

The International TOVS (Soundings) Working Group (ITWG)

Mitch Goldberg(NOAA/NESDIS)

Neils Bormann(ECMWF)

ITWG Co-Chairs

Rapporteur: Mitch Goldberg

Outline

- **International TOVS Working Group (ITWG)**
 - Introduction to group
 - How the ITWG Operates
- **ITWG Achievements**
 - Recent International TOVS Study Conference (ITSC-18)
 - Scientific Collaboration
- **ITWG Top Recommendations & Future Activities**
- **Summary**

International TOVS Working Group (ITWG)

- Established in 1983 as a working group of the International Radiation Commission (IRC) of the International Association of Meteorology and Atmospheric Physics (IAMAP)
 - Currently 150 active members.
 - Meet every 18 – 24 months
- Provides a forum where operational and research users of primarily atmospheric infrared and microwave sounders exchange information on sensor status, derived products, and the impacts of radiances and inferred atmospheric temperature, moisture and cloud fields on numerical weather prediction(NWP) and climate studies

How the ITWG Operates

- Study Conferences every 18 – 24 months
 - The most recent (ITSC) workshop: March 21-27, 2012 in Toulouse, France
 - University of Wisconsin-Madison provides logistic reports
 - Co-chairs are nominated for three meeting terms.
 - Participants (~150) from operational satellite centers, NWP centers, industry, and academia
- Internal Interactions
 - ITWG web site
 - Email lists



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)

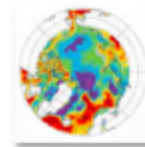
Future meeting information, past meeting reports and presentations

Education and Training

Outreach and training programs involving members

Members, Organizations, and Links

Participants and their organizations, plus related web sites



- ▶ [Email the Co-Chairs](#)
- ▶ [ITWG Webmaster](#)

Updated 16 July 2012

News and Highlights

New ITWG Co-Chairs Elected

Mitch Goldberg
Niels Bormann

[Message from outgoing ITWG Co-Chairs](#)

ITSC-XVIII: Toulouse, France

21-27 March 2012

[First Circular](#)

[Second Circular](#)

[Third Circular](#)

[REGISTRATION](#)

[Program and Presentations](#)

Dated 14 March 2012

[More information about ITSC-18 \(accommodations, activities, transportation, etc.\)](#)

Past ITWG Co-Chairs

- ITSC 1-3 Bill Smith, Rolando Rizzi
- ITSC 4-6 Alain Chedin, Paul Menzel
- ITSC 7-9 John Eyre, Mike Uddstrom
- ITSC 10-12 Guy Rochard, John LeMarshall
- ITSC 13-15 Roger Saunders, Tom Achtor
- ITSC 16-18 Allen Huang, Steve English

Highlights from ITSC-18 (March 2012)

- Hosted by MeteoFrance
- Co-chaired by Stephen English , Allen Huang
- Attended by 154 scientists
- NWP representation the best ever
- **Topics Covered:**
 - Current, new and future observing systems
 - Reports from space agencies and NWP Centres
 - Data assimilation applications
 - Climate applications
 - Processing software systems
 - Advanced sounder science
 - Radiative transfer models
 - Atmospheric chemistry and composition
 - Cloud and precipitation applications
 - Retrieval Science

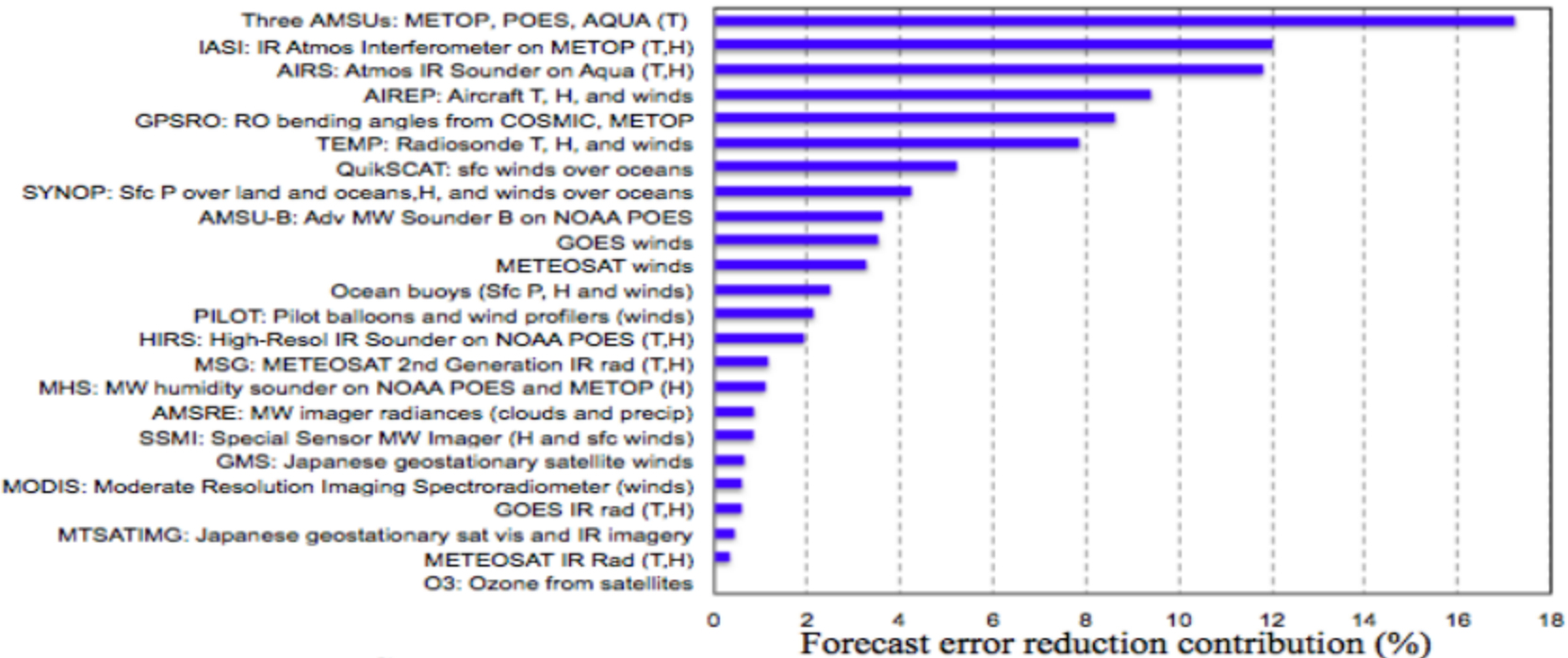


ITSC Working Groups

- Radiative Transfer
- Climate
- Data Assimilation and NWP
- Advanced Sounders
- International Issues and Future Systems
- Products and Software

Infrared and Microwave Sounders provide critical observations for reducing forecast errors

Observing system ranking for 24 hour forecast

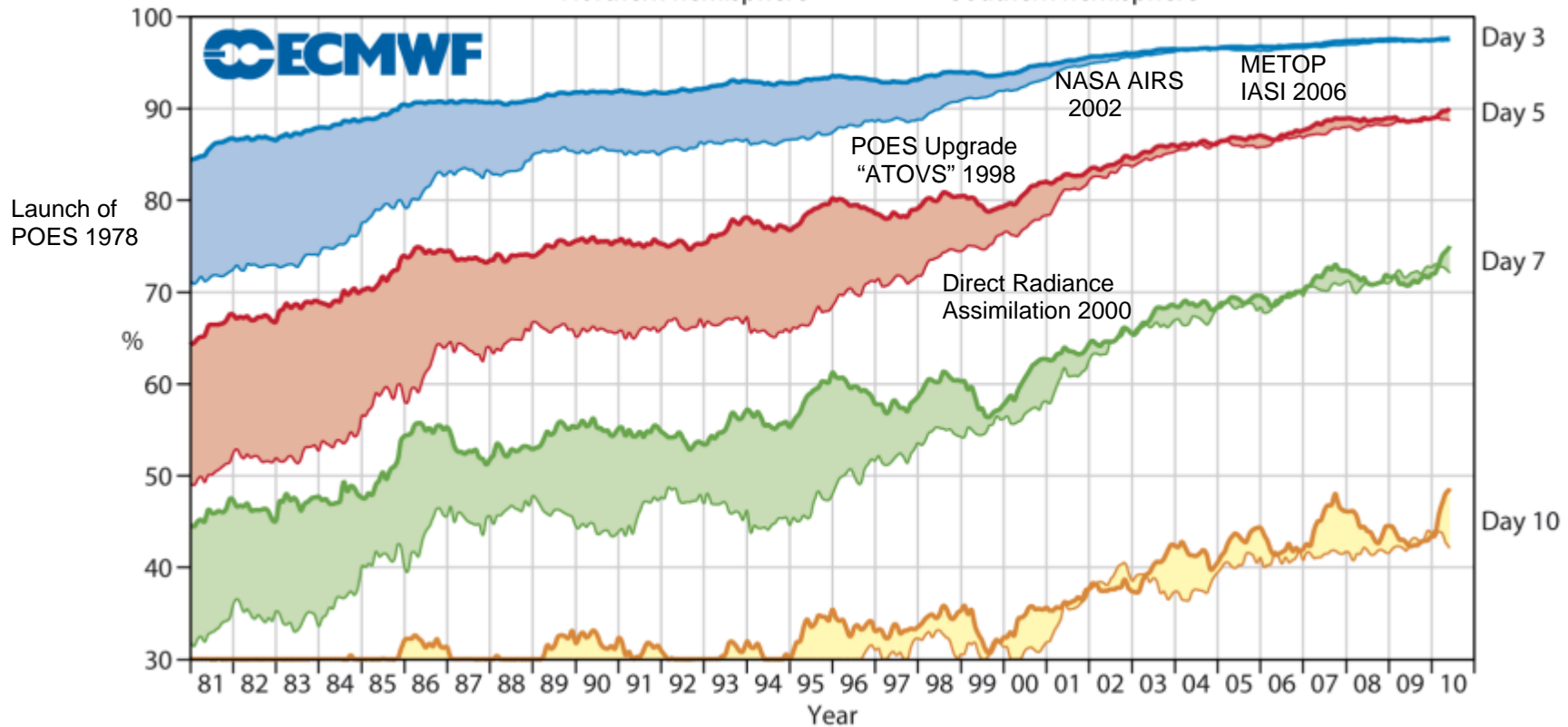


From ECMWF

Good news - Forecast skills have improved significantly over the past 30 years

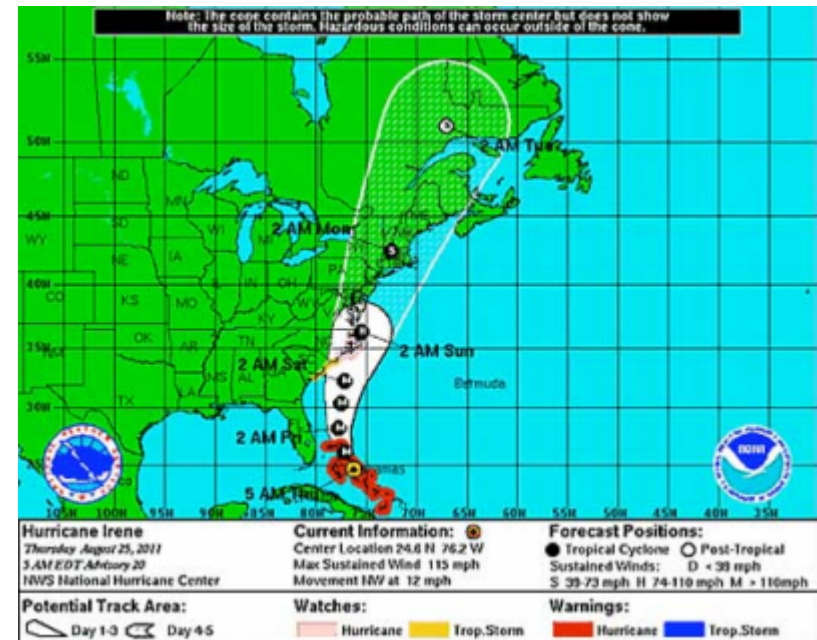
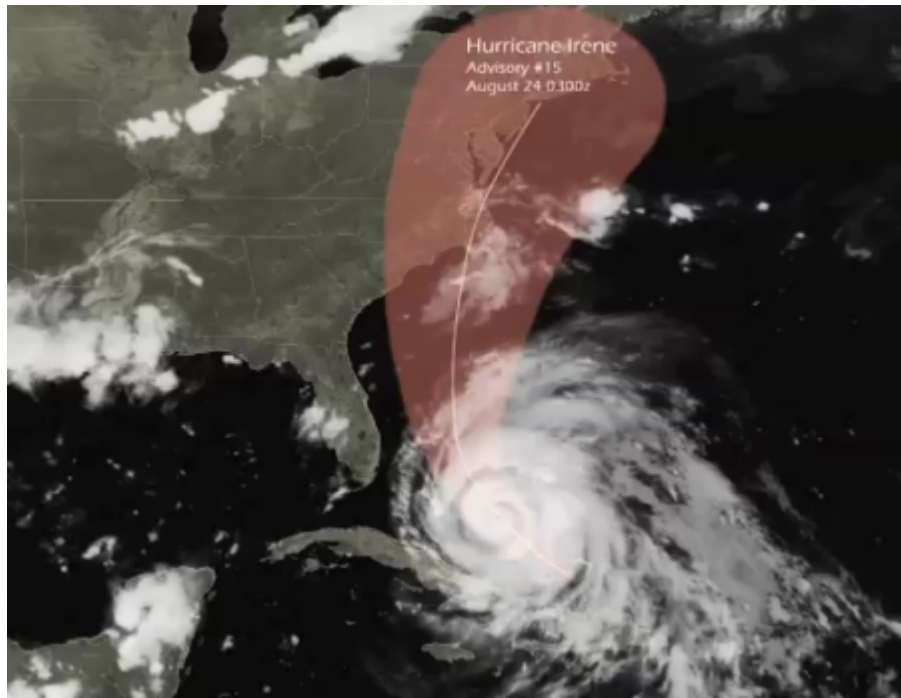
Anomaly correlation of ECMWF 500 hPa height forecasts

— Northern hemisphere — Southern hemisphere



Courtesy of ECMWF. Adapted and extended from Simmons & Hollingsworth (2002)

Advanced IR and Microwave Sounders enables improve tropical cyclone track forecasts



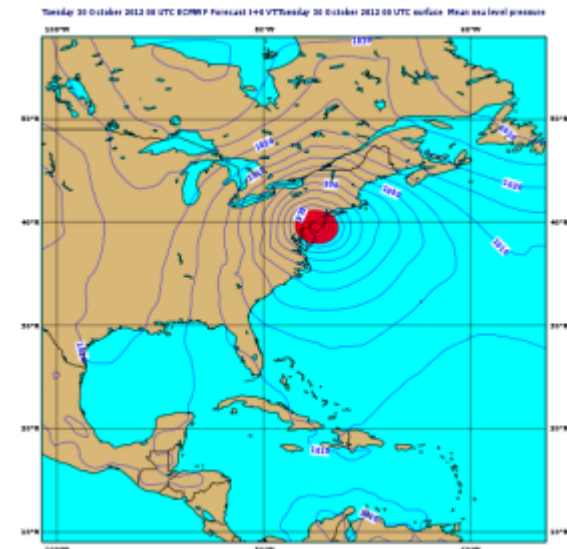
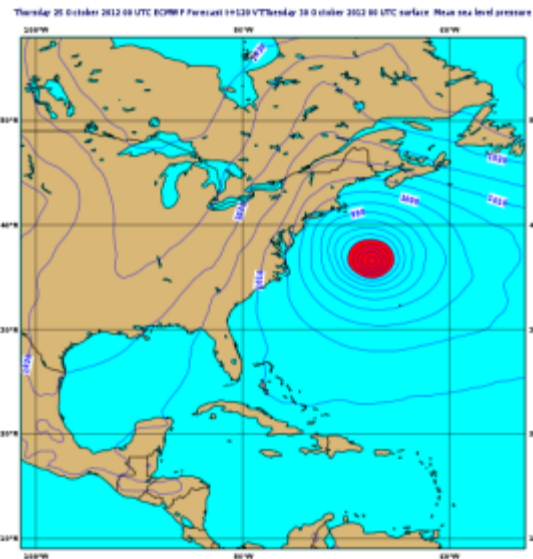
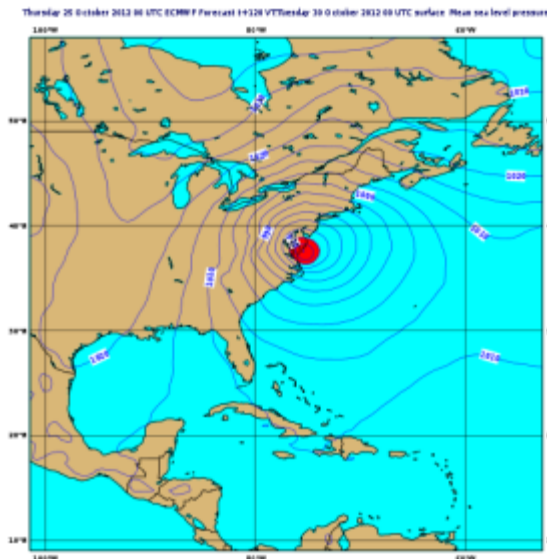
Forecasts of Hurricane Sandy with and without polar satellites

ECMWF forecasts of Mean Sea Level Pressure, **5 days in advance** of the 30th October 2012 for the landfall of Hurricane Sandy. Forecasts from an assimilation system with no polar satellites fail to predict the landfall of the storm on the US east coast.

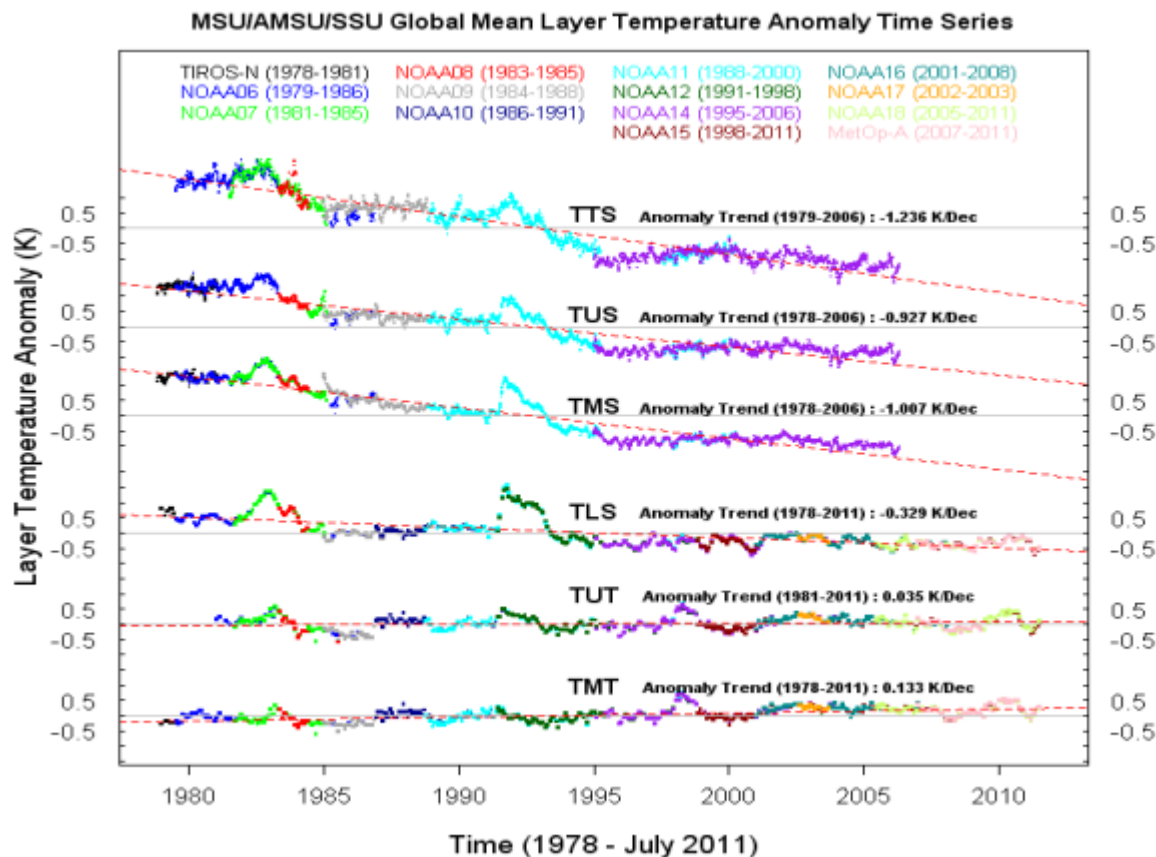
ECMWF OPS

NO POLAR SAT

VERIFICATION



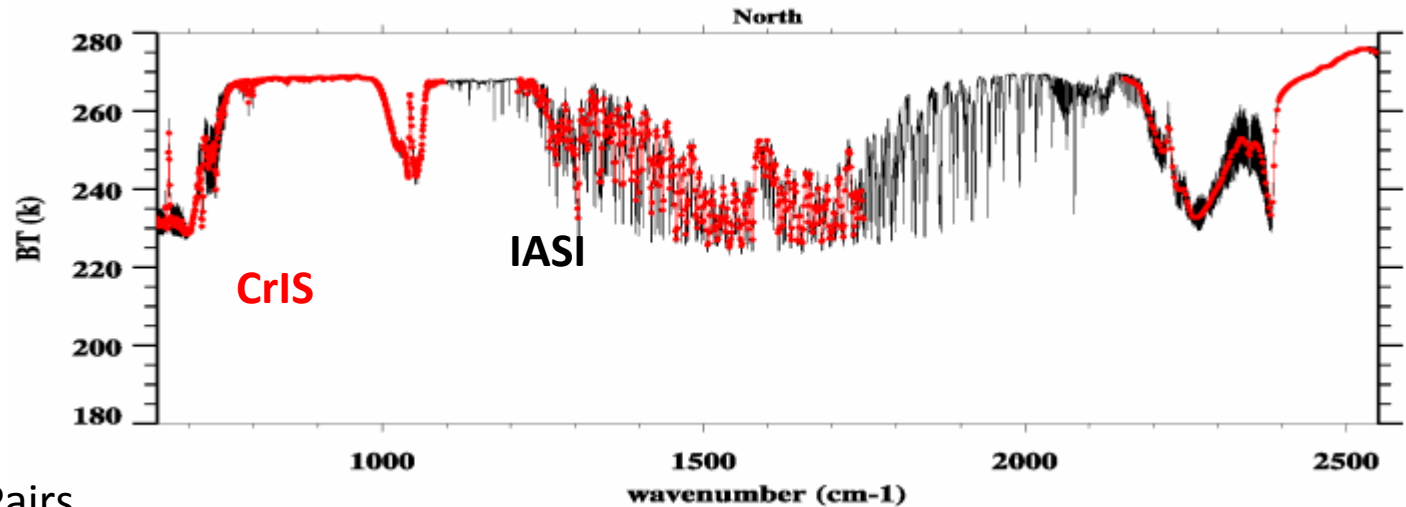
Sounder data records extend back to the 1970's enabling monitoring of climate trends



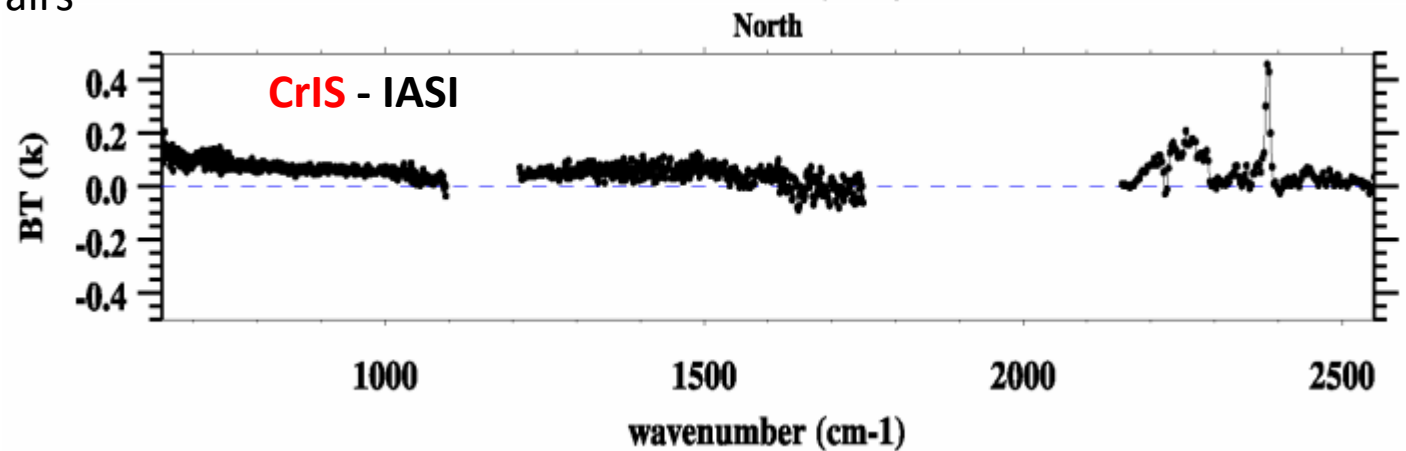
SSU derived TTS, TUS, and TMS: Temperatures of top stratosphere, upper-stratosphere, and mid-stratosphere

MSU/AMSU derived TLS, TUT, and TMT: Temperatures of lower-stratosphere, upper-troposphere, and mid-troposphere

Exceptional accuracy of operational infrared sounders!!!!



Total of 852 SNO Pairs
411 North Pole
441 South Pole



CrIS and IASI have an agreement of 0.2K or better for all 3 bands enabling improved data for NWP and accurate climate trends of temperature, water vapor, clouds, greenhouse gases, and OLR (between 4 and 16 microns)

Challenges

ITSC Working Groups

- Radiative Transfer
- Climate
- Data Assimilation and NWP
- Advanced Sounders
- International Issues and Future Systems
- Products and Software

- ✓ Cloudy radiance assimilation
- ✓ Improve surface emissivity to improve data utilization over land
- ✓ Improved utilization of water vapor channels in NWP
- ✓ More accurate radiative transfer models
- ✓ Improved data latency
- ✓ Improve data coverage for NWP and Climate
- ✓ Reprocessing for climate trends.

Top Recommendations from ITSC18

The constellation of at least three orbits (early morning, morning, and afternoon), each with full sounding capabilities (IR and MW), should be maintained (provided). The overpass times of operational satellites with sounding capability (IR and MW) should be coordinated between agencies to maximize their value.

Meteor-M mission should be a fully contributing component of the Global Observing System (GOS) by providing the global data sets from this mission in a timely manner with all necessary ancillary information.

Better plan the sequence of satellite launches into the polar orbit to minimise the risk of instrument failures and gaps in the time series of observations. Space agencies should consider this for the further planning of the space-based architecture for climate monitoring

Conduct studies to trade off benefits of spectral, radiometric, and spatial resolutions of infra-red sounders and to pursue the development of next generation sounders.

Top Recommendations from ITSC18

For future instruments to be used as calibration reference such as IASI-NG an onboard SI traceability of the calibration shall be realised. Highly accurate black body calibration as established by the CLARREO program can be employed.

Support for line-by-line (LBL) reference model development is of paramount importance and should be continued to ensure that users (in both operational and non-operational institutions) have access to the latest updates in LBL forward modelling.

Agencies to assess the availability of pre-1979 data records and to make an effort to preserve and provide available data records and associated meta data, in particular spectral response functions, to users.

To NOAA: Down-link full resolution data from the CrIS instrument and distribute it to users.

Top Recommendations from ITSC18

Support fast delivery initiatives using direct broadcast with extensions wherever possible (e.g., IASI, METOP-B, NPP)

CGMS agencies to work with EUMETSAT to extend Regional ATOVS Retransmission Services (RARS) with Direct Readout stations receiving NPP.

All CGMS agencies to provide continuous direct broadcast capabilities on future polar orbiting satellites

To CGMS: to consider the potential implications of various funding schemes and public-private partnership with respect to the global technical coordination of the space-based observing system pursued by CGMS, and with respect to data policy, and to establish an appropriate mechanism to ensure that such initiatives can be globally coordinated by CGMS and open data accessibility is guaranteed.

Contribution to HLPP

Coordinate/Optimisation of Observing Systems

The ITSC working group on International Issues and Future Systems discusses this topic with WMO Space Director (or designee) and principal scientists representing satellite and NWP agencies.

Satellite Products

The ITSC working group on Products and Software, and ITSC oral and poster presentation provides a forum for algorithm intercomparisons, product validation and scientific software exchange, including discussion on data formats and quality descriptors

Contribution to HLPP

Climate Monitoring

The ITSC working group on climate, and ITSC scientific presentations include topics on generation of climate data records and recommendations to sustain and enhance observations for climate monitoring

Data Dissemination, direct read out services and contribution to the WIS

The ITWG subgroup on direct readout software discusses and promotes the development of direct readout software such as CSPP (NPP, JPSS), and IAPP (POES, METOP). All software is freely available.

Discussions also include the enhancement of the Regional ATOVS Retransmission Services

Next 5 years

- Conduct Observing System Studies to better optimize data utilization and to demonstrate impacts of improved data latency, improved global coverage and improved spatial, spectral, radiometric performance, including the use cloud contaminated radiances
- Extend the use of operational polar orbiting data through direct broadcast (DB) software – providing application software to generate consistent products by different DB users.
- Continue to demonstrate the use of polar orbiting data to derive climate data records for monitoring and understanding of climate trends and variability.
- Support education and training through the WMO Virtual Laboratory.

Summary

- **International TOVS Working Group**
 - Expert group on sounding applications
 - Provide biennial assessments of the state of the soundings
- **Recommend ITWG is recognized as CGMS working group**
 - Provide expert opinions and recommendation to CGMS as required.

Further Information

[Visit ITWG Web page:](http://cimss.ssec.wisc.edu/itwg/index.html)

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