INGV-BSL Workshop on Solid Earth Geophysics
INGV Rome, main conference room
May 22-23, 2024
Field Trip May 24, 2024

Opening Day (May 22, 2024)

8:30 - 9:00 Welcome Coffee & Pastries;

9:00 - 9:30 Introduction by the organizers (Luca Malagnini)
Welcome by:
Prof. Carlo Doglioni (INGV President) [15‘]
Prof. Richard Allen (BSL Chair) [15’]

9:30 - 12:15 Session 1: Active fault systems of interest (Coffee Break 10:30-10:45)
Conveners Daniela Pantosti and Roland Bürgmann
Topics of interest:

1. The Hayward Fault
2. The Transitional Segment of the San Andreas Fault at Parkfield
3. The Apennines

Talks:

- 9:30 - 10:00 F. Maesano, M. Buttinelli, M. Anselmi, M. Tiberti, S. Pucci: *Overprint of Quaternary extension on a young orogenic belt: two examples from Italian Apennines* [30’]
- 10:00-10:30 N. D’Agostino, F.R. Cinti, D. Pantosti, S. Pucci, A.M. Lombardi: *Assessing earthquake recurrence from complementary approaches in the Apennines* [30’]
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- **10:30 - 10:45 Coffee over the Posters**

  10:45-11.15 Y. Cheng, R. Bürgmann, R. M. Allen: *3D architecture and complex behavior along the simple central San Andreas fault* [30’]
- 11:15-11:45 R. Bürgmann, M. Shirzaei, T. Taira, K. Johnson, M. Khoshmanesh, Y. Li, Y. Cheng: *Decadal creep-rate changes and asperity erosion on the Hayward fault* [30’]

Posters:

- Burrato et al.: *Relations between capable faults and seismogenic structures at depth*
- Cinti et al.: Earthquake *Rupture scenarios in central Apennines from paleoseismological data*
- Maesano et al.: *3D interactive visualization of the Apennines*
- M. Scarponi et al.: *New constraints on the seismic crustal structure of the southern Apennines (Italy): numerical modeling of P- and S- body waves for moderate earthquakes at regional scale*

Discussion: 11:45-12:15

12:15 - 13:30 Lunch;

13:30 - 16:00 Session 2: Source physics
Conveners Massimo Cocco and Yifang Cheng
Topics of interest:

1. Kinematics and dynamics of earthquake ruptures and faulting, and scaling of source parameters
2. Laboratory experiments on rock and earthquake mechanics
3. Creeping faults and slow slip episodes - examples in CA and Italy
4. Repeating earthquakes, non-volcanic tremor and the spectrum of fault slip behaviors

Talks:

- 13:30 - 13:45 R. Azzaro: *Stick slip vs stable-sliding fault behavior: case-studies using a multidisciplinary approach in the volcanic region of Mt. Etna (Italy)* [15']
- 13:45 - 14:00 M. Supino: *Source and spectral characteristics of ordinary and low-frequency earthquakes inferred from the probabilistic analysis of 10-year large data sets* [15']
- 14:00 - 14:30 E. Spagnuolo: *Constitutive laws and earthquake dynamics for laboratory and natural faults* [30']
- 14:30 - 15:00 Z. Smith, R. Bürgmann, A. Griffith, J. Nevitt, F. Waligora, K. Wang, K. Materna: *Multiscale observations of fault damage zones: Insights from Ridgecrest, California* [30']

Posters:

- G. Calderoni: *Stress drop estimates for Italian earthquake sequences*
- F. Mosconi et al: *Modeling dynamic ruptures on extended faults for microearthquakes induced by fluid injection*
- E. Tinti et al.: *Fracture energy and breakdown work scaling with coseismic slip*
- E. Locchi et al.: *Studying the Viability of Kinematic Rupture Models and Source Time Functions with Dynamic Constraints*
- S. Aretusini et al.: *Fault reactivation by fluid injection: insights from laboratory friction experiments with multiple reactivation sequences*
- G. Pozzi et al.: *Friction, Mineralogy, and Microstructures: How Complex is the Brittle Deformation of Faults?*
- Y. Cheng, D. Dreger, R. M. Allen, *Estimating finite source properties of small earthquakes using P-wave spectra and focal mechanisms*

16:00 - 17:00 Coffee over Posters;

17:00 - 18:00 General Discussion (Chair: TBD)

Second Day (May 23, 2024)

9:00 - 11:45 Session 3: Fluid driven faulting (Coffee Break 10:00-10:15)
Conveners Luca Malagnini and Taka'aki Taira
Topics of interest:

1. Faulting sequences;
2. Geothermal energy extraction;
3. Carbon sequestration.

Talks:

- 9:00 - 9:30 Taira et al.: *Seismicity/attenuation/seismic velocity changes at Clear Lake volcanic field, Long-valley caldera, Lassen volcanic center, California* [30']
- 9:30 - 9:45 Lucia Zaccarelli, Almagro, Vidal, Mandler, Pintori, and Serpelloni. *Monitoring the fluid content in the shallow crust through seismic noise interferometry and geodesy* [15']
- 9:45 - 10:00 Pio Lucente, Pasquale De Gori, and Luca Malagnini: *Wet-quakes: the case study of the 2012 Emilia seismic sequence, Italy* [15']
- 10:00 - 10:30 Lauro Chiaraluce: *Detecting fluid signature in seismogenic processes* [30']

10:30 - 10:45 Coffee Break

- 10:45 - 11:15 Simona Gabrielli, Aybige Akinci, Luca De Siena, Edoardo Del Pezzo, Ferdinando Napolitano, Mauro Buttinelli, Francesco Maesano, and Roberta Maffucci: *The impact of tectonic structures on the 3D scattering imaging of the Central Italy Seismic Sequence* [30']

Posters:

- S. Tarantino, P. Poli, N. D'Agostino, M. Vassallo, G. Ventafridda, G. Festa, and A. Zollo: *Hydrologically-related strain reveals non-linear elasticity and promotes earthquake triggering along the Irpinia Fault (Italy)*
- Luca Malagnini, Robert Nadeau, and Tom Parsons: *Seismic attenuation and stress on the San Andreas Fault at Parkfield: are we critical yet?*
- Z. Smith, M. Hornbach, M. Manga: *Heat and Fluid Flow around Faults and Lava Domes in Mono Lake, California*
- Pio Lucente, Pasquale De Gori, and Luca Malagnini: *Wet-quakes: twenty years of "diffused" seismicity in Italy*

11:15 - 11:45 Discussion

11:45 - 12:15 Presentation of the Field Trip

12:15 - 13:30 Lunch

13:30 - 16:00 Session 4: Real-time earthquake monitoring and risk reduction
Conveners Alberto Michelini and Richard Allen
Topics of interest:

1. Monitoring temporal variations in crustal properties

2. Realtime earthquake hazard information and earthquake early warning- EEW
3. Connection between scientists and disaster risk managers

Talks:

- 13:30 - 13:50 Amato, A., F. Bernardi, L. Graziani, S. Lorito, L. Margheriti, A. Piatanesi, F. Romano, L. Scognamiglio and CAT Team: *The NEAM Tsunami Warning System and the INGV Italian Tsunami Alert Center [20']*
- 13:50 - 14:10 Carlo Giunchi and the SOME Team: *Seismologically Oriented Machine Learning - project results [20']*
- 14:10 - 14:30 Licia Faenza, Giovanna Forlenza, Giuseppe Salerno, Marco Olivieri, Alberto Michelini and the Aristotle team *ARISTOTLE: a multi-hazard scientific expert assessment service for the EC Emergency Response Coordination Centre [20']*
- 14:30 - 14:50 Yuancong Gou, Richard Allen, Weiqiang Zhu and Taka'aki Taria: *Application of submarine fiber optic cables for earthquake detection and warning [20']*
- 14:50 - 15:10 Savvas Marcou, Richard Allen: *A ground motion model for MyShake smartphone records and its potential seismic hazard applications [20']*
- 15:10 - 15:30 Richard Allen, Utpal Kumar, Angie Lux, Savvas Marcou, Amy Williamson: *Earthquake early warning and smartphone seismology: Successes, challenges and outlook*
- 15:30 - 15:50 Robert Nadeau: *Non-Volcanic Tremor at Parkfield: A Non-Stationary Process [20']*

Posters:

- Daniela Annunziata, Martina Savoia, Claudio Martino, Fabio Giampaolo, Vincenzo Convertito, Francesco Piccialli, and Gregory C. Beroza: *Machine Learning-based Approach for Discriminating Local and Off-Network*
- Simone Marzorati et al: *"Rete multiparametrica" and "DL50" : Feasibility, social impact, responsibility and implementation of EEWS*
- Anthony Lomax, Matteo Bagagli, Sonja Gaviano, Spina Cianetti, Dario Jozinović, Alberto Michelini, Christopher Zerafa, and Carlo Giunchi: *Effects on a Deep-Learning, Seismic Arrival-Time Picker of Domain-Knowledge Based Preprocessing of Input Seismograms*
- Andrea Bono, Valentino Lauciani and Matteo Quintiliani - *Caravel: A New Earthworm‐Based Open‐Source Development for the Italian Seismic Monitoring System*
- Lorenzo Cugliari, Giuseppe Ruzza, Alessandro Amato, Chiara Ladina, Simone Marzorati, Paola Pierleoni, *The social impact of earthquake early warning systems in Italy: some first results in high schools.*
- Savvas Marcou, Richard Allen, Angie Lux, Andrei Akimov: *Insights into potential earthquake early warning performance in Turkiye and California from replays of the February 2023 Kahramanmaras earthquakes*

16:00 - 16:15 Coffee Break

16:15 - 17:00 Final Discussion (Chair: TBD)

17:00 - 20:00 Bus Transfer to Norcia (Il Casale degli Amici - *www.ilcasaledegliamici.it*)

20:30 - Social Dinner

Third Day (May 24, 2024)

Field Trip: Foot-on the 2016 surface faulting

The 1-day field trip is planned to give the participants the opportunity to visit a few sites where the 2016 ruptures are still well visible and to get panoramic views of the whole area to stimulate discussion of different topics such as: 2016 surface faulting and earthquake source modeling, impact of pre-existing tectonic structures on the rupture complexity and segmentation, geomorphic long-term evidence of the seismogenic fault and paleoearthquakes.

8:30. Bus Transfer to Castelluccio di Norcia

9:15 - 10:45. Mt. Prata Antithetic Fault Surface Rupture (30th October 2016) and Sibillini fault system landscape. *1h TWT (Two Way Time) walking on a dirt road (3.2 km total); 50 m of difference in altitude.*

11:00 - 12:45. The Fonte San Lorenzo Antithetic Fault Surface Rupture (30th October 2016). *1h TWT walking on a flat grassy trail (3.5 km total).*

13:00 - 14:15. Lunch at restaurant "Da Mamma Ida".

14:30 - 16:00. Valle delle Fonti Surface Rupture (30th October 2016). *1h TWT walking on a dirt road and grassy trail (3.8 km total); 50 m of difference in altitude.*

16:00 - 16:15. Castelluccio Plain Surface Rupture (30th October 2016).

16:30 - 17:15. Mt. Vettoretto Surface Rupture (24th August and 30th October 2016) and Laga Fault System Lookout. *20' walking on a stony and grassy trail (0.5 km); 50 m of difference in altitude.*

17:30 - 20:30. Bus Transfer to Rome (INGV).

General advices

The trip takes the participants through a high plain (1270-1750 m a.s.l.), inset into a mountainous region (up to 2476 m a.s.l.).

Considering the season, pack the appropriate clothing, gear, and tools for the expected variable climatic conditions and physical fitness: it can be both cold and rainy or mild and sunny.

Since it is planned to cover short walking distances on rough routes, trail boots and raincoats are strongly recommended.

The schedule can be adjusted by organizers according to weather conditions.