

REPORT FROM THE WORKING GROUP ON METHODS (WG I)

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The working group began with a general discussion of the tracking algorithms used by various members of the working group. This was a good introduction because the wind producers exchanged general information which brought some new members to the workshop up to speed on algorithms for which they were not familiar. The co-chairman discussed the strategy to address issues of concern by the CGMS and other pressing issues of concern to the methods group. The eleven working group participants spent most of their time discussing four topics: 1) trade-offs between spatial and temporal resolution; 2) need for commonality in quality indicators; 3) improved winds in thin cloud situations; 4) the BUFR tables for exchange of wind products. The essence of these discussions and working group recommendations are presented below.

Several workshop presentations examined the trade-offs between image spatial resolution, temporal sampling, and wind errors. Since the lower limit on wind errors is determined by spatial resolution, sampling interval and image-to-image registration, limits on the use of rapid scan imagery needs to be recognised and navigation and registration accuracy needs to be improved. The preliminary results suggest that for 4 km pixels, a 5-15 minute image separation could be utilised to produce high quality winds if image registration is maintained to about one-fourth pixel (~ 1 km). One kilometre visible imagery could support the production of winds with image separation of 3-5 minutes if sub-pixel image registration is achieved. Unique data sets exist which can be exploited to verify these preliminary findings. ***The working group identified a requirement for registration and navigation accuracy to be better than 1 km for accurate wind determination.***

The ***need for commonality in quality indicators*** among the major wind producers was discussed and ***strongly supported***. While commonality in tracking algorithms is also desirable, satellite specific methodologies would prohibit this, although the availability of a standard algorithm for cloud height assignment with various "tuning" features was of interest to the working group. The working group encouraged continued efforts in this direction.

Recent work with FY-2 and GMS data has shown significant progress in developing an enhanced method to distinguish low cloud from thin cirrus in a tracking area. The procedure examines the correlation of suspect areas with water vapour and infrared imagery to better separate contributions from each and to improve height assignment. Additionally, emissivity differences between high and low clouds can be used in a single similar way by examining the split window channel difference field. The reflective characteristics of ice versus water clouds at 3.8 micrometers could be used in a similar way. As a consequence the height assignment of thin cloud tracers are becoming more reliable. ***The working group recommends additional research in the area of multispectral methods to improve height assignment.***

Methods exist which could provide improved target selection and feature tracking under certain conditions. It is difficult to implement many of these techniques operationally at this

time but the working group recognised the need to continue to refine such methods for case studies and individual situations. New approaches to wind tracking and height assignment which utilise data from multiple satellites or an entire sequence of high frequency imagery hold promise for future applications. These methods also require image registration and absolute navigation accuracy better than 0.5 km for optimal implementation and utilisation.

There was general support for the use of BUFR encoding for delivery of satellite wind products. NESDIS and EUMETSAT are prepared to do this.

The working group also had the following comments as an assortment of issues:

- The need to produce "targeted" high density winds in certain situations is reasonable and can be accommodated by the wind producers;
- There is a need to eliminate the dependence of quality indicators of first guess information so that these indicators better represent information not contained in NWP models. The continued use of guess information in tracking and height assignments procedures incurs no problems;
- The feasibility of using new (additional) channels to produce winds in data void regions has been demonstrated. A continued investigation of the utility of winds derived from additional channels is encouraged;
- Algorithm exchange and intercomparison has been performed on a limited basis. The working group recommends continued efforts in this area with a broadened scope to include dissemination of common data sets, involvement of other wind producers, and the use of a variety of tracking and height assignment methods.

It was also agreed that archived satellite data ought to be readily available to the scientific community to support activities such as a wind re-analysis project. This activity would be a major undertaking because it requires significant resources both to restore the archived data and to reprocess wind datasets. There was disagreement as to which component posed the biggest challenge, *however the working group strongly recommends that archived data be restored* such that it could support such an effort. It was noted that this is already underway for METEOSAT data.