

Fibre Optic Sensing in Geosciences  
Catania 16-20 June 2024



## 16 June

19:30 – 22:00 Ice breaker

## 17 June

08:15 – 08:45 Registration

08:45 – 09:00 Welcome and presentation

### Session 1

#### *Fibre optic sensing: Principles, Techniques and Solutions*

Convenors: Bernauer F., Izgi G., Masoudi A., Pottie P.-E.

09:00 – 09:20 **Keynote lecture:** Laser interferometry: a tool for seismic monitoring using the telecom fiber network. Clivati et al.

09:20 – 10:00 **Oral Session 1: Part 1**

09:20 – 09:30 Rotation sensing with fibre optic technology. Igel et al.

09:30 – 09:40 Remote optical interferometric displacement technology development for planetology. Guattari et al.

09:40 – 09:50 High resolution seismometers and strainmeters at the termination of plurikilometric fibers : a new brand of fiber optic sensors for harsh environment. Bernard et al.

09:50 – 10:00 Rapid Rayleigh scattered wave frequency analysis in distributed optical fiber sensing for broadband geophysical observation in the seafloor. Araki and Yokobiki.

10:00 – 10:30 **Coffee break**

10:30 – 11:30 **Oral Session 1: Part 2**

10:30 – 10:40 Assessing Cable Sensitivity in Distributed Fibre Optic Sensing Offshore Catania. Cappelli et al.

10:40 – 10:50 What we learn from multi-component, direct observations of rotational ground motions about atmospheric ground deformation processes. Brotzer et al.

10:50 – 11:00 LASER absolute long base TILTmeter: An innovative instrument to measure a new class of slow earthquakes. Boudin et al.

11:00 – 11:10 GEOFON and GFZ contributions towards democratising DAS data. Strollo et al.

11:10 – 11:20 On the benefit of collecting the seismic divergence using Distributed Acoustic Sensing with coiled fiber. Edme et al.

11:20 – 11:30 A novel Jones matrix analysis applied on polarization data acquired from a Mediterranean sea underwater fiber telecommunication cable. Simeone et al.

11:30 – 12:15 **Session 1 activity**

12:15 – 13:00 **Poster sessions for Session 1 and 2, and manufacturer exhibition**

13:00 – 14:30 **Lunch**

### Session 2

#### *Fibre as a sensor for geohazards and geoenergy systems monitoring*

Convenors: Maass R., Martuganova E., Metaxian J.-P.

14:30 - 14:50 **Keynote lecture:** Multi-scale Fiber Sensing for Earthquake, Volcano, and Ocean Studies. Zhan Z.

14:50 – 15:30 **Oral Session 2: Part 1**

14:50 – 15:00 Shallow geothermal energy recovery and storage monitoring using Distributed Fibre Optic Sensing (DFOS) systems– UK Geoenergy Observatories, in Glasgow and Cheshire, UK. Chalari et al.

15:00 – 15:10 Fibre-optic seismic imaging at the geothermal research platform Groß Schönebeck/Germany. Krawczyk et al.

15:10 – 15:20 Evidence of wind turbines as a metamaterial-like urban layer: Monitoring of the seismic wavefield by Distributed Acoustic Sensing. Pilz et al.

15:20 – 15:30 The value of distributed optical fibre sensors in qualifying energy cables for offshore wind farms. Le Du et al.

15:30 – 16:00 **Coffee break**

16:00 – 17:00 **Oral Session 2: Part 2**

16:00 – 16:10 Exploring Fault Zone Dynamics and Subsurface Motions: Unveiling the PGV-Strain Relationship with Downhole Cross-Fault Optical Fiber Sensing and Borehole Seismometers. Ma et al.

16:10 – 16:20 Source locations of volcanic earthquakes using DAS and fiber optic cables: Azuma and Sakurajima volcanoes, Japan. Nishimura et al.

16:20 – 16:30 Investigating Volcanic tremor, Explosions and Pyroclastic Flows with Fibre-Optic Sensing at Stromboli Volcano (Italy). Biagioli et al.

16:30 – 16:40 Strain-rate variations as response to surface uplift and subsidence during a volcanic crisis measured with DAS on a dark fiber? Wollin et al.

16:40 – 16:50 Hydroacoustic and tsunami observations by a seafloor fiber optic strain meter. Matsumoto et al.

16:50 – 17:00 Towards tsunami early-warning with Distributed Acoustic Sensing: Expected seafloor strains induced by tsunamis. Becerril et al.

17:00 – 17:45 **Session 2 activity**

17:45 – 18:45 **Poster sessions for Session 1 and 2, and manufacturer exhibition**

## 18 June

08:30 – 09:00 Registration

### Session 3

#### *Fibre Optic Sensing in extreme environments*

Convenors: Ugalde A., Yaman F., Diaz-Meza S.

09:00 – 09:20 **Keynote lecture:** Observing seafloor processes by distributed Fiber Optic Sensing: examples from academic cables offshore East Sicily (Italy) and a commercial telecom network in the Guadeloupe archipelago (Lesser Antilles). Gutscher et al.

09:20 – 10:00 **Oral Session 3: Part 1**

09:20 – 09:30 DAS system for the Moon. Tauzin et al.

09:30 – 09:40 New Earth and Planetary Science Discoveries Enabled by the Optical Fiber Sensing Revolution. Lipovsky et al.

09:40 – 09:50 Subsea Environmental Sensing with Operational Submarine Cables. Kamalov V.

09:50 – 10:00 Closing an Information Gap in Geothermal Well Construction: Continuous Distributed Fiber-Optic Sensing for Improved Displacement Efficiency. Hart et al.

10:00 – 10:30 **Coffee break**

10:30 – 11:30 **Oral Session 3: Part 2**

10:30 – 10:40 Moment Tensor inversion with Full-Waveform Inversion and Distributed Acoustic Sensing on a subglacial volcano: Grímsvötn, Iceland. Klaasen et al.

10:40 – 10:50 Closing the Ocean Data Gap: near-coast fibre-optics sensing to monitor tectonic and volcanic events. Krawczyk et al.

10:50 – 11:00 The INFN-LNS Fibre optic infrastructure. Pulvirenti and Viola.

11:00 – 11:10 Reconstruction of nearshore surface gravity waves from Distributed Acoustic Sensing data. Mohammedi et al.

11:10 – 11:20 Comparing location uncertainties with automatic pickers on DAS data: case studies from Canary Islands. Bozzi et al.

11:20 – 11:30 Search for fin whale calls and shipping noise in Western Ionian Sea using Distributed Acoustic Sensor. Idrissi et al.

11:30 – 12:15 **Session 3 activity**

12:15 – 13:00 **Poster sessions for Session 3, 4 and 5, and manufacturer exhibition**

13:00 – 14:30 **Lunch**

### Session 4

#### *Processing, modelling and artificial intelligence for fibre optic sensing users*

Convenors: Allegra M., Bean C., Krawczyk C., Caudron C.

14:30 - 14:50 **Keynote lecture:** Leveraging the spatio-temporal coherence of DAS data for detection and classification. Van Den Ende et al.

14:50 – 15:30 **Oral Session 4: Part 1**

14:50 – 15:00 Inter-channel lossless data compression for Distributed Acoustic Sensing. Segui et al.

15:00 – 15:10 A Framework for Bootstrapping Event Classification Datasets. Dumitru et al.

15:10 – 15:20 Coherence-based methods for early data exploration of DAS data. Grimm and Poli.

15:20 – 15:30 Towards a generic fibreoptic earthquake detection and location algorithm for arbitrary fibre geometries and hybrid fibre-seismometer networks. Hudson et al.

15:30 – 16:00 **Coffee break**

16:00 – 17:00 **Oral Session 4: Part 2**

16:00 – 16:10 Characterizing non-linear ground response using signal classification from acoustic signals and Distributed Dynamic Strain Sensing (DDSS) at Mt. Etna volcano, Sicily. Diaz-Meza et al.

16:10 – 16:20 How Does Wavefield Separation Affect Direction Estimates Using a Rotational Sensor? Izgi et al.

16:20 – 16:30 Seismic Phases Picking with Artificial Intelligence: A Novel Approach for Distributed Acoustic Sensing Data Analysis. Corsaro et al.

16:30 – 16:40 Understanding DAS records and their response with full-waveform modelling. Celli et al.

16:40 – 16:50 Fiber Optic Sensing in Rain Detection Using Unsupervised Domain Adaptation. Ding et al.

16:50 – 17:00 A Deep Learning Neural Network for Controlling Vehicle Weight, Speed, and Lane from Telecom Dark Fiber Distributed Acoustic Sensing. Santos et al.

17:00 – 17:45 **Session 4 activity**

17:45 – 18:45 **Poster sessions for Session 3, 4 and 5, and manufacturer exhibition**

20:30 – 23:30 **Social dinner**

## 19 June

08:30 – 09:00 Registration

### Session 5

*Leveraging existing fibre optic networks for improving resilience in our modern society*

Convenors: Cotton F., Herrero A., Ehsaninezhad L.

09:00 – 09:20 **Keynote lecture:** Urban hazard reduction using dark fiber distributed sensing. Huang et al.

09:20 – 10:00 **Oral Session 5: Part 1**

09:20 – 09:30 Environmental Sensing and Detection based on State of Polarization Monitoring in Terrestrial Optical Data Networks. Virgillito et al.

09:30 – 09:40 Advancing Seismic Monitoring using Interferometric Data Recorded on Telecom Fiber Networks. Herrero et al.

09:40 – 09:50 Landside hazards detection by interferometric sensor over deployed telecom fibers for railway safety surveillance. Morosi et al.

09:50 – 10:00 Exploring Network Sensing for Cost-Effective Event Detection. Carpentieri et al.

10:00 – 10:30 **Coffee break**

10:30 – 11:30 **Oral Session 5: Part 2**

10:30 – 10:40 Monitoring changes in subsurface seismic properties caused by heavy rains with a roadside DAS by targeted interferometry. Biondi and Yuan.

10:40 – 10:50 Monitoring groundwater dynamics in the Crepieux-Charmy water catchment using DAS-based surface wave tomography. Bâ et al.

10:50 – 11:00 Urban Dark Fiber Distributed Acoustic Sensing for Bridge Monitoring under Road Traffic Sollicitation. Rodet et al.

11:00 – 11:10 MIMO-DFS for detection-localization-identification of mechanical threats over existing telecom networks. Dorize C.

11:10 – 11:20 Towards continuous fibre-optic monitoring in the oceans with submarine telecommunications cables – the SUBMERSE project. Tilmann et al.

11:20 – 11:30 Closing the Ocean Data Gap by combined fibre-optics, SMART cable sensing and novel data management strategies. Cotton et al.

11:30 – 12:15 **Session 5 activity**

12:15 – 14:00 **Lunch**

14:00 – 16:30 **Discussion and Conference wrap-up**

14:00 – 15:00 «Ask me Anything»

15:00 – 15:45 Wrap-up and future perspectives

15:45 – 16:30 Closure and celebration of the winner of the poster award

17:00 – 19:00 **Sparkle visit**

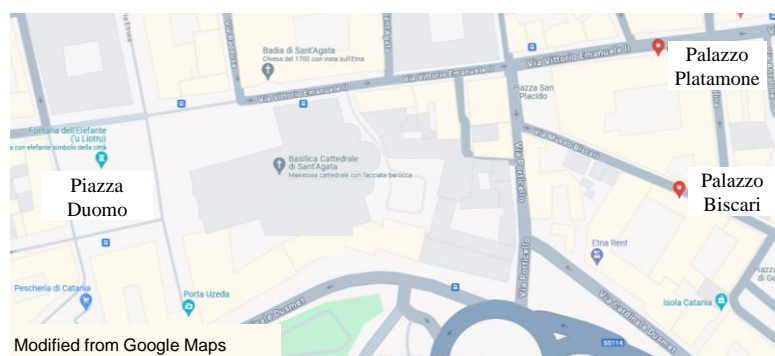
## 20 June

08:00 – 16:00 **Field trip to Etna**

10:00 – 19:00 **Sparkle visit**

### Venues

- **Conference:** Palazzo Platamone, Via Vittorio Emanuele II, 95131, Catania
- **Ice breaker, lunch:** Palazzo Biscari, Via Museo Biscari, 10, 95131, Catania
- **Social dinner:** Ristorante Il Pozzo, Via Musumeci, 124, 95128, Catania
- **Sparkle visit:** Via Antonino Longo, 56, 95125, Catania



### Organizing Committee

Gilda Currenti (INGV-OE, Italy), Verónica Rodríguez Tribaldos (GFZ, Germany), Giorgio Riccobene (INFN, Italy), Stefanie Donner (BGR, Germany), Heiner Igel (LMU, Germany), Kuo-Fong Ma (Academia Sinica, Taiwan), Philippe Jousset (GFZ, Germany), Shane Murphy (IFREMER, France), Rosalba Napoli (INGV-OE, Italy), Salvatore Viola (INFN, Italy), Flavio Cannavò (INGV, Italy), Giuditta Marinaro (INGV, Italy; EMSO-ERIC)

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