ICI VERSION 3 RETRIEVAL PACKAGE

Lydie Lavanant. Pascal Brunel. Laurent Gendrier. Guy Rochard
Météo-France/SCM/CMS

1. SUMMARY

The ICI sounding scheme developed at CMS/Météo-France for the processing of HRPT data is interfaced with the ‘Atos and Avhrr Preprocessing Package’ level1d files and performs retrievals in an operational way at CMS for TOVS and ATOS channels since 1984.

The main scientific characteristics of the IClv2 processing HIRS/AMSUA and the accuracy of the retrieved temperature profile for Noaa15 over Europe are given in Lavanant, 1999. The version has also been implemented in some other HRPT stations, in the context of bilateral cooperations between Meteo-France and other countries, for example in Hungary (Borbas, 1999, 2000), China (Wu, 2000) and LaRéunion. A graphic package inside the ICI package based on the freeware GMT graphic package is used by each ICI user to display on a common website, the accuracy of their retrievals in a near real time.

The IClv3 now process AMSUB water vapor channels together with HIRS/AMSUA for retrieving the humidity profile and integrates Noaa16 channels. This version has been delivered to EUMETSAT in the frame of the NWP SAF and is available to every AAPP users (beta-testers). Section 2 presents the main characteristics of the package. Temperature and humidity error statistics are presented for Noaa16 in the last section.

2. ICI PACKAGE SUMMARY

The ICI package performs in an operational way, retrievals of atmospheric temperature and water vapor profiles from HRPT observations. This package including IClv3 is now available to beta-testers through EUMETSAT by following the same procedure than for AAPP at http://www.eumetsat.de. It has been developed for UNIX platforms in Fortran77 with structure extensions and has been implemented and tested on SUN and HP machines.

The ICI package reads the output files of AAPP (hirs level1d files). So, if you want to use it, you should first install the AAPPv3 package.

Running options are possible to cover several users possibilities:

- from a ‘minimum’ configuration for users who have no access to NWP fields. In that option, a climatological library (TIGR2) is used as guess library and no forecast surface parameters are used. The tuning files are ‘manual’ which means that the user creates the adjustment coefficients off-line.

- to a ‘complete’ configuration with a rolling guess dataset created from ancillary analyses fields, forecast surface information (surface pressure, temperature and wind speed) and tuning coefficients computed from colocations with radiosonde and/or analyses automatically created by the package itself.

Different configuration levels are possible between these extremes by changing the values of parameters in an external file. NWP analyses and forecast fields are read in GRIB or ASCII formats and radiosonde in BUFR or ASCII formats. However, the GRIB and BUFR libraries are not included in the package.

Five result coding routines (ASCII, SATEM, GRIB, AAPP level2, BUFR) are available to read the binary ICI output file and are activated on request.

The ICI package contains the RTTOV6 forward software that is used for computing the radiances of the guess library and inside the 1D-Var module.
It also contains a graphic tool to visualize the level1d information, the retrieved fields and the statistics for the validation in postscript and gif format. It is based on the freeware GMT package. A web page is also provided for an easy look of the result and a possible intercomparison with the CMS statistics available on the Internet.

On the CD-Rom, you have all what is necessary to test ICI: all necessary NWP files (both in GRIB and ASCII formats) for 18 days together with hirs level1d files for the same days are provided. To compare the results, some output files (delta, statistics, graphics) are also included in the test. We run the test for the 3 options: minimum configuration, complete configuration with NWP data read in ASCII format and complete configuration with NWP data read in GRIB.

A large documentation is available with the CD-Rom: users guide, scientific and software documentations.

3. VERSION 3 UPDATES AND ACCURACY

This new version is now processing AMSU-B sounding channels (over land only channels 3 and 4 to avoid surface emissivity problems) together with H11 and 12 to retrieve water vapor profiles.

Figure 1 shows for Noaa16 the error statistics concerning the mean and standard deviation of the inversions compared to the analyses and radio soundings over sea for temperature (left) and humidity (right) on the RTTOV6 working levels.

![Figure 1: Noaa16 temperature and water vapor statistics over sea for a 10 days period on RTTOV levels](image)

Using AMSU-B channels in extra improves the relative humidity RMSE of less than 5% for clear situations and more than 10% for cloudy scenes. However, the departures between retrieved and analysis/radiosonde humidity data near the surface is often large when computed from colocated situations, up to 20% in relative humidity, mainly over land. But the position of the meteorological humidity fields is always well predicted. Figure 2 is an example of ICI specific humidity field at 1000hPa (left) compared to the nearest French Arpege
analysis (right). An effort should be done in the future months to improve the definition of the micro-wave surface emissivity over land by implementing an atlas in the package or by using a regression model with AMSUA1,2 and 3 observations (Weng, 2000).

Figure 2: Example of water vapor retrieval field for Noaa16. orbits 01616, 01617, 01618 (2001/01/14)

All these results can be seen on the ICI web site and are updated every day at http://www.meteorologie.eu.org/ici.

4. REFERENCES

Borbas E., Szenyán, Randriamampianina, 1999 : Current status for operational processing of TOVS data at the Hungarian Meteorological Service.
Borbas E., Randriamampianina R., Szenyán, 2000 : Perspective on the operational use of TOVS and ATOVS at the Hungarian Meteorological Service, ITSC 11, this issue.
Weng, 2000: Developments of a fast and accurate microwave land emissivity model for satellite data assimilation and remote sensing application, ITSC11, this issue
TECHNICAL PROCEEDINGS OF THE ELEVENTH INTERNATIONAL ATOVS STUDY CONFERENCE

Budapest Hungary
20-26 September, 2000

Edited by
J.F. Le Marshall and J.D. Jasper
Bureau of Meteorology Research Centre, Melbourne, Australia

Published by
Bureau of Meteorology Research Centre
PO BOX 1289K, GPO Melbourne, Vic., 3001, Australia

June 2001