INTRODUCTION

Since 1978 polar orbiter HRPT data have been received locally at DNMI in Oslo. AVHRR pictures are processed operationally. The ITPP 3.b was implemented in 1987. During 1988 statistical software including graphics was developed as a tool for experimental processing and evaluation of TOVS data. Last year the first assimilation experiments were performed. Two limited area models with 50 and 150 km mesh grids run operationally at DNMI.

Results from experiments using TOVS data processed with the 3I method in cooperation with LMD will be presented. No positive or negative impact of TOVS data on the forecasts has been found. The presentation follows the satellite data through the analysis and initialization procedures and ends up with some remarks on varying data quality and our future plans concerning this subject.

THE LAM SYSTEM

DNMI runs operationally two limited area models, LAM50 and LAM150 with mesh grids 50 and 150 km. These systems have been described in several publications, S. Grønås and K.H. Midtbø (1986), A.M. Bratseth (1982) and (1986). Some points relevant to the assimilation experiment are:
- Figure 1 shows the analysis and forecasting area, 121*97 horizontal grid with resolution 50 km covering 4 times the operationally run LAM50.
- analysis is performed at 11 pressure levels from 1000 to 100 hPa
- the basic analysis method is based on a successive correction method proposed by A. Bratseth (1986). He has shown that the results converge to the results from optimal interpolation.
- dynamical initialization - a simple alternative to the non-linear normal mode initialization proposed by A. Bratseth (1982)

THE 3I SYSTEM

The 3I system is documented in Chedin and Scott, (1984) and in Chedin et al, (1985). Special attention has been paid to
problems at high latitudes (C. Claud, 1989) which is one reason that TOVS data processed by the 3I method are being investigated at DNMI. The profiles are retrieved without use of surface data.

ASSIMILATION EXPERIMENTS

Two passes from NOAA-10 were analysed through the 3I system: 29.02.1988 at 17:07 and 01.03.1988 at 8:33

Thicknesses between 1000.700, 700.500, 500.300 and 300.100 were assimilated. The standard deviations and the vertical correlations for the observational errors of TOVS derived thicknesses have been deduced from calculations performed by Kelly and Pailleux (1988), although we know that these parameters are not independent of retrieval method or the satellite.

Two separate assimilation experiments were performed:
1. assimilation 29.02.1988 at 18:00 followed by a 6 h forecast
2. assimilation 01.03.1988 at 12:00 followed by a 6 h forecast

Figure 2 shows the locations of the TOVS data assimilated at 01.03.1988 at 12:00

In both cases a 6h forecast from the operational LAM150 was the background field for the new analysis. In order to discriminate the impact of TOVS data we have compared forecasts with only TOVS data to forecasts where no data where assimilated, and forecasts with both TOVS and conventional observations to forecasts with only conventional observations. No positive or negative impacts were found in the forecasts. In fact the meteorological situation is stable and rather insensitive to any kind of observations.

However we found that satellite data survived the analysis and initialization procedures. Figure 3 focuses on an area where there was significant impact of TOVS data on the analysis.

3.a shows differences between 3I thicknesses and the background field, the background field is contoured.
3.b shows differences between 3I thicknesses and the analysed field, the analysed field is contoured.
3.c shows differences between 3I thicknesses and the analysed field after initialization, the analysed field is contoured.
3.d gives increments between the initialized analysis and the background field.

FURTHER PLANS

In the first assimilation experiments we have not stratified the error statistics for TOVS data on either clouds or other parameters that might influence the data quality. It is planned to investigate these statistical relationships further as part of doctoral studies in statistics.
REFERENCES


THE TECHNICAL PROCEEDINGS OF THE FIFTH INTERNATIONAL TOVS STUDY CONFERENCE

Toulouse, France

July 24-28, 1989

Edited by A. CHEDIN

Laboratoire de Météorologie Dynamique (CNRS)
Ecole Polytechnique,
91128 Palaiseau Cedex
France

January 1990