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Sensitivity to initial conditions and external forcing in climate predictions

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Near-term climate predictions exploit the predictability of the climate system arising both from the initial condition information and from external forcings resulting from changes in atmospheric composition, solar radiation, and land use. Predictions from one to several years in advance represent the natural extension of seasonal predictions, so they can be considered as initial-value problems where the correct initialization of the ocean surface and subsurface variables together with the sea ice plays a central role in keeping the trajectory of the system close to the observed one. However, as lead time increases from one season to several years, the component of predictability arising from changes in the external forcing becomes more and more important. As such, these climate forecasts represent a hybrid problem at the edge between predictions of the first and the second kind (following the definition given by Edward Lorenz). In this talk I will trace-back some of the work on climate predictions done in collaboration with Tim including the introduction of probabilistic skill measures such as reliability into multi-annual forecasts.

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