TOVS ACTIVITIES AT THE ITALIAN METEOROLOGICAL SERVICE

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Abstract

ITPP 3.3 software package has been installed at the Italian Meteorological Service and experimental results were produced. The processing method includes the simultaneous physical retrieval and the possibility of injecting surface data obtained by ECMWF 6-hour forecasts. A first comparison with RAOB's shows a good matching, with a standard deviation contained within 1.5 °C.

1. Introduction

ITPP 3.3 software package for TOVS processing has been implemented at the Italian Meteorological Service, and the first experimental results, in terms of maps of thicknesses and actual profiles, have been analyzed.

The plans for TOVS processing are based on the development of products to be used, as a first priority, in a qualitative way by the operational forecasters to support mainly nowcasting activity and, as a second priority, as an input for the fine mesh limited area model under implementation.

TOVS data are received in real time by the HRPT station installed at the Italian Meteorological Service. HRPT data are stored on a mass storage (capacity up to 12 min passage, or more shorter passages) and, on tape, for a domestic temporary archive and for the delivery to ESA/ESRIN, managing the TIROS data archive in the framework of the Earthnet Programme. Tip data are permanently archived on tape (fig.1).

For more details on the HRPT station and on TOVS data circulation scheme within the Italian Meteorological Service reference can be made to Pagano, 1988.

2. Processing scheme

The ITPP package, acquired by the University of Wisconsin, Madison, USA, has been installed on the main frame computer, an IBM 3090/120, and some experiments were performed using the simultaneous physical retrieval method.
At present, the initialization procedure is carried out by means of the regression estimation of the first guess profiles, included in the package; surface data, computed by interpolating the nearest ECMWF 6-hour forecasts can also be injected in the retrieval procedure. The output is both archived for further processing and routed to the graphic system for presentation on the operational consoles (fig. 2).

The retrieved profiles are also compared off line with the actual RDS profiles for a quality control estimate.

As a next step the automatic comparison of meteorological fields, retrieved from satellite (geopotential, temperature etc.) with the objective conventional analysis fields is being implemented.

3. Experimental results

While on line TOUS processing is going to become operational for experimental use by the operational forecasters, a preliminary evaluation of results has been carried out by means of a comparison with radiosonde profiles and objective analysis based on conventional observations. In figs. 3a and 3b the position of the Italian RAOB network and the coverage of the Rome HRPT station is reported. Only retrieval without surface data are here presented.

a. case 1 - 25 May 1989

Fig. 4 shows the comparison between satellite soundings from NOAA 10, 07.58 UTC, and the seven Italian radiosonde observations at 12.00 UTC. The standard deviation and the mean absolute difference (TOUS -RDS data) are always contained within 1.5 °C and 2.5 °C respectively in the middle troposphere; single station profiles fit well with the retrieved profile, except at the surface. This is due to the absence of actual surface data in TOUS processing and to the quite long time departure.

b. case 2 - 8 June 1989

In fig. 5 the standard deviation and the mean absolute difference between TOUS data from NOAA 10, 07.46 UTC, and the Italian RAOB's, 12.00 UTC, is presented. In fig. 6 the comparison between the temperature field and the objective analysis from conventional observation shows a tendency of TOUS data to be colder than the corresponding RAOB's.

c. case 3 - 27 June 1989

In fig. 7 and 8 the comparison between TOUS data from NOAA 10, 07.15 UTC, and radiosondes, 06.00 UTC, is shown, together with the corresponding AVHRR image (fig. 9). In particular the map of thicknesses shows a general shape fitting with the analysis field, however with a cooling effect on the satellite data side.
4. Conclusions

The activity described before represents a first step towards the regular use of TOUS data at the Italian Meteorological Service.

After the first evaluation, experimental results seem to be conformatable. However they are based on a very poor statistics that needs to be increased and associated to objective indicators of fitness.

On the operational side, although, at present, the procedure described is running on command by the operator and requires supervision during processing, the goal is to made available TOUS products automatically and within operational timeframe.

Reference:

EXTRACTION OF THE NEAREST FORECASTS TO SAT. PASS. TIME. THE INTERPOLATION OF THEM GIVES THE SURFACE DATA.

PRESENT

- Processed for obtaining maps and vertical profiles on graphic display (nowcasting applications)

- Processed for comparison with radop's

FUTURE

1) Comparison with the analysis and forecasts

4) Assimilation by a 4-dimensional analysis scheme to be used in LAN
Fig. 3a - Italian Radiosonde Network

Fig. 3b - Coverage of Rome HRPT Station
DATA SET:
SEVEN ITALIAN ROS SITES (25 MAY 85, H 12:00) AND COLOCATED
SATELLITE SOUNDINGS (25 MAY 85, H 17:58, NOAA-10, 6 T PP 2, PHYSICAL
REGRESSION, NO SURFACE DATA)
DATA SET:
SEVEN ITALIAN RDS SITES (8 JUNE 1987, 18:00) AND COLLOCATED
SATELLITE SOUNDINGS (8 JUNE 1989, NOV. 6, NOAM: ITPR2, PHYSICAL
REGRESSION, NO SURFACE DATA)

FIG. 5
**FIG. 7**

**DATA SET:**
Seven Italian RDS sites (27 June 89 10:06:00) and colocated satellite soundings (27 June 89 11:02:15 NOAA-10, 11PP 3.3, physical, regression, no surface data)

- **RDS (Pratica di Mare 41.60N, 12.40E)**
- **Satellite Sounding (41.50N, 12.50E)**
- **Standard Deviation TOVS/RDS**
- **Mean Absolute Difference |TOVS - RDS|**
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