Accounting for Correlated Observation Errors in the Assimilation of High Resolution Sounders

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Since January 2013 data from IASI are used with a full observation error covariance matrix (**R**) within the Met Office 4D-Var assimilation scheme, accounting for correlations between channels. This has been shown to lead to improved use of the water vapour sensitive channels and an associated improvement in forecast accuracy [1]. The correlated observation errors were estimated using a diagnostic technique described Desroziers [2].

The current scheme only accounts for correlated errors for IASI but an extension to include treatment of inter-channel correlations from other high resolution IR sounders such as AIRS and CrIS will be presented.

Accounting for the correlations leads to different weights being given to observations depending on the relationship of the most correlated channels' first guess departures. Several case studies in a 1D-Var assimilation scheme will be shown to explain this behaviour.

The main source of error which contributes to the inter-channel error correlations is representativeness error, which results from a scale mismatch between the observations and the model background. It is difficult to isolate and accurately quantify this source of error but there are techniques which can be used to estimate it. Results from running the 4D-Var assimilation at different resolutions and scale matching will be shown.

References

[1] P. P. Weston, W. Bell, J. R. Eyre. "Accounting for correlated error in the assimilation of high resolution sounders". (Paper for publication in preparation)

[2] G. Desroziers, L. Berre, B. Chapnik, and P. Poli. "Diagnosis of observation, background and analysis-error statistics in observation space," *Q. J. R. Meteorol. Soc.*, vol. 131, pp. 3385–3396, 2005. (Journal Article)