

# OPERATIONAL USE AND EVALUATION OF ITPP5 PRODUCTS AT THE HUNGARIAN METEOROLOGICAL SERVICE

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## 1. THE HRPT RECEPTION AND PROCESSING SYSTEM

TOVS data have been processed operationally by ITPP5 since January 1996 at the Satellite Research Laboratory of the Hungarian Meteorological Service. From the HRPT data stream TIP data of each available orbit and AVHRR data from the near-zenith orbits are extracted and archived. ECMWF first-guess surface and atmospheric data have been used in the operational ITPP5 processing since January 1997. The processing takes place on an HP-715/75 UNIX workstation, an HP ENVIZEX station and on a network of 486 and Pentium PCs.

One of the principal aims of these efforts is to provide the FX-type Hungarian Meteorological Workstation with real-time TOVS-derived meteorological fields and AVHRR imagery. In this paper results of the evaluation of ITPP5-derived total precipitable water and total ozone amounts are presented.

## 2. EVALUATION OF ITPP5 TOTAL PRECIPITABLE WATER AMOUNTS

ITPP5 total precipitable water amounts have been compared to radiosonde and GPS (Global Positioning System) measurements for March, April and May 1996. The GPS precipitable water amounts were determined from two-hourly estimates of the tropospheric delay and from surface meteorological data (*Bevis et al.*, 1992, *Bevis et al.*, 1994). Fig. 1 shows the locations of the permanent GPS stations whose data were used in this comparison.

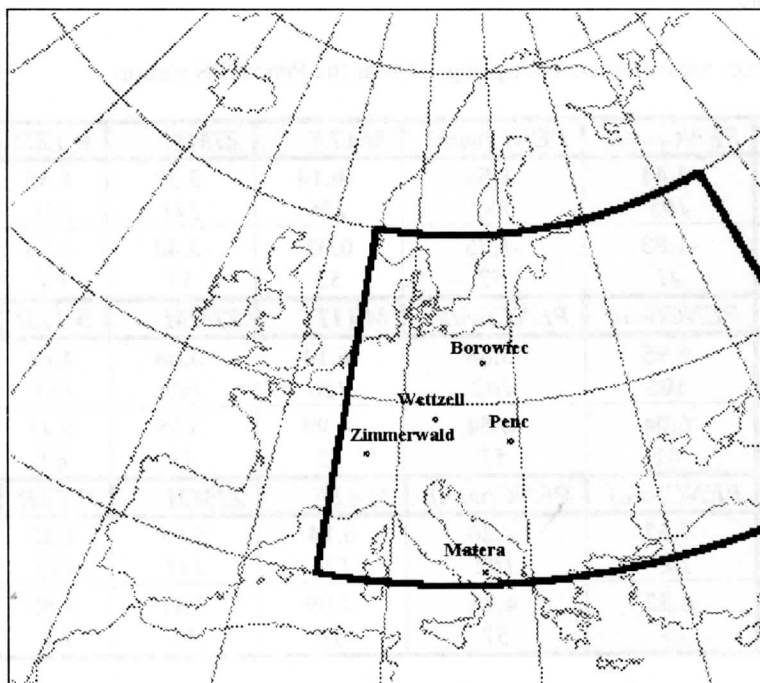


Fig. 1 Locations of the GPS stations used in this study. Also shown is the area where ECMWF data are assimilated into ITPP5

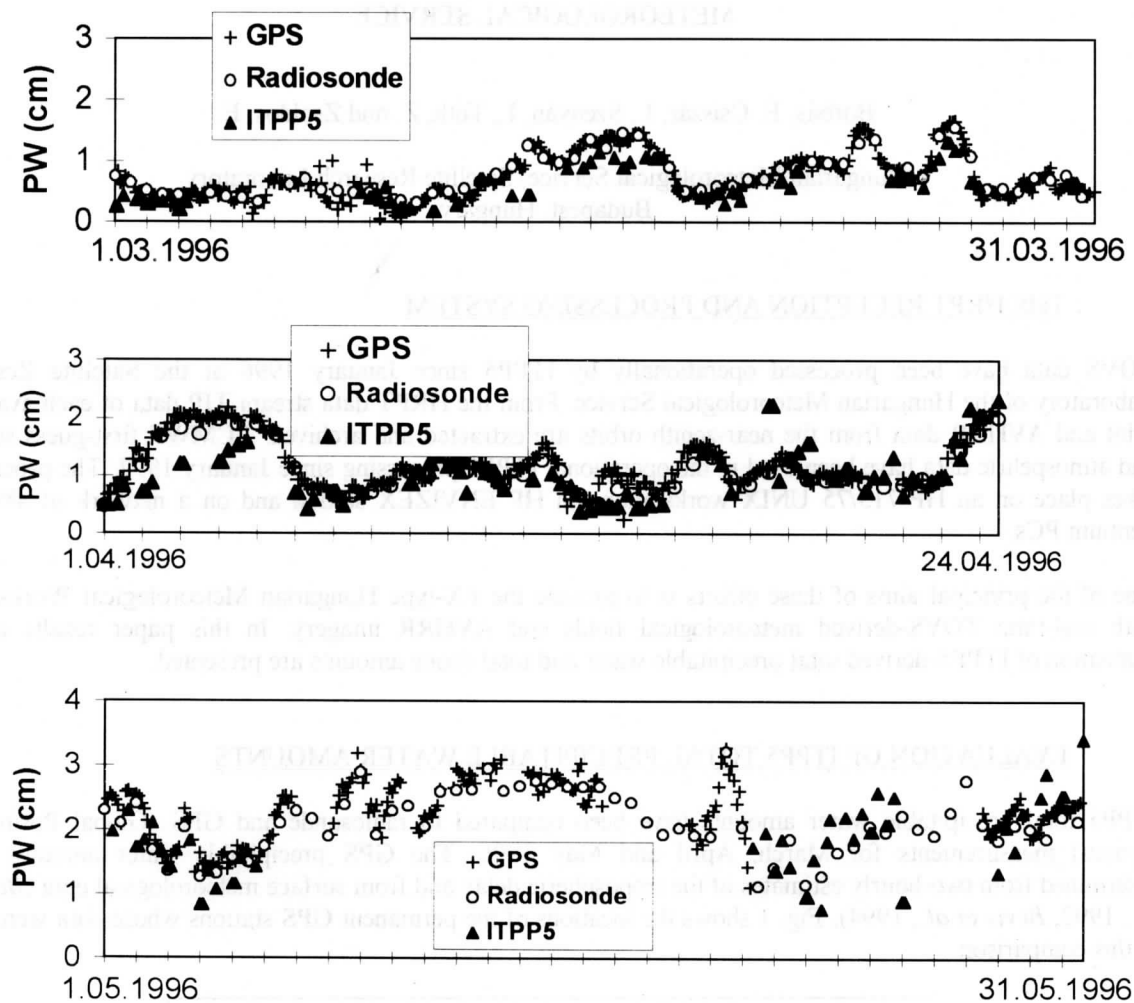


Fig. 2 Precipitable water measurements in Spring 1996 at the Penc GPS station

<i>bias</i>	<i>PENC(w/o)</i>	<i>PENC(with)</i>	<i>MATE</i>	<i>ZIMM</i>	<i>WTZR</i>	<i>BORI</i>	<i>ALL</i>
<i>GPS-ITPP5</i>	2.44	1.59	-0.14	3.39	1.35	-1.14	0.95
<i>case no.</i>	105	102	126	141	135	156	660
<i>ITPP5-RAD</i>	-1.83	-1.75	0.02	-3.43	-1.78	-0.05	-1.39
<i>case no.</i>	41	57	52	53	64	61	287
<i>stdev</i>	<i>PENC(w/o)</i>	<i>PENC(with)</i>	<i>MATE</i>	<i>ZIMM</i>	<i>WTZR</i>	<i>BORI</i>	<i>ALL</i>
<i>GPS-ITPP5</i>	6.95	3.88	6.14	3.68	4.03	3.93	4.68
<i>case no.</i>	105	102	126	141	135	156	660
<i>ITPP5-RAD</i>	6.04	4.54	4.99	3.75	3.41	3.99	4.31
<i>case no.</i>	41	57	52	53	64	61	287
<i>rms</i>	<i>PENC(w/o)</i>	<i>PENC(with)</i>	<i>MATE</i>	<i>ZIMM</i>	<i>WTZR</i>	<i>BORI</i>	<i>ALL</i>
<i>GPS-ITPP5</i>	7.37	4.20	6.14	5.01	4.25	4.08	4.77
<i>case no.</i>	105	102	126	141	135	156	660
<i>ITPP5-RAD</i>	6.32	4.88	4.99	5.11	3.85	3.99	4.52
<i>case no.</i>	41	57	52	53	64	61	287

Table 1. Bias, standard deviation and rms error (mm) between TOVS, GPS and radiosonde-derived precipitable water amounts for April-May 1996

Figure 2. shows the temporal variation of precipitable water at the Penc GPS station, situated 20 km north-east of Budapest, Hungary, as observed by GPS, radiosonde and ITPP5 measurements. It can be seen that ITPP5 data generally follow the trend shown by GPS and radiosonde data. However, in several cases large ITPP5 retrieval errors can be observed.

We also investigated the effect of the inclusion of ECMWF first-guess information into the ITPP5 processing. The collocation statistics for Penc show an improvement in the quality of the ITPP5 retrievals with the inclusion of ECMWF data (Table 1). Also shown are collocation statistics for the other GPS stations used in the comparison. Here the results were obtained using ECMWF first-guess information. The notably high biases for Zimmerwald are probably due to the high elevation of this station, which affects the accuracy of the ITPP5 retrievals.

### 3. EVALUATION OF ITPP5 TOTAL OZONE AMOUNTS

ITPP5 total column ozone values are monitored operationally by comparing the retrieved values to measurements of the local Dobson spectrophotometer. They have been proven to provide useful complementary information when Dobson data are not available. Fig. 3 shows an ITPP5 - Dobson comparison for 1996. ITPP5 data tend to overestimate the Dobson measurements, producing an annual bias of 22 DU. It should be noted, however, that there was a temporal variation in the difference; the bias in the second semester (33 DU) was significantly higher than in the first semester (10 DU).

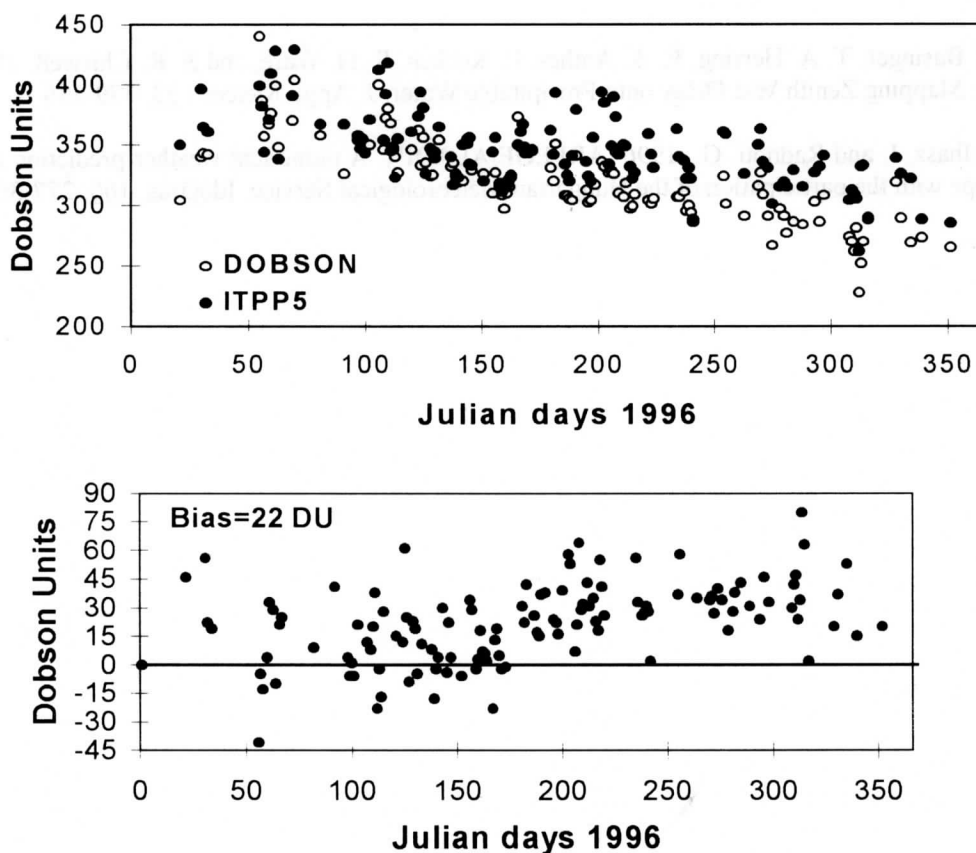


Fig. 3 ITPP5 and Dobson total ozone amounts (above) and the annual variation of the ITPP5-Dobson difference (below)

#### 4. FUTURE PLANS

In the near future NWP first-guess information for ITTP5 will be taken from analysis and forecast fields of the fine-mesh ARPEGE/ALADIN model (Horányi et al., 1996). Also, preparations for the operational processing of ATOVS data are under way. These include the necessary modifications in the HRPT data extraction software and the preparations for the installation of an ATOVS processing package. Researchers from our team are planned to participate in the development and testing of AAPP within the framework of a collaboration between Meteo-France and the Hungarian Meteorological Service.

#### 5. ACKNOWLEDGMENTS

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