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COMMISSION FOR BASIC SYSTEMS
OPEN PROGRAMME AREA GROUP ON INTEGRATED OBSERVING SYSTEMS

INTER-PROGRAMME EXPERT TEAM ON SATELLITE UTILIZATION AND
PRODUCTS

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REGIONAL SATELLITE DATA REQUIREMENTS AND DATA EXCHANGE

UPDATES ON SATELLITE-RELATED ACTIVITIES IN RA V

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Summary and Purpose of Document

To update the regional satellite data requirements, collection, and satellite-related activities in the WMO Region V.

ACTION PROPOSED

The third session is invited to note the information contained in the document.

Appendices:

- A. Draft of Questionnaire : RA V Satellite Survey 2017
- B. Draft of Questionnaire : Survey of satellite data requirements to support climate applications in RA V

DISCUSSION

Introduction

Throughout these years, all countries and users worldwide have been making use of and got tremendous benefits from the data provided by satellite providers, both LEO and GEO satellite data. Abundant data coming from many satellites has been utilized in various fields such as meteorological, oceanographic, terrestrial, solar, climatic, and other specialized data collection activities and services. Global meteorological community should thank to all satellite providers for their consistent commitment to give excellent services to the users.

1. Satellite Data Collection in RA V

Update on satellite data received by RA V (extracted from various sources) country members is shown in the following table:

Country	LEO Satellite Data	GEO Satellite Data
Australia	NOAA satellite, Aqua/Terra, NPP, MetOp A & B, FY-3	Himawari-8, FY-2 satellites, GOES, Meteosat
Brunei	NOAA, Aqua/Terra, NPP, MetOp A	Himawari-8
Cook Islands		
Fiji		
French Polynesia		
Indonesia	MODIS Aqua/Terra, NPP	Himawari-8 (HimawariCloud & HimawariCast), FY-2D / 2-E / 2-F (FY-Cast)
Kiribati		
Malaysia	NOAA-18/19, MODIS Aqua/Terra, NPP, MetOp A & B, FY-3	Himawari-8, FY-2E / 2-G / 2-F
Federated States of Micronesia	NOAA satellite	Himawari-8 (HimawariCloud & HimawariCast)
New Caledonia		
New Zealand	NOAA satellite	Himawari-8
Niue		
Papua New Guinea		
Philippines		Himawari-8 (HimawariCast), COMS
Samoa		
Singapore	NOAA9, Aqua/Terra, NPP,	Himawari-8, FY-2 satellites
Solomon Islands	NOAA satellites	Himawari-8
Timor Leste		
Tonga		
Tuvalu	NOAA satellites	GOES, Himawari-8
UK of Great Britain and Northern Ireland		
Unites States for America		
Vanuatu		

Table 1. Satellite data collection in RA V Members

2. RA V Task Team on Satellite Utilisation (TT-SU)

RA V Task Team on Satellite Utilization's objective is to identify and document the needs for satellite observations and derived products for RA-V members. The TT-SU aims to deliver a regional set of requirements for satellite data and products required by RA-V members, to fulfill their national/international roles in support of weather forecasts and warnings. Based on an agreed set of requirements, data providers will work with data users to meet the requirements, through ongoing leadership by the Task Team.

Meetings via WebEx have been organized by TT-SU in order to be able to:

- Facilitate discussion between satellite data users and satellite data providers
- Better understand satellite data requirements in RA-V
- Better understand barriers to access and usage of satellite data in RA-V
- Make recommendations to improve access and use of satellite data in RA-V

TT-SU Workplan for 2016-2017:

- Increase Regional representation on the team.
- Revise the Terms of Reference of the Task Team.
- Review and finalise the compiled set of prioritised requirements for satellite observations (using the template recommended by IPET-SUP).
- Identify any barriers that impede the effective use of important data streams such as Himawari.
- Develop a report with recommendations that address issues related to access and utilisation of satellite data in RA-V.

Current satellite-related activities under coordination of RA V TT-SU include:

i. Survey of users of meteorological satellite data and products in RA-V

Task Team will develop a document (spreadsheet) of the satellite data requirements for RA-V members. An example of what is required is the work done by RA-III/IV. A survey of RA-V members will be needed to gather the information required to fill in the spreadsheet. The spreadsheet will be used to develop recommendations to improve data utilisation in RA-V, and may address issues such as communications and training. Experience from RA III/IV Task Team first approached the task with a face-to-face and online meeting. The requirements spreadsheet was completed in stages, with the space agencies providing the metadata for the prioritised satellite data and products. The team agreed that the first step will be to draft survey questions. The survey questions will then be circulated to the Task Team for feedback.

TT-SU is planned to circulate the draft document to the Task Team members in June, seek their feedback, make any final changes, and then send it out to RA-V member countries later in this year (2017). Meanwhile, in relation to Global Framework for Climate Services (GFCS) activity to improve support for ACP countries (Africa, Caribbean, Pacific), WMO Space Programme is also seeking regional satellite data requirements for support of climate applications and services. To response to the request TT-SU has send a short survey questions to satellite-related focal points of RA V members by this end of April 2017. The information gathered through this survey will then be forwarded to WMO Space Programme accordingly.

ii. RA-II/V WIGOS activity

Based on the outcomes of the RA-II/V WIGOS workshop on DRR held in Jakarta in 2015 to develop a project plan for a collaborative project to improve access to rapid scan satellite observations in RA-V. It is expected that the RA-V contribution to the project will be through TT-SU.

Joint RA II/V Workshop on WIGOS for Disaster Risk Reduction in October 2015 aimed at enhancing the exchange of observations across Southeast Asia region and to improve the availability and quality of most relevant observations for DRR such as early warning systems for severe weather events. One

of the goals of the Jakarta Declaration adopted at the Joint RA II/RA V Workshop on WIGOS for Disaster Risk Reduction in October 2015 is the development of a protocol for NMHSs of countries in the region on requests for event driven rapid-scan imagery. AHI on board Himawari-8 has the ability to take “target-area” of observations focused on tropical cyclones and active volcanoes under the responsibility of RSMC Tokyo Typhoon Center and the Tokyo Ash Advisory Center (VAAC Tokyo), respectively.

In relation to the RA II/RA V WIGOS for DRR project, JMA collaborated with AuBoM have tested a request based cyclone tracking system by “Target Area” observation during high season for cyclones whereas low season for typhoon. The target area designated by AuBoM was successfully observed, and the data obtained were collected by AuBoM on a real-time basis.

As part of commitment to improve capacity development in Southwest Pacific region especially for readiness to new-generation satellite, JMA provides assistance through WMO/JMA WMO/JMA Project for the Installation of Himawari Cast Receiving and Processing Systems for Federated States of Micronesia, Palau, Papua New Guinea, and Tuvalu.

3. Knowledge exchange and RA-V Satellite Users Portal

It has been identified that there is a need to strengthen communication across the Region in satellite data use and exchange. To facilitate this need the Melbourne VLab Centre of Excellence has been conducting regular (monthly) online event via Regional Focus Group meetings since 2014. The meetings are becoming a forum for information and knowledge sharing medium regarding data access, satellite products interpretation and analysis, and training. , and are regularly attended by approximately 20 participants from WMO RA-V Members.

To further improve information and knowledge exchange among satellite users in RA V, TT-SU initiated an internet portal (RA-V Satellite Users Portal) hosted by The Bureau of Meteorology which has been launched on 22 August 2016. This website is aimed at satellite data users in Australia, South-East Asia and West Pacific. The goals are to improve collaboration on satellite data utilisation and also to facilitate the collection and recording of satellite data requirements in the region.

The screenshot shows a web browser window displaying the RA-V Satellite Users Portal. The address bar shows the URL www.virtuallab.bom.gov.au/portal/news/. The page header includes the Australian Government Bureau of Meteorology logo and the title "RA-V Satellite Users Portal". A navigation menu at the top includes "Home", "TT-SU", "News", and "Contact". The main content area is titled "News" and contains two articles:

- TT-SU on the RA-V Satellite Users Portal**: Dated 22 August 2016 - Agnes Lane. The article states: "The Task Team on Satellite Utilisation (TT-SU) web presence is hosted on the RA-V Satellite Users Portal."
- RA-V Satellite Users Portal launches**: Dated 22 August 2016 - Agnes Lane. The article states: "The Bureau of Meteorology is proud to announce the WMO Region V Satellite Users Portal. This new website is aimed at satellite data users in Australia, South-East Asia and West Pacific. The goals are to improve collaboration on satellite data utilisation and to facilitate the collection and recording of satellite data requirements in the region."

The footer of the page includes the following information:

- Date created: Sat, 28 Mar 2015
- Last modified: Sun, 21 Aug 2016 07:00:44 +0000
- Page count: 0001088
- © Copyright Commonwealth of Australia 2017, Bureau of Meteorology (ABN 92 637 533 532)
- Disclaimer | Privacy | Accessibility

Figure 1. RA V Satellite Users Portal hosted by Australian Bureau of Meteorology

4. Challenges for RA-V on Satellite Data Utilization

- Since ocean is the major part of RA V region, satellite application for ocean monitoring is very essential. Therefore, Higher Resolution ocean products also highly required.
- Limited numbers of RA V countries have used satellite data for various applications including for climate monitoring applications.
- In many of RA V countries the use of satellite data are majority for weather forecasting and warnings. Improved capacity in data acquisition, analysis and interpretation of satellite products are among key factors for gaining optimum benefit from satellite data.
- Efforts and assistances are required to enhance the capabilities of RA V member countries for various satellite applications.
- Large volume of new data streams where to some small countries has been challenging to be managed.

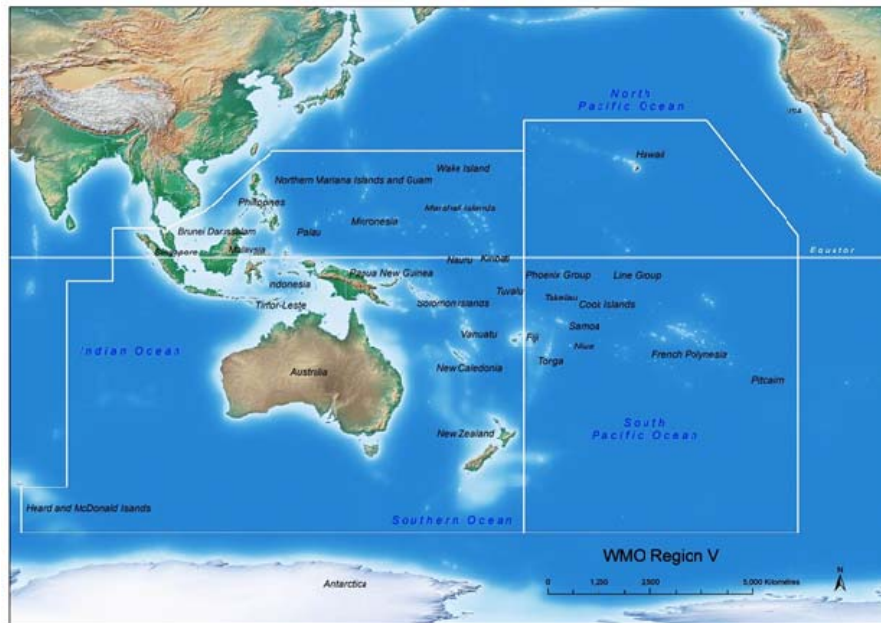


Figure 2. WMO RA V Map

Appendix A: Draft of RA V satellite survey 2017

RA V Satellite Utilisation Questionnaire 2017

Section 1 – contact

Name: _____
 Title or position _____
 Organisation: _____
 Email: _____
 Postal address: _____
 Phone: _____

Section 2 – Current activities

Question 1. Select (using the tick box) all of the satellite data and products that your organisation is currently using (you can select more than one)

- a) Tick all of the products that you currently use.
- b) Select the main application (how you use the data):
 - Weather forecasts and warnings, or
 - Flood forecasts and warnings, or
 - NWP assimilation, or
 - Climate monitoring, or
 - Research, or
 - Website
- c) Select whether you receive the data in real time or delayed.
- d) Select the priority (importance) of the data, where:
 - P1 = highest importance
 - P2 = next in priority
 - P3 = less important
- e) Select the format (if known)

ASCII	AWIPS	BUFR	GEOTIFF	GIF	GRIB1	GRIB2	GVAR
HDF	HDF4	HDF5	HRIT	HSF	JPEG	KML	LRIT
McIDAS	NetCDF3	NetCDF4	PDF	PNG	TIFF		

Tick ✓	Data/products	Application	Real time or delayed	Priority	Data formats
Geostationary VIS/IR/WV					
	Himawari-8 VIS/IR/WV				
	COMS VIS/IR/WV				
	GOES-N/O/P (135W) VIS/IR/WV				
	FY-2E (86.5 E) VIS/IR/WV				
	FY-2F (112.5E) VIS/IR/WV				
	FY-2G (105 E) VIS/IR/WV				
	Electro-LN1/2 (76E) VIS/IR/WV				
Polar orbiting for operational meteorology					
	Metop A/B VIS/IR/WV				
	NOAA-18, 19 VIS/IR/WV				
	Suomi-NPP VIS/IR/WV				
	FY-3 VIS/IR/WV				
Polar orbiting sounding					
	FY-3 Temperature and humidity sounding products				
	DMSP-F19 (SSMIS) Temperature and humidity sounding products				
	Metop Temperature and humidity sounding products				
	Suomi-NPP Temperature and humidity sounding products				
Other products					
	Volcanic ash				
	GEO fog and low cloud				
	LEO fog and low cloud				
	Vegetation index				
	LEO hotspot detection				
	GEO hotspot detection				
	Real time rainfall rate				

	24 hour rainfall rate				
	Heavy Rainfall Potential Area				
	Drought product				
	Dust product				
	Atmospheric motion vectors from GEO				
	Polar region wind vectors from LEO				
	Global Radio occultation sounding				
	LEO Ozone profile				
	LEO Aerosols				
	GEO Cloud mask				
	GEO Cloud top properties				
	Cloud type				
	Regional SSTs				
	Global SSTs				
	Metop/ASCAT Scatterometer winds				
	Jason-3 Ocean surface altimetry (Significant wave height)				
	AltiKa Ocean surface altimetry (Significant wave height)				
	HY-2 Ocean surface altimetry (Significant wave height)				
	Sentinel-3 Ocean surface altimetry (Significant wave height)				
	MODIS Ocean colour				
	FY-3 Ocean colour				
	VIIRS Ocean colour				
	X-band SAR High resolution all-weather multi-purpose imager for ocean, land and ice				

	Solar radiation				
	Soil moisture				
	Land surface temperature				

Data and products from R&D missions

Tick ✓	Data/products	Application	Real time or delayed	Priority	Data format
	Aqua/ Terra (MODIS): multi purpose imagery				
	Calispsa (CALIOP): aerosol profiles, cloud top height				
	GOSAT-2: cloud and aerosol observation, NDVI, total column ozone				
	Megha-Tropiques (MADRAS): Precipitation intensity at surface, snow cover				
	Megha-Tropiques (SAPHIR): humidity sounding				
	SMAP: Soil moisture				
	SMOS (MIRAS): soil moisture, ocean salinity				

Other -----

Question 2. How do you prefer to receive satellite data (internet or HimwariCast or other)

Section 3 – Plans for 2020

Question 3. Select (using the tick box) all of the satellite data and products that your organisation plans to receive by 2020 (you can select more than one)

a) Tick all of the new products that your organisation requires by 2020.

b) Select the main application (how you use the data):

Weather forecasts and warnings, or

Flood forecasts and warnings, or

NWP assimilation, or

Climate monitoring, or

Research, or

Website

c) Select whether you require the data in real time or delayed.

d) Select the priority (importance) of the data, where:

P1 = highest importance

P2 = next in priority

P3 = less important

Tick ✓	Data/products	Application	Real time or delayed	Priority	Data format
Geostationary VIS/IR/WV					
	Himawari-8/9 VIS/IR/WV				
	GEO-KOMPSAT-2A (128E) VIS/IR/WV Launch: 2018				
	FY-4A (86.5 E) VIS/IR/WV Launch: 2016				
	GOES-R (137W) VIS/IR/WV Launch: 2016				
	ELECTRO-LN4 (166 E) Launch: 2019				
Polar orbiting for operational meteorology					
	Metop-A/B/C VIS/IR/WV				
	Suomi-NPP /JPPSS Moderate resolution imagery (375m – 750m)				
	FY-3				

	Moderate resolution imagery (250m – 1km)				
	Meteor-M Moderate resolution imagery (60-120m)				
Polar orbiting sounding					
	FY-3 Temperature and humidity sounding products				
	DMSP-S20 Temperature and humidity sounding products				
	Metop - C Temperature and humidity sounding products				
	Suomi-NPP /JPPSS Temperature and humidity sounding products				
Other products					
	Volcanic ash				
	GEO fog and low cloud				
	LEO fog and low cloud				
	Vegetation index				
	LEO hotspot detection				
	GEO hotspot detection				
	Real time rainfall rate				
	24 hour rainfall rate				
	Heavy Rainfall Potential Area				
	Drought product				
	Dust product				
	Flood product				
	Atmospheric motion vectors from GEO				
	Polar region wind vectors from LEO				
	Global Radio occultation sounding				
	LEO Ozone profile				

	LEO Aerosols				
	GEO Cloud mask				
	GEO Cloud top properties				
	Cloud type				
	Regional SSTs				
	Global SSTs				
	HY-2B/SCAT Scatterometer sea surface winds				
	FY-3E/WindRAD Scatterometer sea surface winds				
	Metop/ASCAT Scatterometer sea surface winds				
	Jason-3 Ocean surface altimetry (Significant wave height)				
	AltiKa Ocean surface altimetry (Significant wave height)				
	HY-2 Ocean surface altimetry (Significant wave height)				
	Sentinel-3 Ocean surface altimetry (Significant wave height)				
	MODIS Ocean colour				
	FY-3 Ocean colour				
	VIIRS Ocean colour				
	X-band SAR High resolution all- weather multi-purpose imager for ocean, land and ice				
	Solar radiation				
	Soil moisture				
	Land surface temperature				

Data and products from R&D missions

	Aqua/ Terra (MODIS): multi purpose imagery			
	Calispsso (CALIOP): aerosol profiles, cloud top height			
	GOSAT-2: cloud and aerosol observation, NDVI, total column ozone			
	Megha-Tropiques (SAPHIR): humidity sounding			
	SMAP: Soil moisture			
	SMOS (MIRAS): soil moisture, ocean salinity			

Other -----

Question 4. How do you expect to receive satellite data by 2020 (internet or HimawariCast or other)

Question 5. Select the options below that you think will be the most significant infrastructure obstacles to achieving your target in 2020, and if possible, describe your requirements.

Tick ✓	Infrastructure obstacles which will prevent you making full use of satellite data by 2020	Describe requirements
	access to data	
	receiving hardware	
	Bandwidth	
	Archive	
	processing	
	system support	
	Other (please specify)	

Question 6. Select the options below that you think will be the most significant technology/personnel obstacle to achieving your target in 2020, and if possible, describe your requirements.

Tick ✓	Technology/personnel obstacles which will prevent you making full use of satellite data by 2020	Describe requirements
	decoding software	
	display software	
	tools for making enhanced products (eg. RGBs, Dvorak, "sandwich" product, principal component, etc)	
	training	
	system support	
	Other (please specify)	

Question 7. Optional. Is there anything else you want to say about your satellite data requirements?

Appendix-B : Survey of satellite data requirements to support climate applications and services in RA
V

**RA V TT-SU Survey on Satellite Data and Products
for Climate Applications and Services 2017**

Question 1. Please identify the needs of your Service / Country for :

- (i) satellite datasets that you need specifically to support climate applications and services:

- (ii) other datasets (model output, reanalysis, surface data) required to support climate applications and services:

- (iii) related capacity development:

Question 2. What are the climate-related applications that you need these data for?
