WMO Space Programme Update - Input to RA II Satellite User Mechanism and Capacity Building

Fernando Belda
World Meteorological Organization (WMO)
Space Programme

5th Meeting of the Coordinating Group for the
RA II WIGOS Project to Develop Support for NMHSs in Satellite Data, Products and Training
Vladivostok, Russia, 21 Oct 2017

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

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WMO Space Programme: 4 Activity Areas

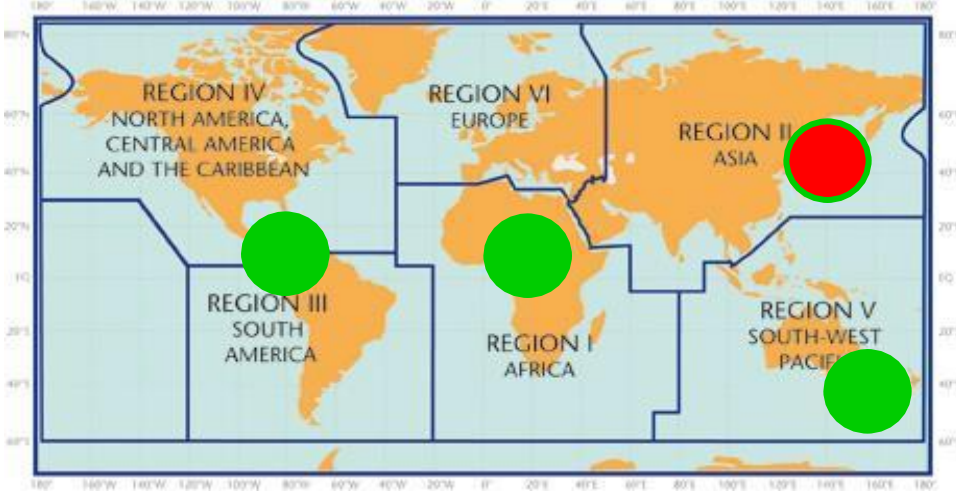
supporting weather, water, climate, and space weather

WMO

WMO Space Programme Presentations at AOMSUC-8 reflect Programme Updates:

- WMO Integrated Observing System (WIGOS) 2040 Vision: The Space-based Component *(S1-10, Wed 18 Oct)*
- Support WMO Members to Ensure Operational Access to and Use of Satellite Data and Products *(S2-1, Wed 18 Oct)*
- WMO Observing Systems Capability Analysis and Review Database for Space-based Capabilities (WMO OSCAR/Space) *(S2-2, Wed 18 Oct)*
- WMO SCOPE-Nowcasting: Using New-Generation Satellite Data: Progress and Perspectives *(S5-1, Thu 19 Oct)*
- The Architecture for Climate Monitoring from Space: Coordinated Satellite-based Observation and Exploitation of Climate Data Records *(S6-1, Fri 20 Oct)*

Enhancing satellite data utilization (1)



Regional user mechanisms

Through:

- RA I (Africa): Dissemination Expert Group
- **RA II (Asia): WIGOS Project Coordination Group**
- RA III/IV (Americas): Coordination Group
- RA V (SW Pacific): Task Team on Satellite Utilization

- Membership:
  - Operational users
  - Satellite providers
  - Training centres (VLab CoEs)
  - Scientific users
  - Others

Advantages for Region:

- Effective user-provider dialogue
- Defined format for expressing requirements
- Coordination of data distribution
- Identification of training needs
- Implementation of WIGOS/WIS

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Enhancing satellite data utilization (2)

AOMSUC Memorandum (June 2016):

-signed by PRs of Australia, China, India, Indonesia, Japan, Republic of Korea, Russian Federation, and WMO Secretary-General

- "add to the current mandate of the International Conference Steering Committee (ICSC) of AOMSUC the coordination responsibility for: (i) a user-focused training event; and (ii) as appropriate, a meeting of the WMO Satellite User Requirements coordination groups in Regions II and V, held jointly with the AOMSUCs"

- ✓ AOMSUC-8
- ✓ Training event 16-17 Oct 2017
- ✓ 5th RA II WIGOS CG Meeting
- ✓ Plans for AOMSUC-9

AOMSUC Memorandum Signature Ceremony, 16 June 2016, Geneva, Switzerland

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Enhancing satellite data utilization (3)

WMO Guidelines formally published:

- Guidelines on Best Practices for Achieving User Readiness for New Meteorological Satellites:

Arabic version: https://library.wmo.int/opac/index.php?lvl=notice_display&id=19931
Chinese version: https://library.wmo.int/opac/index.php?lvl=notice_display&id=19930
English version: https://library.wmo.int/opac/doc_num.php?explnum_id=3553
Russian version: https://library.wmo.int/opac/index.php?lvl=notice_display&id=19929

- Guideline on Satellite Skills and Knowledge for Operational Meteorologists, providing guidance to design and implement satellite-related training programmes to support WMO competencies:

Arabic version: https://library.wmo.int/opac/index.php?lvl=notice_display&id=19890
Chinese version: https://library.wmo.int/opac/doc_num.php?explnum_id=3585
English version: https://library.wmo.int/opac/doc_num.php?explnum_id=3439
Russian version: https://library.wmo.int/opac/index.php?lvl=notice_display&id=19870

RA II (Asia)

- Many satellite providers
- Wide range of user capabilities
- Need a Systematic Approach to
  - Identify
  - Document
  - Address

  User Needs

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Example for a Region-based Satellite User Requirements Documentation

RA III-IV (Americas)

SATELLITE DATA REQUIREMENTS FOR RA III AND RA IV - PRIORITIES ACCORDING TO THE REGION

	USER REQUIREMENTS				INFORMATION FROM PROVIDERS										
PRIORITY	N° of "High Priority" votes (Weight 3)	N° of "Medium Priority " votes (Weight 2)	N° of "Low Priority" votes (Weight 1)	TOTAL SUM	Product ID #	Data Provider	Data Characteristics	Format	Data Distribution	Geographical Area	Frequency	Size (kB)	Size Comment	Format Expected in the Future	FINAL Size (Compressed) kB
1	9	5	2	39	1.8	NOAA NESDIS	GOES Full Disk Visible Full Resolution	GeoTIFF	GNC-A	GOES East Footprint	3 Hours	178	Average File Size (6 per day)	GeoTIFF	108,600.0
2	6	8	1	35	1.9	NOAA NESDIS	GOES Full Disk IR Full Resolution	GeoTIFF	GNC-A	GOES East Footprint	3 Hours	8	Average File Size (8 per day)	GeoTIFF	4,900.0
3	7	5	3	34	1.1	NOAA NESDIS	GOES Full Disk WV Full Resolution	GeoTIFF	GNC-A	GOES East Footprint	3 Hours	4	Average File Size (8 per day)	GeoTIFF	2,100.0
4	8	3	0	30	1.7	NOAA NESDIS	GOES images, channel VIS, WV, IR, Resolution 4km Follows GOES East and West Schedules	LRIT	NOAA Low Rate Informa-tion Trans-mission Service (LRIT)	3AM (A and R Sectors East a					
5	7	3	0	29	1.12	NOAA NESDIS	GOES East Visible	JPEG Image	WWW site	GOES E Foo					
6	7	2	1	26	1.11	NOAA NESDIS	GOES East IR	JPEG Image	WWW site	GOES E Foo					
7	5	4	1	24	1.5	INPE	GOES images, channel VIS, WV, IR, Resolution 4km/ rectangular projection	GeoTIFF	GNC-A / FTP	SAM	30 minutes	18000	3 images	GeoTIFF	10000
8	4	4	3	23	1.6	INPE	GOES images, Channel IR, Resolution 4km/ rectangular projection	GeoTIFF	GNC-A / FTP	SCA	3 Hours	7000	1 image	GeoTIFF	4000

Satellite Data and Product Requirements Baseline of RA III / IV (Americas): TOTAL 402 products

http://satelite.cptec.inpe.br/geonetcast/es/docs/SDR%20RA-III-IV%20%20-%20Product%20Priorities%20-%20V15022016a.xlsx

EXAMPLE FROM REGION III AND IV (AMERICAS)

ANNEX 6: Overview of GOES-R Data Access Mechanisms, Processing and Visualization Tools, and Selected Providers

Data Access	Key features	Typical Country requirements to be met
Direct Readout		
• GRB ○ Harris ○ Seaspace ○ EEC – Telespace ○ Global Science & Technology (GST) - DirectMet ○ Quorum ○ Scisys ○ Global Imaging	Full res L1b: ABI data GLM Space weather L2 products, as specified in contract 31Mbps	Processing of L1b into products Depending on country needs and obligations
• HRIT/EMWIN ○ Global Imaging ○ Dartcom ○ Microcom ○ Scisys	Continuity of EMWIN and DCS, including watches and warnings Some HRIT imagery (400kbps), reduced resolution 1-1.2m dish, LNB, receiver, computer, visualization SW Stable turn-key systems with est'd support Full-disc GOES	Imagery for situational awareness
Satellite-based		
• GEONETCast-Americas ○ EEC Telespace ○ 'custom' ○ Global Imaging ○ Knightsky llc ○ Systems Strategies and Analysis (USA) ○ Scisys ○ Dartcom	Imagery and L2 products, depending on user requirements Multi-format data New system, support structure evolving Coverage of IS-21 satellite (all of the Americas except northern parts of Canada, Alaska, Easter Island) DVB-S based, scalable 6.7Mbps	Risk reduction in transitioning from GOES to GOES-R Back-up system Primary system, depending on needs and resources
• NOAAport	CONUS content Limited value for Central and South America DVB-S2, SES-1 60-75Mbps	Mostly for US-based users
Internet		
• PDA	Full res L1b (ABI data, GLM,	For all users

Satellite Data Access Mechanisms for Users in RA III / IV (Americas):

- Direct readout
- GEONETCast-type
- Internet
- Terrestrial networks
- Low-bandwidth services

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ANNEX 9: OVERVIEW OF EXISTING AND PLANNED SATELLITE DATA RECEPTION INFRASTRUCTURE IN RA III AND IV (OUTSIDE THE U.S.)

State / Territory	Present satellite data reception systems	Planned or potential future systems	Comments
Antigua and Barbuda	ftp/http	GRB, GNC-A, GOES-LRIT	With info from 2015 survey
Argentina	GVAR, HRPT; AHRPT, GNC-A (CONAE); DR X-band (CONAE, INTA)	DR X-band (SMN project on stand-by); GRB (SMN, CONAE), AHRPT (CONAE), GNC-A (1-2 at	With info from 2015 survey
Bolivia	GOES-LRIT; ftp/http; EUMETSAT-Americas	GRB, GOES-LRIT; HRIT/EMWIN; GOES-DCS; GTS; GNC-A	With info from 2015 survey
Brazil	(INMET): GVAR (INPE): GVAR, GNC-A, EUMETCast-A, HRPT, DR X-band	(INMET): GNC-A (INPE): GRB, GNC-A, DR X-band	
Cayman Islands	GVAR		With info from 2015 survey
Chile	GNC-A (U la Serena), GVAR; HRPT, X-band	3 HRPT, 3 GRB; renovation under way	
Colombia	GVAR, GNC-A; HRPT (not operational); ftp/http	GNC-A (first choice); Internet data services (under investigation)	
Ecuador	GVAR, HRPT (not operational), EUMETCast-Americas (not operational); ftp/http	GRB, GNC-A; HRPT; ftp/http	With info from 2015 survey

Satellite Data Reception Infrastructure:

Overview of existing & planned

Satellite-specific Two-Year Vlab Training Plan under development

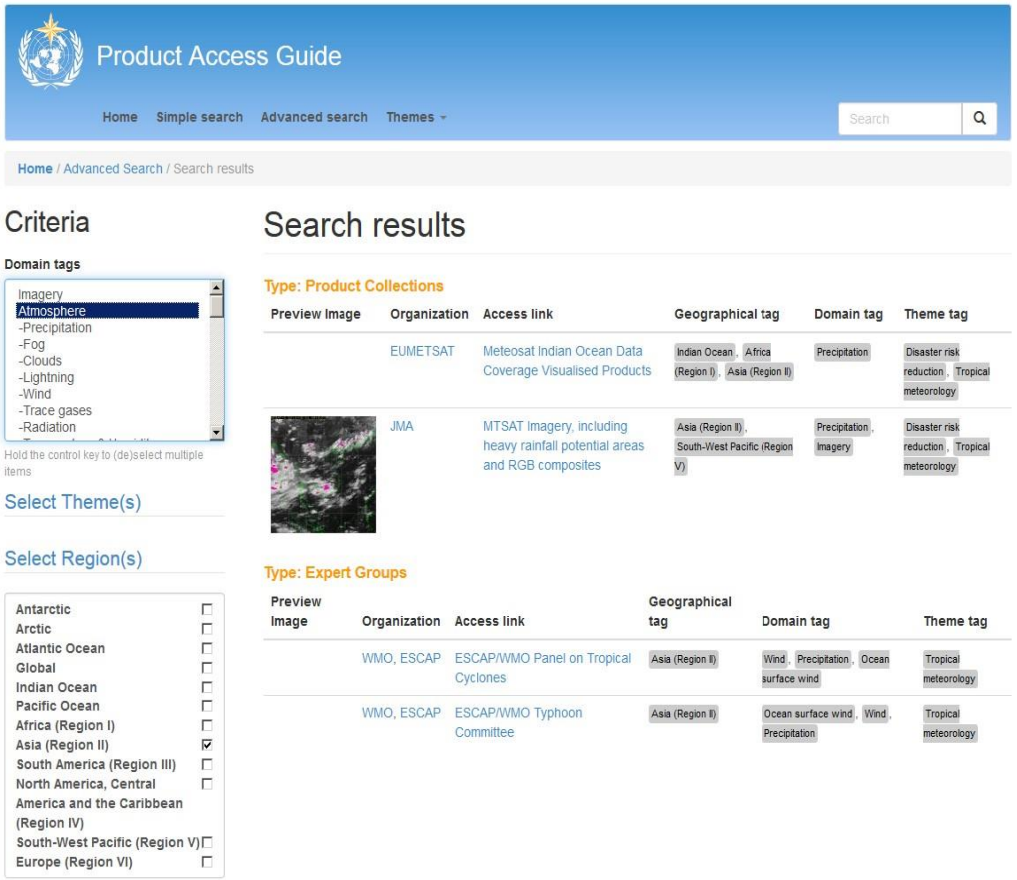
WMO Tools

- Improving User Knowledge of Available Data, Tools and Resources
  - User fora, conferences (eg. AOMSUC)
  - Online resources

    WMO Space Programme web site
    - Product Access Guide
    - Satellites User Readiness Navigator (SATURN)
    - Processing and Visualization Tools
    - OSCAR/Space Database

RA II WIGOS Project: Online resources

- RA II Product Portal
  - Now integrated in WMO Product Access Guide
  - Maintained by
    CBS IPET-SUP
    (Focal Points for RA II :
    Shiro Omori (JMA),
    Fang Xiang (CMA),
    Chu-Yong Chung and
    Jin Woo (KMA))



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RA II WIGOS Project: Online resources

- Project Website
  - Hosted by JMA

Meteorological Satellites -Japan Meteorological Agency (JMA)-

- "WMO Space Programme"
- "Access to low-level satellite data"
- "WMO OSCAR/Space (Satellite missions, systems, and instruments)"
- "Satellite products and imagery for RA II"
- "WMO Product Access Guide"

RA II WIGOS Project to Develop Support for NMHSs in Satellite Data, Products and Training

Co-coordinator

気象庁 Japan Meteorological Agency　KMA Korea Meteorological Administration A New Era of Hope

Under the auspices of

World Meteorological Organization Weather • Climate • Water

Contents

Background　Mission　Accomplishments　Work Plan for the Next Project Phase
Coordinating Group　Meeting　Newsletter　Survey Result

Background

The 14th session of WMO Regional Association II (XIV-RA II), held in Tashkent, Uzbekistan from 5 to 11 December 2008, adopted a resolution to establish a pilot project for the development of support for National Meteorological and Hydrological Services (NMHSs) in the areas of satellite data, products and training. After the session, the WMO Secretariat invited WMO Members to join the Pilot Project Coordinating Group, whose members as of 31 May 2011 are Japan (Co-coordinator), the Republic of Korea (Co-coordinator), Bahrain, China, Hong Kong – China, India, Kyrgyzstan, Maldives, Oman, Pakistan, the Russian Federation, Uzbekistan, Vietnam and, as an observer, EUMETSAT.

At the 15th session of Regional Association II (XV-RA II) held in Doha, Qatar in December 2012, it was decided that the RA II Pilot Project to Develop Support for NMHSs in Satellite Data, Products and Training should continue and become the RA II

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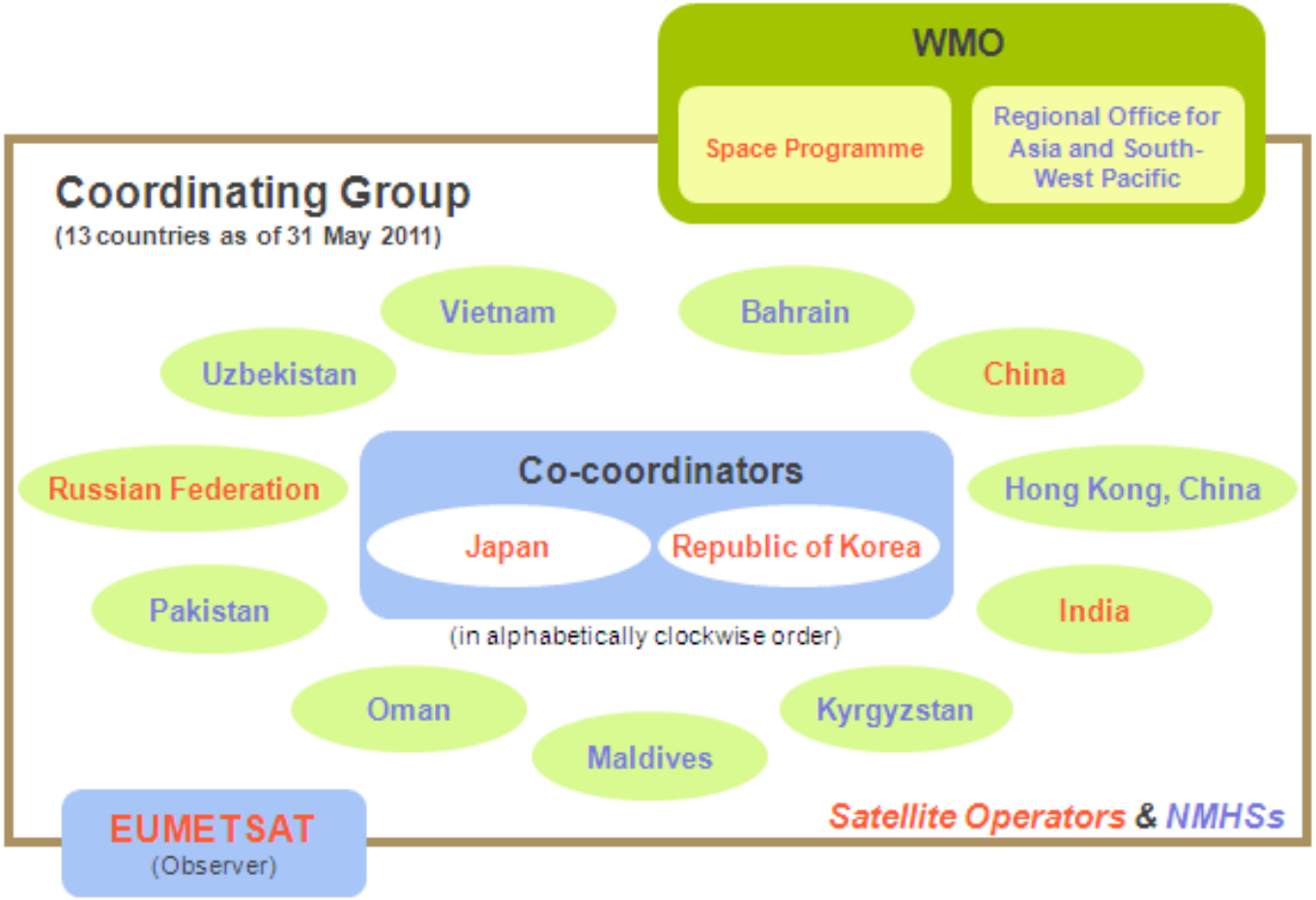
RA II WIGOS Project Coordination Group



Adding new members:

-Beneficiary countries of satellite receiving equipment

-…

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Thank you for your attention

Stephan Bojinski

sbojinski@wmo.int

BACKUP SLIDES

What is WIGOS?

- An over-arching ***framework*** for the ***coordination and evolution*** of WMO observing systems and the contributions of WMO to co-sponsored observing systems;
- A WMO priority & a key contribution to ***GFCS***
- With WIS, a WMO contribution to ***GEOSS***;
- It is about doing more & better with what we have now to enable more efficient and effective service delivery;
- It is about **changing the way** we plan, operate and deliver observations to meet user needs.

WIGOS Framework

- At its simplest, the WIGOS framework is about:
  - ***Documenting and implementing*** standard and recommended practices and procedures in making and sharing observations,
  - ***Coordination and collaboration*** for efficiency and effectiveness,
  - ***Integration and interoperability*** in all senses,
  - ***Timely delivering observations*** that meet user needs in a way they can use them,
  - ***Empowering*** NMHSs

Proposed Workplan for RA II WIGOS Project 2015-2017

(i)identifying and regularly documenting Region-oriented requirements for satellite data access and exchange using the Regional Requirements Template (spreadsheet),

~~(ii)addressing the deficiencies and challenges reported by RA II Members in response to the survey~~, address challenges by RA II members reported at AOMSUC and within RA II WIGOS CG; WMO plans global survey in 2016 – use the RA II response to identify challenges;

(iii)preparation of satellite data users in RA II to the new generation of geostationary meteorological satellites (such as Himawari-8, FY-4A, GEO-KOMPSAT-2A), in line with the CBS-15 "Guideline for Ensuring User Readiness for New Generation Satellites". The preparation should involve user training, guidance to upgrade processing software and hardware, information and tools, (confirmed as a major priority)

(iv)further ~~improvement of the GTS and~~ implementation of the WIS/WIGOS, including registration of satellite datasets in WIS catalogues, and population of Product Access Guide

(v) establishment of a region-wide multi-hazard early warning system for Disaster Risk Reduction, (important indeed, but arguably beyond the mandate and capability of the Group)

(vi)invite Lao PDR to become a member of the RA II WIGOS Project, given the emerging interest in utilization of satellite data in this country. (Lao PDR invited in 2013, with no response; other countries with satellite receiving equipment should also be invited)

(vii) issuance of newsletters for RA II members (to continue but seek feedback on utility).

Proposed Workplan for RA II WIGOS Project 2015-2017

(ix) Hold annual meetings with AOMSUC; co-coordinators to organize 2 inter-sessional teleconferences

Ensuring satellite user readiness

- Formal basis

Resolution 37 (WMO Congress-17): Preparation for New Satellite Systems

- New satellite systems offer the possibility for significant enhancements of products and services delivered by Members,
- Ingest of new satellite data in operational schemes has major impact on user infrastructure, systems, applications and services, and generally requires coordinated actions at the scientific, technical, financial, organizational and educational levels,
- Timely and careful preparation is essential to avoid disruption of operations upon transition to a new system and to take best advantage of the new capabilities
- Next generation of both geostationary and low-Earth orbit satellites (Himawari-8, FY-4A, GEO-KOMPSAT-2A, Elektro-L N2; FY-3E, JPSS-1, EPS-SG)

Ensuring satellite user readiness

- Formal basis (2)

Resolution 37 (WMO Congress-17): Preparation for New Satellite Systems

- Urges the satellite operators to provide regular and timely updates on their new systems through appropriate means and in particular through inputs to SATURN and OSCAR;
- Requests the CBS (incl. IPET-SUP), the regional associations, through their appropriate expert groups on satellite data access and exchange [..] to take appropriate actions in collaboration with satellite operators in order to raise awareness among Members and to facilitate a seamless transition to the exploitation of the new satellite systems

Ensuring satellite user readiness

- Formal basis (3)

VLab Strategy 2015-2019 approved by WMO and CGMS

- Identifed as one strategic driver the introduction of the new generation of satellites, with new data types and products as well as new dissemination systems
- for the design of training events, such as the
- ONLINE VLAB EVENT WEEK
  "Preparing for Next Generation of Satellite Imagery"
  on 16-20 November 2015