Theme 3: Sea Level change, variability, forecasting Breakout Session Report

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Goals

What Observations and Models are needed?

Recommendations

Short-Term Plans

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Goals

Global Sea Level:

- Global Ocean Volume: 0.1 mm/yr water equivalence
- Global Ocean Mass: 0.1 mm/yr water equivalence
- Global Water Balance: 0.1 mm/yr water equivalence

Local Sea Level:

- Sea Level Rise Hazard Map
- Forecasting of coastal sea level rise

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Products:

Global Sea Level:

- Frequent (when new ITRF released) assessments of the global sea level curve including error assessments

Local Sea Level:

- Sea level rise hazards map
- Annually, a forecast of local sea level for the next ten to fifteen years; initially for a few selected locations

Also needed:

- mass redistribution in the global water cycle

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Recommendations for Steering Committee:

Global Sea Level:

- Should the GGOS sea level panel be set up? Lead?

Local Sea Level:

- Should GGOS initiate (with others) a project towards a Sea level rise hazards map?
- Should GGOS engage in the development of a LSL forecasting service?

- How can GGOS make progress towards a products on mass redistribution in the global water cycle?

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Observations:

Global Sea Level:

- Sea surface height from altimeters
  (*critical: continuous, overlapping missions for calibration purposes*)
- Tide gauge measurements
  (*also needed: vertical motion, gravity; spatial resolution tbs*)
- Mass changes in the ocean
  (*GRACE, important for separation of steric effects*)
- Mass changes in glaciers, ice sheets, land water storage
- Ocean bottom vertical motion
  (*currently not achievable*)
- Gravity measurements
  (*in particular Antarctica*)

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Observations:

In addition, for Local Coastal Sea Level:

- Vertical land motion
  (*InSAR and GPS for land motion in the coastal zone*)
- Coastal topography
  (*high resolution DEM*)

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Models:

Global Sea Level:

- GIA/PGR

  (*consistency of reference frames of models and observations*)

- Elastic Sea Level Equation

  (*validation tbs*)

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What do we need?

Access to TRF:

(*critical: Z-geocenter rate – 0.1 mm/yr, vertical velocities: 1 mm/yr with respect to CM*)

Time series of vertical motion

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Recommendations:

- GGOS can measure sea level, interpretation requires interdisciplinary cooperation
- New format for time series of station coordinates
- Need to investigate model consistency in terms of reference frame
- GGOS Sea Level Panel: Frequent assessment of the global sea level curve and its error budget (develop a framework)
- Approach InSAR/geodetic imaging community to develop data center for SAR images for coastal zone
- Investigate limit of secular reference model for a changing world

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Recommendations:

- GGOS should facilitate a reanalysis of GPS RO to improve Antarctic lows, which affect the noise in GRACE; could be a relevant input for meteorological reanalysis; in return, met-institutes could provide higher temporal resolution for the reanalysis of GRACE (to reduce the aliasing problems)

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New Missions:

- GPS RO (polar regions atmosphere)
- InSAR (coastal areas)
- GRACE follow-on
- SWOT (closer to the coast)

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Implementation of full infrastructure:

- Start with the core network