SESSION: (A4) S2S forecasts for decision making

(A5-01)

The Land Surface "Sweet Spot" Between Weather and Climate

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Weather forecasting is typically considered a deterministic initial value problem of the atmosphere. Climate on seasonal to decadal time scales is strongly driven by ocean surface temperatures and near-surface heat content, and forecasts at these longer time scales are probabilistic in nature. In the difficult transition region between deterministic and probabilistic forecasts, the land surface has its greatest potential impact on numerical forecasts. Anomalies in land surface states affect the atmosphere through anomalous surface fluxes that manifest via the diurnal cycle. This occurs where and when the atmosphere is sensitive to its lower boundary, where the land surface anomalies are large enough and persistent enough to have a significant effect. This terrestrial source of potential predictability is a "low-hanging fruit" but has been under-exploited in operational forecasting for a number of reasons. Reliable, high-quality real-time observations of land surface states needed to initialize this component of forecast models are only now becoming widely available, and land data assimilation systems that can ingest this information are relatively new. Models have not been developed, calibrated or validated with regards to the coupled processes that link land and atmosphere, partially because of the historical lack of necessary surface, near-surface and boundary-layer data, and partly because the culture of model development has been fragmented along traditional disciplinary lines. This has resulted in both land surface and atmospheric modelers spending much time and effort trying to compensate for the systematic errors passed across the model interface, rather than developing an appropriately coupled model system. The opportunity is now to realize the potential predictability of from the land surface, whose inherent memory is at the subseasonal timescales that are of such great interest today.