



Report year:
2019

Annual Report* of IGCP Project No. 569

A LIST OF PUBLICATIONS HAS TO BE ADDED AS AN ANNEX.

The scientific information in this report will further be used for publication on the IGCP website hosted at UNESCO (please feel free to attach any additional information you may consider relevant to the assessment of your project).

IGCP project short title: Seismic Hazard and Risk in Africa

Duration: 4 years

Please tick this box if the report is for a Project on extended term (OET):

Project leader(s):

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Project Secretary: None

Date of submission of report: 22/01/2020

Signature of project leader(s):

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Guidelines for Annual Report

1. Website address(es) related to the project

<http://igcp-seismoshaf.unistra.fr/>

<http://eost.u-strasbg.fr/igcp659/index.html>

2. Summary of major past achievements of the project

Previous tasks and achievements of the IGCP-659 project, the emphasis was put in programming of actions towards the regional seismotectonics and seismic hazard assessment in Africa. The 2018 annual meeting of the IGCP-659 Working Group was held in parallel with the conference on the East African Rift System (EARS, 8 – 10 October, Dar Es Salaam, Tanzania).

Responsibilities were assigned for each seismotectonic province in order to update the database in seismotectonics for the development of the deterministic and/or probabilistic models for intraplate and interplate domains. Each province planned the preparation of specific local projects for the inventory of earthquake faulting, and earthquake recurrence time, and develop geodynamic analysis (using geodetic data) with slip rates along with the selection of test sites for the hazard and risk assessment.

3. Achievements of the project this year only

3.1. General scientific achievements

The IGCP-659 Working Group launched several local and regional studies in order to improve the seismotectonic database, improve existing seismic hazard models and initiate a proper evaluation of the building stock and seismic risk evaluation. Scientific achievements are:

1. The IGCP Project “SEISMOSHAF” included the development of a pilot project in Seismic Early Warning System in Africa in cooperation with the NRIAG Cairo (Egypt), EOST Strasbourg (France), and the University of Naples (Italy). Field experiment associated with the pilot project is in preparation on the Aswan Dam and Nasser Lake site in Egypt.
2. The Council for Geoscience (CGS Pretoria) and EOST Strasbourg programmed field investigations from 27 September to 6 October 2019, in active faulting and seismotectonics 1) at the site of the 1969 Ceres earthquake (M 6.3), and 2) in the Kwazulu Natal Province and site of the 1932 Saint Lucie earthquake. The field investigations included researchers from both institutions and a PhD student from Nelson Mandela University.
3. Field investigations on active faults were also conducted at the site of the 2017 Khurutse – Botswana earthquake in June 2019 and a seismotectonic analysis is in development as a cooperation between with the Botswana Geological Institute, EOST Strasbourg, Addis Ababa University and the CGS Pretoria.
4. Field investigations for active faults in Algeria with results have been conducted as a cooperation between EOST Strasbourg and the University of Algiers. This research programme includes a PhD student.
5. A seismic risk programme with evaluation of building stock is prepared for the Accra region in Ghana.
6. A seismic hazard and zonation model is in development as a cooperation between the CGS Pretoria, EOST Strasbourg, NRIAG in Helwan-Cairo, the CRAAG Algiers and the Khartoum University in Sudan.
7. The database for the seismic hazard assessment is enriched with new results on the GPS analysis and the study of major earthquake faults in Tunisia. This research programme includes a PhD student.

8. A probabilistic model of seismic hazard assessment and risk reduction has now been launched for main cities along the Cameroon Volcanic Line as a cooperation between EOST Strasbourg and Buea University

3.2. List of IGCP project meetings/symposia:

The IGCP-659 annual meeting was organized in cooperation with the 2nd Conference of Arab Geoscience Journal in Sousse – Tunisia (25 – 29 November, 2020). The Working Group was involved in organizing the specific session for the IGCP-659 project and a general session on Earthquake Seismology and Geodesy. 21 participants from 14 countries all involved in the IGCP-659 Working Group attended the scientific sessions

The IGCP-659 Annual Meeting programme is attached.

Participation to the South African Geophysical Association meeting (Durban, 6 – 9 October 2019). The meeting was attended by 5 participants from the IGCP-659 project from 3 countries.

The SAGA meeting programme is attached.

3.3. Educational, training or capacity building activities related to the IGCP project and IGCP project participants.

A one-day Training Course with 5 modules was organized before the IGCP-659 Annual Meeting. 41 student and young researchers attended the course.

The training course programme is attached.

3.4. List of countries involved in the project:

Ethiopia, South Africa, Kenya, Cameroun, Sudan, Morocco, Tunisia, Algeria, DR Congo, Botswana, Belgium, France, Egypt, Ghana (all active in 2009).

Tanzania, Malawi, Uganda, Namibia, Zimbabwe, Ivory Coast, Senegal, Erythrea, Mozambique, Madagascar, Libya, Niger, Nigeria (in constant contact).

3.5. Active project participation

	<i>Total number of scientists</i>	<i>Number of male scientists</i>	<i>Number of female scientists</i>
<i>Number of participating scientists</i>	21	15	6
<i>Number of young scientists/students (<35 years old)</i>	7	4	3
<i>Number of scientists from developing countries</i>	19	14	5

21 participants associated with the IGCP-659 project participated to the annual meeting and among them some in other meetings and field works. The majority of scientists (21) are from African developing countries, 1 from France and 1 from Belgium. The 6 female scientists are senior scientists (3) and students (3). Most of participants are between 35 and 45 year-old; 7 participants are less than 35 year-old. NB: Not all working group members are participants to IGCP-659 meetings.

3.6. List of the publications (including maps) of this year, b) related to this project

Meghraoui, M., P. Amponsah, P. Bernard and B. Ateba, 2019, Active Transform Faults in the Gulf of Guinea: Insights from geophysical data and implications for the seismic hazard, *Canadian Journal of Earth Sciences* 56: 1398–1408 (2019) dx.doi.org/10.1139/cjes-2018-0321.

Midzi, V., B. Manzunzu, T. Mulabisana, B.S. Zulu, T. Pule, S. Myendeki, 2020. Probabilistic seismic hazard maps for South Africa, *Journal of African Earth Sciences*, in press

Following the 2019 annual meeting, a proceeding of published short papers is in preparation in a SPRINGER Nature publication (see also the list of presentations in the attached annual programme).

c) did you publish in Episodes during the project's duration or plan to do so?

A publication as a synthesis of main results of the project is in preparation for Episodes

3.7. Activities involving other IGCP projects, UNESCO programmes, IUGS Commissions or Task Groups or others

Discussions on possible cooperation for common meeting organisation are ongoing with projects in Africa and other regions (e.g., IGCP-616, IGCP 636Y, IGCP 692), and with international institutions (African Seismological Commission, Int. Association of Seismology and Physics Earth Interior, Int. Union Geodesy and Geophysics).

3.8. Scientific Legacy:

Currently, the IGCP-659 project is storing the database, results, reports and publications of the seismotectonics and seismic hazard and risk assessment using GIS interface at the Council for Geoscience of Pretoria (South Africa). The IGCP-659 WG will make sure that the data and information used to prepare the papers / articles / reports are available to interested scientists in Africa and beyond. The WG is working together with the African Seismological Commission to set up a virtual data centre, which will allow all stored data to be accessible.

3.9. What tangible improvements has your project obtained?

The cooperation between different African Universities and research centres is now in action in the frame of the IGCP-659 project. See the section 3. 1 - *General scientific achievements*

Most of the IGCP-659 Working Group members are contributing to the preparation of its 3rd General Assembly of the African Seismological Commission in Kasane Botswana (28 June – 4 July 2020).

3.10. What kinds of activities in respect to the benefit of society and science outreach has your project undertaken?

A group led by Dr M. El Gabry (NRIAG, Helwan-Cairo) is preparing a virtual African Seismological Data Centre with scientific and technical information, also accessible to a large public. This initiative was presented at the International Union of Geodesy and Geophysics (IUGG Session S08a titled National and Regional Earthquake Centres, Montreal, July 2019).

3.11. What kind of public information (media reports, etc.) has your project generated? And how do you evaluate their impact?

Along with the program of the African Seismological Commission, initiatives are taken in African countries in order to publicize the IGCP-659 project and results linked to the mitigation of seismic risk.

3.12. Project highlight:

The 2019 annual meeting proceedings (see the attached program) and the IGCP-659 special volume in preparation may be highlighted as the second year product of the project.

4. Activities planned

4.1. General goals

The development of regional models using the seismotectonic database is among fixed objectives for the deterministic seismic hazard assessment (DSHA) and probabilistic seismic

hazard assessment (PSHA). Four regions namely South Africa, North Africa, Ethiopia and East African Rift domain, and Central-West Africa (from Cameroon to Ghana) are progressing in implementing their seismic hazard assessment and risk reduction. A specific effort is made in order to provide plans for risk mitigation for capital cities in Africa.

4.2. Tentative list of specific meetings and field trips (please list the participating countries)

The IGCP-659 Working Group is preparing its annual meeting along with the third AfSC General Assembly that will be hosted in Kasane (northern Botswana) from 28th June - 04th July 2020 (now from 6 to 10 Sept. 2021 due to Covid-19 pandemic). A field visit to the site of the 3rd April 2017 earthquake (Mw 6.8) is programmed.

Participating countries: See list in section 3.4.

5. Project funding requested

The IGCP-569 Working Group would like to dedicate funding to: 1) The participation of young researchers and students to the annual meeting in Botswana (estimated to 4000 \$US), 2) proceed with realisation of the virtual African Seismological Data Centre (estimated to 3000 \$US), and 3) Field and laboratory studies for the seismic hazard assessment and risk reduction for capital cities in Africa (estimated to 3000 \$US). Total: 10 000 \$US

6. Request for extension (non applicable)

7. Financial statement (\$ USD only)

The funds have been primarily used for networking and capacity building. The financial support was dedicated to the participation of the IGCP-659 Working Group to the Annual Meeting in Sousse (Tunisia). A total of 8 participants, including a PhD student benefited from the allocated 5000 \$US in 2019. See Form III Financial Statement.

8. Response to the recommendation of previous IGCP Council

1) A webpage of the project is now active, 2) The training course program is now presented with details of content, 3) Results of the project second year are beginning to appear as publications published (see attached documents and publication list), and 4) The working group is working together with the African Seismological Commission to set up a new GIS interface for the database at the Council for Geoscience of Pretoria (South Africa) and a virtual data center, which will allow all stored data to be accessible to interested scientists.

9. What additional funding besides the IGCP seed funding has your project obtained thanks to the IGCP label?

Additional support in 2019 was obtained from the UNESCO-Paris (~5000 \$US), NAGET-ICTP (~2500 \$US), the 2nd CAJG and Springer Nature editor (~6500 \$US), and EOST-Strasbourg (~2000 \$US)

10. Did all project leaders and participants inform their respective IGCP/IUGS National Committees?

All project participants were informed to contact their respective IGCP/IUGS National Committees, and members of the IGCP/IUGS National Committee in Tunisia attended the IGCP-659 session in Sousse.

Attachments (check the box if document is attached or included):

Financial statement

Meeting report(s)

Publication list

Other



The IGCP-659 Annual Meeting programme is attached.

Training course programme is attached.

The meeting programme of the South African Geophysical Association is attached.