The scientific information in this report will further be used for publication on the IGCP website under the new electronic version of 'Geological Correlation' (please feel free to attach any additional information you may consider relevant to the assessment of your project).

**IGCP project short title: The Changing Early Earth**

**Duration:** 1.1.2011-31.12.2014

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Jaana Halla
IGCP-SIDA Project 599 “The Changing Early Earth”

ANNUAL REPORT 2012

1. Website address related to the project

https://sites.google.com/a/early-earth.org/early-earth/

2. Summary of major past achievements of the project (2011)

1. Actions were made to help scientists from developing countries to get access to high-quality laboratories in industrialized countries. For example, a joint Nordic-Indian proposal (“SIMS U–Pb zircon geochronology of Archean granitoids from the Bundelkhand and Dharwar cratons of the Indian Shield”) to perform high precision U-Pb zircon analyzes at the NordSIM laboratory in Stockholm (Sweden) in 2012 was accepted.

2. Preparations of the EU FP7 Marie Curie Initial Training Network proposal were started by the University of Portsmouth. In addition, several applications to different national funders have been submitted by the project participants.

3. Two special issues coordinating scientific achievements of the project were in progress: I Precambrian accretionary orogens and continental growth (manuscript submission closed), Precambrian research, guest editor M. Jayananda. II Ore Deposits and the Role of the Lithospheric Mantle, Lithos, guest editors S. Mondal et al.

4. IGCP-SIDA 599 Launching Meeting and Field Workshop was held in Mekrijärvi, eastern Finland 26–30 September 2011. 24 participants from 11 countries (Australia, Brazil, Finland, France, Germany, India, Russia, Spain, Sweden, Tanzania, UK).

3. Achievements of the project this year only

3.1. List of countries involved in the (*active this year)

The project has participants from 29 countries, of which 11 are less-developed and six belong to African countries. All the continents are represented.


3.2. General scientific achievements and social benefits

After its initiation two years ago, the IGCP-SIDA 599 project has produced 68 peer-reviewed publications on several topics on Early Earth in high impact factor journals. 46 of the papers (68%) have been accepted this year, so the year 2012 has been scientifically very active.
The regional research has concentrated on both Mesoarchean and Neoarchean granitoids (TTGs, sanukitoids and crust-derived granitoids) as well as greenstone/supracrustal belts, sedimentary sequences and ore deposits in many cratons around the world: Kaapvaal craton, South Africa; Tanzania craton, Tanzania; Carajás and Borborema provinces and São Francisco craton in Brazil; Dharwar craton, India; Bundelkhand Craton, Central India; Karelia and Kola cratons in Finland and Russia; North Atlantic Craton in Scotland and Greenland; Superior craton in North America. More recent granitoid equivalents (Caledonian high Ba-Sr granitoids, Scotland; Himalayan magmatism, India) have also been studied for comparison. Eclogites representing subducted Archean oceanic crust are reported from the Kola Peninsula. Also articles with a global approach on the rates and tectonic setting of the continental growth from the Hadean to the Archean have been published.

The main aim of the research carried out within the IGCP-SIDA 599 project is to establish the existence and style of Archean plate tectonics and the mechanisms of continental growth by combining results of regional craton analyses with global geochemical and geodynamic modelling.

PhD theses

Two extensive PhD theses under the themes relevant to the project have been defended during the year. 1) Kristoffer Szilas defended his thesis “Geochemistry of Archaean supracrustal belts in SW Greenland” on 7th June at the University of Copenhagen. The subject of the thesis is a detailed geochemical, isotopic, and geochronological investigation of a Mesoarchean series of mafic and ultramafic volcanic and plutonic rocks. 2) Oscar Laurent defended his thesis “The geodynamic changes in the Archean–Proterozoic transition: a study of granitoids in the northern margin of the Kaapvaal Craton (South Africa)” on 9th December at the University of Blaise Pascal in Clermont-Ferrand. The comprehensive thesis provides information on the geodynamic changes especially at the Archean–Proterozoic transition by shedding light on classification and petrogenesis of late Archean granitoids as well as their spatial and temporal evolution and significance for the late Archean geodynamic changes.

Submitted and planned EU proposals

A proposal for Marie Curie Initial Training Networks (ITN) (Call: FPT-PEOPLE-2013-ITN) was submitted on 22nd November by University of Portsmouth, UK, with several institutes in Europe (UK, France, Germany, Sweden, Finland) and the University of Stellenbosch, South Africa. The proposal for The European Network for the Study of Subduction Evolution (TENSSE) is to be evaluated as Multi-Partner ITN. As a contribution of the private sector, a working gold mine (Endomines) within the Archean eastern Karelian greenstone belt in Finland is involved as a full partner.

Preparations of an EU FP7 International Research Staff Exchange Scheme (IRSES) - Marie Curie Actions - proposal have been started by the Finnish Museum of Natural History.

Special issues

Two special issues coordinating scientific achievements of the project are in progress: I Precambrian accretionary orogens and continental growth (manuscript submission closed), Precambrian research, guest editor M. Jayananda. II Ore Deposits and the Role of the Lithospheric Mantle, Lithos, guest editors S. Mondal et al.
Laboratory work

Actions have been made to help scientists from developing countries to get access to high-quality laboratories in industrialized countries. For example, a joint Nordic-Indian proposal ("SIMS U–Pb zircon geochronology of Archean granitoids from the Bundelkhand and Dharwar cratons of the Indian Shield") to perform high precision U–Pb zircon analyzes at the NordSIM laboratory in Stockholm (Sweden) in 2012 has been accepted in 2012. The work will be carried out 21–28 January 2013 and presented at the Bundelkhand field conference in March. The next year’s plan is to help researchers from African countries (Botswana and Tanzania) to get analytical time at the Nordsim-laboratory.

African participation

To help in coordinating the activities in African countries, we have invited John D. Kalimenze from the Geological Survey of Tanzania to be one of the secretaries. We are also continuously looking for more leader/secretary candidates and participants from African countries. During the year 2012, we have succeeded to find new participants from Botswana, Kenya, Malawi, Ethiopia, and Cameroon.

3.3. List of meetings with approximate attendance and number of countries

Meetings related to the IGCP-SIDA 599 project (directly* and indirectly)


https://sites.google.com/site/ptsymposium/
3.4. Educational, training or capacity building activities

The IGCP-SIDA 599 group is planning a systematic educational, training, and capacity building network. Several individual research training courses have been held in different countries. A proposal for EU Marie Curie Initial Training Networks (ITN) has been submitted, and preparations of an EU FP7 International Research Staff Exchange Scheme (IRSES) - Marie Curie Actions -proposal have been started.

3.5. Participation of scientists from developing countries, and in particular young and women scientists

The total number of registered participants is 170; approximately 50 % of participants come from developing countries. 10 % of the participants are females (see 3.1. list of countries)

3.6. List of most important publications

During the second year (2012), 46 new peer-reviewed papers of IGCP-SIDA 599 participants were accepted in several high impact factor journals. The list of publications is found in Appendix 1.

3.7. Activities involving other IGCP projects, UNESCO, IUGS or others. N/A

4. Activities planned

4.1. General goals

1. To increase a) the number of participants from African and other developing countries and b) the proportion of young and women scientists.
2. To give research training for young scientists, especially from developing countries, in the connection of the IGCP activities.
3. To strengthen the cooperation between countries and disciplines.
4. To increase the number of joint proposals and activities cutting across different Early Earth themes.
5. To increase understanding of the cause-and-effect relationships of changes in the early Earth mantle conditions, crust-forming processes, atmosphere and hydrosphere compositions, and in the biosphere; and to better understand the early evolution of life and its environment.

4.2. Tentative list of specific meetings and field trips

1. 2013 March 7–14. IGCP-SIDA 599 meeting and field conference “Archean Crust Formation” in the Bundelkhand Craton, Central India. The conference is targeted for young researchers, especially from Botswana, Tanzania, and India. In addition to scientific sessions and field trips, short courses on field work techniques, magma petrology, isotope geology and scientific writing will be arranged. An expected result of the meeting is a Special Publication of the Geological Society of London consisting of 15-25 papers (discussed with Angharad Hills, Commissioning Editor, at the IGC34). 24 participants from 9 countries.

https://sites.google.com/a/early-earth.org/bundelkhand2013/


5. **2013** September. Field trip and Workshop in South Africa. The 7–9 days field trip examines the Archean Kaapvaal craton (South Africa), starting in the ancient core (Swaziland, Barberton) and proceeding northwards across progressively younger terrains to the Limpopo belt. This is a general geology field trip with special focus on “deep” processes (igneous, metamorphic, and tectonic). A two-day’s workshop is planned to be held in Johannesburg before the trip. Organizer: Jean-Francois Moyen.

5. **Project funding requested**

We request maximum project funding 12,000 for 2013 to ensure participation from African countries Tanzania, Botswana, and Kenya. During the year 2013, 78% of the granted UNESCO-SIDA funding will be used to support African participants. In 2014, 100% of the funding will go to African researchers.

6. **Request for extension, on-extended-term-status, or intention to propose successor project**

N/A

7. **Financial statement ($ USD only)**

The IUGS/UNESCO/SIDA funds allocated to IGCP-SIDA 599 (11 000 USD) were used to cover the costs of 5 participants from South Africa and India for the IGCP-SIDA 599 activities (Form III) and minor (3%) administrative expenses. The total cost was 10 993.82 USD.

Most of the meeting costs were covered by other sponsors according to the list of participants (Appendix 1 of Form III)

8. **Attach any information you may consider relevant**

Appendix 1. List of publications 2012