Special plenary session on AMV height assignments

Co-chairs: Mary Forsythe and Chris Velden

A plenary discussion on the issue of AMV height assignment provided an opportunity to talk about some of the limitations of the existing methodology, suggestions for improvement, ideas for investigating height assignment error further, and options for representing AMVs better in NWP. A summary of the main points is provided below:

1. Agreement that height assignment is a key problem to address for AMVs.

2. Ideas for investigating AMV errors further included:
   - AMVs derived from simulated imagery (e.g. Wanzong et al; Bormann et al., this volume).
   - Comparisons with sonde/model best-fit pressures (e.g. Daniels et al; Forsythe et al., this volume)
   - Comparisons with other sources of cloud properties, particularly the new opportunities with the A-train (including Parasol, Calipso, CloudSat). Also comparisons to stereo cloud top heights (e.g. MISR) and other derived cloud top pressure products (e.g. MODIS cloud top pressure and various geostationary imagery cloud top pressure products). Consideration of other cloud measurements e.g. optical depth (possibly use to represent thickness of cloud layer tracked) and cloud classification. Work together more with cloud communities.
   - Inter-comparisons of height assignment techniques.
   - Observation-background (model) statistics studies (e.g. NWP SAF) and/or comparisons to rawinsondes and aircraft winds.
   - Analysis of AMVs overlain on satellite imagery.

3. How can we improve AMV height assignment?
   - Improve the link between the pixels used for height assignment and those that dominate in the tracking (Borde et al, this volume). Example shown of where current practice can lead to high level AMVs being assigned to low level and vice versa.
   - Work towards producing a height assignment error estimate (or confidence indicator) with each AMV.
   - Consider bias correction of radiances prior to height assignment (e.g. Daniels et al, this volume).
   - Use of the latest radiative transfer models and higher resolution short-period forecast data.
   - Work to improve the height assignment techniques, particularly in known problem regions e.g. multi-level cloud, thin cloud over desert, etc. Work with the cloud communities to consider improvements.

   - Chris Velden presented a preliminary study that indicated a reduced root mean square vector difference against rawinsondes of 1-2 m/s could be achieved using a **layer** of best fit analysis rather than a level of best fit. Further work on this is planned at CIMSS. Treating the AMV as a layer rather than assigned to a specific level has 2 possible benefits. Firstly, the AMV does genuinely represent the movement of a mean-layer flow, and secondly it is a way of allowing for height assignment uncertainty.

4. Work in NWP
   - Consider modifying the observation operator to treat the AMVs as layer observations.
   - Use of a height assignment error (or quality indicator), when available, to help screen bad data and/or to adapt the observation errors.

5. Emphasis on data providers and assimilators working together in the AMV community to pursue these issues.