SESSION: (A1) Mechanisms of S2S predictability

(A1-02)

Predictive signal and noise in sub-seasonal to decadal forecasts

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The prediction of the state of dynamical systems involve the estimation, and through temporal relationships, the projection of the current state into the future. In non-periodic systems like the coupled atmosphere - ocean - land - ice, or more generally, the Earth system, information about the exact state of the system is lost due to the chaotic growth of errors originating from the initial condition and the numerical model of the system. We distinguish between "traceable" predictability where the phase and amplitude of individual events can be still tracked, and "climatic" predictability where only the statistics of selected events (such as their frequency), but not their timing or position, can be predicted.

Though some high impact events such as heat waves, cold spells, or certain types of floods are associated with low frequency, large scale events that are more predictable, many high impact weather events such as severe storms, tornados or flash floods are associated with smaller scale events that lose traceable predictability relatively quickly. Even after their traceable predictability is lost, the frequency or other statistics of such smaller scale and potentially high impact weather events may still exhibit deviations from climatology, contingent on the traceable predictability of larger scale processes (i.e., climatic predictability of thunderstorms at a given location, as a function of the phase of ENSO). In this study, the effectiveness of algorithms designed to separate the predictable (traceable or climatic) signal from noise in S2S and S2D predictions such as spatial, temporal, or ensemble-based averaging will be critically reviewed.