Welcome to a Joint Meeting of Ocean Sciences and Surface Water Hydrology in Support of Wide-Swath Altimetry Measurements

Hosted by:
Lee-Lueng Fu, Hydrosphere Mapper
Doug Alsdorf, WATER

Funding from CNES, JPL, and NASA
Monday:

9:00 - 9:15: Welcome and opening remarks, Lee Fu, Doug Alsdorf

9:15 - 10:45: Overview of Wide-Swath Science and Technology
Doug Alsdorf, Lee Fu, Ernesto Rodriguez

10:45 - 11:00: Coffee Break

11:00 - 12:00: Space Agency Wide-Swath Activities
NASA Lucia Tsaoussi; NASA Tony Freeman; CNES Eric Thouvenot, Herve Jeanjean

12:00 - 5:25: Action Item Discussions: Science Thrusts & Requirements
Ocean and Coastal Zone
Jim McWilliams, Dudley Chelton, David Glover, Ted Strub, Baptiste Mourre

12:25 - 1:30: Lunch Break

3:05 - 3:20: Coffee Break

Coastal Zone and Terrestrial Surface Waters
Gregg Jacobs, Dennis Lettenmaier, Paul Bates, Larry Smith, John Melack
**Tuesday:**

8:30 - 9:15: Discussion to Form Consensus on Science Thrusts & Requirements from Monday:
led by Lee Fu, Doug Alsdorf

9:15 - 11:30: Action Item Discussions: Mission Orbits & Data Requirements
Don Chambers, Richard Ray, Ernesto Rodriguez, Tony Freeman

10:35 - 10:50: Coffee Break

11:30 - 12:00: Action Item Discussions: Next Steps

- Writing of Meeting Report, leading to publishable manuscript, on the consensus of science thrusts, science requirements, mission orbits, data requirements, and participating agencies.
- Fall AGU Wide-Swath Session; opportunity for further discussions with much broader community.
- Determine next meeting. Should it be timed with funding opportunity, or with need for very broad community support, or during an international meeting?
Meeting Goals and Expected Outcomes

- Solidify our joint community of ocean sciences and surface water hydrology
- Define the wide-swath mission
  - Science & applications drivers
  - Orbital coverage
    - Sun synchronous, non-sun synchronous, spatial coverage requirements (i.e., max latitude, max gap size), temporal sampling requirements vs. latitude
  - Spatial resolutions
    - Sub-100 m for rivers to 1 km for oceans
  - Height and slope precision and accuracy
  - Science, technology, and cost trade-offs
    - Ka vs Ku band
- Publish these in peer-reviewed journal
Summary of Surface Water Presentations and Discussions

- Water balance for entire basin: P – E = ΔS + R
  - ΔS + R directly addressed by WATER/HM concept
  - We do not know how much water is available in U.S., i.e., the world
  - We do not know the spatial and temporal dynamics of terrestrial water
- Arctic hydrology is changing in a locally heterogeneous manner
  - Varying dh/dt for lakes
  - Will impact global water, energy, and carbon cycles
- Tropical surface water contributes greatly to global terrestrial water and carbon balance
  - Discharge, storage changes, and wetland flow dynamics are poorly measured
  - e.g., Hydrostatic pressure relates to bubble flux
- Models and Measurements
  - Hydrodynamic models, i.e., *Floods are natural hazard of greatest impact*
    - well-established but h, dh/dt, and dh/dx constraints are nearly non-existent
    - Predictions of floods (extent, elevation, force) are not constrained
    - Data assimilation is producing Q, permits testing of spatial and temporal sampling
  - No existing measurements fulfill 2D mapping of h, dh/dt, and dh/dx
    - Existing measurements are h and dh/dt at 1D points from existing altimetry and in-situ; flow is 2D and complex
Action Items

- Initialize the risk-reduction stage of the WATER Hydrosphere Mapper concept.
  - Articulate joint science goals
    - Terrestrial water storage changes and sea level rise
    - Large lakes have similar sub-meso-scale processes as oceans
    - Flux from rivers and oceans impact estuaries and coastal zone
    - Arctic hydrology will be sampled near daily and could be tied to Arctic ocean circulation
  - Identify cost trade-offs related to spatial and temporal sampling of surface waters, coastal zones, and some open ocean (i.e., data rate issues)
  - Aliasing issues based on wide-swath, update orbit studies
  - Form a science working group with ocean, terrestrial surface water, estuaries, limnology, societal benefits
  - Potential benefits from “ties” to other mission, e.g., ICESat 2, GPS occultations
  - Make international partnership with CNES
- Produce meeting report with possible peer-reviewed publication, and EOS note.
- Change WATER web page to WATER Hydrosphere Mapper and invite participants to the joint mission concept.