Seamless Earth System prediction illustrated with EC-Earth

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Climate and forecasting applications share a common ancestry and also build on the same physical principles. The concept of "seamless prediction" is emerging to forge forecasting and climate change studies into a joint topic. Another development is the extension of the physical climate system toward a comprehensive view of the Earth System, including the human dimension. In this contribution the concept of seamless earth system prediction is presented using EC-Earth. EC-Earth is based on ECMWFs operational numerical weather prediction and seasonal forecast systems. EC-Earth merges regularly with new operational NWP models of ECMWF. The seamless prediction strategy is illustrated in three ways. First, EC-Earth model development guided by initial biases will be shown. Second, skill of initialized predictions in EC-Earth from medium-range to decadal time scales will be demonstrated. Finally, the implementation of Earth System components, such as atmospheric chemistry and integrated assessment modules, will be discussed. It is concluded that environmental predictions with EC-Earth can serve as a basis for vulnerability assessments as part of climate services.