

Status Report from the International (A)TOVS Working Group (ITWG) Allen Huang & Steve English, Co-chairs Iguacu, Brazil 5 August 2008



<http://cimss.ssec.wisc.edu/itwg/>

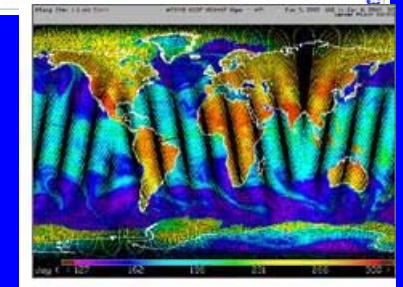
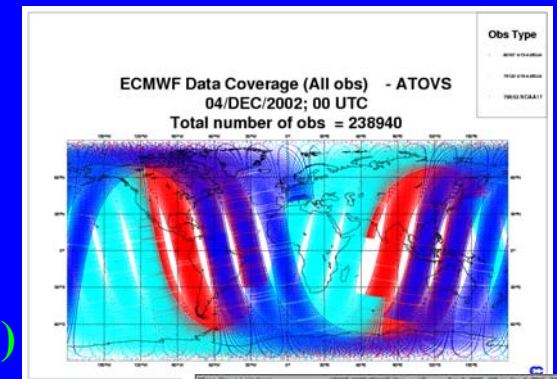
Working Groups:

- Advanced Infrared Sounders
- ATOVS/TOVS data in NWP
- ATOVS/TOVS in climate studies
- International Issues and Future Systems
- Radiative transfer and surface property modeling
- Satellite Sounder Science and Products

Sharing ideas, plans and techniques to study the earth's weather using space-based observations

Technical Sub-Groups:

- AAPP (ATOVS and AVHRR Pre-Processing Package)
- IMAPP (International MODIS and AIRS Processing Package)
- Frequency Management
- RTTOV (Radiative Transfer (A) TOVS)
- Direct Broadcast



ITWG Mission

The ITWG serves as a forum for operational and research users of TIROS Operational Vertical Sounder (TOVS), Advanced TOVS (ATOVS) and other atmospheric sounding data to exchange information on methods for extracting information from these data to create atmospheric variables, and on the impact of these data and products in numerical weather prediction and in climate studies.

ITWG organizes the International TOVS Study Conferences (ITSC), which have met every 18-24 months since 1983. So far 16 conferences have been held.

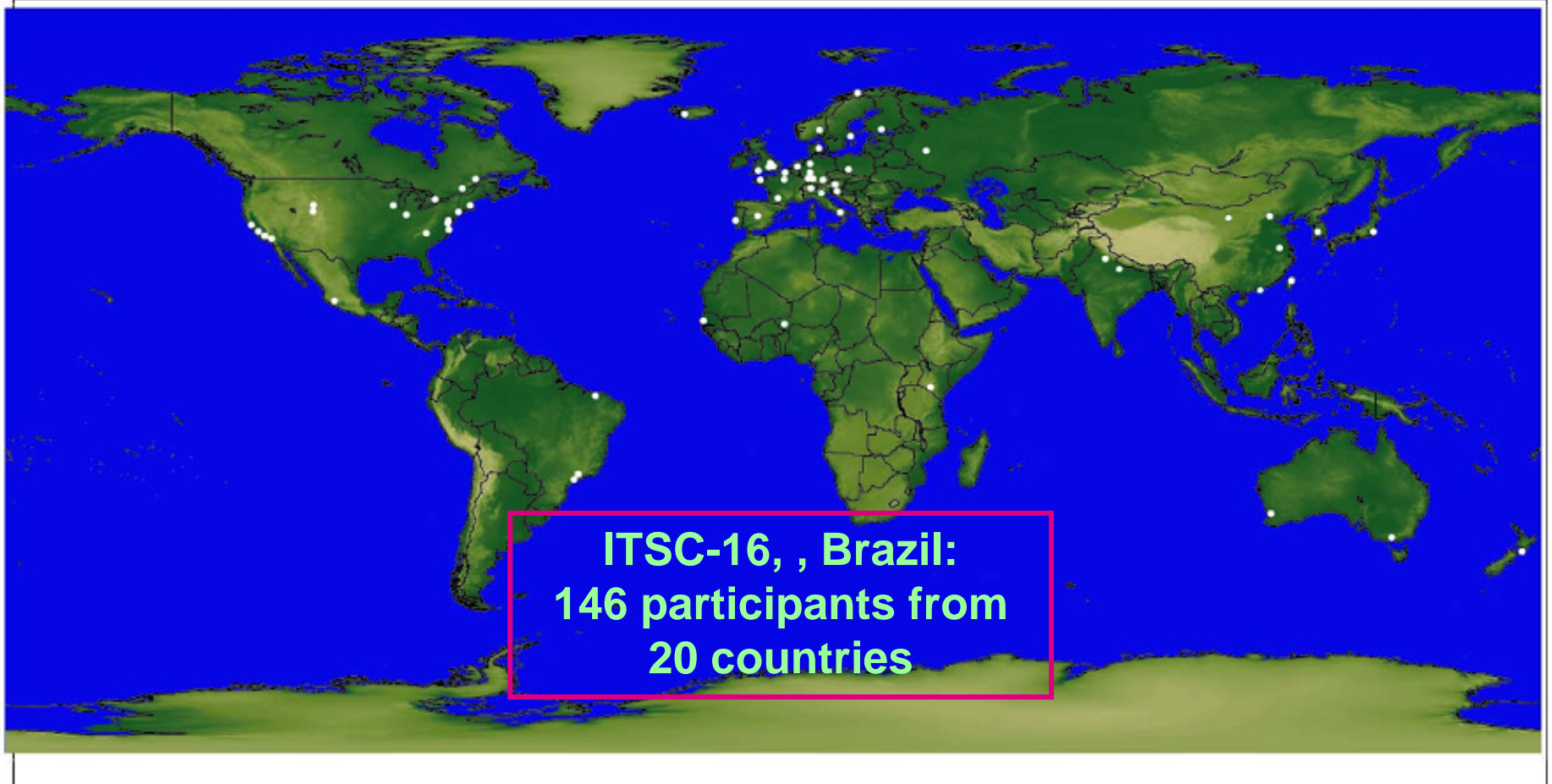
ITWG Mission - continue

The ITWG meetings result in recommendations and actions to guide the directions of future research and to influence relevant programs of the WMO and satellite provider agencies (e.g. NASA, NESDIS, EUMETSAT, NSMC, JMA, ISRO).

An important part of the group's work has been to foster and participate in the generation of software to be shared throughout the community to enable use to be made of these data for operations and research.

The group also is developing an important education and training role through the WMO and other collaborative and member actions.

ITWG Members are located worldwide



**ITSC-14, Beijing, China:
125 participants from
21 countries**

WMO, NOAA, NASA, ECMWF
EUMETSAT, CMA, JMA, ISRO
CPTEC/INPE, ABOM, Meteo
France, UK MetOff, LMD,
CWB, NIWA, Universities

**ITSC-15, Maratea, Italy:
110 participants from
16 countries**

ITWG

Working Groups & Technical Sub-Groups

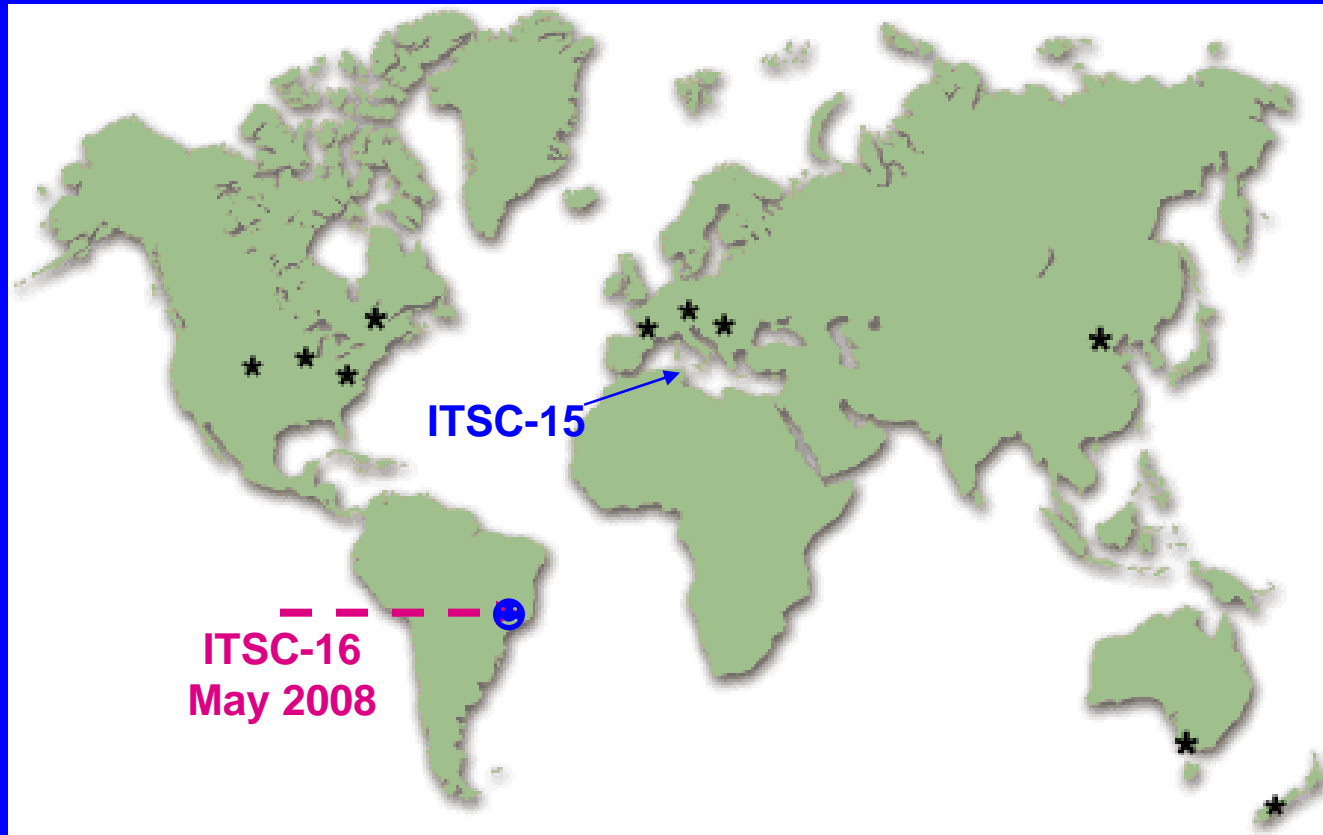
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Technical Sub-Groups:

- AAPP (ATOVS and AVHRR Pre-Processing Package)
- ICI (Inversion Coupled with Imager)
- IAPP (International ATOVS Processing Package)
- 3I/3R (Improved Initialization Inversion)
- IMAPP (International MODIS and AIRS Processing Package)
- Frequency Management
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- Direct Broadcast

ITSC 1-16 Locations



1st Meeting in Igls, Austria – August 1983
Europe (8), NAM (4), Asia/Oceania (3), SAM (1)

ITSC 1-16 Locations

ITSC-XVI	Angra dos Reis, Brazil	May 2008
ITSC-XV	Maratea, Italy	October 2006
ITSC-XIV	Beijing, China	May 2005
ITSC-XIII	Sainte Adele, Canada	October 2003
ITSC-XII	Lorne, Australia	February 2002
ITSC-XI	Budapest, Hungary	September 2000
ITSC-X	Boulder Colorado, USA	January 1999
ITSC-IX	Igls, Austria	February 1997
ITSC-VIII	Queenstown, New Zealand	April 1995
ITSC-VII	Igls, Austria	February 1993
ITSC-VI	Airlie, Virginia, USA	May 1991
ITSC-V	Toulouse, France	July 1989
ITSC-IV	Igls, Austria	March 1988
ITSC-III	Madison, Wisconsin, USA	August 1986
ITSC-II	Igls, Austria	February 1985
ITSC-I	Igls, Austria	August 1983



ITWG Co-Chairs

- **ITSC 1-3** **Bill Smith** **Univ. Wisconsin**
 Rolando Rizzi **Univ. Bologna**
- **ITSC 4-6** **Alain Chedin** **LMD**
 Paul Menzel **NOAA**
- **ITSC 7-9** **John Eyre** **UK Met Office**
 Mike Uddstrom **NIWA**
- **ITSC 10-12** **Guy Rochard** **Meteo-France**
 John LeMarshall **ABoM**
- **ITSC 13-15** **Roger Saunders** **UK Met Office**
 Tom Ahtor **Univ. Wisconsin**
- **ITSC 16-18** **Allen Huang*** **Univ. Wisconsin**
 Steve English* **UK Met Office**

*** : Current**

INTERNATIONAL
ATOVS
WORKING GROUP



<http://cimss.ssec.wisc.edu/itwg/>

*Sharing ideas, plans and techniques to study the earth's weather
using space-based observations*

[ITWG Overview](#)

About the ITWG, its mission, and co-chair information

[Working Groups/Technical Sub-Groups](#)

Focusing on key issues, topics and software

[International TOVS Study Conferences \(ITSC\)](#)

Future meeting information, past meeting reports and presentations

[Education and Training](#)

Outreach and training programs involving members

[Members, Organizations, and Links](#)

Participants and their organizations, plus related web sites

News and Highli

ITSC-XVI: Brazil

7-13 May 2008

NEW! [Draft Program is now available! \(PDF\)](#)

[Third Circular](#)

[Hotel reservation inform](#)

[More information about ITSC-16.](#)

**A Tribute to Izabela
(1954-2007)**

[Visit the tribute web page](#)

ITWG Working Groups & Technical Sub-Groups

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Working Groups

Information on all the Working Groups listed below is contained in "A report on the Eleventh International TOVS Study Conference (ITSC)." Please visit the [ITSC web page](#) for availability information.

- **Advanced Infrared Sounders**
Planning and recommendations in preparation for future instrumentation
<http://cimss.ssec.wisc.edu/itwg/aswg/>
- **ATOVS/TOVS data in NWP**
Operational and research applications of low earth orbit (LEO) sounder data in numerical weather prediction
<http://cimss.ssec.wisc.edu/itwg/nwp/>
- **ATOVS/TOVS in climate studies**
Studies applying the 30 year climate database from the NOAA polar sounder
- **International Issues and Future Systems**
Cooperative actions with the international weather satellite community on issues involving polar remote sensing
- **Radiative transfer and surface property modelling**
Fostering the development of radiative transfer and surface models for ATOVS applications
<http://cimss.ssec.wisc.edu/itwg/groups/rtwg/rtwg.html>
- **Satellite Sounder Science and Products**
Promoting the development and utilization of meteorological techniques and products from operational and research satellites in weather and climate applications
<http://cimss.ssec.wisc.edu/itwg/sssp/index.html>

Technical Sub-Groups

Information on all the Technical Sub-Groups listed below is contained in the Reports of the [International TOVS Study Conference](#).

- **AAPP (ATOVS and AVHRR Pre-Processing Package)**
AAPP is the ATOVS direct broadcast pre-processing software developed by the EUMETSAT Satellite Application Facility for Numerical Weather Prediction (NWP SAF).
<http://www.metoffice.com/research/interproj/nwpsaf/>
- **ICI (Inversion Coupled with Imager)**
ATOVS Temperature and moisture retrieval software from Meteo-France
<http://www.meteorologie.eu.org/ici/index.html>
- **IAPP (International ATOVS Processing Package)**
<http://cimss.ssec.wisc.edu/opsats/polar/iapp/iAPP.html>
- **3I/3R (Improved Initialization Inversion)**
Temperature and moisture retrieval software
- **IMAPP (International MODIS and AIRS Processing Package)**

ITSC-16 Group Photos



ITSC-16 Science Presentations

- **Guy Rochard session on direct broadcast packages, preprocessing, calibration, and frequency protection**
- **The Infrared Atmospheric Sounding Interferometer**
- **Atmospheric radiative transfer**
- **Surface emission and scattering**
- **Climate studies**
- **Current use in NWP**
- **Developments in use of sounding data in NWP and environmental prediction**
- **Cloud studies**
- **Developments in assimilation of sounding data in NWP in cloudy regions**
- **Other applications of sounder data**
- **Agency Status Reports**
- **Future instruments**
- **Working group reports**

ITSC-16 Special Focus Working Groups - Reports provided by each group

- 1. Numerical Weather Prediction**
- 2. Satellite Sounder Science and Products**
- 3. Radiative Transfer**
- 4. Climate**
- 5. Advanced Sounders**
- 6. International Issues and Future Systems**

ITSC-16 Meeting Statistics

1. 146 participants from 20 countries
 2. 95 oral presentations (including 14 poster introductions)
 3. 16 working group and technical sub group presentations)
 4. 86 poster presentations
 5. 27 conclusions/recommendations are generated
 6. 6 working group reports are written
- In addition, one reception, three party banquets and two excursions

ITSC-16 Major Conclusions (in draft form)

1. The results of new observing system experiments presented at ITSC-XVI demonstrate that **satellite data have a large impact on weather forecast accuracy and promising new results** suggest the potential for future enhancements in the use of satellite sounder and imager data. It is crucial that future instruments as a baseline maintain, and if cost effective, improve upon, the quality of AMSU and IASI
2. Many NWP centres are now assimilating radiances operationally or experimentally from the Infrared Atmospheric Sounding Interferometer, **IASI, and getting significant positive forecast impacts**. The experience with AIRS was crucial to the rapid implementation of IASI.
3. The success of the JAIVEx campaign in support of cal/val for IASI was a major theme at ITSC-XVI both in support of assimilation of IASI observations in NWP and to improve characterization of climate data records. The group urged similar campaigns for future instruments.
4. **Many centres are experiencing difficulty using moisture sensitive channels** and the group urged more focused effort in this area and encouraged more exchanges of experience between centres.

ITSC-16 Major Conclusions (draft) - continue

5. Since ITSC-XV several centres have made significant progress in understanding and using cloud-affected radiances, with progress in radiative transfer, data assimilation and more sophisticated cloud screening. As a result more satellite sounding data can be used.
6. The IASI and AIRS radiances assimilated are still a small fraction of those available but some efforts are underway to allow a more complete use of the data (e.g. through use of reconstructed radiances or principal components).
7. The number of NWP centres using level 1b ATOVS radiances in their variational assimilation systems continues to grow but there are still centres which rely on the level 2 retrievals provided by NESDIS.
8. The Regional ATOVS Retransmission Service, RARS, has continued to develop since ITSC-XV. The Asia-Pacific RARS service has continued to expand and **more NWP centres are using the RARS data**. RARS networks in S. America and Africa are now available. The group encouraged WMO and the space agencies to continue to develop this ATOVS retransmission service as a low cost means of providing more timely ATOVS data for 90% of the globe. **The Southern ocean and North Pacific were identified by one study as particularly needing RARS.**

ITSC-16 Major Conclusions (draft) - continue

9. The group continues to strongly support the SafetyNet concept, identifying it as one of the most attractive features of NPOESS. WMO and the RARS Implementation Group were invited to consider an expansion of RARS for NPP and NPOESS-C1 as SafetyNet will become fully operational only from NPOESS-C2 onwards.
10. An important issue for consideration is that when MODIS is retired, according to current plans, there will not be an imager in polar orbit with a channel in the water vapour band. This will degrade the accuracy of any polar satellite derived winds. Space agencies are urged to consider the best means for providing a polar orbiting imager with water vapour channels along with the conventional VIS and IR channels.
11. Further progress in the pre-processing of SSMIS data has been made with the development of the unified preprocessor, jointly developed by several centres with a strong interest in SSMIS data quality. More NWP centres are now able to use the DMSP-F16 SSMIS sounding channels operationally and progress is being made with DMSP-F17 SSMIS. The group encouraged the SSMIS cal/val team to make the data available from DMSP-F18 as early as possible after the launch to expedite their use in operational systems.

ITSC-16 Major Conclusions (draft) - continue

12. The group encouraged the careful characterization of new satellite instruments, notable **promoting the use of pre and post-launch traceable calibration standards for future sounders.**
13. The group recommended further studies on the optimization of the size of the advanced sounder fields of view using experience with the MetOp HIRS/4 and NOAA-17 HIRS/3 instruments.
14. The group noted that lossy datasets for advanced sounders may not be suitable for all applications and consequently recommended techniques for spatial as well as spectral thinning to be studied for distribution of advanced sounder data, notably IASI.
15. The community software packages (i.e. AAPP, IAPP, IMAPP) have been essential in the use of ATOVS, IASI, AIRS and MODIS data by the meteorological community. **The group encouraged satellite agencies to continue to support these packages for existing missions and to develop and release pre-processing software packages as soon as practical before launch e.g. IPOPP.**

ITSC-16 Major Conclusions (draft) - continue

16. The group urged space agencies to provide documentation on data formats well before launch to allow similar community software packages to be developed for planned new satellites (e.g. FY-3 and NPP).
17. The group urged space agencies to use expertise from NWP centres throughout the cal/val phase for new instruments, as proved particularly successful for SSMIS and IASI.
18. The group noted the increasing threat of RF interference in microwave imager channels. All members were urged to lobby their respective radio communication authorities to support protection of the imager and sounder bands and specifically to identify useful bands between 275 and 3000 GHz and to undertake more detailed studies in support of 52.6-59.3 GHz and 86-92 GHz.
19. Satellite provider agencies were again encouraged to continue and expand their support for education and training of the next generation of remote sensing scientists

ITSC-16 Major Conclusions (draft) - continue

20. It was also noted that research into truly lossless compression techniques continues in the wider scientific community. **It is recommended that space agencies investigate both lossless and lossy data compression techniques which may be used to aid dissemination of advanced sounder observations.**
21. Optimal use of community state-of-art software packages within the central operational processing for satellite programs has been raised again and **the group is continuing to recommend to the space agencies to promote partnership in building environmental satellite systems where government, industry and university science communities share their expertise.**
22. The time series of (A)TOVS now exceeds 29 years and the quality and number of climate products continues to grow. It was recognized that the fundamental instrument parameters of all the (A)TOVS sensors should be retained for future reprocessing efforts.

ITSC-16 Major Conclusions (draft) - continue

- 23. The group supported the continuing efforts to develop the GCOS Reference Upper Atmospheric Network (GRUAN) for climate with the primary objective of creating long term records of critical upper air measurements and associated error characteristics to support their continuing integration in climate applications and research.**
- 24. The ITWG noted that the TOVS/ATOVS lower tropospheric climate data record is view geometry dependent and this product would be lost if there was a migration to a conical viewing geometry.**
- 25. It was recognised that high spectral resolution imaging radiometers on geostationary platforms are likely to be an important part of the future global observing system. The group supported plans for operational missions but would also welcome a preparatory mission earlier than 2015 if possible.**

ITSC-16 Major Conclusions (draft) - continue

- 26. The group noted that LEO IR and MW sounding capability on 3 orbital planes is essential to proper sampling of atmospheric temperature and humidity vertical profiles. At present there is no IR sounding capability planned for the early morning orbit and the performance of the MIS sounding channels is yet to be assessed. The group recommended WMO, CGMS and CEOS investigate scenarios for sounding instruments in the early morning orbit.**
- 27. The group noted that GPSRO data has allowed better characterization of biases in passive sounding data from 20-40 km and consequently operational continuity for COSMIC is now important to maintaining good quality passive upper level sounding data.**

ITWG Future Plans

- **ITWG will continue to meet and inform the ATOVS community of the latest news and developments through its web site currently maintained by the University of Wisconsin CIMSS.**
- **The forthcoming 4th Hyperspectral Workshop to be held at EUMETSAT, Darmstadt, Germany 15-17th September 2008. ITWG will undertake the coordination between this group, the AIRS science team, the IASI conference and the ITWG advanced sounder working group to ensure effective exchange of information.**
- **The ITWG will also be holding the second workshop on remote sensing and modeling of surface properties prior to ITSC-17, tentatively scheduled for June 2009.**

ITWG Future Plans - continue

- **The ITWG website will continue to evolve to become an even more important tool for ITSC, with many new ideas proposed and endorsed at ITSC-16. This could include some interactive elements to the website (e.g. wiki).**
- **ITWG is considering options for continuing to deliver a successful meeting which may require changes in structure, length or number of oral presentations. At ITSC-16 a partially successful experiments was carried out with the operational NWP session using a format of a longer, invited summary presentation, followed by short 3 minute poster presentations, followed by the poster session. It has been suggested this format could be extended to other sessions**

ITWG Future Plans - continue

- **The ITSC-XVI Working Group Report, a Proceedings for ITSC-XVI from the papers submitted will be provided to attendees and other interested persons on CD-ROM.**
- **The next meeting of the ITWG is scheduled to take place in the period between October 2009 and February 2010, depending on final choice of venue. Topics of interest will include more extensive evaluation of MetOp data, initial assessment of FY-3 data and status of preparations for the NPP launch**