

CGMS-XXVIII  
USA-WP-22  
Agenda Item: II/3

**REPORT ON THE ELEVENTH INTERNATIONAL TOVS STUDY CONFERENCE  
(ITSC-XI)**

A report on the findings and recommendations  
produced at the ITSC-XI for CGMS consideration.

## **Report on the Eleventh International TOVS Study Conference (ITSC-XI)**

### **I. Introduction**

The eleventh International TOVS Study Conference (ITSC-XI) occurred in Budapest, Hungary from 20 – 26 September 2000. The co-chairs, Dr. Guy Rochard from CMS, Lannion, France and Dr. John LeMarshall from BMRC, Melbourne, Australia, convened 90 scientists from 25 countries that comprise the International TOVS Working Group (ITWG). They heard presentations of recent progress in using Advanced TIROS Operational Vertical Sounder (ATOVS) data and participated in working group deliberations.

### **II. Major Conclusions**

ITSC-XI had several significant conclusions: (a) ATOVS continues to provide positive impact on global NWP in both hemispheres and an increasing number of NWP centers are assimilating radiances directly; (b) AMSU is a critical component of the polar sounding system with HIRS providing complementary moisture and cloud information; (c) international collaboration within the ITWG continues to evolve (inclusion of NOAA-16, improved cloud detection, more efficient HIRS and AMSU collocation, retrieval refinements) the AVHRR and ATOVS Processing Package (AAPP) that is freely available to all users developing their ATOVS processing capabilities; (e) transmittance model performances are improving, but spurious spectral response errors need further investigation (especially in the water vapor sensitive bands); (f) upcoming reanalysis at NCEP, ECMWF, and TOVS pathfinder will be including more data and improved algorithms for discerning indications of interesting climate trends; (g) coordination with the reconfigured CBS is progressing well with active ITWG participation in several of the WMO's Commission for Basic Systems (CBS) Open Program Area Group for Integrated Observing Systems (OPAG IOS) expert teams; (h) early examples of MODIS data are demonstrating exciting possibilities for enhanced land, ocean, and atmosphere (especially cloud) characterizations; and (i) enhanced preparations for EOS have assured timely development of packages for processing direct broadcast data from MODIS, AIRS, and AMSU as well as global distribution of sounding data.

### **III. Items from CGMS**

CGMS XXVI had requested that four items be considered at ITSC-XI. The items and the ITWG responses follow.

- (a) The use of satellite radiances or retrievals over land needs further attention as there is a growing need for improved use of satellite data in some land areas of the globe; surface emissivity effects must be accommodated to achieve positive results. ITSC-X accepted this challenge; several members are already working on this problem and will report at the next study conference.

Firm evidence of the utility of TOVS/ATOVS data over land in the northern hemisphere NWP is emerging; non surface viewing spectral radiances are being assimilated directly with positive

impact. In addition, the ITWG distributed information on improved characterizations of surface emissivity maps for AMSU surface viewing channels that are being dynamically updated. The ITWG was also informed about recent progress in improving vertical profiles of temperature and moisture retrieved from broadband infrared spectral measurements by accounting for the surface emissivity; an algorithm was presented that estimates short and long wavelength surface emissivity as well as temperature and moisture profiles directly from the infrared multispectral radiances.

- (b) The am and pm polar satellites will likely have different sounding capabilities. ITSC-X agreed that members would study how to mitigate the effect of these differences in weather applications (including NWP) and report at future study conferences.

The ITWG requested that CGMS coordinate a consistent policy with regard to satellite products to be distributed via the GTS within the Initial Polar System of NOAA/NESDIS and EUMETSAT (MetOp AM satellites and NOAA PM satellites). This policy would address production and distribution on the GTS of IPS products in order to avoid duplication.

- (c) The importance of good characterization of total system spectral response functions has been stressed in past reports. ITSC-X agreed to investigate how good current estimates are and how good they need to be in various parts of the infrared spectrum. A report will be forthcoming.

The ITWG recommended that spectral responses (SR) must be characterized well enough so that associated uncertainties are well below instrument noise. For high spectral resolution infrared instruments and microwave instruments, this seems within reach. But for broad band infrared instruments, renewed efforts must be encouraged.

- (d) Geostationary sounding is evolving toward greater capability with higher spectral resolution. What are the tradeoffs between spectral and spatial resolution and the information content of geostationary soundings in an era of polar orbiting satellites with high spectral resolution sounders on three platforms? ITSC-X noted that several operational satellite simulation experiments are underway to explore this issue and would hear progress reports at their next conference.

The ITWG concluded from their discussions that hourly high spectral resolution infrared radiances offer unique observations that would benefit nowcasting, very short range forecasting, as well as regional numerical weather prediction. Moisture gradients would be determined at commensurate temporal and spatial (both horizontal and vertical) resolutions for the first time.

#### **IV. Items for CGMS**

At ITSC-XI, in their discussions on "International Issues and Future Systems", the ITWG produced several items of interest to CGMS regarding over-arching strategy for the global observing system, education and training, direct read-out, software availability, satellite data and product monitoring, GTS capacity for future satellite data and products, and new sensors.

*(a) an over-arching strategy for the global observing system*

It was noted that the presentations by each satellite operator (NOAA/NESDIS, EUMETSAT, China, the Russian Federation and NASA) included plans to launch polar-orbiting satellites but that coordination of their equator crossing times was not apparent. The ITWG was informed that the WMO Executive Council had agreed to hold “Consultative Meetings on High-Level Policy on Satellite Matters” on a yearly basis and that both the operational and research and development satellite operators would be participants in such meetings. Thus, the ITWG encouraged CGMS and WMO, through its “Consultative Meetings” to consider contingency plans that would be comparable and consistent for all three polar orbits (early AM, AM and PM).

**Recommendation:** ITWG encourages CGMS and WMO to consider coordination of polar-orbiting equator crossing times to optimize satellite utilization while minimizing potential conflicts in data reception.

With regard to the present plans which include only one operational advanced sounder (IASI) before 2009, the ITWG received an update regarding NASA's NPOESS Pathfinder Project (NPP) which had the potential to make available a second advanced sounder prior to 2009. It also heard about the plans of the Russian Aviation and Space Agency (RASA) to fly its high spectral resolution advanced sounder (IRFS) on METEOR 3M N2 in 2003. However, the ITWG noted that both advanced sounders were planned to fly in an AM orbit and suggested that consideration be given to placing the NPP sounder in the PM orbit.

**Recommendation:** ITWG encourages NASA to consider placing the NPP sounder in a PM orbit. ITWG also encourages RASA to finalize manufacturing of the very high spectral resolution IFRS and launch it on METEOR 3M N2 in 2003.

*(b) frequency protection*

The ITWG was briefed on WRC 2000 held in Istanbul, Turkey. It noted that the results of WRC 2000 were very positive for the protection of microwave frequencies. A compromise had been obtained for both the 18.6 – 18.8 GHz and 55.78 – 56.9 GHz bands to protect remote sensing of the Earth. Between 71 GHz and 275 GHz, all the requested frequencies were allocated as primary for passive remote sensing. The goal for the next WRC will be to achieve allocations that recognize the need for less than 0.01% contamination in each band as has been achieved in the 50 – 60 GHz band for example. However, the ITWG noted that some satellite operators still had plans to utilize frequencies where appropriate allocations did not exist; it strongly urged those satellite operators to conform to the ITU allocations. The ITWG noted the excellent work of the Space Frequency Coordination Group (SFCG) in preparing for each WRC; the ITWG resolved to request through its co-chairs attendance at SFCG meetings as an observer.

*(c) education and training*

With regard to education and training and the use of small workstations, the ITWG was pleased to learn of recent developments by WMO in defining a Virtual Laboratory for Education and

Training in Satellite Meteorology. The ITWG recalled its commitment to make available, where possible, its expertise for education and training activities. The ITWG also noted that the Virtual Laboratory enabled direct participation of specialized science groups through links to the WMO's specialized "centers of excellence" (the RMTCs for Costa Rica, Barbados, Niamey, Nairobi, Nanjing and the BMTC in Melbourne). Thus, it was agreed that the ITWG web site should be augmented to contain information and links related to education and training for sounding instruments and that links be provided to the six centers of excellence as well as other interested entities.

(d) *distribution of data*

With regard to the monitoring of satellite data on the Global Telecommunication System (GTS), the ITWG reconfirmed the importance of such activities, but felt that they should include quality control of the content of BUFR messages on the GTS.

**Recommendation:** ITWG encourages CGMS and WMO to review the monitoring procedures and practices for satellite data and products placed on the GTS with a goal towards improving them. The review should also identify the future monitoring policy once the Initial Polar System of NOAA/NESDIS and EUMETSAT becomes operational.

The ITWG recalled that concern had been expressed for the capacity of WMO's present GTS to handle large volumes of satellite data. In particular, the ITWG noted that the volume of data from AIRS in 2001, IASI in 2003 and GIFTS in 2004 would greatly exceed the present GTS capacity. Thus, the ITWG strongly encouraged WMO to seek means to greatly increase the GTS capacity including through the implementation of its Distributed Database System Concept. The ITWG also reaffirmed the sounding community's need for continuation of broadcast of satellite data either directly from the satellite or by other telecommunication means that would ensure near real-time reception.

**Recommendation:** ITWG encourages WMO to increase the GTS capacity including through the implementation of the Distributed Database System Concept.

The ITWG noted that the availability for data from the SSMIS was unclear. It suggested that CGMS confirm if such data would be available similar to the SSM/I and SSM/T1 and SSM/T2 over Shared Processing.

**Recommendation:** ITWG requests CGMS clarify the situation concerning the availability of SSMIS data.

With regard to satellite products to be distributed via the GTS within the Initial Polar System of NOAA/NESDIS and EUMETSAT (MetOp AM satellites and NOAA PM satellites), ITSC-XI agreed that there should be a consistent policy as to production and distribution on the GTS of IPS products in order to avoid duplication.

**Recommendation:** ITWG requests information from CGMS as to plans for IPS products and their distribution over the GTS.

With regard to the need for radiances, the ITWG was informed that NPOESS Sensor Data Records (SDRs) would include radiance products but that they would not be available as part of the suite of NPOESS Environmental Data Records (EDRs).

**Recommendation:** ITWG requests CGMS seek clarification from the NPOESS IPO as to the availability of radiance products (referenced to level 1b as is heritage from FGGE onwards) as part of the suite of NPOESS SDRs.

(e) *direct broadcast and software packages*

The ITWG noted the important potential contribution of the AIRS instrument on the EOS PM (Aqua) satellite to be launched in 2001 to WMO's World Weather Watch. In particular, Aqua's AIRS would provide advanced sounder data in synergy with AMSU-A (and HSB), AMSR-E and MODIS data to the meteorological community to allow preparations for the operational advanced sounders. The ITWG was pleased to note NASA's activities to establish direct readout access as well as software processing packages for AIRS, AMSU-A (and HSB) and MODIS to allow timely use of the data for operations and research. The ITWG also noted the need for the processing software package to include ingest software for AIRS and to expand to AMSR-E. The ITWG also recommended that a similar activity be started for the NPP mission. A letter from the ITWG is being sent to NASA thanking them for their direct broadcast support.

The ITWG reconfirmed the need for free software for ingest and processing from new instruments. Such free software would ensure a broad distribution and provide for more validation and data usage.

## V. ITSC-XII

The next meeting will occur in first quarter of 2002.