

IGCP 565 Workshop 3 Questions



How can we bridge the gap in spatial scales between regional/global and point/catchment measurements?

- Promote the development of the International Terrestrial Reference Frame. Densify, consistent processing of 1000s of station. Use to georeference InSAR etc. (VLBI, SLR, GPS, DORIS)
- Also need consistent modeling framework for assimilating gravity, surface displacement, over range of scales. Problem variation of density of observations and temporal resolutions and spatial wavelengths. Community modeling framework for geodesy (e.g. Surface processes framework).
- Geodesy is at intersection of many fields (tectonics, hydrology). New to tie to range of physics problems.
- Observation framework (way to get observations easily and in same frame)
- Note Long Range Geodesy Plan (see UNAVCO)
- Need techniques for separating hydro and geodesy.
- Need to better understand the physics of processes and techniques to improve smoothing and fill gaps

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How can we bridge the gap in spatial scales between regional/global and point/catchment measurements? Continued...

- How to do combined modeling using GIA? But may still need to be more work on GIA to separate GIA from more recent processes. Have better idea of physics but perhaps not the driving forces. Need modern as well as historical observations.
- Physics helps tie across the scales of observing systems. This will help us see the whole picture. Need to improve techniques, but also span scales. Earth system approach needed.
- Need to encourage assistance in installing new instrumentation in Africa and other areas. Need observations on the ground as well as space. Encourage collocation of techniques (for science and logistics and to help foster long term measurements.
- Need to define what we need to do to support hydrology with geodesy. We need to be able to understand each other's jargon. Need to increase interactions and mutual understanding of our science.
- Need a way to provide uncertainty from models to be able to do data fusion and inversion. (not easy to do). Pin down errors from GLDAS and others.
- Float the concept of a geodesy center? Data portal? E.g. GRACE, IGS and other data, no one stop shopping. Need to consider other than GLDAS but others as well WGHM, LaD (different input data, different conceptualization of model,
- Contact Hydrology Focus Group (Famiglietti), US Example
- Need water well, river flow, moisture data. Currently hard to find. Look at global water data center. National centers, states, etc. HIS desktop from CUASHI

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How can we isolate long-term hydrological changes from secular effects due to tectonics, GIA, etc

- Use hydrologic models to estimate secular effects. Need improved resolution and to be able to separate different hydrologic effects
- GRACE can provide secular in places like Africa where GIA is not a problem
- Where there are three processes involved additional difficult to separate effects.
- The concept of long term hydrological signal is changing. Need to be careful to define.
- Establish validation points. E.g absolute gravity in Fennoscandia. Perhaps tie down one point precisely? Would this be useful for GRACE? (see previous question)
- Look at ratio between vertical and gravity changes to resolve mass changes.
- Back to physics and models.
- GRACE provides the hydrological storage term.
- International ground water assessment center in Utrech. Model long term secular signal.
- Hydrological models only work for certain types of processes.

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How can we isolate long-term hydrological changes from secular effects due to tectonics, GIA, etc

- Can compare coherence of tectonic vrs hydrological models at times to help separate sources of deformation. Can use separation of components of deformation (e.g. Horizontal vrs vertical) to test. E.g. PBO.
- Need to promote acquisition of long term time series. This can be a problem with space systems like GRACE. Need follow on systems. Same for terrestrial. Need to explicitly state this. Need to encourage long term funding with high level document.
- Need to encourage more local involvement in on the ground measurements. E.g. In Africa. AfricaRef working to get two open stations/country. Also AfricaArray
- Also need to encourage international sharing of data. Key topic for GEO. GEO portal a source of data. Governments realizing this is a problem. Gap in real-time GPS/Seismic as an example. ISO standard accepted in GEO registry. Use it and give feedback.
- Capacity building is critical for sustainability. Then contributors will have lo
- Need multiple complementary observations for comparisons. E.G. GPS and GRACE. Greenland example. LiDAR. The more the better. Each has strengths. Different parameters such as gravity and deformation.

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How can we improve measurement accuracy and robustness to seasonal and other artifacts?

- Use combination of techniques, understand multiple processes such as Atmospheric pressure loading. Bring the cryosphere into hydrological modeling. Need improved models for Antarctica as well as Greenland.
- Catalog artifacts in geodetic data (somehow..). Interoperability of observing systems. Metadata standards. Need to publish metadata about datasets.
- Not all seasonal effects are sinusoidal. Things vary from year to year. Need to have models that allow for this type of variability.

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How can we improve infrastructure to build reliable services?

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Encourage new systems (e.g. DESDynI, GRACE followon, ICESatII, CryosatII, SWOT, etc.)

Encourage sharing (great example is ESA and Sentinel). Individually and through for example WInSAR. The Charter for InSAR might be built upon. Example Supersites. Could extend to hydrology.

Be able to do seasonal predictions for sustainability. E.g. Drought index, early warning for hydrological applications. Disease. Increase societal relevance. Speak to sponsors with applications of interest to them.

Landslide detection.

Workforce development. Integrate geodesy into hydrological programs.

Multiple use of techniques. For example GPS multipath detection of snow, moisture, and plant growth. Also GPS met.

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