Contribution of diverse partnerships toward a new era

PG Diwakar
ISRO, India

Plenary@APRSAF26:
Innovative Partnerships for Sustainable Society
November 29, 2019
Nagoya, Japan
<table>
<thead>
<tr>
<th>EO Data exchange</th>
<th>Access to data from other space agency’s satellites to complement and supplement our satellite data • Contributing data to other agencies and for global studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint satellite missions</td>
<td>Augment data sources through international cooperative satellite missions • Building advanced sensors to meet growing data demand</td>
</tr>
<tr>
<td>Data quality &amp; Joint experiment</td>
<td>Enhancing data quality through joint calibration-validation • Joint campaign for proof of concepts</td>
</tr>
<tr>
<td>Capacity building &amp; data reception</td>
<td>Capacity building for other country, like through UN-CSSTEAP and joint workshops • Support in Telemetry Tracking and Data reception</td>
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<td>International platforms</td>
<td>Participation in key international meetings, bodies, etc. • Support to global initiatives, leadership roles.</td>
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</tbody>
</table>
International cooperation on data exchange

- USGS (Landsat – 8/7; Resourcesat-2), LGAC
- International Disaster Charter for Disaster Management Support
- EC (Sentinel series of satellites) vs IRS
- Resourcesat-1/2 data reception by INPE for environmental monitoring
- Meteorological Satellites through EUMETCast
- Scatsat-1 data to NASA, NOAA, KNMI, EUMETSAT

<table>
<thead>
<tr>
<th>International Charter</th>
<th>2018</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Activations: 10</td>
<td>Activations: 29</td>
</tr>
<tr>
<td></td>
<td>Countries: 09</td>
<td>Countries: 22</td>
</tr>
<tr>
<td></td>
<td>No. of scenes supplied: 54</td>
<td>No. of scenes supplied: 140</td>
</tr>
</tbody>
</table>

2019, supported management of 11 disasters across 11 countries, provided ~55 sets of IRS data.
Regional cooperation on data exchange

- BRICS Virtual RS Constellation
- NR Data for ASEAN
- Drought mechanism
- SAARC STORM
- International Charter/ Sentinel Asia/ UN-ESCAP
- APRSAF - SAFE Initiative/ SAWG

Responded to 15 disaster events across 11 Asia Pacific countries

UNESCAP Drought Mechanism
- Aug 2014 - NDVI
- NDVI ANOMALY 2014 VS 2005
- Yala 2014 Drought Assessment

Sentinel Asia

SAARC STORM
- 50 AWS4 GPS Sonde stations
- 1 DWR

India-ASEAN cooperation
SAFE Evolution

To share the SAFE accomplishments in Asia-Pacific region, and to build operational solutions for regional environmental issues,

- Design new framework of “SAFE Project” for multi-lateral cooperation (data / information and knowledge sharing)
- Using space based technology for food security – agromet and rice crop monitoring projects are implemented

Rice Crop Monitoring Project
- Since 2018
- Rice crop monitoring by SARs in South East Asia, especially Mekong Region
- Linkage to AFSIS and GEOGLAM
- Joint appeal to GEO by Europe, India and Japan
- Future expansion to South Asia through the cooperation with India

Agromet Project
- Since 2018
- Decision-making on food security with provision of outlook information by Agromet information in ASEAN
- Contribution to the drought monitoring project in next RESAP by UN ESCAP
- Future expansion to South Asia through the cooperation with India

Solve environmental problems and improve the quality of life in the Asia-Pacific region

Knowledge sharing

Monthly Rice crop outlook

ISRO

JAXA

GISTDA

FAO

LAPAN/MOA +GISTDA (JAIF)

GEOGLAM

Sustainable Development GOALS

PARIS 2015
Data sharing efforts from ISRO

- Most of the data becoming ‘Open and Free’
- Free downloads coarser than 24m resolution, CartoDEM, Oceansat data, Scatsat-1 data etc. made available free and open since 2010.
- Around 10 lakhs products being disseminated freely every year.

Free and open data through:
- BHUVAN
- MOSDAC
- Oceansat portal
- Data support during disaster

<table>
<thead>
<tr>
<th>Product</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMS-1/HYSI</td>
<td>2008-2012</td>
</tr>
<tr>
<td>Oceansat OCM GAC</td>
<td>2011-2015</td>
</tr>
<tr>
<td>Cartosat-1 DEM</td>
<td>2006-14</td>
</tr>
</tbody>
</table>

- Terrestrial Sciences - 29 Products
- Ocean Sciences - 21 Products
- Atmospheric Sciences - 3 Products
Data sharing efforts from ISRO

OCEANSAT-2 GAC data is 8 days cycle

SCATSAT-1 ~ 8 Lakhs downloads

OCM – GAC & SCATSAT-1

GAC 1 km CYCLE DATA

GLOBAL WIND VECTOR

Repository of Space based Weather & Ocean Data,
Geo Physical Parameters

- Oceansat-2 Scat derived product, Megha-Tropiques
  SAPHIR, SCARAB, SCATSAT-1 Ku-band Scatterometer,
  SARAL Ka band Altimeter, INSAT 3D & 3DR Sounder and Imager.
- Weather Forecast : 24, 48 and 72 hrs. at 5 Km.
- Ocean State Forecasts : (6 hourly) for 5 days
- Cyclone Track, Intensity & landfall forecast
- Alerts : High Intensity rainfall, Cloud Bursts, Heat wave
International Cooperation on Joint Missions

**Joint Satellite Missions**

- **CNES**: SARAL, Megha –Tropiques, Satellite with Thermal Infrared Sensor, ARGOS onboard Oceansat-3
- **Russia**: Youthsat
- **JPL/ NASA**: NISAR (L & S Band SAR)

**MEGHA TROPIQUES (2011)**

Joint Indo-French mission for studying water cycle & energy exchanges of tropical convective system.

**SARAL (2013)**

Joint Indo-French satellite mission for oceanographic studies

**YOUTHSAT (2007)**

Satellite built by Indian & Russian youths for joint development of the experimental satellite

**NISAR (2020)**

Joint Indo-US satellite mission for earth science studies

**TRISHNA (Joint ISRO-CNES Program)**

Thermal Infrared Instrument by CNES (50m), VNIR Instrument (ISRO)
Multi-lateral Cooperation in EO

ISRO’s Contribution to

- Land Surface Imaging (LSI) – Resourcesat-2
- Ocean Colour Radiometry (OCR) – Oceansat-2 OCM
- Ocean Surface Vector Wind (OSVW) - Oceansat-2 Scatterometer
- Precipitation (PC) – Megha-Tropiques
- Ocean Surface Topography (OST) – SARAL
- Sea Surface Temperature (SST-VC) – INSAT 3D/3DR

Important roles
CEOS, ISPRS TC, GEOSS-AP, CGMS, Disaster Charter, APRSAF, SAFE, ACRS, UNESCAP

Contribution to GEO

Participation in GEOSS Societal Benefit Areas (SBAs) including Global Agricultural Monitoring initiative (GEO-GLAM), Global Forest Observation Initiative and GEOSS Data CORE (Collection of Open Resources for Everyone)
Thanks