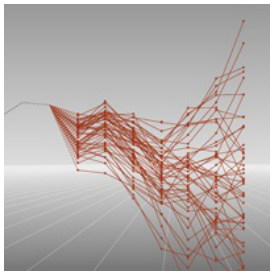

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Taming the butterfly effect to reach subseasonal and seasonal predictability

Monday, 2 September 2019 14:45 (50 minutes)

Operational forecasts valid beyond the two weeks period that was thought to be the limit of predictability in the 1960s/1970s, have been available since the 1990s. At ECMWF, for example, operational, ensemble-based seasonal forecasts have been issued since 1997, and a dedicated monthly ensemble have been in operation since 2004.
Progress in the past two decades in predictability gains have been stunning. For the seasonal forecast range, probabilistic forecasts of sea-surface-temperature anomalies linked to El-Nino have been improving by almost 1 month every decade. In the subseasonal forecast range, probabilistic forecasts for large-scale phenomena such as the Madden-Julian Oscillation have been improving by about one week every decade.
These exceptional skill extensions (exceptional compared to the 1 day/decade gains in predictability detected in single, deterministic forecasts) have been achieved by working on many key aspects of ensemble system design. Gains have been obtained by contrasting error propagation from the smaller to the larger scales, with the propagation of predictable signals from the larger to the smaller scales. Improvements in the model design and in the simulation of atmospheric and land-surface processes, the introduction of coupling to the ocean and the sea-ice, advances in the definition of the initial conditions, the adoption of more reliable ensemble systems, have all contributed to the extension of the forecast skill horizon.
In this lecture, I will present an overview of the key aspects that have led to the operational production of skilful subseasonal and seasonal forecasts, and will make some considerations on the future prospects for subseasonal and seasonal forecasts.

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