Title: 'The Role of Ocean Dynamics in Multi-Year Predictability'

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Abstract: The most predictable patterns of global sea surface temperature in coupled atmosphere-ocean models are identified. Remarkably, the most predictable patterns in models that include interactive ocean circulation are very similar to predictable patterns in models without interactive ocean circulations (i.e., models whose ocean is represented by a 50m-deep slab ocean mixed layer with no interactive currents). In addition, these patterns can be skillfully predicted in observational data using empirical models trained on simulations from either type of climate model. These results suggest that interactive ocean circulation is not essential for determining the spatial structure of multi-year predictability previously identified in coupled models and observations. However, the time scale of predictability, and the relation of these predictable patterns to other climate variables, is sensitive to whether the model supports interactive ocean circulations or not, especially over the North Atlantic. To understand this sensitivity, a stochastically forced Stommel box model is analyzed. The box model is able to reproduce many statistical characteristics of sea surface temperatures that are relevant to predictability. This model is then used to suggest hypotheses that can be tested about the role of ocean dynamics in multi-year predictability.