, approximately 70% related to teaching and training activity.

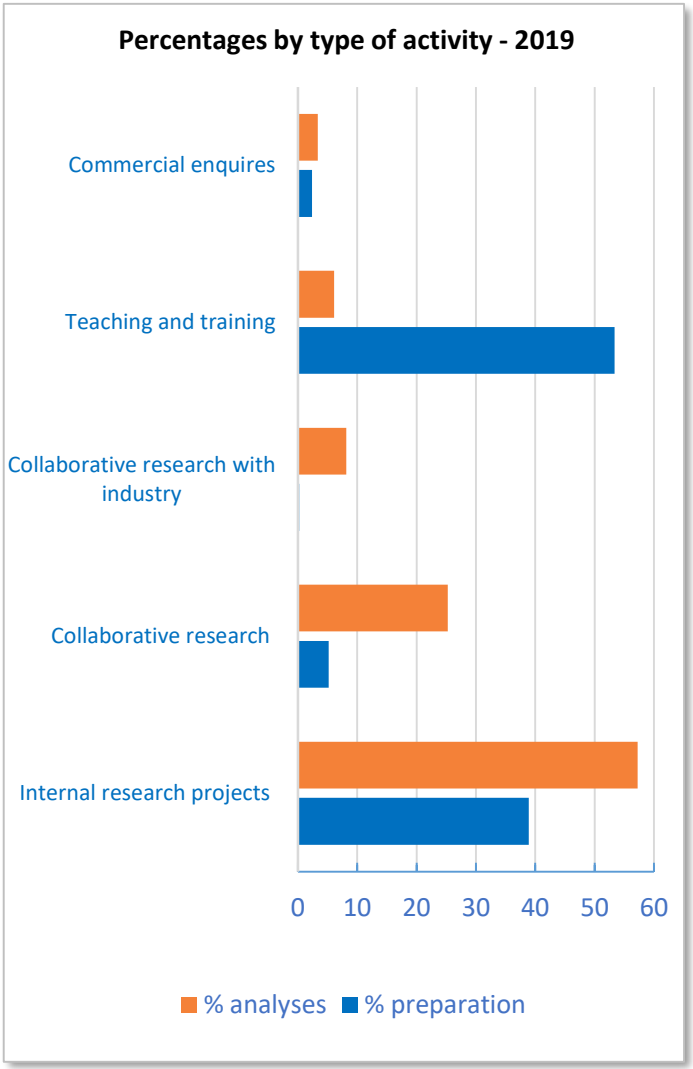
The highest volumes of analyses were executed in X-ray Powder Diffraction laboratory, Isotope Ratio Mass Spectrometry and Scanning Electron Microscope laboratory. For the latter laboratory, the volume of analyses corresponds to hours of measuring time.

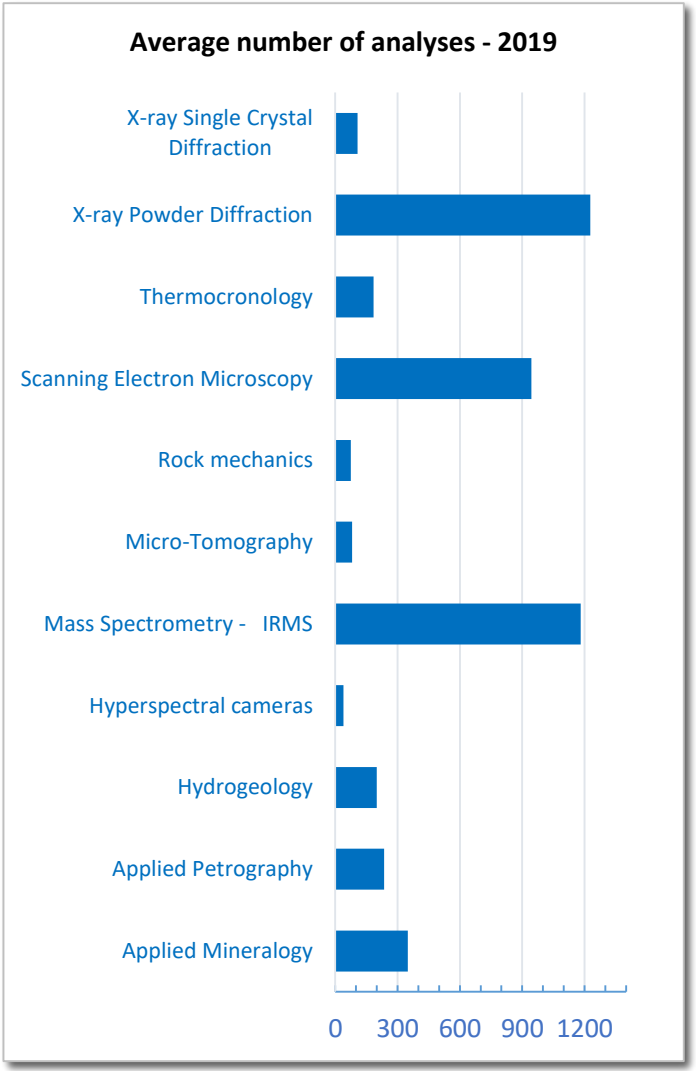
Main research fields supported by X-ray Powder Diffraction and Scanning Electron Microscope range from Petrology to Archeometry and Cultural Heritage and include Applied Mineralogy to alternative green building materials.

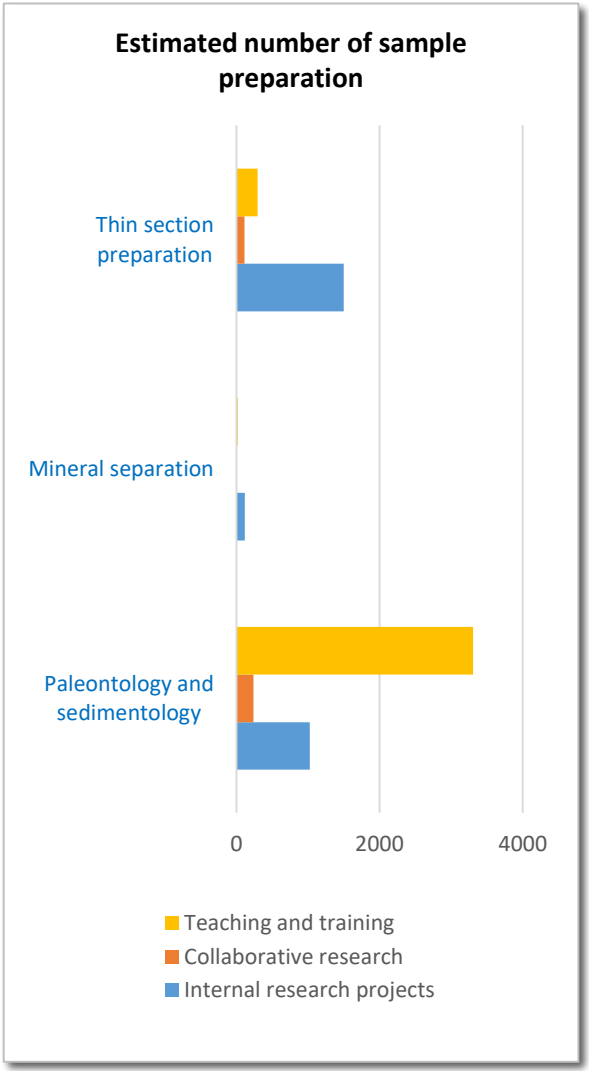
The Stable Isotope Mass Spectrometer laboratory mainly supported researches on fields ranging from paleoclimatology/paleoceanography, to cultural heritage science, to applied mineralogy and more.

Equipment acquired in 2019:

- NANOVEA Jr-25 Portable Optical Profilometer;
- ZL800 – Spectrofotometer;
- Nano-Hyperspec hyperspectral sensor 400-1000 nm;
- Micro-Hyperspec hyperspectral sensor 900-2500 nm;
- QUICK press piston cylinder apparatus;
- Lampert PUK U5 micro-welder.


Percentages by type of activity - 2019
Commercial enquires
Teaching and training
Collaborative research with industry
Collaborative research
Internal research projects
0
10
20
30
40
50
60
% analyses
% preparation


Average number of analyses - 2019
X-ray Single Crystal Diffraction
X-ray Powder Diffraction
Thermocronology
Scanning Electron Microscopy
Rock mechanics
Micro-Tomography
Mass Spectrometry - IRMS
Hyperspectral cameras
Hydrogeology
Applied Petrography
Applied Mineralogy
0
300
600
900
1200



List of laboratories at Geosciences Department	
Applied Mineralogy	A
Applied Petrography	A
Catodoluminescence and fluid inclusion	A
Confocal Optical Microscope (maintenance phase in 2019)	A
Fitoplancton	S
Geophysics	A
Hydrogeology	A
Hyperspectral cameras	A
Macropaleontology	S
Mass Spectrometry - IRMS	A
Micropaleontology	S
Micro-Tomography	A
Mineral Resources	S
Mineral separation	S
Palynology	S
Rock mechanics	A
Scanning Electron Microscopy	A
Sedimentology	S
Thermocronology	A
Thin section preparation	S
X-ray Fluorescence Spectroscopy (maintenance phase in 2019)	A
X-Ray Powder Diffraction	A
X-Ray Single Crystal Diffraction	A
Graphic and photography	A

S: sample preparation; A: analysis

Museums

MUSEUMS *by L. Giusberti*

The Department of Geosciences owns extensive collections of Italian and foreign rocks, fossils and minerals housed in the Museum of Geology and Paleontology, and in the Museum of Mineralogy. Such huge scientific and cultural heritage has its roots in the old collections of the Natural History Museum of the University of Padova, founded in 1733 thanks to the donation by Antonio Vallisneri Jr. Besides the scientific activities, carried out by Italian and foreign researchers from all over the world, the Museum's staff, coordinated by CAM (Centro Ateneo Musei), carry on an intense activity of public engagement with the fruitful support of the Department's researchers.

CIRCe

CIRCe – Centre for the Investigation of cement materials *by G. Artioli*

The CIRCe Centre is the only centre devoted to the fundamental investigation of cement materials and the formulation of construction binders in Italy. The Centre activity includes fundamental research, applied research, and consulting. The Centre started as a collaboration in the field of construction materials between the Department of Geosciences and the Department of Civil, Construction, and Environmental Engineering (ICEA). Recently the Department of Cultural Heritage (DBC) and the Department of Industrial Engineering (DII) also joined. The Centre acts as research support and partner for a number of Institutions and Companies at the international level.

Active projects include: the effect of superplasticizers on physical properties of binders, advanced modeling of cement hydration processes, optimization of the microstructure of concrete, conservation of historical buildings, characterization and dating of archaeological mortars, binder-based solidification and stabilization processes of contaminated soils, development of sustainable binders in the frame of circular economy.

Ph.D and Summer Schools

Ph.D. AND SUMMER SCHOOLS by C. Agnini

In 2019, the ANVUR released the National Accreditation to the Doctoral course in Geosciences of the University of Padova (XXXIV series) with a special recognition for Internationality and interdisciplinarity. The Ph.D. Board is composed by 44 people, who include 32 members of the Padova University faculty staff, 11 high-reputation foreign researchers and one Italian external member (INGV – Rome) (https://www.geoscienze.unipd.it/corsi/Ph.D.-course/Ph.D.-board).

In 2019, the active series were XXXII, XXXIII, XXXIV and XXXV with XXXII series finishing on September 30th and XXXV series starting from October 1st. The total number of Ph.D. Candidates were 42 (Figure 1) and details on single Ph.D. candidates can be found on the people chapter. The average total number of Ph.D. students per year is ca. 9 that is a quite high value considering the national scenario.

Looking at the last decade, it is noteworthy that the number of foreign Ph.D. students has increased substantially (Figure 2) with an average percentage of ca. 25 % in the last 5-6 years. The increase of foreign Ph.D. students has created a more stimulating and cutting-edge environment where Italian and foreign students can interact in a positive mode always respecting each other's cultural background and identity.

A scissor graph on the male/female percentage per year displays a high variance essentially due to the relatively low number of the Ph.D. positions but the average value calculated for the last decade confirms a substantial gender balance with a little bit higher percentage of the female component.

The research projects cover all the discipline of the geosciences (i.e., paleontology, stratigraphy, sedimentology, structural geology, geomorphology, applied geology, mineralogy, petrography and geochemistry, applied mineralogy, cultural heritage conservation, geophysics and applied geophysics) and in most, if not all, cases the research projects have a multidisciplinary integrated approach. Though the publication of papers is not a mandatory requirement to finish the Ph.D. program, the outcomes of the Ph.D. researches are usually published in ISI-Scopus Q1 journals.

In 2019, an official agreement between the Department of Geosciences and INGV was signed. This accord is particularly focused in trying to develop a stronger scientific/research collaboration and would also allow Ph.D. students to use the facilities of INGV.

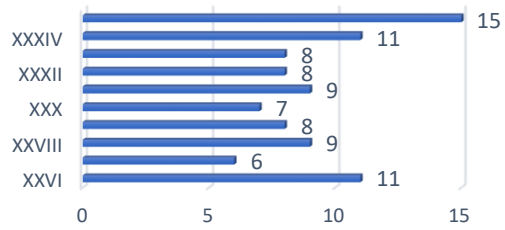


Fig. 1 - Ph.D. Students 2010/2019

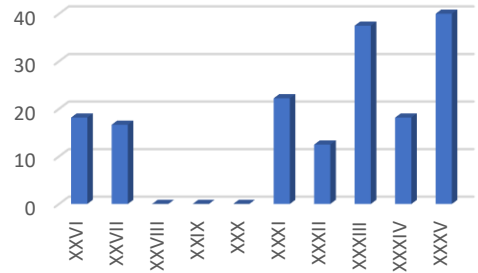
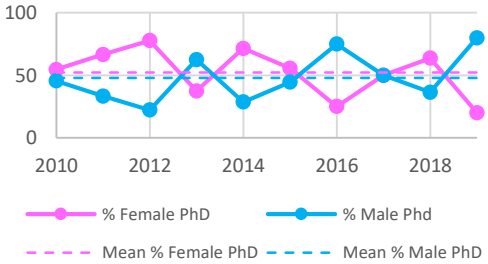


Fig. 2 - Percentages of foreign Ph.D. students (2010-2019)

Fig. 3 - Scissor graph Female vs Male (2010-2019)



Summer Schools

In 2019, some members of the faculty staff of the Department of Geosciences were involved in the organization of Summer Schools. In particular, Prof. Pennachioni was committed in the organization of the Fifth EGU Summer School on "Structural Analysis of Crystalline Rocks" held at Nevessee area/Bruneck - South Tyrol, Italy from 24th to 30th August 2019 and Prof. Silvana Martin was the leading organizer of the Summer School on “Historic and prehistoric landslides in the northern Italian Alps. Implications for new hazard maps in mountainous areas” held mainly Padova but also in Belluno, Bolzano and Trento provinces from 30th June- 5th July. The summer school was organized and funded by the University of Padova with the support of University of Trento, ETH Zurich, Geological Survey of Trento, and Austrian Geological Survey.
Dr. Riccardo Biondi organized the 5th International Training School on “Convective and Volcanic Clouds (CVC) detection, monitoring and modelling”, in Nicolosi, Italy (October, 2nd -10th) and the 4th “(Geo)Science Communication School” in Trieste, Italy (September, 16th-19th).

Collaborations

COLLABORATIONS *by A. Fontana*

The Department has a long tradition in collaborating with other Italian and foreign institutions, mainly for research purposes aiming at the development of new concepts and ideas and at the use of cutting-edge technologies for field and lab investigations in geosciences. In the list below only the formalized collaborations which were active in 2019 are indicated, anyhow a much higher number of informal relations exists, in particular with other national and European institutions and local territorial agencies.

A major network of collaborations involves other Italian universities in the framework of research project funded by Italian Government (e.g. PRIN, PRNA), but also stemming from interpersonal relations with colleagues.

Besides the consolidated relations with the CNR-IGG (Institute of Geosciences and Georesources), which has its local office of Padova hosted in the Department, several other collaborations exist with other institutes of the Italian National Research Council (CNR).

An important mission of the Department is the partnership of Italian institutions devoted to the territorial administration and management, in particular several research agreements and contracts exist with agencies of Regione del Veneto, Regione

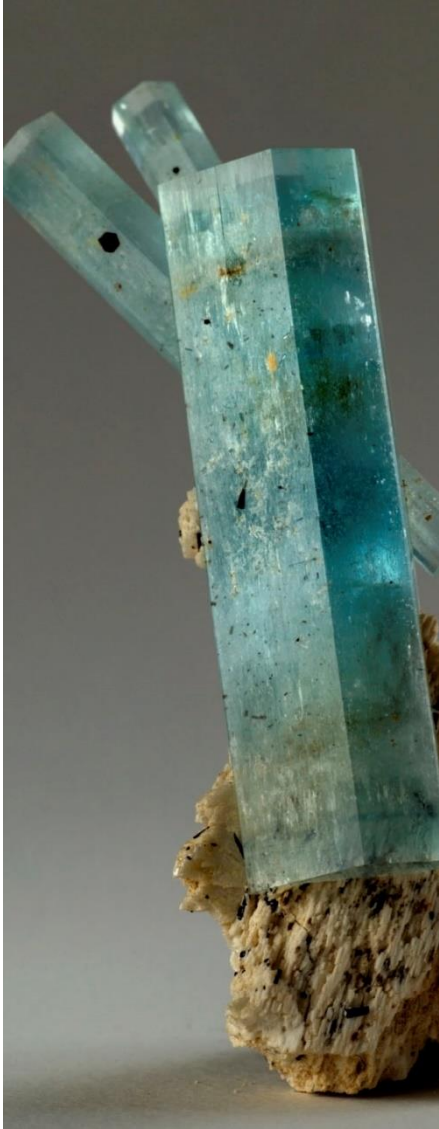
Autonoma Friuli Venezia Giulia and Provincia Autonoma di Trento. In this framework, specific projects are related to monitor, study, plan and manage rivers channels, mountain slopes and geological mapping, collaborating for example with Veneto Regional Agency for Environmental Protection (ARPAV), ARPA of Region Emilia-Romagna, Basin Authority for Eastern Alps, Geological Survey of Friuli Venezia Giulia. In an European perspective the Department is related to several academic institutions, mainly for the development of research projects that, partly, have been funded in the framework of the programs European Research Council (ERC), H2020 and INTERREG. Several partnerships are also linked to the co-tutoring of PhD students for their thesis and in the framework of the exchange program ERASMUS+, but about these latter the details are mentioned in the Education section of this yearbook. At global scale the Department has relationships also with extra-European countries and, in particular, during 2019 a significant number of agreements has been active with universities and research institutions of China, Australia, USA and Canada. Some of the agreement with China Universities are aimed at strengthening the cooperation for the courses of Master and PhD.

ITALY

University of Bari Aldo Moro, Department of Earth and Geo-environmental Sciences
University of Bologna, Department of Chemistry
University of Bolzano, Faculty of Sciences and Technology
Università Ca' Foscari, Dipartimento di studi umanistici, Venice
University of Chieti-Pescara G. d'Annunzio, Department of Engineering and Geology (INGEO)
University of Ferrara, Department of Physics and Earth Sciences
University of Genova, Department for the Earth, Environment and Life Sciences (DiSTAV)
Università of Parma, Department di Sc. Chimiche, della Vita e Sostenibilità Ambientale
University of Pavia, Department of Earth and Environmental Sciences
University of Perugia, Department of Physics and Earth Sciences
University of Udine, Department of Agricultural, Food, Environmental and Animal Sciences
University of Modena Reggio Emilia, Department of Chemical and Geological Sciences
Roma Tre University, Department of Science, Rome
University of Siena, Department of Geological Sciences
Campania University Luigi Vanvitelli, Department of Mathematics and Physics, Caserta
University of Milan, Department of Earth Sciences, Milan
La Sapienza University, Department of Earth Sciences, Rome
Politechnic of Milan

CNR-ICMATE, Institute of Condensed Matter Chemistry and Technologies for Energy, Padova
CNR-IGAG, Institute of Environmental Geology and Geo-Engineering, Rome
CNR-IGG, Institute of Geosciences and Georesources, Padova
CNR-IGG, Institute of Geosciences and Georesources, Pisa
CNR-IRPI, Institute for Geo-Hydrological Protection, Padova
CNR-IRSA, Institute of Research on Water, Bari
CNR-ISAC, Institute of Atmospheric Sciences and Climate, Bologna
CNR-ITC, Construction technologies institute, Milan

INGV - National Institute of Geophysics and Volcanology, Rome
INGV - National Institute of Geophysics and Volcanology, Bologna
OGS – National Institute Experimental Geophysical observatory, Trieste
ENEA - Technical Unit for the Development of Applications of Radiations, Frascati
CIRCE - Centre for Isotopic Research on Cultural and Environmental Heritage, INNOVA SCaRL
ASI - Italian Space Agency, Rome



Sevizio Geologico, Regione Autonoma FVG, Direzione Centrale Difesa dell'Ambiente, Energia e Sviluppo sostenibile, Trieste
ARPA-Emilia Romagna, Bologna
Autorità di Bacino Distrettuale delle Alpi Orientali, Venezia
Regione del Veneto, Assessorato Ambiente e Territorio, Venezia
Regione del Veneto, Dipartimento Difesa del Suolo, Venezia
Ente Parco Adamello Brenta
Regione del Veneto, Genio Civile di Belluno, Belluno
Ente del Parco nazionale delle Dolomiti Bellunesi
Museo Regionale della Sicilia, Galleria di Palazzo Abatellis, Palermo
MAPEI Spa, Milan
Fondazione Bruno Kessler (FBK) - REET, Trento
SOGEI spa Società Generale di Informatica, Rome

EUROPE

Austria, University of Vienna, Department of Geodynamics and Sedimentology

Belgium, Vrije Universiteit Brussel, Department of Electrochemical and Surface Engineering
Belgium, University of Lueven, Department of Egiptology
Belgium, Belgian Institute for Space Aeronomy

Czech Rep., Palacky University, Regional Centre of Advanced Technologies and Materials, Olomouc
Czech Rep., Masaryk University, Faculty of Science, Brno
Czech Rep., GSA, Galileo Supervising Authority, European Commission, Prague

Denmark, Aarhus University, Department of Geoscience

Estonia, University of Tartu, Estonian Biocentre, Institute of Genomics

France, University Sorbonne, Institute of Mineralogy, Physic of Materials and Cosmochemistry, Paris
France, National Museum of Natural History, Paris
France, CNRS France and University of Lyon
France, University of Bordeaux, Laboratory Georesources and Environment
France, University Sorbonne, ISTeP - Institute of Earth Sciences of Paris, Paris

France, TOTAL, Paris
France, University of Paris Sud, Department of Earth Sciences
France, University of Lorraine, Department of Earth Sciences
France, University of Lille, Department of Earth Sciences
France, European Space Agency, Paris
France, CNRS, Laboratory of Paleontology and Geodynamics, Nantes

Germany, MARUM, Center for Marine Environmental Sciences, University of Bremen
Germany, Alfred Wegener Institut, Helmholtz Centre for Polar and Marine Research
Germany, University of Heidelberg, Institute of Earth Sciences
Germany, Institut für Erd- und Umweltwissenschaften, Universität Potsdam
Germany, Freie Universität Berlin, Institute of Geological Sciences
Germany, Friedrich Alexander University Erlangen Nuernberg (FAU), GeoCenter of Nothern Bavaria
Germany, University of Bonn, Department of Geography
Germany, Jacobs University Bremen, Department of Physics and Earth Sciences
Germany, Bauhaus University Weimar, F. A. Finger Institut für Baustoffkunde, Weimar
Germany, University of Frankfurt, Department of Geoscience
Germany, Westfaelische Wilhelms-Universitaet Muenster, Institut für Planetologie
Germany, UFZ - Helmholtz Centre for Environmental Research, Leipzig

Greece, Centre for Renewable Energy Sources and Saving Fondation (CRES), Pikermi Attiki
Greece, ICCS - Institute of Communication and Computer Systems, Athens
Greece, NTUA - National Technical University of Athens, School of Rural & Surveying Engineering
Greece, Aristotle University of Thessaloniki, Department of Mechanical Engineering, Thessaloniki

Hungary, Eötvös Loránd University Budapest, Lithosphere Fluid Research Lab

Israel, Israel Antiquity Authority, Jerusalem
Israel, Weizmann Institute of Science, Department of Chemical Research Support, Rehovot

Luxembourg, Musée national d'histoire naturelle, Luxembourg

Norway, Oil company DNO North Sea, Stavanger
Norway, Oslo Metropolitan University, Department of Civil Engineering and Energy Technology
Norway, Østfold University College, Faculty of Engineering

Poland, Centrum Badań Kosmicznych Polskiej Akademii Nauk - Space Research Centre

Spain, University of Saragoza, Department of Earth Sciences
Spain, CSIC-University of Granada, Instituto Andaluz de Ciencias de la Tierra
Spain, Politechnic University of Valencia, Department of Applied Physics
Spain, University of Valencia, Institute for Information and Communication Technologies (ITACA)
Spain, Autonomous University of Barcelona, Departament of Geology
Spain, University of Granada, Department of Mechanics, Structures and Hydraulics

Sweden, Uppsala University, Department of Earth Sciences

Switzerland, WSL Institute for Snow and Avalanche Research SLF, Davos Dorf
Switzerland, University of Zürich, Glaciology and Geomorphodynamics Group, Dept. of Geography
Switzerland, University of Applied Sciences and Arts of Southern Switzerland (SUPSI)
Switzerland, Institute of Geology, ETH-Zurich
Switzerland, Ion Beam Physics, ETHZ, Zurich
Switzerland, Paul Scherrer Institute PSI, Villigen

UK, University of Durham, Geography Department
UK, University of Durham, Earth Sciences Department
UK, University of Leeds, School of Earth and Environment
UK, University of Edinburgh, School of Geosciences
UK, University of Leeds, School of Earth and Environment
UK, University of Liverpool, Department of Earth, Ocean and Ecological Sciences
UK, University College London, Department of Earth Sciences
UK, University College London UCL, Institute of Archaeology
UK, University of Plymouth, School of Geography, Earth and Environmental Sciences
UK, Open University, School of Physical Sciences

EXTRA-EUROPE AND GLOBAL

United Nations Educational, Scientific And Cultural Organization (UNESCO)
Golder Associates Srl

Australia, Macquarie University, Department of Environmental Sciences, Sidney
Australia, Monash University, School of Earth Atmosphere and Environment
Australia, University of Western Australia, School of Earth Sciences & UWA Oceans Institute, Perth
Australia, The Australian National University, Research School of Earth Sciences, Canberra
Australia, Department of Earth and Environmental Sciences, Macquarie University, Sidney

China University of Geosciences, Beijing
China, Guangzhou University, Earthquake Engineering Research and Testing Center
China, Hohai University, College of Harbour, Coastal and Offshore Engineering
China, China University of Geoscience Wuhan
China, Northwest University Xi'an, Department of Geology
China, Chengdu University of Technology, Institute of Sedimentary Geology, Chengdu, Sichuan

Morocco, Chouaïb Doukkali University, El Jadida

New Zealand, Victoria University, School of Geography, Environmental and Earth Science, Wellington
New Zealand, Institute of Environmental Science and Research Limited, Wellington

Canada, Polytechnique of Montreal
Canada, Laurentian University, Harquail School of Earth Sciences, Sudbury
Canada, McGill University, Department Earth and Planetary Sciences, Montreal
Canada, University of Alberta, Department of Earth and Atmospheric Sciences, Edmonton
Canada, University of Manitoba, Department of Geological Sciences, Winnipeg

India, Indian Institute of Technology, Kanpur

Iran, Hakim Sabzevari University, Faculty of Geography and Environmental Sciences

Japan, Kyushu University, Dynamics, Structure and Evolution of Earth and Planets

USA, Rice University, Department of Earth, Enviromental and Planetary Sciences, Houston
USA, Lawrence Berkeley National Laboratory, Berkeley, California
USA, University of Minnesota, Department of Earth and Environmental Sciences, Minneapolis
USA, University of California, Berkeley Earth and Planetary Sciences, California
USA, Colorado State University
USA, University of South Carolina, Department of Geography
USA, Rutgers University, Dept of Earth and Planetary Sciences, New York
USA, Lunar and Planetary Institute, USRA, Houston

INCOMING VISITING

Zhao Liu (Omar Bartoli)
China, Chinese Academy of Sciences, Guangzhou Institute of Geochemistry, Guangzou

Necula Nicusor (Mario Floris)
Romania, University of Iași "Alexandru Ioan Cuza", Department of Geography

Alessandro Ielpi (Massimiliano Ghinassi)
Canada, Lurentian University - Harquail School of Earth Sciences

Xing Yu (Christine Meyzen)
China, Second Institute of Oceanography, Key Lab of Submarine Geosciences, Hangzhou

Novak Milan (Luciano Secco)
Czech Rep., Masaryk University, Faculty of Science, Brno

Wang Yu (Massimiliano Zattin)
China, China University of Geoscience, Wuhan

Balic-Zunic Tonci (Fabrizio Nestola)
Denmark, University of Copenhagen, Dept. Geosciences and Nat. Resources Management

Sariel Shalev (Artioli Gilberto)
Israel, University of Haifa, Department of Maritime Civilizations

Patrice Carbonneau (Simone Bizzi)
UK, University of Durham, Geography Department

Rami Eid (Francesca Da Porto)
Israel, Sami Shamoon College of Engineering, Beer Sheva

Edi Leibovich (Francesca Da Porto)
Israel, Sami Shamoon College of Engineering, Beer Sheva

Juergen Herget (Alessandro Fontana)
Germany, University of Bonn, Department of Geography

Christophe Hemond (Christine Meyzen)
France, Université de Bretagne Occidentale, Brest

OUTGOING VISITING

Jacopo Boaga
Switzerland, WSL Institute for Snow and Avalanche Research SLF, Davos Dorf

Manuel Rigo
Japan, University of Kumamoto, Faculty of Science

Fabrizio Nestola
Germany, University of Frankfurt, Department of Geoscience

Ilaria Barone
Germany, Freie Universität Berlin, Institute of Geological Sciences

Manfredo Capriolo
UK, University of Leeds, School of Earth and Environment

Pietro Carpanese
Germany, Bauhaus University Weimar, F. A. Finger Institut für Baustoffkunde, Weimar

Ludovico Mascarin
France, University Claude Bernard Lyon 1, Department of Geology

Claudio Mazzoli
Antartica, ENEA (PNRA)

Rodolfo Perego
Switzerland, University of Applied Sciences and Arts of Southern Switzerland (SUPSI)

Seminars

DATE	SPEAKER	AFFILIATION	TITLE
05/03/2019	Gianluca Benedetti	ENSER - Società di Ingegneria, Faenza, Italy	The Reference Geological Model (RGM) in the professional practice
19/03/2019	Annalisa Martucci	Università di Ferrara - Dipartimento di Fisica e Scienze della Terra	Evolution and Development of Porous Materials : prospects in the Environmental Application Fields based on their ion exchange properties
26/03/2019	Silvia Spiandore	Università di Padova - Ufficio Tirocini e career	Stages and interships
02/04/2019	Alberto Vitale-Brovarone	Università di Torino - Dipartimento di Scienze della Terra	Mira el dito: life, death and some miracles of Alpine Corsica
09/04/2019	Tatiana Bartolomei	Presidente Ordine Geologi Veneto	La relazione geologica alla luce dell'aggiornamento delle Norme Tecniche per le Costruzioni (N.T.C.) – D.M. 17 gennaio 2018
16/04/2019	Marcia Maia	Laboratoire Domaines Océaniques, UMR CNRS-UBO Institut Universitaire Européen de la Mer (IUEM), Plouzané, France	Evolution of a slow-slipping multisegmented transform : the Saint Paul system, Equatorial Atlantic
30/04/2019	Alessandro Ielpi	Harquail School of Earth Sciences – Laurentian University, Canada	Is the present the key to the (deep) past? Exploring analogies between modern and Precambrian fluvial basins
07/05/2019	Simon Schorn	University of Cape Town - Department of Geological Sciences, South Africa	Heat and temperature - two sides of the same coin
14/05/2019	Alexander Garcia	INGV - Istituto Nazionale Geofisica e Vulcanologia, Bologna	Seismicity induced by pressurized fluid injections
21/05/2019	Tod Waight	University of Copenhagen - Department of Geoscience and Natural Resource Management	Using Sr isotopes in phenocrysts to understand magma evolution – an example from Cabo de Gata, Spain
28/05/2019	Giorgio Carnevale	Università di Torino - Dipartimento di Scienze della Terra	The Bolca fossil fish fauna: a look into 50 My-old tropical marine ecosystems

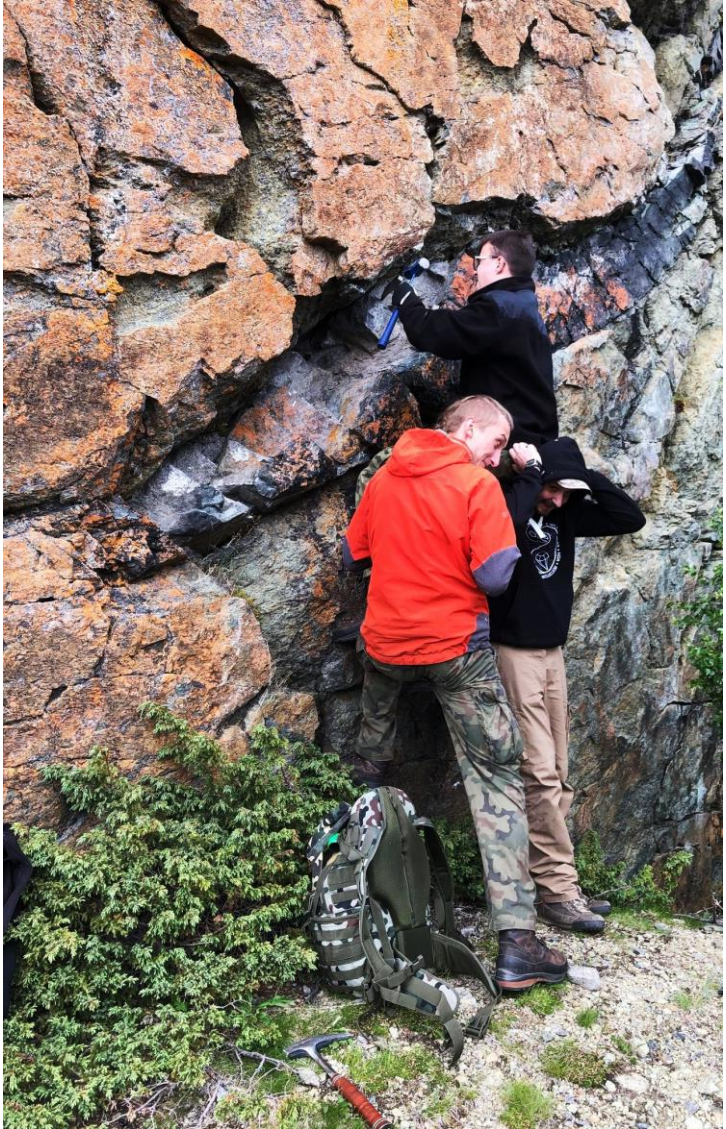
DATE	SPEAKER	AFFILIATION	TITLE
12/09/2019	Konstantin Litasov	Sobolev Institute of Geology and Mineralogy, Novosibirsk (Russia)	New high-pressure minerals in iron meteorites
03/10/2019	Juergen Herget	University of Bonn - Dfepartment of Geography, Germany	Reconstructing discharges of historic flood levels
10/10/2019	Jerome Dyment	Institut de Physique du Globe de Paris, France	Marine magnetics: from hydrothermal sites to subducting slabs
17/10/2019	Gabriele Vola	Cimprogetti S.r.l. Lime Technologies, Dalmine, Italy	The reactivity of quicklime: a topic of industrial interest in different industrial sectors
24/10/2019	Fabio Ferri	EIT RawMaterials CLC South, ENEA Casaccia, Rome, Italy	EIT RawMaterials: The World's largest innovation community in the raw materials sector
31/10/2019	Piero Poli	Univresity of Grenoble - Institut des Sciences de la Terre, France	Monitoring real faults towards their critical state
07/11/2019	Rajiv Sinha	Indian Institute Technology, Kanpur, India	Sediment flux from the Himalayan rivers: causes, controls and consequences
21/11/2019	Jarolsaw Majka	Uppsala University, Sweden; University of Science and Technology in Kraków, Poland	Early Paleozoic HP-LT rocks from the Scandinavian and Svalbard Caledonides – what do they tell us?
28/11/2019	Claudio Rosenberg	Università Sorbona Paris - Institut des Sciences de la Terre Paris (iSTeP), France	Alpine sections through time: a mirror of evolving observations and thoughts on the tectonics of the Alps
05/12/2019	Isabella Raffi	Università di Chieti - Dipartimento di Ingegneria e Geologia (InGeo), Italy	Biostratigraphy, biochronology and age models: the role of calcareous nannofossils
12/12/2019	Stefano Dominici	Università di Firenze - Museo di Storia Naturale, Italy	The odd fossil record of whales

Teaching

TEACHING by P. Mozzi

The professorial and research faculty of the Department of Geosciences covers the wide array of topics of the Earth Sciences, spanning from paleontology and stratigraphy to sedimentology, structural geology, geomorphology, technical geology, mineralogy, petrology, geochemistry, georesources, planetary geology and geophysics of the solid Earth and the atmosphere. The 56 faculty members are active scientists in their fields of expertise and their effort is to continuously transfer groundbreaking scientific and professional knowledge and skills to their students. This allows the Department to offer a thorough, high-standard education cycle in the geosciences, entirely hosted in a modern and comfortable building where classrooms are adjacent to laboratories and research facilities.

The bachelor's degree in Geological Sciences (Laurea Triennale in Scienze Geologiche) provides sound basis for the understanding of the main processes that control the evolution of the Earth. In the first and second year the students have to follow common courses on basic mathematics, chemistry and physics, as well as on fundamental topics such as mineralogy, petrology, sedimentary geology, stratigraphy, structural geology, regional geology, physical geography and geomorphology. In the third year they have courses in geophysics, geochemistry, analytical techniques and technical geology. Specific attention is devoted to field activities and laboratories, in order to provide students with challenging, hands-on experience.



The students participate to several field trips related to the various different topics. Furthermore, there are two field camps at the end of the second and third year, each lasting 7 – 10 days, embedded in two courses dedicated to the geological survey of diverse geological settings, spanning from sedimentary successions to magmatic and metamorphic units. In 2019, the second-year survey camp was in the Dolomites and the third-year one was in Corsica.

The master's degree in Geology and Technical Geology (Laurea Magistrale) represents the ideal prosecution of the studies. Indeed, about 91% of those who obtained the bachelor's degree in Geological Sciences in 2019 has subsequently enrolled in a master's degree in geosciences. Highly specialized lectures, field activities and laboratories introduce the students to the multi-facet application of geological science and techniques to diverse issues such as the prevention and mitigation of geohazards, land planning, the prospection and sustainable exploitation of georesources, geomaterials, environmental management and cultural heritage protection. The 2019 teaching plan includes detailed courses belonging to two main typologies:

1) common courses on fundamental aspects of the Earth Sciences; these courses are compulsory for all students;

2) a number of courses, specifically addressed to the field that each student intends to specialize in.

The experimental thesis work occupies the whole last semester and allows focusing on specific topics of interest in the vast realm of the Earth sciences. This master's degree allows to achieve advanced skills in mathematics and informatics applied to Geosciences, as well as the

capability to address geological problems through a robust scientific approach; it warrants a thorough knowledge of the different processes in Earth Sciences; it provides the student with skills in defining geological problems and in proposing proper operational solutions. In 2019, bachelor students in Geological Sciences were 177, with sixty new students enrolled in the first year. Students in the master's degree were 93. About one third of the bachelor students were female, and this percentage rises to 42% in the master's degree. Forty-one students obtained the bachelor's degree in 2019, and forty-five the master's degree. Most of the students managed to get their bachelor's and master's degree in the scheduled three and two years, respectively. The final vote of graduation of the 2019 students in Geology and Technical Geology was generally excellent , averaging 109/110. Aim of the master's degree in Geology and Technical Geology at the University of Padova is to form geologists that can start and develop successful professional careers as free-lance geologists or in private firms, public agencies and research institutions. The percentage of work occupation of those who graduated in 2018 is about 91% , and it rises to 100% for those graduated three years before, i.e. in 2016 (source Alma Laurea 2019).

The master's degree in Geology and Tecnhical Geology provides sound background and expertise for accessing Ph.D. courses in Italy and abroad. Indeed, several of our master's students who graduated in 2018 has started a Ph.D. in 2019.

The master's degree in Geology and Technical Geology is presently partly in Italian and partly in English. In order to consolidate the international experience of our students and enhance their opportunities in the European and worldwide professional and research market, in 2019 the Department has started to plan a curriculum entirely in English to be operative in the academic year 2021-2022. Agreements with other European universities will allow a selection of the most meritorious students to spend 6 months abroad in one of these institutions and possibly acquire a double-degree.

As well, in 2019 the Department finalized a new international master's degree in English, on the topic of geophysical applications for natural risks and resources. Scheduled time of activation is the academic year 2020-2021. This master's degree aims at providing a multidisciplinary training in the theory and application of geophysical methods for the exploration of the subsoil, at depths ranging from few meters to hundreds of kilometers. Fields of application span from the prospection of mining and energy georesources to, among others, the characterization of soil and subsoil for optimal use of renewable energies, environmental protection and remediation, civil engineering, slope stability and hydrogeology, cultural heritage protection and the mitigation of seismic hazard. Working careers may develop as free-lancers or in industry, public agencies and research institutions dealing with diverse issues such as environmental protection, ore mining, fossil and renewable energies and natural hazards. Students may opt for (a) a computational specialization for large-scale geophysical applications in mining and energy subsoil exploration as well as satellite applications, and (b) a field specialization, with the aim of educating independent professionals capable of applying geophysical methods in the management of natural resources and in environmental and engineering disciplines.

The Department of Geosciences is enthusiastically committed in the ERASMUS+ Program and presently offers fourteen fluxes with European Universities in Norway, Finland, Denmark, France, Germany, Hungary, Spain and Switzerland. Up to 20 grants have been available for our best students.

Graduates

Bachelor

Candidate	Title	Supervisor
Benato M.	Geological mapping of the area of Lumignano (Vicenza - Italy).	N. Preto
Bonetti M.	GEO-Structural analysis Bocca di Selva hut and surroundings (Alta Lessinia, Verona).	M. Massironi
Cappellari D.	Study of silicatic melt inclusions in the metamorphic aureole of the Sondalo gabbro (Austroalpine domain, Central Alps).	O. Bartoli
Caravello M.	Geomorphological units and spectra of Bek crater and surrounding terrains (Mercury).	M. Massironi
Cesa A.	A study on landslide susceptibility in the Piave valley between Belluno and Lentiai (Italy).	M. Floris
Chinello M.	Structural geological survey of the seismogenic Monte Marine Fault Zone (Central Apennines, Italy).	G. Di Toro
Costa N.	Radargrams Analysis of Martian North Polar Cap in the Apical Area of Gemina Lingula.	M. Massironi
Curtolo A.	Crystallographic relationships between ferropericlase inclusions and diamond.	F. Nestola
Daniele F.	Electrical resistivity tomography for the characterization of a landslide at Cinto Euganeo (Pd).	J.Boaga
Destro A.	Mineralogy of mafic intrusions in Corsica.	A. Marzoli
Farinea E.	Interactions between extensional structures and deep seated gravitational slope deformations in Noctis Labyrinthus (Mars)	M. Massironi
Fattori M.	Evolutionary analysis through remote sensing of the Bojana river delta (Montenegro / Albania).	A. Fontana
Fioraso M.	War caves in Italian Classic Karst.	A. Bondesan
Furlanetto L.	Chemostratigraphic investigation on organic matter (d13C) of the Monte Serpone section across the Pliensbachian - Toarcian boundary.	M. Rigo
Gaspari M.	Preliminary hydrogeological characterization of subsidence-prone areas of Portogruaro city	L. Piccinini
Gasperini N.	Geological and geomorphological study on the summit part of the Marzola massif.	S. Martin
Giurisato M.	Isotopic investigations on organic matter around the Triassic-Jurassic boundary of Muzzerone Section, La Spezia, Italia.	M. Rigo
Gobbo M.	Isotopic investigation on the organic matter around the Triassic/Jurassic boundary of the Muzzerone section, La Spezia Basin, Italy.	M. Rigo
Gosio F.	The disappearance of pseudotachylytes from the geological record: mineralogy and geochemistry.	G. Di Toro
Lazari F.	Structural analysis of the Piz Conturines area (BZ).	D. Zampieri
Lucadello A.	Isotope geochemistry of Euganean eocenic magmatism.	A. Marzoli

Bachelor

Candidate	Title	Supervisor
Makdoud M.	Analysis of the crystallographic orientation of quartz inclusions in garnets of felsic granulites.	B. Cesare
Marcante N.	Investigation of mineralogical inclusions in Siberian diamonds.	F. Nestola
Martinez N.	Xenoliths in basalts from Sao Jorge Island, Azores	A. Marzoli
Mezzanotte V.	Lower Jurassic stratigraphy of the Coste di Salò section (Valle di Ledro, Italy).	M. Franceschi
Michielotto A.	Isotopic investigations on the organic matter (d13C) around the Triassic/Jurassic boundary, Muzzerone section, La Spezia, Italy.	M. Rigo
Migotto Y.	Analysis of cut-off characteristics in tidal landscapes.	A. D'Alpaos
Modesti A.	The disappearance of pseudotachylytes from the geological record: microstructures and clast size distribution.	G. Di Toro
Padoan F.	Stuctural control on speleogenesis of El Cenote shaft (Conturines, BZ).	D. Zampieri
Penzo	N. Investigation of diamonds from meteorites: implications on their formation conditions.	F. Nestola
Schibuola A.	Analysis of instrumental earthquakes in the Lodi area from 1986 to 2018.	A. Zaja
Simionato R.	Microstructural study on Corundum - Hercynite associations in La Galite's grandiorite enclaves (Tunisia).	B. Cesare
Sisti D.	Filling rates of abandoned tidal channels: examples from the Venice Lagoon (Italy).	A. D'Alpaos
Trevisiol S.	Microstructural study of the associations Corundum - Hercynite in the inclusions of Lipari's lavas.	B. Cesare
Uguagliati F.	Morphodynamics and sedimentology of a cuspate tidal meander (Venice Lagoon, Italy).	M. Ghinassi
Vanzani F.	Uplift history and recent tectonics of the Patagonian Andes (between 43° S and 46° S) reconstructed by river longitudinal profiles.	M. Zattin
Vettore F.	Assessment of landslide susceptibility in the Gosaldo municipality area (BL).	M. Floris
Vivaldi A.	Conodont biostratigraphic investigations of the Monte Mufara section, Madonie (Palermo).	M. Rigo
Zangrando M.	Chemostratigraphic investigations on organic matter (d13Corg) around the Triassic/Jurassic boundary of the Muzzerone section, La Spezia, Italy.	M. Rigo
Zanon G.	Stable isotopic record for the interglacial MIS 31 (Lower Pleistocene) from the Crosia area (Ionian Calabria, Southern Italy).	L. Capraro
Zordan S.	K in omphacite geobarometer.	F. Nestola

Master

Candidate	Title	Supervisor
Antignani P. A.	Crystallographic orientations and timing relationships of clinopyroxene inclusions in diamond.	F. Nestola
Ballaera A.	Preliminary geological-technical study finalized to the construction of a tunnel in the area of "Passo Mauria" (Noth Eastern Italian Alps).	M. Floris
Beltrame B.	Mineralogical and petrographic characterization of Pagiriai anhydrite (Kaunas, Lithuania) finalized at a possible use as an ornamental stone.	C. Mazzoli
Benà E.	Radon exhalation along the Periadriatic Lineament in the Pusteria Valley (Bolzano, North-Eastern Italy).	R. Sassi
Buiatti P.	Securing the village of Livinè (Livinallongo del Col di Lana, BL) against avalanches risk, after the meteorological event of November 2018.	P. Scotton
Burgarello G.	Calcareous nannofossil biostratigraphy and paleoecological significance at the Oligocene- Miocene transition at Site IODP U1507 (Tasman Sea).	C. Agnini
Busato A.	Compressibility of holocene deposits in the Portogruaro area (VE) through geotechnical investigations and the estimation of surface deformations with satellite SAR interferometry techniques.	M. Floris
Carrera A.	Surface wave method and electrical surveys for the characterization of a landfill site.	J. Boaga
Censini M.	Electromagnetic methods for near-surface applications: a critical analysis of different investigation approaches.	G. Cassiani
Conedera M.	Mineralogical and textural characterization of the San Pedro Au-Ag (Zn, Pb, Cu) epithermal veins, Andacollo District, Argentina.	P. Nimis
Dalla Brida M.	Study of nanogranite inclusions in garnets from the Ulten Zone (Austroalpine Domain, Eastern Alps).	O. Bartoli
De Gerone L.	Validation of parametric methods for the estimation of hydrogeological impacts related to the tunnels excavation: the case study of the Follo Line project (Oslo, Norway).	L. Piccinini
Faccincani L.	The lithospheric redox state of the Siberian Craton: new insights from inclusions in Udachnaya kimberlites diamonds.	F. Nestola
Falsirolli M.	MEMS distributed sensors network as tool for the Central Italy 2016 earthquakes monitoring.	J. Boaga
Gaiga M.	Hydrogeological study to support the feasibility project of the Mauria Pass road tunnel.	L. Piccinini
Gallina G.	The response of calcareous nannofossils to the Middle Eocene Climatic Optimum (MECO): clues from the Kuma Formation (Belaya River, Russia).	C. Agnini
Garzotto F.	Hydrogeological modeling of the venetian area affected by perfluoroalkyl (PFAS) contamination.	P. Fabbri
Gastaldello M.E.	Integrated benthic foraminiferal and calcareous nannofossil records from IODP Site U1506: the biogenic bloom.	C. Agnini

Master

Candidate	Title	Supervisor
Gianesini A.	Numerical modeling to support the design of drainage system in the Lamosano landslide.	L. Piccinini
Guelfi M.	Point bar sedimentary record of an extreme flood event: an example from the Powder River (Montana, US).	M.Ghinassi
Guzzo G.	Thermochronological evolution of Transantarctic Mountains in the Mt Murray area.	M. Zattin
La Valle F.	Factors controlling the thickness of fault damage zones in carbonates.	G. Di Toro
Milizia E.	Depositional environment of "Pietra di Vicenza" (Lower Oligocene) and criteria for provenance	N. Preto
Pesce D.	Evidences of salt tectonics in Arabia Terra bulged craters (Mars): Geological mapping and structural analysis of the Crommelin Crater.	M. Massironi
Siviero A.	Electric and borehole radar methods for the characterization of contaminated site.	G. Cassiani
Splendore G.	Geomorphological analysis of the Adige plain between Bonavigo (VR) and Piacenza d'Adige (PD).	P.Mozzi
Stramare G.	Field analysis of a static penetrometer for the measurement of snowpack resistence.	P. Scotton
Thaqi E.	Crystallographic orientations of ferropericlase inclucions in diamonds.	F. Nestola
Toffol G.	Exploitation of unsuitably oriented foliation by localyzed mylonites and pseudotachylytes (Tauern Window, Eastern Alps).	G. Pennacchioni
Tusberti F.	Geology and landing site selection in Copernicus Crater (Moon).	M. Massironi
Varese M.	Redescription of "Rhinobatus" dezigni, an Eocene guitarfish from the Bolca Konservat-Lagerstatte.	L. Giusberti
Villa M.	Geological and geomorphological cartography of the Pordenone area.	A. Fontana
Viscolani A.	Multidisciplinary analysis of a seismically active area in the Southern Alps foreland	D. Zampieri
Volpe R.	An experimental apparatus for the study of low enthalpy geothermal energy.	P. Scotton
Zanola E.	Atmospheric methane: discrete measurements for individual greenland ice core samples via the picarro g1301 analyzer.	L. Capraro

Dissemination & divulgation

DISSEMINATION & DIVULGATION by J. Boaga

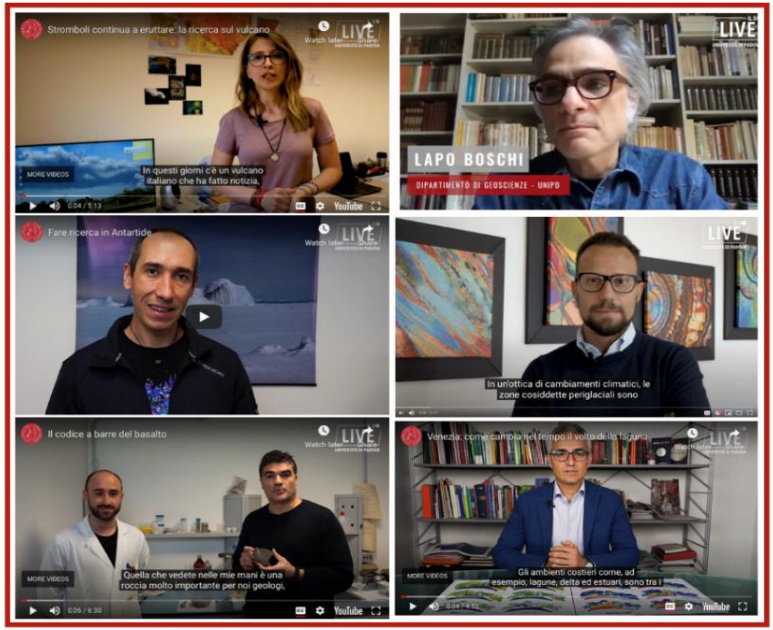
The Department of Geosciences is actively committed in promoting and offering dissemination and divulgation of the scientific knowledge.

It is nowadays agreed that a pervasive and effective outreach of the Research is as important as the "traditional" scientific dissemination. The latter is mainly achieved via publication of the scientific results on specialistic journals and congresses, generally using a strict scientific and technical jargon. Accordingly, only a restricted community will ultimately benefit of the information. Divulgation, on the contrary, is intended as the attempt of sharing the scientific knowledge to a broader audience, composed of people with no specific training in the field.

Dissemination and communication activities performed by the components of the Department of Geosciences are also aimed at increasing its public visibility and reputation. In this respect, TV coverage, radio broadcasts, printed and online documents, video and digital contents (as interviews and documentaries) on social media are exceptionally efficient. For these reasons, the Department of Geosciences has considerably increased in the last years its commitment in social media, public events, exhibitions and educational activities, as well as the distribution of publications specifically addressed to a generic audience.

The Department of Geosciences' motto is: knowledge unshared remains in the dark, so turn the lights on! Following this message, in year 2019 members of the Department were extraordinarily involved in divulgation, with almost 100 activities altogether.

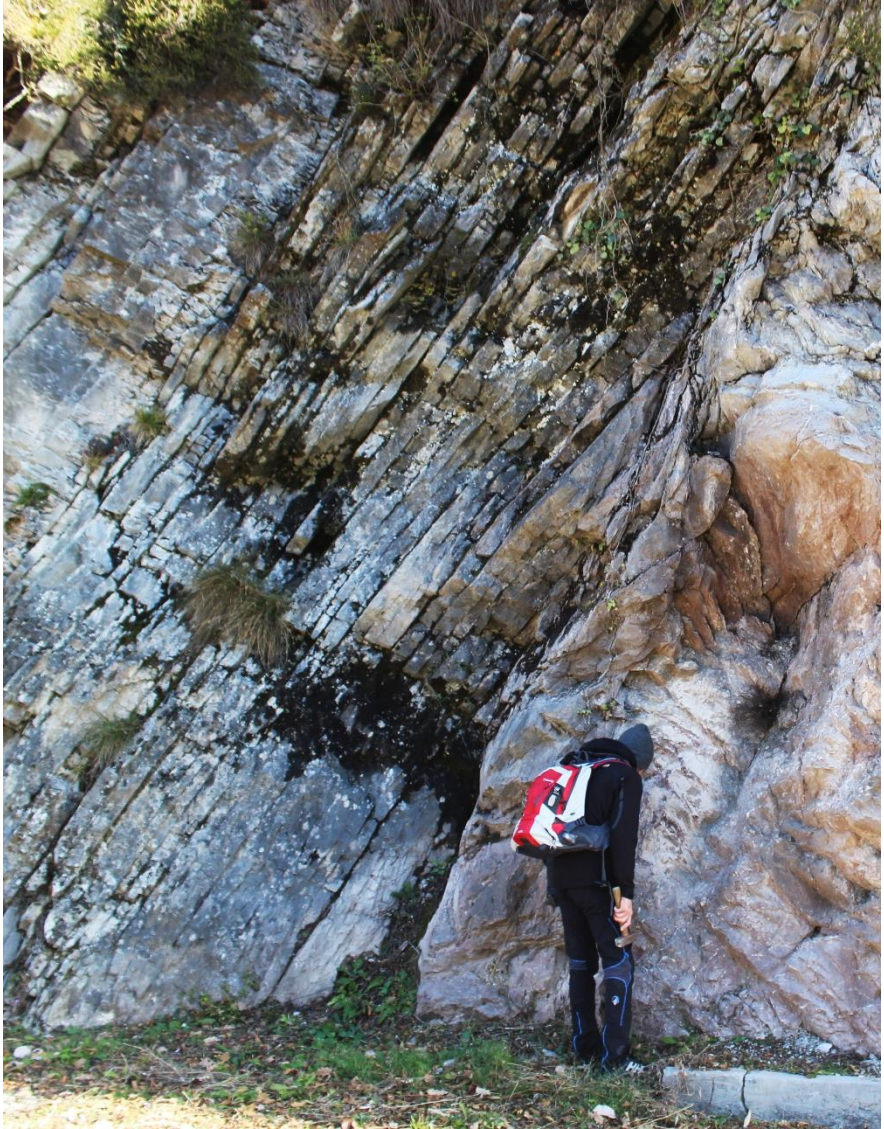
Specifically, our researchers were hosted in 10 radio interviews to explain their research topics, ranging from national news broadcasts to local radio stations. More than 25 publications were prepared and shared for the generic audience, with topics such as the role of Earth Sciences for cultural heritage preservations, the contributions of Geosciences to renewable energy sources, or the many contributions to the Dolomiti UNESCO world heritage. We were also actively involved in exhibitions and documentary films.



Department of Geosciences scientists on air in the Youtube channel 'ilbolive'

The Department of Geosciences participated to a number of divulgation events, directly hosted in the Department structures or in other locations. We coordinated 20 events, from the Kids University activity to the Night of the Research, also including several conferences for schools or cucltural associations. Kids University is an official program issued by the University of Padova in order to present the the academic world to the schools of the Veneto Region. In particular, for the Kids University program, our Department hosted 115 students enrolled in primary and secondary schools from several places of the region. One week of activities with 5 different experiences were specifically designed, to introduce the youngest to the world of Earth Sciences. During the annual Night of the Research, also called the "Veneto Night", the Department played a leading role by hosting 5 different activities in the Bo University courtyard. Hundreds of people were invited to dive, in the funniest and easiest ways, into the everyday life of an Earth scientist. Visitors moved from the micro scale of the nannofossils microscopy observations to the galactic distances of planetary geology studies. Everybody was impressed from discovering how the water flows in the underground in our hydro-sand box... and why not testing the seismic shaking experience?

Department of Geosciences scientists sharing their research with the citizens at the Veneto Night 2019



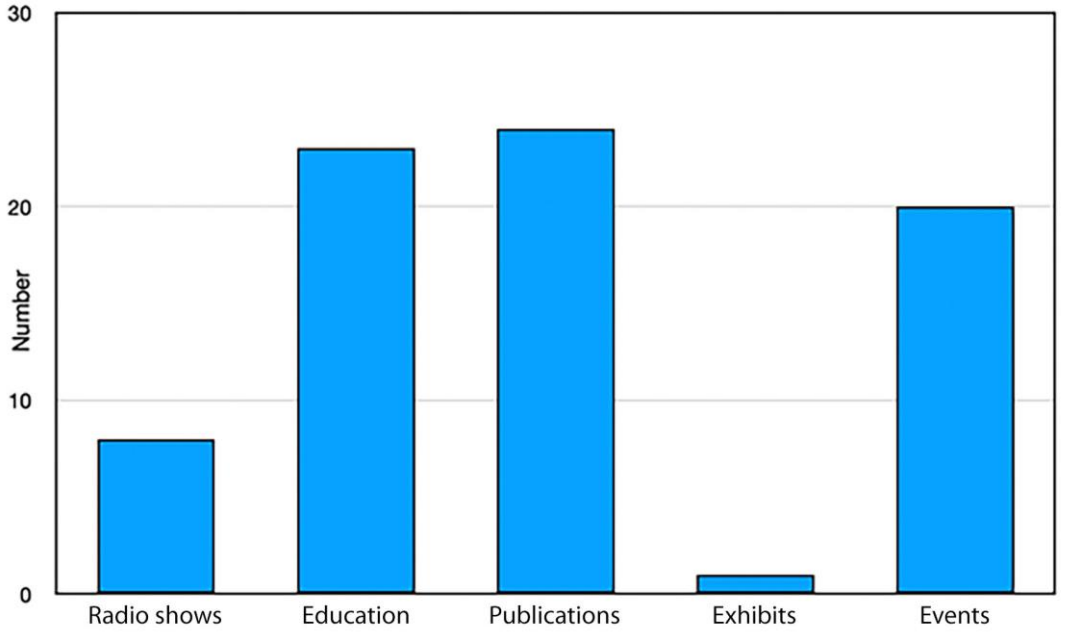
In 2019, the main effort dedicated by the Department to divulgation was however oriented to the world of education. 23 activities were organized, with the purpose of introducing Earth Sciences to the broadest possible audience. Our primary target were obviously the youngest, in attempt of nurturing the interest and passion of future Earth scientists. Our base message was: everybody lives on the Earth, but few know how it is made and works! Researchers of our Department were deeply committed with the 'Piano Lauree Scientifiche', a national program aimed at encouraging High School students to enroll in Science Bachelor programs. Many of us were involved in giving seminars in schools, trying to emphasize the relevance of Earth Sciences and their impact on people's life. Particular interest was posed on the projects 'Women in Science' and 'Donne e Geologia' (Women and Geology), focused on the role of female scientists within the University of Padova.

Finally, outdoor activities were organized to take High School students in our everyday field work. It was amazing to observe the students in awe after realizing that a lagoon marsh or a dolomite cliff can turn into their classroom for a day!

In particular, in 2019 we proposed as case studies the coastal environment of the Venice lagoon and the infamous Vajont river dam. The first is intended to show the students how a familiar environment is formed and how it constantly changes due to geological processes such as sedimentation and erosion. The latter is the place where in 1963 a horrific man-made disaster took place, with almost 2000 people killed as a result of errors in the estimate of geological problems. Students treasured the core message that learning from past mistakes is of the essence when planning future choices.

Part of the 2019 efforts in divulgation also addressed to the Science teachers, who represent the main inspiration and guide in orienting the youngest. Based on the feedback received, we strongly believe that teaching Earth sciences deserves a more modern and efficient approach to captivate the interest of middle and high school students.

In the graph below, the Department Dissemination and Divulgation 2019 activities are summarized. Stay tuned for our future proposals!



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