

Processing and interpretation of TOVS data at the Institute of Physics of the Atmosphere, Czechosl. Acad. Sci. (IPA CAS)

P. Zacharov, P. Kočíková, Z. Sokol
Institute of Physics of the Atmosphere, Czechosl. Acad. Sci.
Boční II
141 31 PRAHA 4, Czechoslovakia

1. Introduction

Two HRPT receiving station work in Czechoslovakia, in the Czech and Slovak Hydrometeorological Institutes. Data of AVHRR have been regularly received since 1979, TOVS data experimentally since 1985, on daily basis then since 1988. Both of these data are processed and evaluated at IPA, for modelling of atmospheric phenomena and for numerical weather prediction.

2. Processing TOVS data

As a part of the Interkosmos program we started with experimental retrievals of temperature profiles using the statistical method completed at the Meteorological Servis of SDR [1]. We used them in refinement of the objective analysis of temperature and heights of geopotential levels and also of several cloud characteristics [2,3]. The correction method of analysis is used, with non-symmetric weighting functions and varying radii of influence [4]. Data SYNOP, TEMP, TOVS and AVHRR are on an input. All sounding points of TOVS within the prognostic area are utilized, but they are controlled with the nearest TEMP sounding and omitted if do not reached the quality criterion (a quite wide interval is used for it). After coupling TOVS and TEMP+SYNOP analyzed fields, another smoothing is accomplished (fig.1). But using the resulting fields in the prognostic process, we cannot notice any unambiguous improvement. Two causes of it are evident: too short experience and too crude smoothing, which does not correspond especially to our latest goals, consisting in modeling and prediction of frontal phenomena typical for the complicated orography of CSSR. We work on the prognostic grid with a grid-step 32 km (or smaller) and the quality of TOVS profiles retrieved with the method mentioned above is not probably high enough for this reason.

3. Reprocessing AVHRR data

The AVHRR data are processed in surroundings of all grid-points of the prognostic area; picture windows of 16x16 or 8x8 pixels are used for pattern recognition [5]. Several cloud characteristics are then derived (different cloud amounts, heights of upper levels, etc. [6,7]), which are again transferred to relative humidities and analyzed [7]. Experiments with derivation of other characteristics of the humidity fields are in progress (mixing-ratio, liquid water content, etc.). Collocation of AVHRR and TOVS data has been accomplished [2]. The set of analyzed "cloud characteristics" is completed with heights of upper levels from IR Meteosat data and heights of lower limits from SYNOP messages. The research in this fields continues.

4. Some conclusion and future plans

Cloud amounts and heights of upper levels of cloudiness which are obtained as a by-product during the retrieving process [1] were compared with similar data from other sources (SYNOP, AVHRR, radar, Meteosat) [3]. Not very large set of data was used, but, evidently, the quality of TOVS products was not satisfactory. The retrieving process needs more research and -among others- the method used is too time-consuming for our computing facilities.

At present we try, at the one hand, to improve a little the method [1] raising the quality of necessary a priori data, recalculating temperature covariance matrices and selecting an optimal TOVS sounding grid. We also started first experiments with the TOVS retrieval program package prepared at the Sidrometcentr, Moscow. Very important for us is the TOVS humidity information, but we have not had any experience with it and the humidity analysis is ever completed using only TEMP, SYNOP and AVHRR data [7], (fig.2).

On the other hand, we would appreciate to continue our work also with TOVS PC-program package, because of the installation of PC (IBM compatible) local area network in our Institute.

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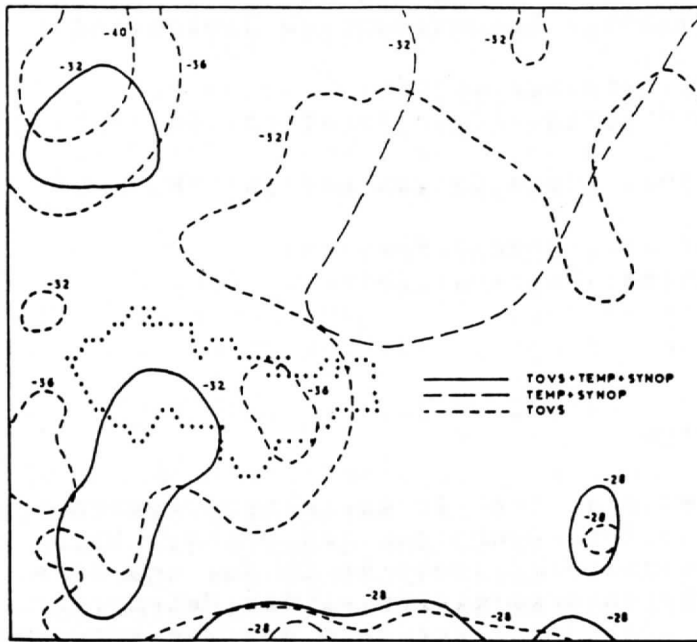


Fig. 1. Temperature analysis, 13.J., 12 00 GMT, level 500 hPa.
 Prognostic grid 25 x 20 points, a grid-step 75 km.

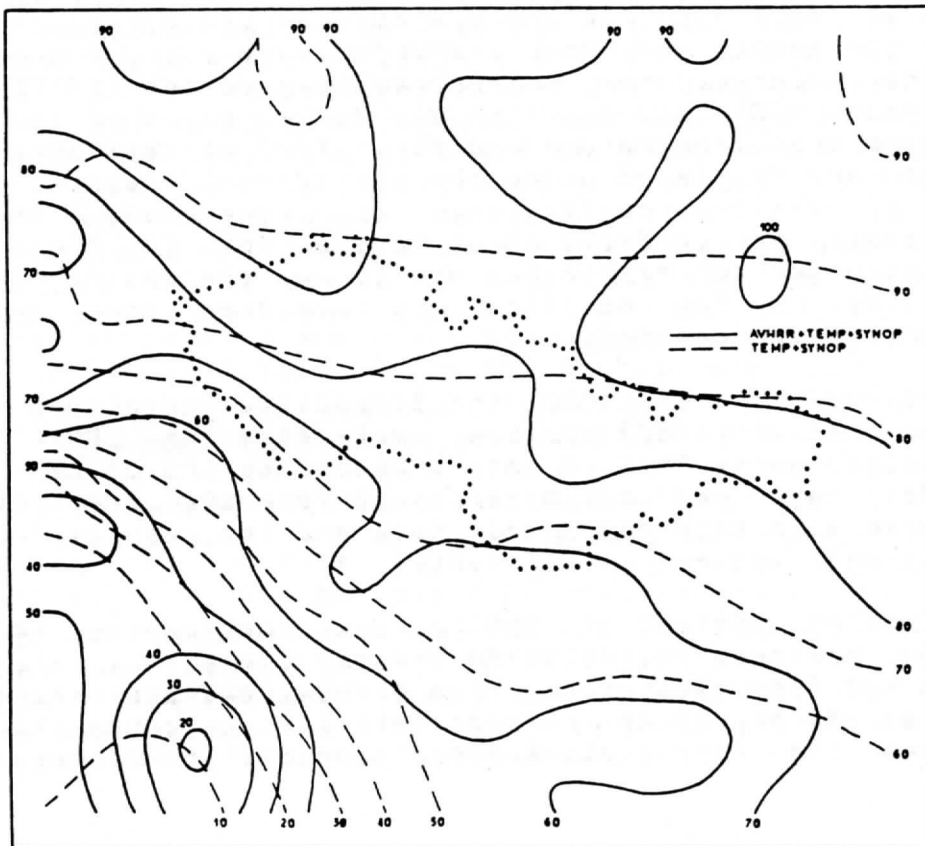


Fig 2. Relative humidity analysis, 7.11.1988, 12 00 GMT,
 level 850 hPa. Prognostic grid 11 x 20 points.

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

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