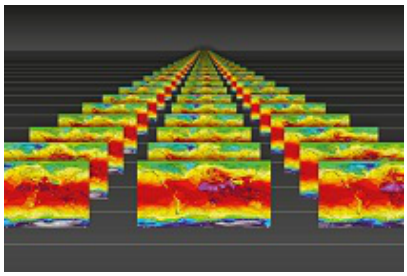

Contribution ID: **59** Type: **Oral presentation**

Ensemble Prediction and Predictability of Extreme Weather via Circulation Regimes

Wednesday, 3 April 2019 14:45 (15 minutes)

We use S2S multi-model ensemble forecasts of circulation regimes to assess the changes in the probability of storminess over Europe and the US in the sub-seasonal forecast range.
The existence of preferred planetary scale flow structures (circulation regimes) in the Pacific - North American (PNA) and Euro-Atlantic (EA) sectors on sub-seasonal time scales has been well validated in the literature. The shifts in extreme US weather associated with each circulation regime were established by recent published work (Amini and Straus, 2018): each boreal winter circulation regime is associated with dramatic shifts in the storminess metrics: regional likelihood of extreme precipitation (flood or drought), atmospheric river occurrences and moisture flux, and the storm track configurations.
We evaluate S2S ensemble forecasts in the circulation regime context. We identify those times for which the verification of 500 hPa geopotential height (Z500) is strongly associated with a particular regime in reanalyses. The regimes are identified separately in the PNA and EA sectors using machine-learning techniques (e.g. k-means cluster analysis), but strong association of a reanalysis state with a regime composite is further assessed via pattern correlation. The S2S forecasts are evaluated by determining the fraction of ensemble members strongly associated with the observed regime using Z500.
We apply these ideas to create a forecast tool for storminess. When one or more circulation regimes are identified in the ensemble forecasts for a particular forecast range, the storminess metrics associated (in observations) with that (those) regime(s) provide a forecast for the likelihood of extreme precipitation, shifts in atmospheric rivers, and changes in storm track configurations. This method is independent of the model statistics of e.g. precipitation, relying solely on the models'large-scale features.

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Session Classification: Prediction and verification

Track Classification: Workshop on Predictability, dynamics and applications research using the TIGGE and S2S ensembles