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GRUAN-GSICS-GNSSRO WIGOS Workshop

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Title, Background

- "GRUAN-GSICS-GNSSRO WIGOS Workshop on Upper-Air Observing System Integration and Application"
- 6-8 May 2014, WMO HQ, Geneva, Switzerland
- 25 experts, by invitation only

- Addressing key areas for WIGOS Implementation (Ref: WIP v2.0):

  b) Collaboration with WMO co-sponsored observing systems

  c) Design, planning, and optimized evolution

  d) Observing system operation and maintenance

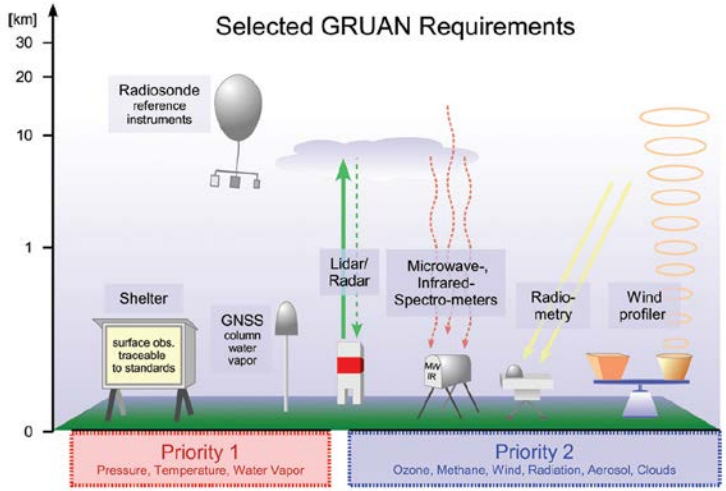
  e) Quality management

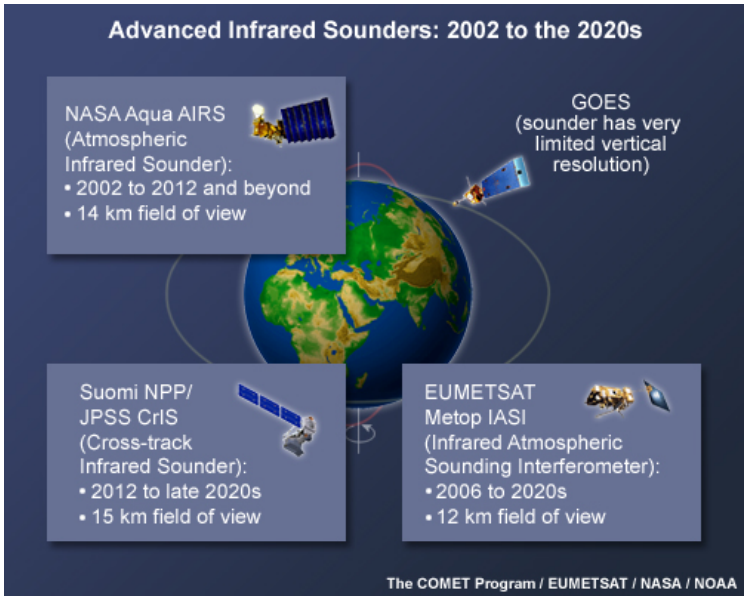
  f) Standardization, system interoperability and data compatibility

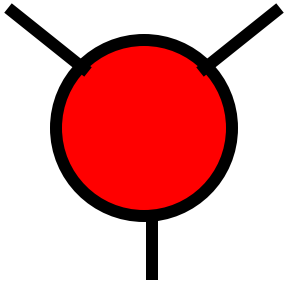
- Action in WIGOS Implementation Plan (4.1.2; Ref: WIP v2.0)

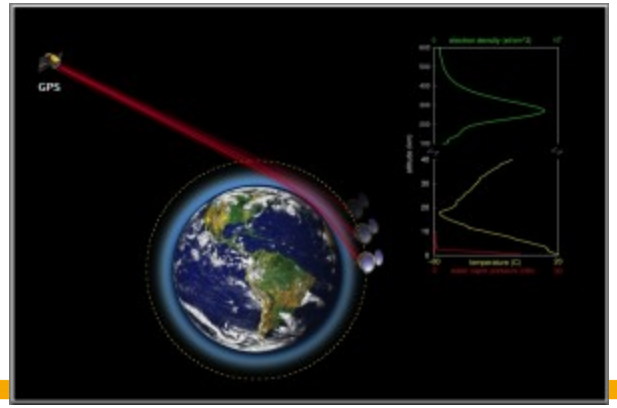
  "Inform the development of guidance for sharing operational experiences, expertise, and joint exploitation of resources"

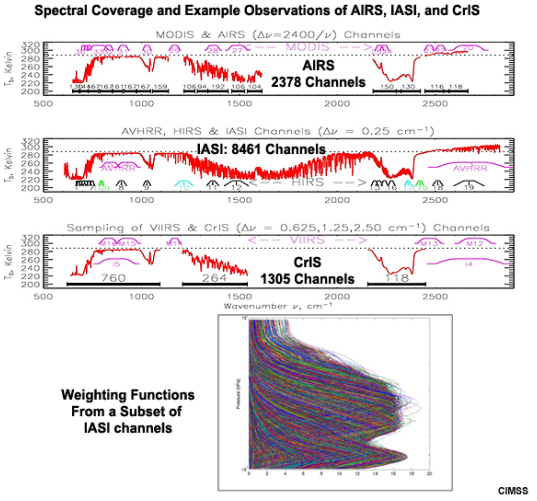
- Workshop is a "case study" in this regard; benefits from WIGOS funding


Selected GRUAN Requirements
[km]
30
20
10
1
0
Radiosonde
reference
instruments
Shelter
surface obs.
traceable
to standards
GNSS
column
water
vapor
Lidar/
Radar
Microwave-,
Infrared-
Spectro-meters
Radio-
metry
Wind
profiler
Priority 1
Pressure, Temperature, Water Vapor
Priority 2
Ozone, Methane, Wind, Radiation, Aerosol, Clouds


Advanced Infrared Sounders: 2002 to the 2020s
NASA Aqua AIRS
(Atmospheric
Infrared Sounder):
• 2002 to 2012 and beyond
• 14 km field of view
GOES
(sounder has very
limited vertical
resolution)
Suomi NPP/
JPSS CrIS
(Cross-track
Infrared Sounder):
• 2012 to late 2020s
• 15 km field of view
EUMETSAT
Metop IASI
(Infrared Atmospheric
Sounding Interferometer):
• 2006 to 2020s
• 12 km field of view
The COMET Program / EUMETSAT / NASA / NOAA




GPS


Spectral Coverage and Example Observations of AIRS, IASI, and CrIS
MODIS & AIRS (Δν=2400/ν) Channels
AIRS
2378 Channels
AVHRR, HIRS & IASI Channels (Δν = 0.25 cm⁻¹)
IASI: 8461 Channels
Sampling of VIIRS & CrIS (Δν = 0.625,1.25,2.50 cm⁻¹) Channels
CrIS
1305 Channels
Wavenumber ν, cm⁻¹
Weighting Functions
From a Subset of
IASI channels
CIMSS

Objectives

- Identify measures to better connect GRUAN with the satellite community
- Compare methods of measurement uncertainty estimation
- Provide guidance for how the various observing systems and datasets can better serve meteorological and climate applications
- Develop recommendations for future observing system design

Input to the workshop

- Personal position statements:
- **What is your view on the following issues:**
  - What is your vision for an optimized integrated observing system for upper-atmosphere variables?
  - What are the main steps needed to achieve this vision?
  - Which are the main deficiencies in the current system, including gaps in infrastructure, expertise, and training?
  - Which practical steps could WMO and co-sponsored programmes (such as GCOS, WCRP) take to address these issues?
  - How can high-quality ground-based atmospheric sounding such as by GRUAN support needs of the satellite community, now and in the future?
  - How can the satellite community support needs of the ground-based atmospheric upper-air sounding community such as GRUAN, now and in the future?

Input to the workshop

- Personal position statements:
- **What are your key recommendations regarding the workshop objectives** [X]**:**
- The most urgent actions that should be taken by the international community over the next **3 years** (based on current resources):
- The most urgent actions that should be taken by the international community over the next **10 years** (assuming additional resources):

- [X] Regarding: an optimized, interoperable upper-air observing system (in-situ, satellites), including issues such as: measurement uncertainty estimation, dataset generation, and data utility

Output

- Recommendations, at technical and strategic level
- Workshop report
- Peer-reviewed journal article

Agenda

Tuesday, 6 May 2014		
8:30	Registration (Salle C2)	*Approx.Time incl. Discussion*
9:00	**1. Opening remarks** (W. Zhang and co-chairs P. Thorne, T. Hewison, T. Mannucci)	20'
9:20	**2. Introductory position statements** (All participants)	120' (5' per participant)
11:30	**3. WMO Observing System Planning**	
	3.1 Status of WIGOS Implementation (L. P. Riishojgaard)	20'
	3.2 Vision for the Global Observing System in 2025 and Rolling Review of Requirements (J. Eyre)	20'
12:10	**4. Applications of Upper-Air Observations**	
	4.1 Climate Monitoring (P. Thorne)	20'
	4.2 Climate Process Studies (J. Dykema)	20'
12:50	*Lunch Break*	80'
14:00	4.3 Numerical Weather Prediction (J. Eyre)	20'
	4.4 Reanalysis (A. Simmons)	20'
14:40	**5. Observing systems: principles, practices, uncertainties, cal/val, plans**	
	5.1 GRUAN (P. Thorne)	20'
	5.2 Hyperspectral sounding and GSICS (T. Reale; T. Hewison)	20'
	5.3 GNSS-RO (T. Mannucci; G. Kirchengast; S. Healy)	20'
	5.4 Radiative transfer (L. Strow)	20'
16:00	*Coffee Break*	20'
16:20	**6. Formation of discussion groups along areas of integration and interoperability**	
	6.1 Observing system coordination (GRUAN – satellites) (Facilitator: G. Bodeker)	
	6.2 Measurement uncertainty estimation and collocation (Facilitators: X. Calbet; H. Vömel)	
	6.3 Dataset generation and application (Facilitator : *TBC)*	
	6.4 Data access, representation, dissemination (Facilitator : S. Bojinski)	
17:00	*Adjourn for Day 1*	
Wednesday, 7 May 2014		
9:00 - 17:00	**Work in Break-out and Plenary sessions (Rooms: C2, 7 Lake, 7 Jura)**	
Thursday, 8 May 2014		
9:00	**7. Development of recommendations**	
15:00	**Final Plenary session**	120'
17:00	*Adjourn workshop*	

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Thank you for your attention

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Invitees

GRUAN-GSICS-GNSSRO WIGOS Workshop 6-8 May 2014 WMO HQ, Geneva					
Name	**First name**	**Affiliation**	**City**	**Country**	**Function**
Bodeker	Greg	Bodeker Scientific	Alexandra	New Zealand	GRUAN Co-Chair
Thorne	Peter	Nansen Environment	Bergen	Norway	GRUAN Co-Chair
Bojkov	Bojan	ESA	Frascati	Italy	ESA Cal/Val Manager
Eyre	John	UKMO	Exeter	UK	IPET-OSDE Chair
Manucci	Tony	NASA JPL	Pasadena	USA	GNSS-RO Expert and IROWG Rapporteur
Vömel	Holger	DWD	Lindenberg	Germany	GRUAN Lead Centre
Dykema	John	Harvard U	Boston	USA	WG GRUAN and SPARC
Calbet	Xavier	EUMETSAT	Darmstadt	Germany	Satellite Cal/Val, IR/MW sounding and EUMETSAT
Kivi	Rigel	FMI	Sodankylä	Finland	GRUAN Site FMI
von Engeln	Axel	EUMETSAT	Darmstadt	Germany	IROWG Co-Chair
Hewison	Tim	EUMETSAT	Darmstadt	Germany	GSICS, IR/MW sounding and EUMETSAT
Simmons	Adrian	ECMWF	Reading	UK	Reanalysis Expert; GCOS
Reale	Tony	NOAA NESDIS	Washington	USA	GSICS, GRUAN TT Ancillary, IR/MW sounding and NESDIS
	Expert	JMA	Tokyo	Japan	Satellite user and GRUAN host country
	Expert	CMA	Beijing	China	Satellite user and GRUAN host country
Majodina	Mark	South Africa SAWS	Pretoria	South Africa	Satellite user and potential GRUAN host country
	Expert	Brazil	Sao Jose dos Campo	Brazil	Satellite user and potential GRUAN host country
Healy	Sean	ECMWF	Reading	UK	GNSS-RO Assimilation Expert
Kirchengast	Gottfried	U Graz	Graz	Austria	GNSS-RO Expert, Uni Graz
Strow	Larrabee	U Maryland	Washington	USA	IR/MW sounding and RT Expert, Uni Maryland
	Expert	BOM	Melbourne	Australia	Satellite user and potential GRUAN host country
de Mazière	Martine	BIRA-IASB	Brussels	Belgium	NDACC Expert
Secretariat Support					
Bojinski	Stephan	WMO			
Lafeuille	Jerome	WMO			
Riishojgaard	Lars Peter	WMO			
TOTAL		**25**			
Status: 25 Feb 2014					

Organizing Committee

- Greg Bodeker
- Stephan Bojinski
- Bojan Bojkov
- Xavier Calbet
- John Dykema
- John Eyre
- Tony Mannucci
- Peter Thorne
- Holger Vömel