SeaRISE: Addressing "How bad could sea-level rise get"?

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WAIS began under the moniker of SeaRISE (Sea-level Response to Ice Sheet Evolution) thanks to Barclay Kamb suggestion. While the name was soon changed (thanks to those who remain nameless at NSF), the primary objective of predicting the future contribution of the West Antarctic ice sheet to future sea level remained. And so it remains today.

Recent observations of rapid ice loss in Greenland and other parts of Antarctica have expanded the concern about where increased contributions to sea level might originate and at the same time heightened concern that we might be witnessing the opening stages of dramatic acceleration. Acknowledging the observations of rapid ice-sheet changes, the IPCC-AR4 stated that the "…understanding of these effects is too limited to assess their likelihood or provide a best estimate or an upper bound for sea level rise." Through workshops and conversations, a coordinated effort, recycling the name SeaRISE, has emerged that seeks to address this weakness in ice sheet models on a schedule to inform the next IPCC Assessment Report. SeaRISE's goal is to provide quantitative, upper bound estimates of ice sheet contributions to sea level for the 21st and 22nd century. Confidence in these estimates will be gained by applying many independent models to a common set of climate and boundary condition scenarios to reduce unrealistic characteristics of any single model from affecting the predictions.

The first experiments are intentionally extreme in their physical realism to help determine the upper bound of possible future ice sheet response. Subsequent experiments representing more likely scenarios will then be run to help lower the upper bound. All models will quantify their calculated ice sheet responses relative to a control run of the same model generated either by holding modern climate fixed in the future or by using AR4 predictions of future climate. This "normalization" process will help minimize unrealistic aspects of any single model and attempt to further isolate the impact of the difference in forcing between the experiment and the control runs.

SeaRISE includes regional models as well as whole ice sheet models. The interactions are expected to be two-way: regional models will be used to help provide more reasonable forcings for selected whole ice sheet model experiments and whole ice sheet models will be used to define boundary fields that will enable regional models to refine the predicted responses of particularly dynamic areas. Another anticipated benefit is that the results of this effort will help inform the implementation of dynamic land ice into a fully coupled CCSM.