

Impacts of Inter-Channel Interference on the Use of AIRS in Data Assimilation

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A posteriori diagnostic studies indicate that considerable inter-channel observation error correlations are present in certain wavelength bands in the high-spectral-resolution infrared sounders such as AIRS and IASI (Garand et al., 2007, Bormann and Bauer 2010, Bormann et al 2010). Because of the lack of knowledge of the true error correlation structure in these data and the complexity to account for correlations in the underlying analysis system, the errors between different channels are treated as uncorrelated and resulting inter-channel interferences could make some observations be assimilated improperly. An approach to account for this simplification is to inflate the observation error variances assigned to the data. The amount of inflation needs to be determined and needs to be such that the corresponding observation information content is not severely degraded, enforcing inter-channel interferences to remain low which would allow observations from high-spectral-resolution instruments such as AIRS and IASI to be properly assimilated.

A 1-dimensional diagnostic tool based on estimates of the so-called background error variance reduction is being combined with the Degrees of Freedom for Signal (DFS) diagnostic to allow investigating more closely how best to assimilate AIRS observations with the GMAO 3DVar system. The idea is to choose proper observation error inflation parameters to reduce inter-channel interference from AIRS, especially when it comes to the long-wave surface temperature and water vapor sensitive channels.

References

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