Accessing the Circum-Iberian mantle archive of Wilson Cycle processes through Land-to-Sea drilling (MANTLE-L2S)

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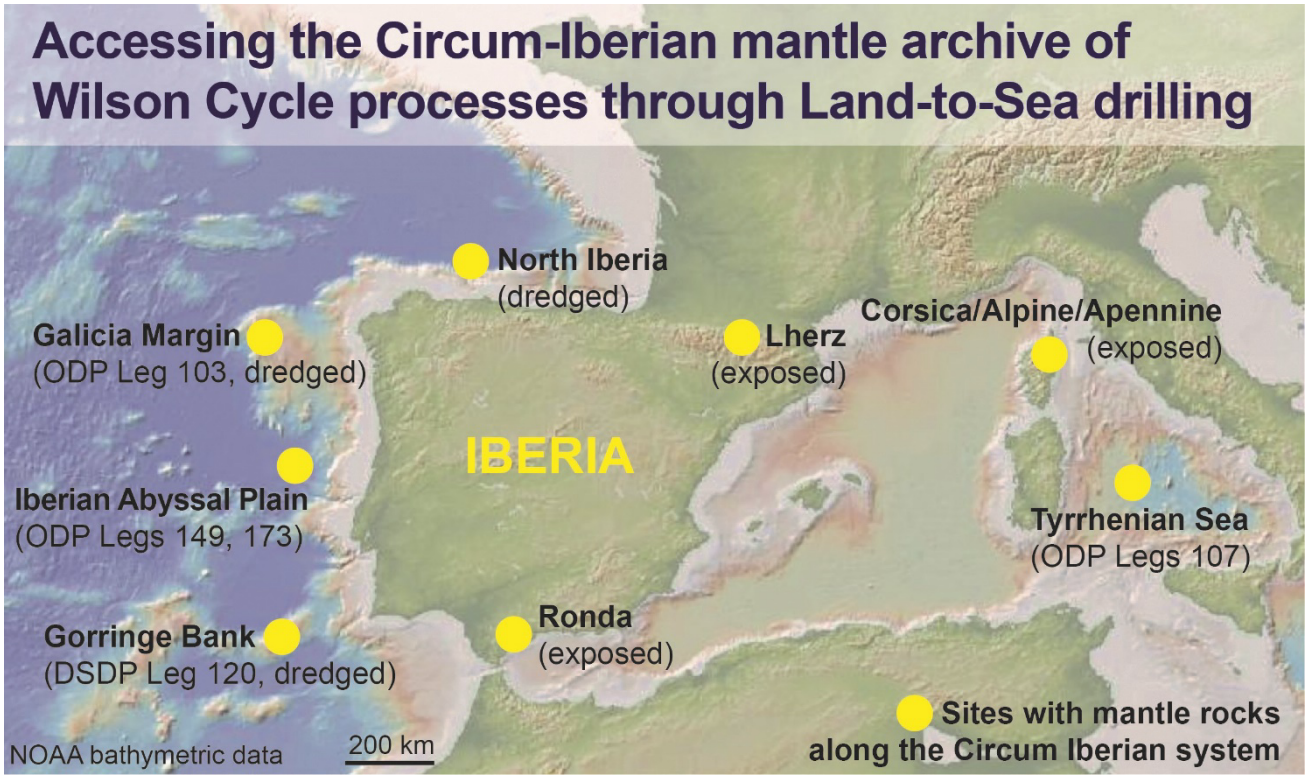

Mantle rock localities of the circum-Iberian system

Our MagellanPlus workshop, "*Accessing the Circum-Iberian mantle archive of Wilson Cycle processes through Land-to-Sea drilling*", also know as MANTLE-L2S, was held at the University of Plymouth on the 3rd to 6th July 2023. The primary goal of MANTLE-L2S was to bring together a diverse group of researchers, who could develop Mission Specific Platform-based scientific drilling proposals to investigate mantle rocks and their interactions with Earth systems and cycles during the Wilson cycle.

Regional focus of MANTLE-L2s was directed towards the circum-Iberian system and similar Atlantic-type settings, where shallow occurrences of mantle rocks offer exceptional opportunities to target various stages of the Wilson cycle. Recognising ECORD's need for a compelling and diverse range of drilling proposals to implement during the post-2024 phase of scientific ocean drilling, MANTLE-L2S had a particular emphasis on the application of Mission Specific Platform (MSP) technologies and land-to-sea (L2S) drilling programmes. From a longer-term perspective, MANTLE-L2S hoped to create a diverse consortium, comprising early career and senior researchers with a broad spectrum of skills, which will aim to address multiple Strategic Objectives of the 2050 Science Framework through applications of MSP drilling.

MANTLE-L2S was born out of the previous MagellanPlus workshop held at Plymouth, in April 2022, *"Investigating the Oceanic Life Cycle of Tectonic Plates with Mission-Specific Scientific Drilling"*. At that workshop, one of three focus groups identified the investigation of mantle rocks at different stages of the Wilson Cycle as a key target to for addressing Strategic Objective 2 (Oceanic Life Cycle of Tectonic Plates) of the 2050 Science Framework with MSP-based scientific drilling. From that focus group formed the MANTLE-L2S committee, comprising Andy Parsons (lead proponent – University of Plymouth), Julien Collot (Geological Survey of New Caledonia), Marguerite Godard (CNRS Géosciences Montpellier), James Hepworth (University of Plymouth), Gael Lymer (Royal Belgian Institute of Natural Sciences), Gianreto Manatschal (ITES, University of Strasbourg), Antony Morris (University of Plymouth), Esther Schwarzenbach (Université de Fribourg), and Arianna Secchiari (Università degli Studi di Milano Statale).

MANTLE-L2S was attended in-person by 28 guests, with an addition 5 attendees taking part online. The group included guests from nine different countries and 20 different institutes, including 11 attendees who classified themselves as early career researchers (ECR). The workshop took place over three and a half days, including an evening icebreaker event on 3rd July, followed by two days of technical presentations from invited speakers alongside group discussions and breakout groupwork. The final day of the workshop involved focused groupwork aimed at the delivery of one or more proposal plans for new IODP MSP pre-proposals.

To help us meet our aim of creating new MSP proposals, we sought out a range of invited presentations, which covered all possible scientific and technical components of a successful MSP-based proposal. Our selection of invited speakers therefore ensured that our workshop was attended by leading experts from all relevant disciplines:

- Geoffroy Mohn, CY Cergy Paris – The circum-Iberian system and the Wilson cycle
- Margot Goddard, Géosciences Montpellier – Onshore peridotite massifs
- Peter Kelemen, Lamont – Continental drilling, OmanDP
- Esther Schwarzenbach, Fribourg (CH) – Serpentinisation, fluid flow and element cycles
- Chiara Boschi, IGG-CNR, Pisa – Hydrothermal alteration and CO2 storage
- Susan Lang, Woods Hole – Biogenic activity associated with serpentinization

- Lisa McNeill, Southampton – Examples of legacy drilling, borehole monitoring

As well as seeking a diverse range of scientific expertise, we also wanted to ensure that our workshop included guests with a detailed technical knowledge of scientific drilling including MSP-based technologies and borehole measurements and monitoring. We were therefore very fortunate to have ECORD Science Operator (ESO) representatives Hannah Grant (BGS), Marisa Rydzy (Leicester), and Luzie Schnieders (Bremen) attend our meeting, presenting technical talks on MSP applications, and being on hand to help our discussions of potential MSP targets. Talks were spaced out across the mornings and mid-day of the first two days with plenty of time for breakout groups to get together to consider what regions and topics they were interested in and to identify targets suitable for addressing those problems via MSP applications. Each evening involved food and refreshments for the whole group, allowing all attendees to naturally continue their scientific discussions, or to simply relax and take a break!

Thanks to the hard work and contributions of all attendees, MANTLE-L2S has achieved its central aim of creating a proposal plan for a new MSP-based IODP pre-proposal. Whilst a number of potential targets were discussed, there was an overwhelming consensus that the Gorringe Bank serpentinite seamount, offshore SW Portugal, should be the target for our pre-proposal. This seamount first exhumed during opening of the Atlantic but is currently in a state of compression. It is located in a region of complex and societally important seismic activity and has also be interpreted as a site of subduction initiation. As such Gorringe bank offers a unique opportunity to investigate mantle rocks in the middle part of the Wilson cycle during which, passive margins transform to active margins. Work is currently underway to write up the plans developed during MANTLE-L2S into MSP pre-proposal.

The MANTLE-L2S committee are grateful for the funding provided by the ECORD MagellanPlus Programme, for the dedicated assistance provided by Katie Rhodes and the events team at the University of Plymouth, and for the participation of all workshop attendees who contributed to the workshop success.