Review of AOMSUC-9 Country Report

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OUTLINE

- Collection and Processing of Satellite Data
- Satellite-Bases Product Used
- Regional Challenges
- Training and Infrastucture Need
- Current Observation System

COUNTRY REPORT SUMMARY

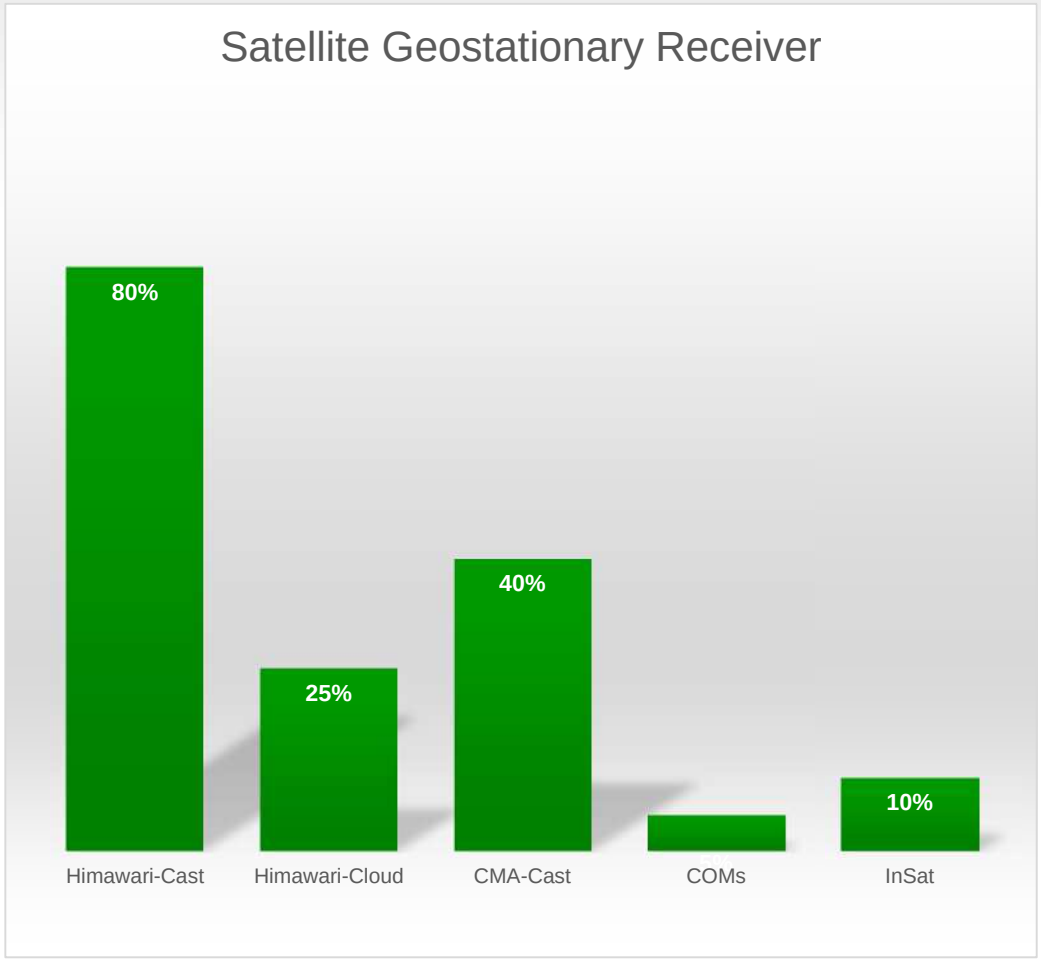
AOMSUC-9 Local Organizing Committee received 21 Country Reports
from 32 invited countries member of WMO RA II (Asia) and RA V (South-west Pacific)

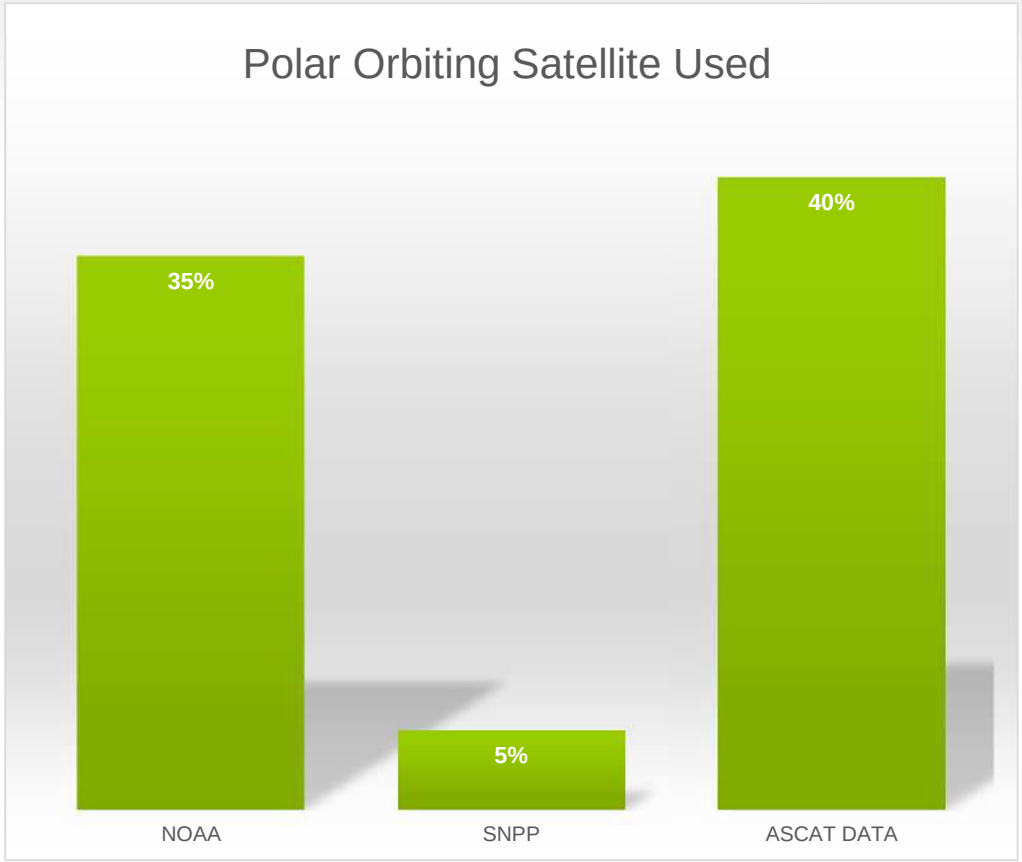
1. Indonesia
2. Micronesia
3. Vanuatu
4. Tonga
5. Timor Leste
6. Thailand
7. Sri Lanka
8. Fiji
9. Solomon Island
10. Maldives
11. Kiribati
12. Samoa
13. Papua New Guinea
14. Palau
15. Hongkong
16. Vietnam
17. Myanmar
18. Malaysia
19. Laos
20. Tuvalu
21. Bhutan

COUNTRY REPORT SUMMARY

- Summary of Country report made based on information submitted by 21 countries in RA II and RA V.
- The content of the country report mainly cover :
  - Collection, processing and utilization of satellite data,
  - Satellite-based product has been used,
  - Regional challenge, and
  - Training and infrastucture need

Collection, processing and utilization of satellite data





Based on 21 countries

Satellite-Based Products Being Used

- Most of countries using Geostationary Satllite to produce
  - Cloud imagery products (IR, VIS dan WV)
  - Rainfall estimation
  - RGB product
- Some countries has an advanced product using Geo Satellite :
  - RDCA (Rapid Development Cumulus Area)
  - Hotspot Information
  - Identification of cloud types, cloud top
- Polar Orbit Satellite used to :
  - Hotspot Information
  - Ocean Monitoring
  - Ocean vector motion wind data

Regional Challenges

- Upgrade the forecast accuracy by using high spatial resolution and multi-spectral bands
- Extreme weather early warning
- Forest fire monitoring
- Data assimilation using satellite radiance data could improve NWP model performance
- Development of products for climatology
- Tropical cyclones forecasting and tracking
- Internet connection

Training and Infrastucture Need

Training :

- Capacity building of new algorithm for RGBs
- Training on imagery analysis of tropical cyclones
- Interpreting various types of satellite images and combining with other resources to provide accurate weather information and forecasts

- Infrastucture Need
  - Satellite based lightning detection dataset and Near Real Time lightning monitoring
  - Reception of new generation satellites (FY-4 / GK-2A)

THANK YOU

Collectiong and Processing of Satellite Data

No.	Countries	Current Satellites/instruments Used Operationally
1	Indonesia	Himawari Cloud and HimawariCast CMA-Cast S-NPP (Ground Satellite Reveiver)
2	Micronesia	GOES Himawari 8
3	Vanuatu	GOES Himawari cast
4	Tonga	Himawari cast
5	Timor Leste	Himawari 8
6	Thailand	CMAcast Himawari cast Himawari Cloud
7	Sri Lanka	CMA cast Meteosat Second Generation (MSG)Insat
8	Fiji	Himawari cloud and Himawari cast Goes RadarWind profiler

Collectiong and Processing of Satellite Data (2)

No.	Countries	Current Satellites/instruments Used Operationally
9	Solomon Island	• Himawari cast
10	Maldives	• CMAcast
11	Kiribati	• Himawari cast
12	Samoa	• Himawari cast SATAID
13	Papua New Guinea	• Available Satellite Images (IR, Microwave, VIS) • Near real time observations from satellites – Himawari 8 • EMWIN (Microwave prod.) • SMART MET (Finish Met. Service) – Operational in 2014, Weather Forecasting and Risk Mapping Tools – Uses GFS data • RIMES WRF (9km) rainfall and temperature forecasts up to 10 days
14	Palau	• NOAA Geostationary and Polar Orbiting Satellites • HimawariCast • JMA MSC - Himawari Real Time (on line) • Taiwan Central Weather Bureau (CWB) and Philippine (PAGASA) Satellite Images

Collectiong and Processing of Satellite Data (3)

No.	Countries	Current Satellites/instruments Used Operationally
15	Hongkong	• MODIS/POES • FY-4
16	Vietnam	• Himawari 8/9 for weather analysis and rainfall estimation • NOAA sounders (ATOVS) for data assimilation experiments • Sea surface wind from ASCAT for data assimilation experiments
17	Myanmar	• NOAA • GMS Satellite Fengyun • Himawari-8
18	Malaysia	• Polar-Orbiting/LEO Satellite • Geostationary Satellite • Ground receiving antenna (Himawari Cast, CMACast, FY2 Direct Broadcast for FY2G, SATRAX for NOAA Series, TERRA, AQUA, NPP, METOP A&B , FY-3, VXEOS for NOAA series) or internet services (e.g. Himawari Cloud)
19	Laos	• COMS-1 • CMACast (Fengyun Cast Satellite Receiver FY-2C/2D) • Himawari-8

Satellite-Bases Produst Used

No.	Countries	Satellite-based Products Used
1	Indonesia	• Infrared Enhanced and Visible and Water Vapour Enhanced • GeoHotspot • RDCA • Volcanic Ash RGB and • Smoke RGB • GSMAP Rainrate Product
2	Micronesia	• Infrared, Visible, Water Vapour • GSMaP • Ocean surface current, temp, and Ocean wave • RDCA
3	Vanuatu	• 5-min multi-spectral imagery for tropical cyclone forecasting • ASCAT
4	Tonga	• ASCAT • GSMaP
5	Timor Leste	• Himawari-8

Satellite-Bases Produst Used (2)

No.	Countries	Satellite-based Products Used
6	Thailand	• Infrared, Visible, Water vapor • GSMaP • RGBs
7	Sri Lanka	• Precipitation estimates from MSG • Insat Images • ASCAT ocean vector motion wind data and precipitate water product
8	Fiji	• 16 bands of Himawari 8 • Goes images • Ascat, Sea Surface Temperature • Ozone and atmosphere
9	Maldives	• FengYun and Insat images • Meteosat images
10	Papua New Guinea	• Cloud imagery products • Cloud characteristics products (Identification of cloud types, cloud top temperature and pressure level)

Satellite-Bases Produst Used (3)

No.	Countries	Satellite-based Products Used
11	Palau	• Visible Imagery • Infrared Imagery • Near Infrared Imagery • Water Vapor Imagery • ASCAT Wind Data • Microwave Imagery • Alitimeter Data
12	Hongkong	• Himawari-8 Satellite derived Reflectivity using Multi-layer perceptron artificial neural network(MLPANN) • Satellite Nowcasting of Significant Convection and Tropical Cyclone Rapid Intensification) • LMI for thunderstorms monitoring • Tropical Cyclone and Deep Convection Monitoring (To enhance Indian Ocean Monitoring using FY4) • AOD for suspended particles • CI for convection development • QPE for rainfall estimation • High pass filter water vapour imageries for turbulence

Satellite-Bases Produst Used (4)

No.	Countries	Satellite-based Products Used
13	Vietnam	• Convective systems • Rainfall estimation • ropical cyclone analysis
14	Myanmar	• Visible, Infrared, EIRc, EIRm, • Water Vapour, RGB and Potential Heavy rainfall Areas and SATAID products
15	Malaysia	• Himawari Cast Data – SATAID • MTSAT / Himawari Cast Data – METEOR • CMACAST DATA – GMSOFT and SWAP • Himawari Cast Data / HSD / HCAI / AMV Product Messir – SAT COROBOR • FY2G Data (direct Broadcast) – MCIDAS • Polar Orbiting System – Lexicsl and Meteor
16	Laos	• MSLP and Accummulation Precipitation, Snow Area • NWP Products • Model Parameter Overlay • Upper air charts 850, 200 mb (forecast for 24, 48, 72 hrs)

Training and Infrastucture Need

No.	Countries	Needs
1	Indonesia	• Interpretation and Adjustment of RGBs for tropical environment • Capability of software utilization (updated version of Sataid and Mcidas V) • Satellite data assimilation for NWP • Validating procedure of the satellite products
2	Micronesia	• Very slow internet • Satellite data receiver
3	Tonga	• RGBs interpretation • SATAID utilisation
4	Thailand	• Capacity building of new algorithm for RGBs • Interpretation and application for risk disaster, water and air-quality management • Big data and AI on the meteorological data • Visualization data in virtual reality • Parallel processing to analyse and and visualize meteorological data • Application of meteorological satellite data on the data assimilation for Numerical Models and images processing to combine with various meteorological data and geographical information system.

Training and Infrastucture Need (2)

No.	Countries	Needs
5	Sri Lanka	• Establish NOAA HRPT receiving station • External support to maintenance of receiving system and WRF system
6	Fiji	• More training on the use of satellite data • Learn how the different channels work and how it can be implemented in daily and cyclone forecasting
7	Solomon Island	• Training on imagery analysis of tropical cyclones
8	Vanuatu	• RGBs interpretation • Visualizing loops • Direct receiver from Himawari Cloud
9	Kiribati	• Training needs on interpreting RGBs and on visualizing loops and other related satellite data topics
10	Samoa	• Refresher training on Tropical cyclone analysis using SATAID • Further useful products and technical support on capacity building regarding satellite data

Training and Infrastucture Need (3)

No.	Countries	Needs
11	Maldives	• Discovery of various satellite data sets available over internet. • Training on utilization and visualization techniques of such data sets for local application. • Identification of weather systems (eg. Meso-scale Convective Systems and other synoptic scale features) and interpreting RGBs of the datasets. • Satellite based lightning detection dataset and Near Real Time lightning monitoring techniques. • Satellite radiance data assimilation techniques for NWP model run, research and simulation.
12	Papua New Guinea	• Satellite image analysis and interpretation • RGB Image analysis • Use of the SATAID software • On-the-job training with the NMHSs that are very experienced and knowledgeable with the HimawariCast Receiving system
13	Myanmar	• We need the application training for Satellites images • Utilization of satellite application for weather forecasting • Rainfall estimation by using satellite images

Training and Infrastucture Need (4)

No.	Countries	Needs
14	Palau	• Training needs: Interpreting various types of satellite images and combining with other resources to provide accurate weather information and forecasts. • Technical infrastructure issues to access and process/visualize satellite data: HimawariCast data originates from Himawari Satellite to JMA to JMA's communication satellite then to WSO Palau. Thus, no internet is needed. Internet fluctuates in Palau, so this is the best source of satellite information. If WSO Palau could be provided with internet sources of real time data and high resolution products, regardless of country of origin, it would be beneficial to WSO Palau efforts.
15	Hongkong	• Enhance Indian Ocean Monitoring using FY4-series satellite • Evaluate FY4A LMI for thunderstorm and severe weather monitoring • Reception of FY4A GIIRS data to enhance NWP works • Reception of new generation satellites, e.g. GEO-KOMPSAT-2A /2B, etc. to enhance weather monitoring • Upgrade of MODIS/POES for reception of more POS data e.g. NOAA-20, METOP-C and FY3C/3D.

Training and Infrastucture Need (5)

No.	Countries	Needs
16	Vietnam	• Training needs : On interpreting RGBs, on meso-scale system analysis and On detecting thunderstorm developments, on rainfall estimation, and Tropical cyclone analysis • Technical infrastructure issues : Direct reception for polar orbit products (NOAA), Higher speed for internet service with HimawariCloud, Integrating local data to SATAID (lightning, local Vietnam observation, radar…)
17	Malaysia	*Satellite data and product requirements*: • Level 2 geostationary satellites data e.g forest fire, atmospheric aerosol and for aviationservices • Near real time polar orbiting satellites data (Level 0 or Level 1b) through internet serviceto NMHSs *Training needs* • Interpreting RGBs products and high level satellite products *Technical infrastructure issues to access and process/visualize satellite data* • Up-to-date data processing package software that can automatically generatesatellite Level 1b and RGB products for NMHSs services

Training and Infrastucture Need (6)

No.	Countries	Needs
16	Vietnam	• Collaboration with National University to develop the curriculum on meteorology and hydrology • Open house • Trainings with media • Monsoon forum • Celebration of WMO's Day, World Water Day
17	Malaysia	*Satellite data and product requirements*: • Level 2 geostationary satellites data e.g forest fire, atmospheric aerosol and for aviationservices • Near real time polar orbiting satellites data (Level 0 or Level 1b) through internet serviceto NMHSs *Training needs* • Interpreting RGBs products and high level satellite products *Technical infrastructure issues to access and process/visualize satellite data* • Up-to-date data processing package software that can automatically generatesatellite Level 1b and RGB products for NMHSs services

Current Observational Systems

No.	Countries	Current Observational Systems
1	Indonesia	• 120 Meteorological Station, • 27 Climatological Station • AWS 361 sites; • AWOS 91 sites • 22 Radiosonde • 2 Wind Profiler • 41 Radar • 61 Lightning Detector
2	Micronesia	• 23 Meteorological Station • Radiosonde
3	Vanuatu	• 7 surface observations • 4 tide gauges • AWSs
4	Tonga	• 6 meteorological stations • AWS1 • tide gauge
5	Timor Leste	• 5 meteorological stations • 2 AWS

Current Observational Systems (2)

No.	Countries	Current Observational Systems
7	Sri Lanka	• 23 meteorological stations • 38 agro meteorological stations • 4 pilot balloon • 1 radiosonde • 512 rain gauge • 37 AWS
8	Fiji	• Meteorological station, climatological stations • AWS and Rainfall station • Radar • Wind profiler
9	Solomon Island	• 7 meteorological stations • 6 AWS • 7 ARG
10	Maldives	• 5 meteorological station • 36 AWS • 1 Upper air observation • 1 Doppler radar • 3 tide gauge

Current Observational Systems (3)

No.	Countries	Current Observational Systems
11	Kiribati	• 7 meteorological stations • 1 upper air observation
12	Samoa	• 42 manual rainfall stations • 8 manual climate stations • 6 seismic stations • 12 automated rain gauges with telemetry capability • 2 Agro Met stations • 19 AWS • Radar Wind Profiler • 2 tide gauges
13	Papua New Guinea	• Surface observation • Upper air observation
14	Palau	• Surface observations • Upper-air observations • Marine observations • Aircraft-based observations • Satellite observations • Coop stations

Current Observational Systems (3)

15	Hongkong	• Surface stations • Aircraft Meteorological Data Relay (AMDAR)	
16	Vietnam	• 181 surface synoptic stations (33 stations are reported to GTS) • 354 hydrological stations6 TEMP (6 stations are reported to GTS) • 6 pilot stations: (4 stations are reported to GTS) • 500-800 automatic rain gauge • 8 weather radars • 26 marine stations (wave and water level) • Marine radar (wave, surface current)	

Current Observational Systems (3)

17	Myanmar	• synoptic observation stations • conventional weather forecast
18	Malaysia	• Principal Meteorological Stations • 196 AWS • Upper Air Stations : Peninsular (7), Sarawak (3), and Sabah (2) • Weather Radar Stations • Satellite Ground Receivers
19	Laos	• 53 Manual weather Stations • 43 Automatic Weather Stations • 110 Manual Water Level Station • 37 Automatic Water Level Stations • 119 Manual rain Gauge posts • 1 Weather Radar (Doppler : C-Band)