

## **A Critical Comparison of Methods to Assess Observation Impact in NWP**

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In numerical weather prediction the value of a particular observing system can be assessed both in terms of its impact upon atmospheric analyses and forecasts. Understanding this impact allows the data assimilation and forecast system to be optimised to make best use of the available observations.

The classical approach is to perform Observing System Experiments (OSEs) where a particular observation is deliberately withheld (or added) and the quality of the resulting analyses and forecasts compared to a control system. However these are computationally very expensive to perform. Significantly less expensive measures of impact of assimilated observations on analysis or forecast can be obtained from evaluations of degrees of freedom for signal (DFS), adjoint-based methods and the impact of a given observing system upon the analysis fit to other measurements.

This study takes a critical look at the extent to which these different measures of impact can be considered consistent and complementary to each other.