RGMA PI Meeting 2020
October 13, 2020
Day 1 - Coastal Land-Ocean-Atmosphere Breakout
Sub-breakout: Terrestrial Fluxes

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Goals:

- Motivate discussion for White Paper Development
- Discussion of challenges of RGMA coastal science
- Subgroup breakouts to develop text for White Paper section on coastal science

Agenda:

1) Feedback on overarching grand challenge question
2) Identify focused sub-questions
3) Challenges identified from current RGMA research
4) Research gaps, future goals and directions
    a) Short-term (3-5 years)
    b) Long term (10 years)

Grand challenge question:
How do persistent and extreme ocean, lake, land, atmospheric, and human drivers individually and compoundingly influence coastal dynamics that control erosion, flooding, deltaic dynamics, and land use changes that in turn feedback on atmospheric, terrestrial, and ocean/lake processes and determine the resilience of coastal ecosystems, infrastructure, and communities?

Grand challenge question - too long? Maybe make a broader, vaguer(?) question and save a lot of these specifics for focused sub-questions. Hard to digest in its current form.

Break it down into space and time. How do drivers change over time and over timescales? Daily vs monthly… vs decadal. Timescales of change vary with region. Look more into how importance of drivers changes moving from fine to coarse temporal scales, and spatial scales as well. + regional variability.

Also important: rivers. Erosion, flooding, deltas - all affected by fluvial processes. Are they covered by 'land' or need to be called out explicitly? River and land are separate models for E3SM.

Do we want to focus just on resilience? What about function? Adaptation?

Need to simplify this so we can have more detailed questions to single out these many things we've highlighted in the initial question.

Focused sub-questions?
Persistence vs extremes - is it the punctuated, storm events or the more consistent drivers that affect change? More gradual increases in precip or big changes in snowmelt/precip.

Regional variability in processes (and therefore sub-questions). Arctic vs. ag-dominated vs tropics. How do processes and process feedbacks vary with region or latitude? Or with land cover? Timescales change as well? Are there additional processes we need to consider in different regions? High latitudes - how important river ice processes? Surficial geology/conditions matter for resilience/vulnerability.

How to identify small-scale processes/changes that are within the noise? Compared to long-term large-scale change. Are records long enough to assess changes? Can the tools we have really capture these changes. When to use simple models vs more complex ones? Model hierarchies.

Social implications of changing coastal regions? Varies regionally.

A lot of models don't really resolve the coastline. Scale issues, are we using the right tools? Do we have sufficient information to develop (sub-grid scale?) parameterizations? Do we even have the data/ability to determine if riverine processes are accurately represented in ESMs? For streamflow we can often identify whether models are doing well, but highly regionally variable. What about sediment and biogeochemistry? Need to do some additional testing and analysis to identify observational gaps, especially regional gaps.

Challenges:
Data management challenges

How does the chemistry fit in? How do chemical transformations impact river/coastal systems? Lack of information to properly model chemical inputs/transformations.

Distributed vs pt source fluxes - large range in spatial scale of terrestrial fluxes

Future directions:
How to improve observation data we use for validation? Remote sensing a good direction. SWOT data - river discharges. Make use of this data for modeling efforts.

Linking remote sensing to groundwater. Need to understand GW-SW interactions, lateral flow. What remotely sensed data products in this realm?

Some low-level ortho imagery, SfM, etc. can get at things like river ice, snow pack. UAV maybe too fine-scale for more regional modeling.