SESSION IV

NEW TECHNIQUES

Chairperson: Graeme Kelly

The fourth session heard presentations on research developments that show important insight into the nature of the targets that are tracked and how they relate to the scales of motion of the atmosphere.

The keynote talk presented by A. Szantai showed that some cirrus could be followed for a number of hours giving a trajectory of the flow. This paper written in conjunction with M. Desbois, reported on a investigation into the motion of cirrus clouds. It also included a comparison with radiosonde winds during one day of the ICE campaign. The findings indicated that there was good agreement between the velocity of these cirrus clouds measured in the water vapour channel of METEOSAT and the radiosonde measurements. A complementary approach to this study was the computation of trajectories. These observations indicated that some of the cirrus observed have a lifetime of more than 24 hours.

G. Büche gave a presentation concerning the interpretation of displacement vectors derived from pure water vapour structures in a series of METEOSAT scenes. The aim was to find a consistent interpretation. Ways to define a representative height for structure displacements was examined. The discussion highlighted the main uncertainties expected in the derivation of wind vectors from the displacement of structures in pure water vapour scenes.

J. Purdom provided a follow on from the previous winds conference discussing the latest findings in their research concerning the measurement of cloud heights. He showed what can be achieved with the use of very rapid scan and stereo in particular regarding rapid developing phenomena such as thunderstorms. The author hoped that the innovation of the time adjusted stereo and its recent modifications will allow for the replacement of temperature dependent methods with geometric calculations and help refine temperature dependent methods in other areas. J. Purdom concluded by showing some movies of two and a half minute cloud imagery. This showed many scales of motion such as: gravity waves on tops of status cloud decks, vertical motions at the tops of thunderstorms and the movement of the large scale cloud fields.

An investigation into the application of NeuroFuzzy techniques to the automatic extraction and height assignment of cloud motion winds from a time series of satellite images was presented to the delegates by F. T. Newland. He highlighted the advantages of NeuroFuzzy processing which has been showing potential for modelling unknown or complex functions in many fields. In the fuzzy rule base models the expert knowledge consists of subjective linguistic rather than precise mathematical statements. Following this a neural network learning algorithms are applied to the fuzzy system. The model thus identifies and tracks cloud objects. This presentation considered the ability of the model to derive a better approximation of the underlying windfield from the generated cloud motion winds, on both a regional and local basis.

Q. Wu presented his work concerning the speed and accuracy between different matching functions under various noise levels. He considered the experimental results between three popular matching functions: 1. the Cross-Correlation Coefficient, 2. Sum of Squared Difference, 3. Sum of the Absolute Value of Difference. The performance of the Sum of Squared Difference method appeared to be adequate without much sacrifice to the overall motion quality.

M. Rohn discussed his CMW research through the use of variational techniques. Wind fields from water vapour images also provide important information regarding upper tropospheric dynamics in cloud free areas. He described a functional analytical method in which motion analysis is represented by a variational problem and produced research findings which indicated an underestimation of wind speed and an improvement in the reconstruction of wind direction.

Finally, the delegates heard from A. Stoffelen who posed the question as to whether his work on scatterometer wind calibration method was useful for CMW? He presented results from a one year data set of triple collocations of NOAA buoys, scatterometer winds and ECMWF model winds. His preliminary analysis revealed that ECMWF winds were biased high with respect to the NOAA buoys, whilst the scatterometer upwind/downwind wind component was biased low and the other (cross wind) component was found to be much less biased.

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