Evaluation of TOVS-products

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1 Introduction

A project concerning evaluation of TOVS-products is in progress at SMHI. TOVS-processing is done in near real-time at the satellite data receiving and processing station PROSAT during one week every two months. The term "near real time" means that the retrieval was processed as a low priority batch job on a VAX 8600 system. This means that the retrievals are processed during the evenings or nights. The TOVS processing system is described in [2]. One important modification to this algorithm is that the initial guess is the a +6h-forecast from the operational Limited Area Model (LAM) instead of climate. The more accurate initial guess motivated a change in the penalty term, described in [1]. The evaluation of the retrieved TOVS-products has been done in two ways.

- Objective comparison between TOVS-retrievals and radiosondes of temperature- and water vapour profiles. So far only NOAA-10 retrieval comparisons with radiosondes at 06:00 and 18:00 have been done.

- Subjective analysis of different TOVS-products — geopotential height, integrated water vapour, stability index and ozone. These products can be displayed on an image processing system together with other meteorological parameters, e.g forecasts from LAM and AVHRR data.

The project started in October, 1988 and will end in autumn, 1989.

2 Objective analysis

We have compared the parameters layer mean temperatures at 850/1000, 700/850, 500/700, 400/500, 300/400, 200/300, 100/200 and 70/100 hPa
and integrated water vapour at 400/1000, 400/850, 400/700 and 400/500 hPa. Because we have only used NOAA-10 satellite soundings compared to radiosondes launched at 06:00 or 18:00 the number of comparisons are limited. There are 15–20 radiosondes available to compare with. These are from Finland, the Netherlands, German Democratic Republic, Czechoslovakia, USSR and some Atlantic weather ships. The radiosonde and satellite retrievals shall not be separated with more than 3 hours in time and more than 150 km in distance.

For the five months we have measured until now (October, December, February, April and June) the RMS-difference between radiosonde and satellite temperature retrievals are 2–3 degrees. The corresponding difference for integrated water vapour 400/100 hPa is 2–3 mm. A more detailed analysis will be done and some special experiments will be arranged during the autumn.

3 Subjective analysis

The parameters geopotential height 500hPa, integrated water vapour, stability index (KO-index) and ozone have been displayed on an image processing system. The parameters can be displayed together with other meteorological parameters, e.g. AVHRR-data, weather radar data and forecasts from the Limited Area Model.

The objective of the manual check of these parameters was to evaluate the goodness of the parameters in different situations and to see if they could contribute in the forecasters diagnosis in the prediction process. The most interesting parameter in this test was the stability index. One of the forecaster's duty is to foretell the risk of convection and thunder during the day. If a stability index is able to indicate certain cores of high instability before the convection starts then this TOVS product might be interesting. The ozone values are interesting today to monitor since the discussions in some reports indicate un-normal conditions and correlated risks.

4 Future plans

In June, 1989 there was a Nordic Satellite Soundings symposium in Norrköping, see [3]. The symposium has given some proposals for Nordic projects in the area of satellite soundings. These proposals are divided in two different areas,
• regarding operational use,

1. Monitoring and tuning of satellite information.
2. Documentation of ITPP.
3. Quality control of preprocessed data.
4. Transmission of western Atlantic TOVS data to the Nordic meteorological institutes.

• regarding applications of TOVS data in Northern latitudes

1. Construct a data set containing polar low situations.
2. TOVS in Northern latitudes.
3. Preparation for AMSU

In order to use our limited resources in the best way, we welcome cooperation with other institutions, both within the Nordic countries and in the rest of the world community.

References


THE TECHNICAL PROCEEDINGS OF THE FIFTH INTERNATIONAL
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