

## Multivariate Spatio-temporal Stochastic Generator for Global Climate Ensembles

Matthew Edwards

Ensembles are used to understand uncertainties in the climate system. Increasing the number of ensemble members is often required to advance our understanding of these uncertainties. However, with ensembles now requiring petabytes of storage this is no longer sustainable. The storage requirements of an ensemble can be reduced with a stochastic generator. A stochastic generator, given a base ensemble, can efficiently simulate additional ensemble members. It is critical that these stochastic generators simulate ensemble members that are representative of the climate system. Hence, they must capture all the complex temporal, spatial and multivariate variations in the base ensemble. Previous stochastic generators have only simulated univariate ensemble members (e.g.~surface temperature and wind speed separately). However, we introduce a stochastic generator that can simulate multivariate ensemble members. We demonstrate that given a base ensemble of five members additional multivariate ensemble members can be simulated that are representative of the climate system.