International Lithosphere Program

Activity Report 2023 – Task Forces / Coordination Committees

Project Title: LithoMar - Assessing the relationships between lithospheric processes and seafloor topography at oceanic hotspots and divergent margins
Project No.: 2021-TF5
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1. Highlights of recent ILP Task Force work/results

Progress made by the LithoMar TF for the period 2023 includes the participation and organization of scientific meeting/conferences and collection of new data. In particular:
- The LithoMar TF is directly involved in organizing the second International Conference on Seafloor Landforms, Processes and Evolution, that will be held in Lipari, Italy (1-3 July 2024 – www.icslpe.unimib.it). The conference will be partly supported by ILP funds, especially to cover expenses for invited speakers who will expand the LithoMar TF network. To promote inclusiveness and adhere EDI principles (as discussed during the last ILP business meeting), the LithoMar TF decided to give visibility to research from South America, Africa and South Asia. We therefore invited 3 keynote speakers from these regions, asking them to deliver a 30-minute talk reviewing recent seafloor geomorphic research in their countries, identifying key scientific questions for the future. Paula Andrea Ramirez Zapata from southern America, Khaira Ismail from south Asia and Andrew Green from south Africa were invited.
- New data were acquired within the framework of the following projects in which the ILP TF is involved:
1) PNRA (National Programme for Antarctic Research) ISOBATA project: a new oceanographic expedition took place in December 2022 - March 2023 on board R/V Laura Bassi in the Southern Ocean. Multibeam and magnetometer data were collected along the Emerald Fracture Zone and the Macquarie Triple Junction (MTJ), extending the area surveyed during a previous cruise performed in winter 2021/22. As mentioned within the previous report, the dataset will be used to achieve the objectives pursued by WP1, WP2 and WP5 of the TF LithoMar.
2) The Erasmus+ project BridgET (Bridging the gap between the land and the sea in a virtual Environment for innovative Teaching and community involvement in the science of climate change-induced marine and coastal geohazards): new multibeam and drone dataset were collected offshore Mt. Etna, surveying the submerged sector of the Lachea island and thus contributing to the objectives set out in WP1. We obtained a seamless high resolution digital terrain model that covers the emerged and submerged sector of the island, formed by basaltic rocks resulting from magma intrusion that occurred half a million years ago into the pre-existing rocks of the seabed, as a consequence of the collision between the European and African plates.

The results and activities of the BridgET project are disseminated through a dedicated website, where the ILP logo is included.
3) Project SUAVE (Submarine volcanism in the western Sicilian Channel): Aaron Micallef participated in the M191 oceanographic expedition onboard the R/V Meteor between the 16th July and 5th August 2023. The main of this expedition was to analyse how volcanism has developed in conjunction with tectonic structures in the passive continental rift of the western Sicilian Channel. The seafloor was extensively mapped with multibeam echo sounder, sediment echo sounder, and towed magnetometer, and sampled using a chain bag dredge.
4) AKMA project: over the past years, as a contribute to WP3 and WP4, Alessandra Savini participated in two oceanographic expeditions carried out in the Arctic Ocean (11-23 May 2022 and 29 April – 11 May 2023) and funded by AKMA project (whose PI, Giuliana Panieri, is part of the LithoMar network). The initial plan was to present the results at the 15th GIMS conference held in Cadiz, Spain 22-27 October 2023 (a conference that was postponed several times from 2021, due to COVID), but the conference overlapped with activities carried out within the BridgET project. We also realised that the many outcomes obtained from the AKMA project take time to be properly processed, so we decided to include their presentation in a dedicated session scheduled for the second edition of the International Conference on Seafloor Landforms, Processes, and Evolution (also supported by ILP) and to submit a publication focused on the topic of WP4 by the end of 2024.

2. Presence at international meetings/workshops (this year)

The ILP LithoMar TF leaders participated at the following conferences:

- EGU General Assembly 2022 (23-27 May 2022). Prof. A. Savini participated to the ILP Business Meeting and presented first results of the ISOBATA project at session GM6.3 “Submarine Geomorphology and offshore Geohazards”. The presented talk promoted an interesting discussion on the topic of data sharing in open science networks to make scientific research and data more accessible, transparent, and collaborative (which is one of the goal of the ISOBATA project also promoted by the entire ILP TF).
- INQUA Conference (Rome, Italy, 13-20 July 2023). Prof. Paraskevi Nomikou has been invited as keynote speaker to the conference for session 6 “Recent advances in understanding the Quaternary geomorphological evolution of continental margins” under the main theme “Geomorphology and stratal architecture of continental margins”. She presented the most well-known and well-studied onshore and offshore features found on the volcanic islets along the active Hellenic volcanic Arc in the South Aegean Sea. The ILP was officially thanked during the closing of the session.

3. Important publications of ILP Task Force members (max. five)

- Karstens, J., Preine, J., Carey, S., Bell, K. L., Nomikou, P., Hübscher, C., Lampridou, D., Urlaub, M. (2023). Formation of undulating seafloor bedforms during the Minoan eruption and their implications for eruption dynamics and slope stability at Santorini. Earth and Planetary Science Letters. 10.1016/j.epsl.2023.118215
- Karstens, J., Crutchley, G.J., Hansteen, T.H., Preine, J., Carey, S., Elger, J., Kühn, M., Nomikou, P., Schmid, F., Dalla Valle, G. and Kelfoun, K., 2023. Cascading events during the 1650 tsunamigenic eruption of Kolumbo volcano. Nature Communications, 14(1), p.6606.
- Zegkinoglou N. Nikolaos, Mathur Ryan, Kilias P. Stephanos, Linda Godfrey, Vasilios Pletsas, Nomikou Paraskevi , Zaronikola Nina (2023). Boiling-induced extreme Cu isotope fractionation in sulfide minerals forming by active hydrothermal diffusers at the Aegean Kolumbo volcano: Evidence from in situ isotope analysis. Geology 2023; 51 (11): 1072–1076. doi: https://doi.org/10.1130/G51404.1.

- Fallati L, Panieri G, Argentino C, Varzi AG, Bünz S and Savini A (2023) characterizing Håkon Mosby Mud Volcano (Barents Sea) cold seep systems by combining ROV-based acoustic data and underwater photogrammetry. Front. Mar. Sci. 10:1269197. doi: 10.3389/fmars.2023.1269197.
- Klein E, Hadre´ E, Krastel S and Urlaub M (2023) An evaluation of the General Bathymetric Chart of the Ocean in shoreline-crossing geomorphometric investigations of volcanic islands. Front. Mar. Sci. 10:1259262. doi: 10.3389/fmars.2023.1259262.

4. New contacts (this year)

New contacts for 2023 include:
- Paula Andrea Ramirez Zapata, Universidad Pontificia Bolivariana, Medellin, Colombia
- Kahira Ismail, Universiti Malaysia Terengganu, Malaysia.
- Andrew Green, University of Kwazulu Natal, South Africa.
- Luca Gasperini, CNR ISMAR, Bologna, Italy.
- Filippo Muccini, INGV, Italy.

5. Usage of ILP funding (this year)

A total of EUR 3.304,85€ was spent during 2023, to support the participation of Prof. Paraskevi Nomikou to the INQUA conference (Rome, Italy, 13-20 July 2023) as keynote speaker. Her invited presentation focused on explaining the geomorphological evolution of the active Hellenic volcanic Arc in the South Aegean Sea, from the W to the E, and presented its gradual transition from dome landforms to craters and collapsed caldera landscapes. The latter is related to dynamic interactions between the volcanic activity and the erosional processes that sculpture the terrestrial and submarine topography along the arc. She also presented the first results of the IODP 398 expedition in Santorini volcanic group.

6. Activities planned for 2024

- ILP TF5 2021 WebSite: A dedicated website will be set up to advertise the activities of the ILP TF (including information on TF topics, participants, events, publications and outcomes) and give credit to ILP.
- MEETINGS: The TF will have the opportunity to meet at:

- EGU2024: Alessandra Savini will be the convener of a thematic sessions focused on “submarine Geomorphology”, also officially sponsored by ILP. Since we have collected a significant amount of data that will help to fulfil the objectives of the Lithomar WPs, we will take advantage of the EGU General Assembly to promote the publication of a special volume (possibly led by an early career researchers) focusing on the LithoMar topic. The targeted journal has yet to be decided.
- Third meeting of the BridgET Erasmus project (Milan, Italy, June 2023): all TF PIs will participate in presence or remotely. Within the support of BridgET data, we are working on a publication focused on highlighting the significance of integrating emerged and submerged geospatial dataset to investigate processes controlling the evolution of volcanic islands. The ILP will be credited in the publication.
- Second edition of the International conference on Seafloor Landforms, Processes and Evolution (Lipari, 1-3 Luglio 2024) – all TF PIs will participate in presence and the conference is partly supported by ILP. As for the EGU general assembly, the conference will promote the publication of a special volume, and will enlarge the network involving researchers from South America, Africa and South Asia.

- PUBLICATIONS: For the upcoming year we aim at putting a special focus on publications. As mentioned before, we have collected significant data in previous years and have a good network within which we can promote both the production of a special volume and individual publications in which we will credit the support received from ILP.