# REPORT OF THE CHAIRPERSONS OF SESSION VI: RESEARCH METHODS AND APPLICATIONS

**Chairpersons: Johannes Schmetz and Paul Menzel**

Session VI, Research Methods and Applications, included ten presentations on advances and novel applications of satellite derived winds. It also included a talk on radar tracking and the effects of stray light on imaging.

Christopher Velden presented the “Determination of Wind Vectors by Tracking Features on Sequential Moisture Analyses Derived from Hyperspectral IR Satellite Soundings”, an application that will be possible with future hyperspectral instruments in geostationary orbit. The advanced sounders will enable tracking of water vapour in narrower vertical slabs thus minimizing any height determination errors. The concepts have been demonstrated by examining simulated hyperspectral data and with data from airborne observations.

James Purdom reported on “Geostationary Hyperspectral Imaging and Sounding: A Revolutionary Breakthrough in Satellite Derived Cloud Motion Vectors”, which contained convincing examples of how hyperspectral imaging will change and improve our capabilities to observe winds and rapidly changing atmospheric phenomena.

André Szantai’s talk on “Using Multiple Channels from MSG to Improve Atmospheric Motion Wind Selection and Quality” investigated the tracking of clouds and atmospheric clear-sky structures in the tropics. Novelties were the improved tracking of cirrus with the 13.4 µm channel and the tracking of water vapour features with the 7.3 µm channel.

The presentation by Guo Qiang on “Full-Field-of-View Stray light Estimation for FY-2 Meteorological Satellite Based on the High-Order-Statistical Eigenvalues” addressed the modeling of stray light in the Chinese FY-2 satellites. The improved understanding of those effects will be exploited in the FY-2B operational system.

Lars Peter Riishojgaard reported on “High-latitude winds from Molniya orbit: a mission concept for NASA’s Earth System Science Pathfinder Programme”. On the basis of the success of polar winds tracked in MODIS water vapour images, a new imaging mission is proposed with the prime objective of deriving winds at latitudes north of 60°. The baseline imager has six spectral channels which would also cover other high latitude applications.

Jeffrey Key, on behalf of Jennifer Francis, gave a presentation on “Arctic Tropospheric Winds from Satellite Sounders”. He described a new Arctic wind data set available for the period of 1979-2001 that shows improved biases in meridional winds compared to reanalysis and a general improvement in zonal winds above 700 hPa. The data set is also proving useful for the study of climatological anomalies.

The paper by Yanqin Zhu described the “Assessment and Applications of MISR winds”. The objective of the study was to evaluate MISR cloud-tracked winds in a global data assimilation system. Initial results show a small positive impact on forecast skill. The assimilation of MISR winds improves the fit of short-term forecasts to MODIS winds in the Southern Hemisphere.

Roger Davies reported on lessons learned from “Multi-angle Measures of Cloud Tracked Winds from MISR”. The evaluation of the MISR winds generally shows good agreement with other measurements. It is expected that further quality control will improve the MISR wind product.

The paper by Markus Peura and Harri Hohti described “Motion Vectors in weather radar images”. The method is based on the EUMETSAT method for feature tracking in Meteosat images. The product is used to forecast the advection of precipitation patterns. It works well and is one of the most popular products in the Finnish Meteorological Institute. In the future optical flow is considered a viable efficient alternative to the autocorrelation tracking which is rather time consuming.

The last presentation by Johannes Schmetz reported on “Upper Level Divergence Field in a Tropical Convective System Observed with Meteosat-8”. A case study based on Meteosat-8 data demonstrated that the upper level divergence field can be derived in consistent manner from both high density satellite tracked winds and the temporal change in upper level cloud cover with convectively active cloud. The paper also provided perspectives for future work including the divergence fields as gridded product for NWP potentially circumventing current problems with the assimilation of high density winds.

A related work on upper level divergence calculations from high level water vapour winds by M.S. Sakamoto from Brazil was also included as the authors could not attend the workshop. An interesting result of Sakamoto’s study is the clear relationship between increased upper level divergence and rain periods.

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