

DRAFT

Coastal System Land-Atmosphere-Ocean Interactions

Feedback from Outbrief:

Coastal downscaling of climate model projections and the uncertainties arising from natural climate variability remains a key challenge. Most downscaling studies are unable to fully consider the range this range of internal and multi-model variability for two reasons:

Underdeveloped coastal earth system models that integrate multi-system dynamics (e.g. ground/surface waters, wetlands, coastal ocean, precipitation, etc.)

It is computationally prohibitive to downscale large-ensemble projections at the coastal scale

A comment to Joel: how far to go with model resolution will depend on the processes that you will wish to solve rather than parameterize.

WM: A comment regarding the required model resolution for the representation of ocean coastal dynamics: it must be sufficient to resolve buoyancy-driven coastal currents (order of 10-30km) and the 1st baroclinic radius of deformation on shelves, which in the Arctic marginal seas is order of few km. Hence a resolution of 1-2km in the horizontal is required to resolve the basic coastal ocean dynamics.

In my opinion, the question of required model resolution is connected to the grand challenge: given that climate models are not going to use such a high ocean model resolution (1-2km) anytime soon, part of the challenge is how to realistically represent the land-ocean coupling in the mean time?

Grand challenge question:

How should models be coupled at the coastal interface and how do these couplings affect predictions of the dynamics and feedbacks of the Earth and Human system components?

Needs

Introduction

Focused sub questions

Rivers

Sea Ice

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Long range forcings and how they propagate to the coast

Coupling of atmosphere to the ocean

Precipitation impacts on land and ocean

Groundwater

Regional variability

Description of Challenges and Current Research in RGMA

Research Gaps and Future Directions

Short Term (3- 5 years) Research Goals

Long Term (10 years) Research Goals