



## **Algorithmic tuning of spread-skill relationship in an ensemble forecasting system**

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In an optimal ensemble weather prediction system, the spread of the ensemble and the skill of the ensemble mean are in balance. Ensemble spread is generated through representations of uncertainties in initial values, boundary values, and model errors. The amplitudes of these representations are regulated by parameters, here called ‘spread parameters’, and the task is to optimise the spread parameters such that the ensemble system is optimal.

We present an algorithmic approach to optimise the spread parameters. The approach consists of a cost function based on filter likelihood and an optimiser using differential evolution. The approach is demonstrated with the Lorenz’95 model with a stochastic parametrisation based on Wilks’ work. The results are verified using rank histogram, spread/skill relationship, and continuous ranked probability score. The results indicate it is possible to optimise spread parameters in an idealised ensemble system.

Work is in progress to test the ideas using OpenIFS and some initial results are available.