

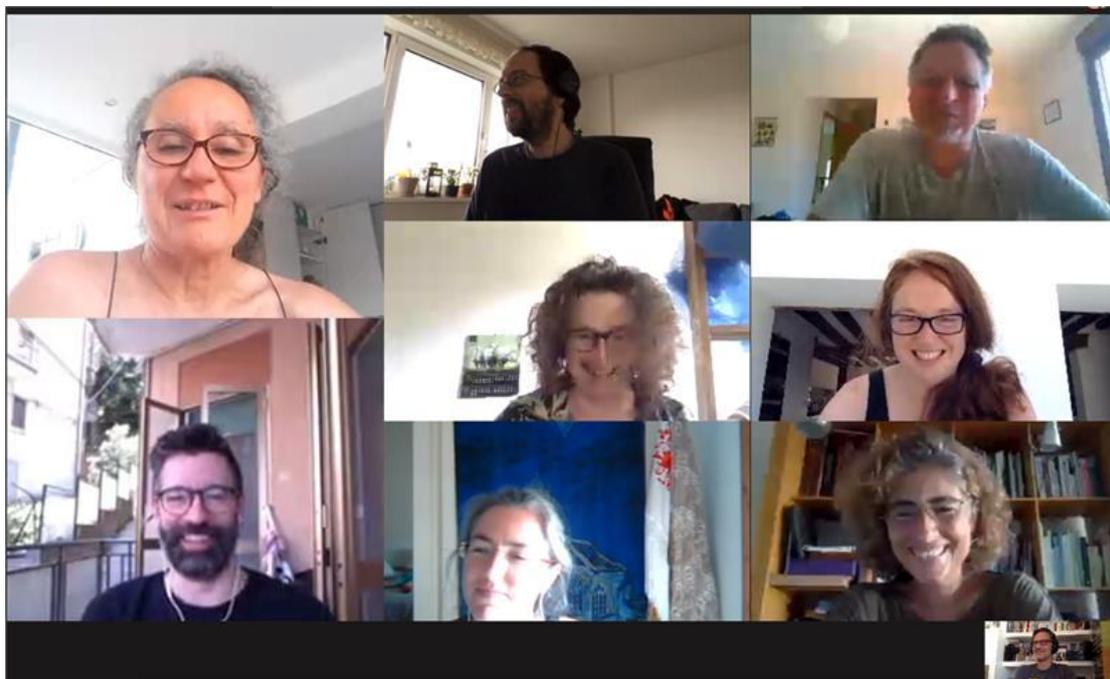


FAULT2SHA Working group - 4th Annual Report - 2019–2020

By Oona Scotti & Laura Peruzza

With contributions from:

Maria Ortuño, Joanna Faure Walker, Francesco Visini, Bruno Pace, Lucilla Benedetti, Julian Garcia-Mayordomo, Graeme Weatherill



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SCOPE & KEY ISSUES

The aim of the ESC FAULT2SHA working group is to motivate exchanges between field geologists, fault modellers and seismic hazard practitioners.

The Key Questions for the Working Group remain the ones declared at its approval by the European Seismological Commission, in 2016: they are listed in the home page of the FAULT2SHA website (<http://fault2sha.net/info/>).

Annual Reports are available online at: <http://fault2sha.net/what/>.

2019-2020 THE COMMUNITY GROWS

The fourth year of activity continued the process of enlargement of the community inside and outside Europe, the consolidation of natural test areas, and the search for funds to support the network.

SUBSCRIPTIONS AND GOVERNING BOARD

People are asked to join to Fault2SHA working group by a form, accessible since Jan 2018 on a fully renewed website (<http://fault2sha.net/join-fault2sha/>). As of June 8, 2020, about 131 members from 31 countries had signed; they regularly receive news and info about the on-going activities, via e-mail messages and social platforms (Twitter, Facebook) too.

The nine people that offered to act as governing board (Executive Committee, ExCom), and were elected with a ballot in 2017, continue their duties of leading some activities, always as voluntary, non-paid contributors. The FAULT2SHA ExCom is composed of the following members:

- Oona Scotti and Laura Peruzza (coordinators of the Working Group activities and responsible for reporting to the ESC)
- Bruno Pace



- Francesco Visini
- Lucilla Benedetti
- Julian Garcia-Mayordomo
- Maria Ortuño
- Graeme Weatherill
- Joanna Faure Walker

MEETINGS & WORKSHOP

The WG promotes the organization of sessions during well-known International Conferences. After the very appreciated 4th Workshop, held in Barcelona (E) in June 2019 (see fault2sha.net/4th-workshop/) some Fault2SHA members supported the organization of international meetings such as the 20th INQUA Congress in Dublin, and 8th ISAG in Ecuador,

The 2020 activity plan has been facing with the worldwide difficulties of the COVID-19 pandemia: all the scheduled meetings have been postponed, cancelled or modified. This year only one session was organized in Online mode, at the May 2020 EGU General Assembly. The session entitled '*Seismic hazard based on paleoseismicity, active faulting and surface deformation data – the challenges of FAULT2SHA*' was convened by Oona Scotti, Esther Hintersberger, Bruno Pace; about 30 contributions coming from all over the world were discussed through a chat and displays were made available online beforehand <https://meetingorganizer.copernicus.org/EGU2020/displays/34849>. About 110 people attended to this virtual conference, and the Q&A done in the chat have been uploaded to the EGU web-site (see for example <https://meetingorganizer.copernicus.org/EGU2020/EGU2020-19434.html>).

Concerning more restricted workshops/meetings, Oona Scotti participated to a CHEESE¹ Industrial Board meeting as a representative of the Fault2SHA WG. This was an opportunity to interact with physics-based research groups (led by Alice Gabriel, LMU) that are interested in the activities of the FAULT2SHA group. In addition, she presented the ongoing activities of the FAULT2SHA Central Apennines ESC WG at Ecole Normale Supérieure, Paris. The

¹ ChEESE (cheese-coe.eu) is a European infrastructure project coordinated by the Barcelona Supercomputing Center. The main objective of ChEESE is to establish a new Center of Excellence in the domain of Solid Earth targeting the preparation for the upcoming pre-Exascale (2020) and Exascale (2022) supercomputers.



ENS video is available here: <https://www.twitch.tv/geosciences/>.

FUNDING

As mentioned in previous reports, the ESC WGs are not financially supported, their activities and member participation are based on voluntary contributions, in terms of time or economic resources. The funds for organizing sessions and workshops derive from research resources of the promoters. From July 2019 on, no specific FAULT2SHA workshops have been organized. Nevertheless, as expanding the community, organizing meetings and workshops, and providing the group with a more long-term vision continue to be central actions for the FAULT2SHA ExCom members, they submitted the following actions/proposals,

The IGCP-UNESCO proposal led by one of the ExCom Spanish representatives (Maria Ortuño) submitted through the call Earth Science for Society in October 2019, has been accepted (May 2020). This action (namely, OLLIN-Fault2SHA in Latin America) will cover travel/conference expenses for young scientist within the group, to establish a strong interaction between the group and modellers/data providers from Europe and Latin America: although the action already started, the funds will be released in in 2021, due the delays caused by the COVID-19 emergency (see project description here: <http://www.unesco.org/new/en/natural-sciences/environment/earth-sciences/international-geoscience-programme/igcp-projects/geohazards/igcp-project-712/>)

The COST proposal re-submitted by the ExCom Italian representative (Laura Peruzza), in the call OC-2019 in September 2019, received in March 2020 an excellent evaluation, but it was not retained.

Similarly, the ITN proposal re-submitted by the ExCom French representative (Lucilla Benedetti) in the call H2020-MSCA-ITN received an excellent score but it was not retained.

FAULT2SHA TEST LABS

- CENTRAL ITALY LAB



The central Apennines Fault2SHA laboratory is composed of 8 researchers. It has been set up to provide a forum within the Fault2SHA ESC Working Group for collaboration between those with research relating to fault-based seismic hazard in the central Apennines region. In particular, the central Apennines Fault2SHA laboratory aims to resolve and understand discrepancies and make data accessible, bringing together fault data from different research groups.

The central Italian Apennines fault trace and slip measurements database is close to completion. Building an open-access database on active faults, in particular tracing in a database how to account for the debate regarding which faults are active has been a major challenge.

The central Apennines Fault2SHA laboratory devoted many online meetings to discuss data-collection and their representation for hazard calculations. The back and forth discussion between data providers and hazard modellers within the group has proven very effective for both sides although quite time-consuming because it involved changing the structure of the database and of the codes that attack the database. An endeavour well worth the effort because it allows (1) end users to know where the inputs for fault models are coming from and (2) comparisons between different modelling approaches at different stages of modelling because the outputs are based on the same inputs. In addition, the database offers the opportunity to identify priorities for reducing the uncertainties on poorly known or debated/doubtful faults and thus where future fieldwork may be focused.

Faure Walker et al. are planning to publish this summer a paper to accompany the database for publishing in an international peer-reviewed journal. A companion paper will also be published to illustrate the methodology that can be used to attack the database and construct fault models for hazard purposes.

Once the work on the current database is complete, the central Apennines lab will focus on (1) expanding the database to cover a larger geographical region; (2) expanding the database to include details on palaeoseismicity in the region; and (3) deciding the next piece of work to be undertaken by the lab, focusing on modeling using the available data.



It is the hope that our academic research will help to reduce both the human and economic losses from earthquakes in the future.

- BETICS LAB

The Betics Lab group was established in November 2017 and is composed of 20 people with research interests in the earthquake geology of the Eastern Betics Shear Zone (EBSZ) and the application of geological data in fault hazard modelling. A general meeting was planned for July 2020, in coincidence with the Spanish Geological Congress, but it was eventually cancelled due to the current COVID-19 pandemic. Some of the members are currently working on the update of the Quaternary Active Fault Database of Iberia (QAFI) to version 4. It is foreseen that during June we will know about the results of the last national call for research funds in which the project SOURCES was presented.

Fruit of the collaboration among different members of Fault2SHA, two papers have been produced and provide an application of the Fault2SHA tools to the Betics Lab. These are:

- Gómez-Novell, O., Chartier, T., García-Mayordomo, J., Ortuño, M., Masana, E., Insua-Arévalo, J.M., Scotti, O. (2020). Modelling earthquake rupture rates in fault systems for seismic hazard assessment: the Eastern Betics Shear Zone. *Engineering Geology*, 105452. doi: 10.1016/j.enggeo.2019.105452.

Gómez-Novell, O., García-Mayordomo, J. Ortuño, M., Masana, E., Chartier, T. (in prep). Fault interaction propagation into PSHA in a region of moderate seismicity: the EBSZ (SE Iberia). To be submitted to *Frontiers in Earth Science – Geohazards and Georisks*, Special issue: Source and Effects of Light to Moderate Magnitude Earthquakes

DISSEMINATIONS & ACTIVE STUDENTS

New functionalities were added to the Fault2SHA website, as the “Job Offers” page, where we post positions open that can be of interest for the Fault2SHA community, master, PhD and post-Doc positions, and the “Events” page where is possible to find the calendar with all the events. As a



reminder, all Fault2SHA members are invited to contact the web administrators (bruno.pace@unich.it, lperuzza@inogs.it) to suggest new entries to the Paper Gallery, periodically updated.

The fault2sha.net website in the last year has been visited about 6,500 times, with a mean of about 500 visits per month, by about 3,700 different visitors, from 75 different countries.

The editorial activities of 2019–2020 include the publication online of the Proceedings Book of the 4th Fault2SHA Workshop (fault2sha.net/wp-content/uploads/2019/09/PROCEEDINGS-Barcelona-2019-4th-Fault2SHA-Workshop-3.pdf).

The number of PhD students/grants working on the Fault2SHA topics is growing, namely:

- Fiia NURMINEN - “Probabilistic fault displacement hazard: improved methodology and applications” , Chieti University, Italy and Institut de radioprotection et Sûreté Nucléaire, France - Contract ends November 2021
- Octavi Gomez-Novel - “Implications of the integration of paleoseismic data into seismic hazard assessments at the Eastern Betic Cordillera, SE Spain” - Facultat de Ciències de la Terra, Universitat de Barcelona, Spain - Contract ends April 2021
- Thomas Chartier - “Modeling earthquake rates on faults for the probabilistic seismic risk assessment” , Ecole Normale Supérieure de Paris and Institut de radioprotection et Sûreté Nucléaire, France - PhD completed on 31st October 2019

ONGOING AND FUTURE ACTIVITIES

FUNDING/WORKSHOPS/MEETINGS/SESSION/WEBSITE

The activity of the WG will hopefully continue next year with the aim at improving further the network of interested researchers, the sharing of tools and information within and outside of the group. Efforts will be devoted to search for funds, by means of:

- Resubmittal of a COST proposal, now that a wide network of supporting



members is established: the deadline is October 2020, the main proposer remains the previous one (Laura Peruzza, OGS, Italy).

- Resubmittal of the ITN proposal, given the great motivation of all personnel involved: deadline is January 2021 with a main proposer that is under discussion.
- Organization of the 5th FAULTSHA workshop in 2021. According to the exits of the previous one, this workshop should focus on the results from the two established natural laboratories, e.g. Betics and Central Italy, and/or to the formalization of a new one. The location and the local organizers of this venue are still being discussed, and it will adapt to the needs/limitations given the current health crisis.
- The 37th General Assembly of the ESC that should have been held in Corfu, Greece from 6 to 11 September 2020 was cancelled. The WG is exploring the idea of proposing a dedicated Online session.
- The ExCom Italian representative (Francesco Visini) is organizing a Fault2SHA hands-on session in Pisa in Nov 2020, financed by the Italian Civil Protection and INGV.
- The OLLIN-Fault2SHA group is planning an online meeting in autumn for organizing the team in different working groups and scheduling a physical meeting next year in Bogotá (Colombia).