



Solid Earth Response and influence on Cryospheric Evolution (SERCE) Implementation Plan



1. Introduction ~ 1 page.

The *Solid Earth Response and influence on Cryospheric Evolution* (SERCE) scientific research program aims to *advance understanding of the interactions between the solid earth and the cryosphere to better constrain ice mass balance, ice dynamics and sea level change in a warming world.* This overarching objective is being addressed through integrated analysis and incorporation of geological, geodetic and geophysical measurements into models of glacial isostatic adjustment (GIA) and ice sheet dynamics.

The program is designed to synthesize and integrate the extensive new geological and geophysical data sets obtained during and subsequent to the International Polar Year with modeling studies, in a timeframe to contribute to IPCC AR6. SERCE aims to provide the international collaborative framework and scientific leadership to investigate systems-scale solid earth – ice sheet interactions across Antarctica and relate these results to global earth system and geodynamic processes.

Indicative areas of interest to SERCE include GIA modelling (including validation of models), geodetic observation of bedrock deformation, models of elastic deformation, geothermal heat flux, influence of GIA on ice sheet dynamics, seismological inferences of Earth's crust and mantle, and bedrock erosion by the ice sheet, etc. This list should not be seen as definitive and focus on other in scope research topics is welcome.

2. Deliverables, Timeline and Milestones ~ 3-5 pages.

List and explain main deliverables of the programme, including:

- I. Primary publications in peer-reviewed journals
The primary source of publications will be through SERCE facilitation of interaction of researchers. This interaction will occur primarily through coordination of workshops and training schools. Our workshops will be targeted to bring together different communities, and where possible support will be provided to Earth Career Researchers. We do not envisage coordinating large volumes of publications in our own right, although a limited number of targeted papers that provide timely consolidation or review will be discussed. Researchers are encouraged to acknowledge when their work contributes to the aims of SERCE.
- II. Major reports, including linkages to major SCAR activities (e.g. advice to the Treaty or IPCC)
We expect our work to feature within IPCC AR6.
- III. Other reports and grey literature
None planned
- IV. Workshops and other key meetings
The table below outlines our planned activities, with activities later in the program to be scheduled based on discussions within the Steering Committee and with the wider community. We aim to leverage support from other sources through co-sponsorship of activities.

YEAR	WORKSHOP/SYMPOSIA	THEME SESSION	TRAINING	OUTREACH
2012	Earth Structure/Modeling (SCAR OSC)	Earth–Cryo Interactions SCAR OSC AGU		Logo Web site plan
2013	Reconciling Observations and Models of Elastic and Viscoelastic Deformation due to Ice Mass Change (w/ IAG, Ilulissat, Greenland)			Complete Web site
2014		Earth–Cryo Interactions SCAR OSC	GIA Training School <i>Postponed to 2015</i>	Complete Web site
2015	Ice load changes and Earth deformation (Fairbanks, Alaska) with IAG Sub-commission 3.4 (support from TU Denmark, EGU and UAF) Data archiving & exchange – ISAES	Earth–Cryo Interactions EGU IUGG ISAES	<ul style="list-style-type: none"> GIA Training School Autonomous Systems-ISAES 	Training Videos on web Complete Web site
2016	The Antarctic ice sheet from past 2 future (w/ AntClim ²¹ , ISMASS & PAIS at SCAR OSC)	Earth–Cryo. Interactions SCAR OSC AGU	Cryoseismology Training School <i>Postponed to 2017</i>	Complete Web site
2017	Separation of elastic and viscoelastic GIA signals (w/ IAG, Reykjavik, Iceland)	EGU thematic session AGU - JpGU joint session “Cryoseismology - a new proxy for detecting surface environmental variations of the Earth”, Chiba, Japan, May 2017 IAG-IAPSEI thematic session July-Aug 2017, Kobe, Japan	Cryoseismology Training School (Fort Collins, USA)	
2018	Antarctic Heat Flow (Hobart, Australia – date TBC) GIA-ice sheet feedback workshop, including lateral earth structure (w/ WCRP; Ottawa, Canada, TBC)	Earth–Cryo. Interactions SCAR OSC AGU	GIA Training School TBC Polar geodesy school TBC	Preliminary metadata catalogue uploaded to Website GPS velocity dataset to website
2019	TBC	TBC	TBC	TBC
2020	TBC	TBC	TBC	TBC

denotes completed. denotes delayed.

V. Capacity building and education activities

We plan substantial capacity building through a series of training schools aimed particularly at early career researchers. These schools will focus on GIA modelling and application of seismology within an ice sheet context, with other schools considered in the final years of the program depending on interest and need. The majority of funds will support travel for these early career researchers to workshops and training schools.

VI. New data and/or meta-data (including plans for archiving)

We are not a data acquiring program. However, we will work to bridge a major gap in that metadata associated with geodetic observations in particular is fragmented. Such data are not always publicly available and we will coordinate with the SCAR GIANT Expert Group to establish a database of metadata and work with station operators to encourage them to make their data available in public archives. We will encourage GPS data archiving within the SCAR GNSS database or through other international public archives. We will include archiving arrangements within our metadata on the SERCE website. On the basis of this, we will work with GIANT to establish a comprehensive set of site velocities.

We plan to establish a data sub-committee within SERCE, whose aim will be to populate the 'Data' page on the SERCE website with metadata relating to not only GNSS data, but also seismic data, heat flux data, geological data and GIA/ice sheet model output. We will coordinate with Quantarctica dataset custodians to include SERCE relevant datasets, providing them with an appropriate dataset editor or editors.

VII. Brochures, and other PR material

None planned

VIII. Linkages to other international programmes and activities

We will maintain close linkages with

International Lithosphere Program, DynaQlim
SCAR GIANT Expert Group
SCAR ISMASS and PAIS
SCAR GeoMap
IAG Sub-commission 3.4 "Cryospheric Deformation"
CLiC
APECS
Quantarctica
PALSEA2

Include a Timeline of what will be done, by when and by whom.

See table above. All activities will be coordinated by the Steering Committee with overall responsibility taken by the Co-chairs.

Include Milestones that lead to specific deliverables when appropriate.

3. Appendices and References

N/A