

SESSION 4

FUTURE STUDIES AND DEVELOPMENT

Chairperson: P. Menzel

The fourth session heard presentations on research developments that have promise for future operational application and also plans for next generation wind processing systems. The keynote paper by T. Inoue of JMA reported on the feasibility of inferring low level vectors by tracking moisture features in the infrared windows in cloud free regions. In several case studies, tracking persistent moisture gradients produced good low level winds. This should increase the opportunity for good density of wind vectors especially in the regions of trade winds; however, operational implementation will require considerable care.

A presentation on the EUMETSAT operational system for 1995 was given by Y. Buhler of EUMETSAT. He announced that the system will be capable of producing hourly full disk wind vectors; this will enhance quality control and enable continuous assimilation in forecast models. There was some discussion on whether efforts are better placed toward global hourly winds or toward hourly wind derivation that focuses on different mesoscale areas developing between the four main synoptic times.

P. Menzel presented the paper of C. Hayden of NESDIS introducing recent progress in assigning meaningful quality flags to wind vectors. Research at the Cooperative Institute for Meteorological Satellite Studies has indicated that an improved autoeditor reduces speed bias and produces quality indicators that are useful for screening the data. The procedure adjusts the wind vector height to minimize a "penalty function" of temperature, wind vector, and height differences with respect to a model first guess. Additionally, an adjustment for the slow bias of the cloud motion drift vectors is introduced. While very good results were apparent, this raised the question of how dependent the final wind field should be on the model first guess.

G. Kelly of ECMWF indicated that all satellite derived winds were now being assimilated in the ECMWF model (the blacklist has been retired) and requested more effort on INSAT winds and in data sparse regions such as the Tropics. All data is useful if it has a quality flag. He introduced the new Variational Analysis which offers several improvements over the current Optimal Interpolation; the use of clear radiances in the model analyses was also foreshadowed.

The challenge of producing good wind estimates in the polar regions was made less daunting in a NESDIS presentation by J. Purdom. He showed results with polar orbiting satellite imagery where cloud motions were apparent in the 100-minute interval images and good cloud heights were estimated using cloud shadows and different viewing geometry in the multiple images. While this is a research program, operational possibilities were obvious and more effort in this area was encouraged.

Finally, Q. Wu of the New Zealand Landcare Research presented his work on a correlation relaxation algorithm for computing cloud motion. This approach considers many possible displacement vectors by exploiting problem knowledge in contrast to the presently favoured approach where only the maximum cross correlation position is considered. Using GMS data in several case studies, he was able to sharpen the wind field determinations.

In summary, tracking features (clouds, moisture gradients) in more frequent and shorter time interval multispectral image loops presents the opportunity to improve wind derivations in data sparse regions such as the Tropics. Satellite schedules must be revisited to create new windows of opportunity. Progress in assigning meaningful quality flags to cloud motion and water vapor drift winds increases the likelihood that all winds can have a positive influence on the model forecast; close collaboration between the wind producers and the wind users must continue.

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