European Geosciences Union

Galileo Conferences

Fibre Optic Sensing in Geosciences

Catania 16-20 June 2024

© Francesco Zuccarello (INGV-OE)

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. Seguí 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**

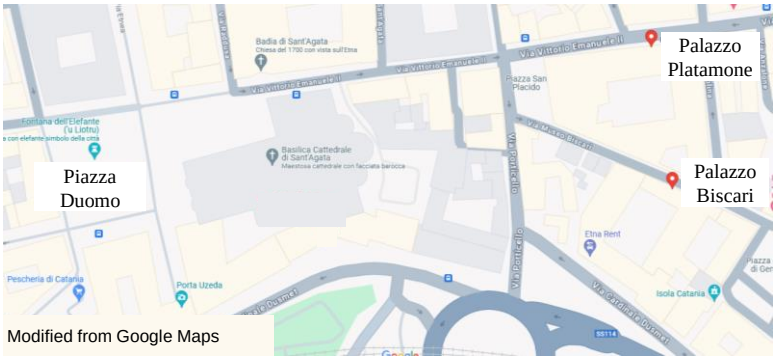
20 June

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



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