Improving weather forecasting with a new IASI channel selection method

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With the advent of satellite observation techniques and improvements in data assimilation schemes, the initial state in a numerical weather prediction (NWP) model is increasingly realistic. This is fast becoming the most vital part of the process. Furthermore, among the many available satellite observations, infrared hyperspectral measurements are known to have the greatest impact on weather forecasting.

In a new study published in *Advances in Atmospheric Sciences*, researchers attempted to select hyperspectral sounder infrared atmospheric sounding interferometer (IASI) channels from the 314 channels provided by the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) for data assimilation in the U.K. Met Office Unified Model using a one-dimensional variational analysis . The channel selection was performed by considering the degree of improvement in retrieved atmospheric parameters from 1D-Var over the background atmospheric parameters, using the Channel Score Index as a measure of success. In the Unified Model, IASI measurements have been assimilated since 183 channels were subjectively selected in 2007.

Instead of the currently used 183 channels, 200 newly selected IASI channels, including substantially different H2O and shortwave infrared channels, were used for the UM data assimilation. From the two trial runs using the UKMO UM data assimilation system, it was noted that the new IASI channels gave an overall neutral impact in terms of the NWP index based on parameters such as 500-hPa geopotential. However, experiments resulted in a significant bias reduction in the relative humidity forecasts, in particular over the upper-troposphere layer from 500 hPa to 200 hPa, which was attributed to additional H2O channels in

the new IASI channels.

More information: Young-Chan Noh et al, A new Infrared Atmospheric Sounding Interferometer channel selection and assessment of its impact on Met Office NWP forecasts, *Advances in Atmospheric Sciences* (2017). DOI: 10.1007/s00376-017-6299-8