

# International Union of Geological Sciences

REPORTING FORM FOR CONSTITUENT BODIES

**2008**

1. TITLE OF CONSTITUENT BODY:  
***Geological Applications of Remote Sensing Programme (GARS)***  
***Reporter: Professor Stuart Marsh, GARS Chairman, British Geological Survey***

2. OVERALL OBJECTIVES (mission statement and goals):

1) To demonstrate the uses of advanced remote sensing techniques in solving key geological questions, from primary through applied research and as a basis for operational systems, and so achieve the integration of remote sensing techniques into normal workflows in the geosciences

2) To build capacity by ensuring transfer of information and technology through co-operative research, in combination with educational programmes, especially in developing countries

3) To support this through dissemination of results at appropriate scientific congresses

3. FIT WITHIN IUGS SCIENCE POLICY (relate goals to IUGS scientific objectives):

The GARS Programme contributes to advancement of geological research and developing understanding of the earth system, in order to address problems of relevance to the welfare of the earth's population. Since 2005, there has been a dual focus on geohazards and groundwater issues. Building on previous GARS studies into landslide hazards in Latin America and volcanic hazards in Asia, GARS has been an important sponsor for development and implementation of the Integrated Global Observing Strategy (IGOS) for Geohazards. This international strategy was approved by the IGOS Partners in 2003, published by the European Space Agency (ESA) in 2004 and revised in 2007. GARS runs a Secretariat that manages the Theme's steering committee, helps fund scientists' participation in Theme implementation and contributes to the Group on Earth Observation's (GEO) Disasters Societal Benefit Area through participation in GEO tasks. A second action on Earth Observation and groundwater in Africa was pursued via workshops in March 2006 (Paris) and October 2007 (Utrecht).

The GARS Programme thus continues to focus on 3 key strategic issues identified by IUGS:

- Reducing vulnerability of communities at risk to natural hazard (GEO/IGOS Geohazard Theme)
- Managing resources in a sustainable and environmentally sound way (Groundwater Initiative)
- Contributing to understanding of global environmental change (Both programme elements)

Strategically, the GARS Programme has continued to enhance the visibility of earth science amongst the space agencies, inter-governmental UN organisations and world research programmes that sponsored IGOS and now GEO. This now includes the main in-situ elements of a future Dynamic Earth Observing System: International Association of Geodesy's Global Geodetic Observing System (GGOS); Federation of Digital Seismic Networks; World Organisation of Volcano Observatories; and International Landslide Consortium. All are active GARS-IGOS Geohazards Joint Committee members. GEO's Secretariat works closely with GARS; their Disasters expert attended all Joint Committee meetings.

4. ORGANIZATION (broad description):

The GARS Programme is sponsored jointly by IUGS and the UNESCO Ecology and Earth Sciences Division. Core programme membership includes 40 institutes and individuals from 28 countries, mostly from the developing world. The GARS Programme Chairman in 2008 was Professor Stuart Marsh of the British Geological Survey. The Programme Secretary, Mr Robert Missotten of UNESCO Earth Sciences Division, chairs the GARS-IGOS Geohazard Joint Committee, which met in May (formally) and August/September (informally at IGC/CEOS) 2008 to steer the GARS programme and IGOS Theme.

The Joint Committee includes representatives of GARS, UNESCO, IUGS, ICSU, the British, French and US Geological Surveys, the European, Japanese and US Space Agencies, the GEO Secretariat and the in-situ observing systems or international networks for geodesy, seismology, volcanoes and landslides. Its formal 2008 meeting was held in association with the IGOS Partnership's May Plenary in Paris; informal meetings of UNESCO and the geological surveys were held during the International Geological Congress in August 2008 and of the space agencies during CEOS meetings held in September 2008.

5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS:

- UNESCO is the main sponsor alongside IUGS, providing seed corn funding for participants from developing countries. During 2008, its contract with BGS to support the GARS Secretariat was not renewed while the BGS staff member concerned was away on her maternity leave; the GARS-IGOS Geohazard Joint Committee was supported by the IGOS Geohazards Executive Bureau in the French Geological Survey. A third UNESCO budget line that has supported the Groundwater programme element was not available during 2008 but should be again in 2009.
- The British Geological Survey contributes staff time and travel funds for the GARS Chairman. BGS' contribution means that IUGS funding is mainly reserved for other GARS activity.
- The European Space Agency and the French Geological Survey BRGM jointly supported the establishment of and continued to fund the IGOS Geohazards Executive Bureau in 2008. This office at the BRGM is staffed on a full time basis to support implementation of the strategy.
- The GEO Secretariat supported IGOS Geohazards contributions to GEO's Work Plan 2009-11.
- Member institutes and GARS-IGOS Geohazard Joint Committee members dedicate staff, travel and project funds to GARS work, greatly extending the impact of the above contributions.

6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS IN 2008:

- IGOS, the Integrated Global Observing Strategy Partnership (over the IGOS Geohazard Theme) and the other IGOS Themes including Coastal, Oceans, Water Cycle and Land. The GARS Chairman chaired the IGOS Theme Leaders Group across all IGOS Themes in 2008 and oversaw successful completion by May 2008 of the transitioning all 8 IGOS Themes into GEO.
- GEO/GEOSS: GARS and the IGOS Geohazards Theme continued to contribute to several Tasks under the Disasters Societal Benefit Area. The GARS Chairman attended the GEO Science and Technology Committee in February, May and September 2008. He also represented the IGOS Geohazards Theme and OneGeology during an EC Projects GEO Workshop in September 2008.
- Space Agencies: NASA, ESA and JAXA all continued their strong support for IGOS Geohazards, with ESA continuing to fund its Executive Bureau in 2008 and all three contributing to the further development of the IGOS Geohazards SuperSites natural hazard laboratories initiative, arising from the successful International Geohazards Week held at ESA in November 2007.
- IUGS and ICSU: both have open invitations to attend Joint Committee Meetings. GARS was a co-sponsor of symposia at IUGS' International Geological Congress 2008 held in Oslo in 2008.
- Global Geodetic Observing System: GGOS joined the IGOS partnership at its May 2006 Plenary in Geneva. As an IGOS Partner, GGOS was an active supporter of the IGOS Geohazard Theme during 2008 and also helped the GARS Chairman develop a transition plan for all of the IGOS Themes into GEO and helped to represent the theme in GEO, at the User Interface Committee.
- International Consortium on Landslides: ICL is represented on the Joint Committee.

- Federation of Digital Seismic Networks: FDSN is represented on the Joint Committee.
- International Association of Volcanology and Chemistry of Earth's Interior: IAVCEI's World Organisation of Volcano Observatories is represented on the Joint Committee.

7. CHIEF ACCOMPLISHMENTS IN 2008:

From the IGOS Geohazard Theme perspective, the GARS Chairman contributed to the successful completion of the Integrated Global Observing Strategy Partnership. He was jointly responsible with the GEO Secretariat for the transition of all 8 IGOS Themes, including the Geohazard Theme, into GEO. Once this had been accomplished to the IGOS Partnership's and GEO's satisfaction, in May 2008 the IGOS Partners dissolved the Partnership. A celebration of the Partnership's achievements is being organised in the form of an International Symposium and the GARS Chairman scoped this with the GEO Secretariat and sits on the organising committee that has now been formed under the Chairmanship of Greg Withee, from the US National Oceanographic and Atmospheric Administration.

The IGOS Geohazards Theme's SuperSites initiative on natural hazards laboratories was successfully conceived as a GEO Task in the 2009-11 GEO Work Plan and this was adopted by the GEO Plenary in Budapest in November 2008. This Task forms the core of future IGOS Geohazards Theme activity within GEO and has the potential to attract considerable funding from the space and other agencies.

The GARS Chairman gave a well-attended invited keynote presentation on GARS and IGOS Geohazards during the Hazards MegaSymposium at the International Geological Congress in Oslo in August 2008. The GARS Programme contributed to the organisation of a two day session on geological remote sensing, also at the International Geological Congress. The first day was poorly attended but this position improved considerably on the second day and there is interest in pooling some of the better papers with strong remote sensing papers from the other Congress sessions in a special publication.

8. CHIEF PROBLEMS ENCOUNTERED IN 2008 (if any):

There were three problems in 2008. Firstly, IUGS funding for the GARS Programme was not received. This limited the activity that could be supported by the Programme. For example, it restricted its ability to support Congress attendance by GARS members. Secondly, UNESCO funding for groundwater activities has not yet come on stream. This delayed implementation of selected groundwater projects. Thirdly, the BRGM/ESA funding for the IGOS Geohazard Executive Bureau came to an end at the end of 2008 and the Bureau formally ceased its operations. Considerable effort was expended discussing future funding models, which remain unresolved. If one or more of these issues are not resolved in 2009, the future activity of the programme will continue to be more limited than desired.

9. CHIEF PRODUCTS (e.g. Publications, maps) IN 2008:

- Geohaz Update: periodic IGOS Geohazard Theme Newsletter was published in January 2008
- Presentations and/or sessions on IGOS Geohazards Theme & GARS Programme given at the:
  - UNAVCO Science Workshop held in Boulder, Colorado in March 2008
  - The 15<sup>th</sup> IGOS Partnership Meeting held in Paris in May 2008
  - The International Geological Congress in Oslo in August 2008
  - An EU Framework Programme GEO Project's Workshop in Brussels in September 2008
  - GEO Science & Technology Committee meetings in Hanover, Brussels and Geneva.
  - GEO User Interface Committee meeting in Boulder Colorado in October 2008.

10. SUMMARY OF EXPENDITURES IN 2008

No IUGS Budget was received in 2008; limited GARS activity was supported from funds at 5 above.

Date	Venue	Purpose	Item	Amount
			<b>Budget</b>	<b>£49.55</b>
			<b>Total Expenditure</b>	<b>£0.00</b>
			<b>Balance</b>	<b>£ 49.55</b>

11. WORK PLAN FOR NEXT YEAR:

A GARS work plan is dependant on resumption of funding from IUGS, UNESCO and elsewhere. It will address restructuring of the IGOS Geohazards Theme, following the closure of the IGOS Geohazards Executive Bureau in December 2008, and the implementation of the GARS Groundwater projects.

The resumption of IUGS funding will be used to fund a series of meetings of the key players in the IGOS Geohazards initiative over the past 5 years, designed to develop a new structure, governance and funding mechanism for the continued implementation of the Geohazard Theme. This will take into account the transition of the Theme to GEO, the creation of new, relevant Tasks within the GEO Work Plan, the implementation of the SuperSites initiative and the closure of the Executive Bureau, following the ending of ESA and BRGM funding. Consensus will be sought on the way ahead in the changed landscape and the GARS Programme, which initially led the development of and launched the IGOS Geohazard Theme from 2003-2004, will take on a particular responsibility for securing it in 2009, following the initial implementation period under the Executive Bureau.

The resumption of UNESCO funding for the Groundwater programme will allow the two projects already selected to be funded. There may a requirement for some re-negotiation, as the projects were initially proposed over a year ago. Once the funding is in place, the GARS Chairman and Secretariat will take on responsibility for concluding these negotiations successfully and initiating the projects.

12. CRITICAL MILESTONES TO BE ACHIEVED NEXT YEAR:

- Complete a new governance structure for IGOS Geohazards and secure funding for it
- Fund the two successful bids for projects under the new GARS Groundwater Programme

13. ANTICIPATED RESULTS/PRODUCTS NEXT YEAR:

- Report describing development of new Theme governance and funding structure under GEO
- Project Reports on two GARS-IGWCO-TIGER-SHIP Earth Observation & groundwater projects
- Annual Report on activities of IGOS Geohazards and GARS Programme for IUGS and IGOS

14. COMMUNICATION PLANS:

- Communication via email/website to GARS and IGOS Geohazards working group members
- Reporting GEO Task progress to GEO Science and Technology and User Interface Committees
- Reporting activities via other Partner and Parent Body meetings and at scientific conferences

15. BUDGET FOR NEXT YEAR (Affiliates should report only if requesting IUGS financial support):

Activity	Purpose	Amount
GARS Meetings	Seed corn support for the members of GARS-IGOS Joint Committee	US\$1500
GEO	Support Chairman's attendance at 2009 GEO Committees/Plenaries	US\$1500
Working Groups	Seed corn support for international expert Workshop participation	US\$9000
	<b>(this will support several meetings to define new structure)</b>	
<b>Total</b>		<b>US\$12000</b>

16. POTENTIAL FUNDING SOURCES (INCLUDING NON MONETARY FINANCIAL SUPPORT) OUTSIDE IUGS (Affiliates should report only if requesting IUGS financial support):

- The GARS Programme is co-funded by UNESCO, who will continue its strong support in 2009

- UNESCO aim to secure funding in order to implement the two groundwater projects in 2009
- BGS pay the staff time plus much of the GARS-related travel costs for the GARS Chairman
- BGS will negotiate with UNESCO to resume co-funding the GARS Secretariat with UNESCO
- Discussions on a new governance structure for the Theme will explore alternative funding

17. REVIEW CHIEF ACCOMPLISHMENTS/RESULTS OVER LAST 5 YEARS (PERIOD 2004-2008):

- **The Integrated Global Observing Strategy for Geohazards**  
In April 2004, the Integrated Global Observing Strategy for Geohazards developed by GARS and its partners was published by ESA. This landmark publication for the GARS Programme completed a major 4 year effort to build on GARS' previous science achievements by making a definitive statement on the impact of remote sensing in the geohazards. 2005 saw the implementation of this 10-year strategy commence. The newly established IGOS Geohazard Executive Bureau ran an international workshop to launch the Theme and populate its 5 working groups, which were then active over the first 3 years of Theme implementation. The highlight during this period came in November 2007, when the Theme and its partners, including GARS, ran a major international meeting and three associated workshops at ESA Frascati, billed as International Geohazards Week. This resulted in the Frascati declaration, adopted by all participants with the aim of accelerating implementation of the Integrated Global Observing Strategy for Geohazards in years 4-10.
- **Positioning GARS within the international Earth Observation Community**  
Over the 5 years under review, this process has seen geoscience in general and GARS in particular become a mainstream player in international fora such as IGOS, CEOS and GEO. There is now direct engagement in GARS by ESA, JAXA and NASA to balance the more traditional involvement of geological surveys and institutes. Toward the end of the review period the programme engaged with the GEO process over the future of IGOS Geohazards, opening up a significant new line of dialogue for the geological sciences with this major international earth observing initiative. This was supported by the participation of observing systems and networks covering geodesy, seismology, volcanoes and landslides in the IGOS initiative. The successful transition of the Geohazard Theme from IGOS to GEO represents a milestone for the Theme. Where IGOS was a best-efforts science partnership ideal for the development of observing strategies, GEO is an inter-governmental grouping of nations focused on development and implementation of the necessary space and in-situ observing systems. As such, it represents an ideal home for a Theme firmly in the implementation phase.
- **A new GARS topic on Transboundary Aquifers in Africa and the Middle East**  
The above initiative had been scoped in 2001 but it could not be taken forward until late 2003, through participation in a workshop held by ESA on the same topic and by attendance early in 2005 at an IGOS Water Cycle Theme Workshop. Discussions were continued in late 2005 and resulted in a first international workshop on this topic being held in Paris in March 2006. The outcome of this workshop was translated into a GARS Programme Call for Projects in August 2007. Two proposals were selected for funding. It is hoped that they will be initiated during 2009 with UNESCO funding. This initiative has benefited substantially from the evolution of the GARS Programme in the context of international initiatives such as IGOS. What would have been a worthy but standard GARS initiative in previous years has become an international collaboration involving links with ESA's Tiger initiative, UNESCO's SHIP initiative and the IGOS Water Cycle Theme. This strategic positioning of the GARS Programme is a significant achievement that increases both the profile and potential of the Programme.

18. SUMMARIZE ANTICIPATED OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2009-2013):

- Achievements of the IGOS Geohazards Theme will be reported at a GEO event in USA in 2009
- A new phase of IGOS Geohazard Working Group activity, within GEO, will run from 2009-2011

- GARS Groundwater Working Group: run 2 Trans-boundary Aquifers projects from 2009-2011
- Review and redefine GARS Programme in 2009 considering the balance of the above activities
- Review, update and re-publish Integrated Global Observing Strategy for Geohazards in 2010
- Present results of GARS Programme at International Geological Congress in Brisbane in 2012
- Define new geographic region(s) and scientific foci for initiating new GARS activities post-2012