Report of Transnational Access Projects

Project ID: C4-TA3-86-1-2

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Project title: Oceanic Acoustic Sensing for Island Systems

Project acronym: OASIS

Hosting installation: Ella-Link GeoLab Madeira testbed, TA3-86-1

Hosting team: Afonso Loureiro, University of Lisbon, ARDITII

Period of access: on-site visit 25-26/3/2026

Report of activities:

The Principal Investigator carried out the transnational access visit together with a collaborator from NTNU during an on-site visit to the University of Lisbon on 25–26 March 2026. The visit focused on establishing collaboration with the hosting research team, familiarising the visitors with the Distributed Acoustic Sensing (DAS) infrastructure, and implementing the technical workflow required for the OASIS project.

The hosting team introduced the visitors to the department, its research activities, and the Madeira submarine fibre-optic DAS testbed. The visitors attended a departmental scientific seminar and a research group meeting, where the OASIS project was presented and discussed. These interactions strengthened the

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collaboration between the participating institutions and provided valuable feedback on the project objectives.

A major component of the visit was dedicated to technical training on accessing and processing DAS data. The host researcher demonstrated the workflow for retrieving recordings from the Madeira DAS archive and introduced the modular Python processing framework developed for event selection, data conversion and analysis. The workflow included connecting to the remote S3 repository, downloading raw fibre-optic recordings stored in OptoDAS/HDF5 format, selecting user-defined time windows and fibre channels, visualising the retrieved waveforms, and converting the data into MiniSEED format for subsequent seismological and acoustic analyses. The processing framework also supports event-based processing, metadata handling, configurable signal processing (e.g., filtering), and export to standard formats (Figure 1).

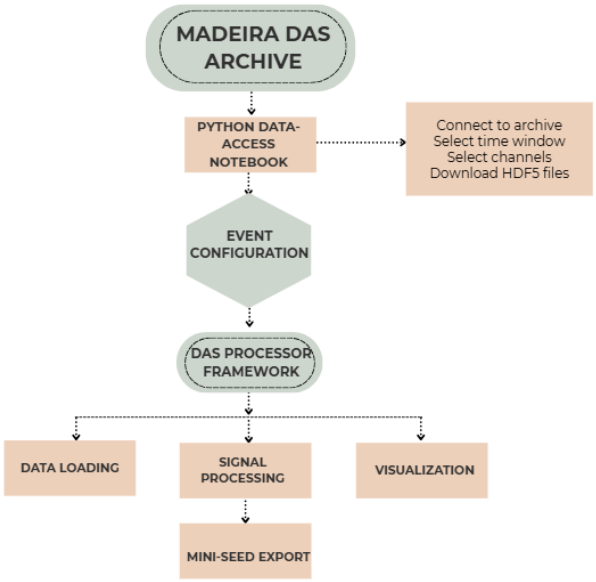

Figure 1. Workflow developed during the transnational access visit, from retrieval of DAS data from the Madeira S3 archive to processing and export into standard formats (*figure created with Canva*).

The software environment and processing scripts were tested during the visit, allowing the visitors to become familiar with the complete processing chain.

The technical work was carried out using Python-based tools, including the host-developed DAS processing framework together with standard scientific libraries for data access, handling and visualisation. The hosting team also shared documentation describing previous analyses of the Madeira DAS dataset and examples of detected signals, including seismic events and marine bioacoustics recordings. These materials were reviewed to support the planning of the subsequent analyses within the OASIS project. During the visit, the software, documentation, and processing workflow were also transferred to the research team through an internal project meeting.

The main outcomes of the transnational access were the successful establishment of a workflow for accessing and processing the Madeira DAS data, implementation of the software environment at the home institution, and transfer of technical expertise between the host and visiting teams. These activities provide the foundation for the forthcoming scientific analyses of marine soundscapes, seismic events and other acoustic sources recorded by the Madeira submarine fibre-optic cable.

Project outcomes:

The transnational access established the technical and collaborative framework required to achieve the scientific objectives of the OASIS project. A key outcome of the visit was the transfer of the Python-based data-access and processing workflow developed for the Madeira DAS testbed. The notebooks, software environment and associated documentation were shared within the research team and are now being used as the foundation for the subsequent analysis of marine soundscape components.

Following the visit, the project team began reproducing the reference processing examples provided by the host institution to validate the workflow and ensure consistent handling of the DAS dataset (Figure 2).

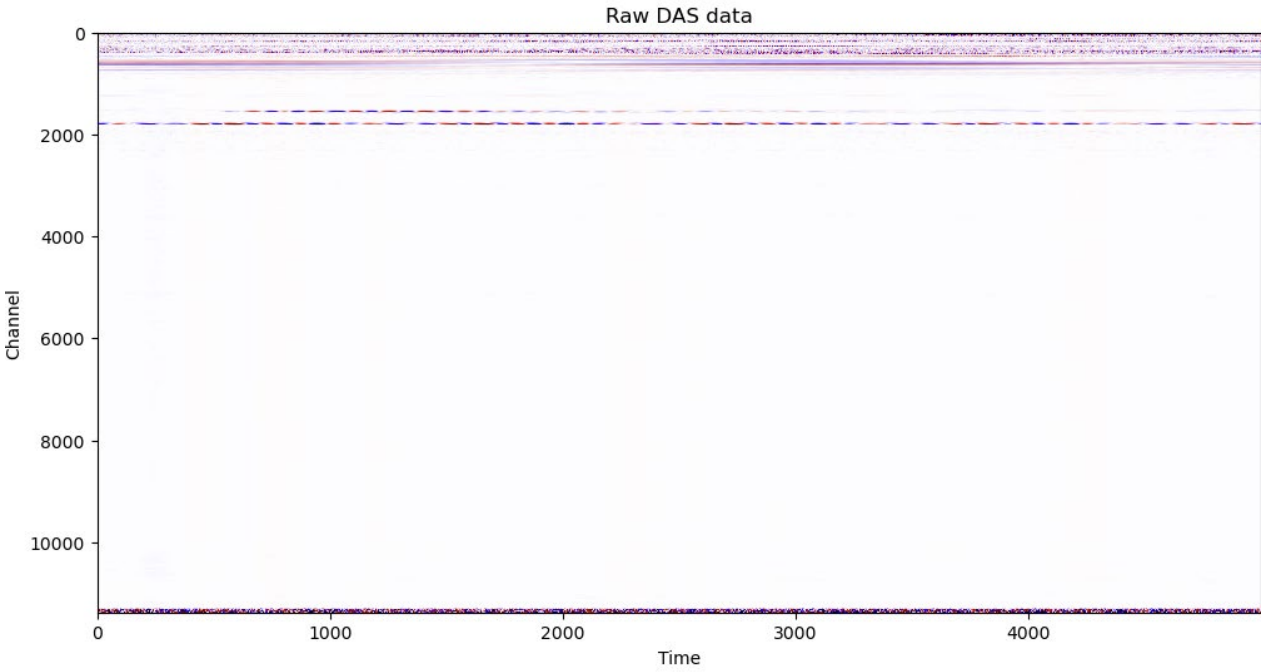

Figure 2: Overview of the raw DAS strain data across the full spatial extent of the Madeira testbed cable array (~11,500 channels). The baseline time-series illustrates the spatial dynamic range of the system, showing high-amplitude nearshore/landing zone noise (channels 0–500), active seafloor-coupling regions (channels ~1500–1800), stable sensing channels across the deep-water section, and signal attenuation near the distal end of the fiber (>11,000 channels).

This represents the first stage of the analysis and provides a benchmark for the subsequent investigation of different marine soundscape components.

The next phase of the project will extend the methodology to additional case studies, including seismic and T-wave events, cetacean vocalisations, vessel traffic and weather-related acoustic signals, with the aim of evaluating the capability of the Madeira DAS testbed for multi-purpose marine soundscape monitoring.

The collaboration established through the transnational access also provides the basis for a joint scientific publication involving the host institution and the beneficiary research teams. The manuscript will present the scientific results obtained from the analysis of the Madeira DAS dataset and will be submitted to an international peer-reviewed journal. The developed processing notebooks and analysis workflow will be

made available through an appropriate public repository whenever possible, supporting reproducibility and future research.

Current outputs

- Python notebooks and processing workflow transferred to the research team and integrated into the project analysis pipeline.
- Internal knowledge-transfer meeting held with the research team following the access.
- Validation of the DAS data-access and processing workflow through reproduction of reference examples provided by the host team.
- Scientific analyses based on the Madeira DAS dataset currently in progress.

Data and software

- Processed datasets: DOI/repository link to be added upon publication.
- Processing notebooks/software repository: link to be added upon publication.

Publications

- Joint scientific publication involving the host and beneficiary teams: data analysis currently underway; submission planned to an international peer-reviewed journal.

Dissemination

The OASIS project was presented during a departmental seminar and research meeting at the University of Lisbon during the transnational access visit. The scientific results generated within the project will be disseminated through international conferences and peer-reviewed publications. The team plans to present the results at scientific meetings in the fields of underwater acoustics, marine science and related disciplines (e.g., OCEANOISE or similar conferences).

The project will promote reproducibility by documenting the processing workflow and sharing Python notebooks and analysis scripts through an appropriate repository (e.g., GitHub or Zenodo), subject to the data-sharing policy governing the Madeira DAS dataset. Processed datasets supporting scientific publications will also be deposited in trusted repositories whenever permitted.

The transnational access has strengthened collaborations between the University of Lisbon, OGS, NTNU and the University of Trento through the exchange of software, processing workflows and technical expertise. Additional dissemination opportunities will be supported through the PI's involvement in the BluEcho project, including interactions with the advisory committee, members of TG Noise and experts involved in JPI Oceans' Science4GES activities.