Summary of Session II:
Global NWP and data assimilation

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This session included eight presentations representing six different groups reporting status and progress related to the assimilation of AMV in operational systems.

In recognition of the fact that traditional data withholding experiments are becoming increasingly difficult to diagnose, ECMWF proposed an innovative approach to establishing the information content of the various components of the observing system. The method basically consists of assessing the amount of skill associated with a given observation type by adding it to a baseline of conventional observations only, rather than by withdrawing it from a baseline consisting of the full complement of observations. A comprehensive set of data impact experiments was shown, and among the conclusions were that satellite winds seem to be uniformly more useful in the southern hemisphere than in the northern hemisphere. In a direct comparison, the assimilation of clear sky radiances were found to contribute less skill than the assimilation of AMVs. The MODIS winds were found to be very useful to the system, the water vapor winds more so than the IR winds, even though even the latter type also had a uniformly positive impact. This is an important point given the current uncertainty about the future of polar imaging for the water vapor channel in particular.

ECMWF also presented a study related to the transition from Meteosat 7 to Meteosat 8. The impact of the change was neutral, and this was thought to be a reasonable starting point. In a study related to the use of CO_2 slicing for height assignment of high-level winds, a neutral impact was also found, albeit with additional evidence for improved assignment with the new method. Initial results from the monitoring of winds from MTSAT and FY-2C were also reported.

Finally, ECMWF presented their views on challenges and future plans for the assimilation of AMVs. Their view is that height assignment and perhaps especially outdated quality control methods are the main limiting factors for increasing the AMV impact. An interesting approach to the problem of observation errors was their plan to test the retrieval of AMVs on model simulated images in order to help better characterize the error of the real AMVs.

A group representing the Center for Numerical Prediction Research, the Chinese Academy of Meteorological Sciences, and the Chinese Meteorological Agency presented a study assimilating FY-2C AMVs in a preoperational version of GRAPES, their unified global/regional variational data assimilation system. Also here the height assignment was raised as a major issue, and the group reported a substantial improvement of the innovation statistics after a background dependent adjustment of the assigned heights of the FY-2C winds. A case study using winds with and without the height adjustment also showed improved forecast skill after the adjustment.

DWD, the German Weather Service, showed results concerning a long range of AMV-related issues. The transition from Meteosat 7 to Meteosat 8 had been found to give positive results by a variety of metrics. A preliminary one-month experiment using MTSAT-1R winds seemed to have identified a speed bias in these data. However, the impact on forecast skill was still predominantly positive. The MODIS winds were also found to have a positive impact on forecast skill, especially over Europe.

The Hungarian Meteorological Service reported results using Meteosat 8 AMVs in their implementation of the Aladin regional assimilation/forecast system. Overall, the impact was found to

be neutral to slightly positive. A positive impact of the forecast of precipitation was found in a case study covering a particularly intense event.

The Japanese Meteorological Agency reported results from a study using two different thinning methods for high density winds from MTSAT-1R. Over a one-month test period, equal distance thinning was found to be superior to the reported order thinning method currently employed in operational mode at JMA. Future plans called for implementing equal distance thinning to all satellite winds in JMA.

The Met Office also reported results on a variety of AMV-related matters. Substantial changes had been made to the operational ingest of satellite winds since the previous Workshop in 2004. The MODIS winds continue to have a positive impact on forecast skill, especially in the high latitudes, and more so in the northern than in the southern hemisphere. This was in contrast to results reported by ECMWF, but consistent with results reported by GMAO in a later session. Studies comparing the use of Meteosat 7 and Meteosat 8 winds showed neutral impact of the change in a summer period but a slight advantage to Meteosat 8 in a winter period. The 4-D VAR system now operational at the Met Office has the capability to use AMVs at a higher temporal density. However, the lack of accounting for temporally correlated observation errors means that the data must now be thinned in time as well as in space. The overall point of view expressed by the Met Office was that a more sophisticated way of assigning observation errors would likely be the best way to increase the impact of the AMVs in the short term.

In summary, good progress was reported from all the groups represented in the session. The polar winds from MODIS continue to impress and these data have by now become part of the standard observing system at many NWP centers. The initial results using data from the new satellites, Meteosat 8 and MTSAT-1R, were mostly positive even though there are clearly still things to be learned concerning the use of data at the higher density that these systems are capable of delivering. Data from the Chinese FY-2C platform are being monitored by several groups and may become ready for assimilation in the future.