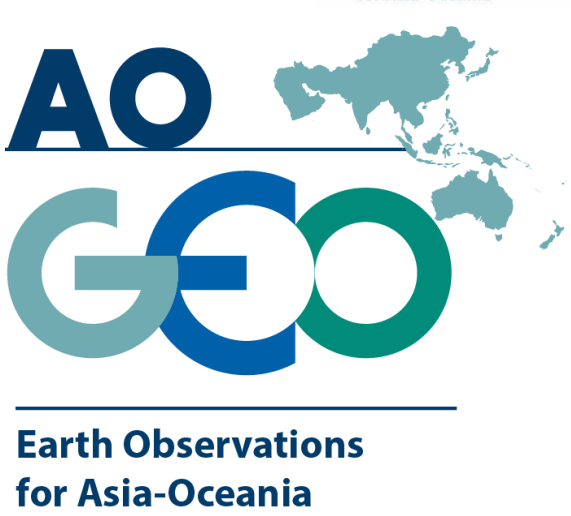
GROUP ON EARTH OBSERVATIONS

Regional Workshop for Promoting the Asia-Pacific Geospatial Information Platform: AOGEO Data Hub progress



Dr David Hudson, Australia

Coordination Board Co-Chair, AOGEO

October 2020 / Canberra, Australia

AOGEO's structures

Governance mechanisms

- AO Caucus (GEO Principles)
- AOGEO Coordination Board
- Task Groups

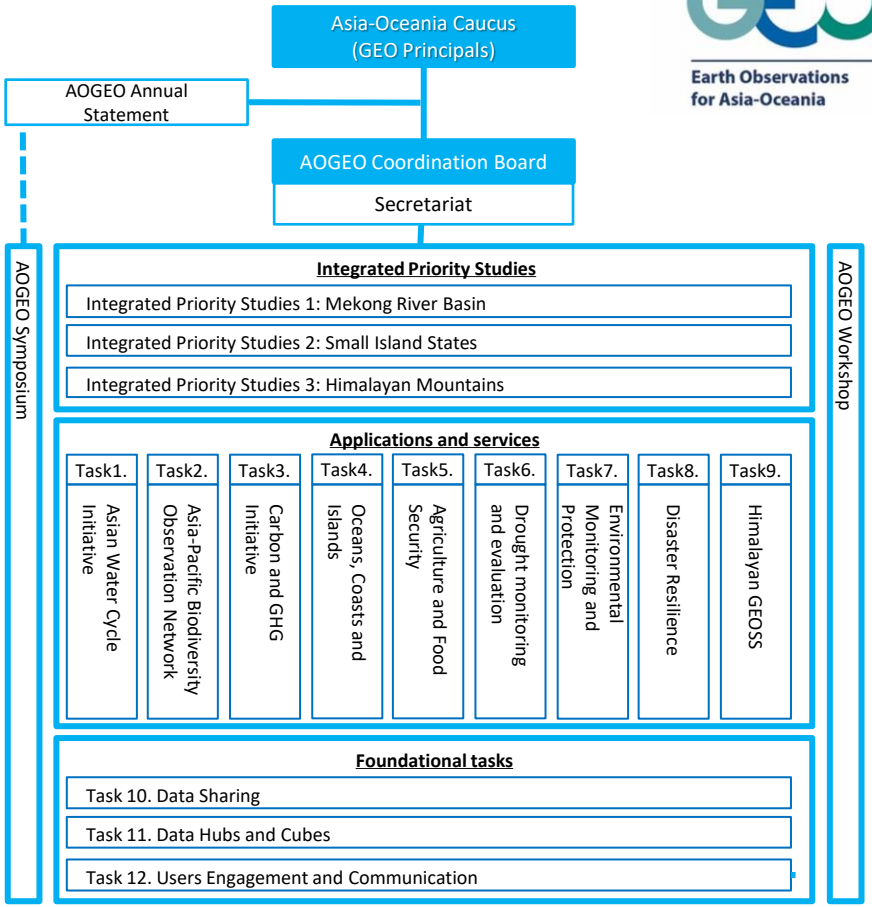
Our forums

- AOGEO Symposium (formerly GEOSS Asia-Pacific Symposium)

11th GEOSS-AP Symposium (Oct 2018, Kyoto)

- AOGEO Workshop (formerly International AOGEOSS Conference)

2nd AOGEO Workshop (Apr 2019, Jakarta)



AOGEO's strong commitment to open data and open platforms

Data Policy

GEOSS Data Sharing Principles

encourage to make data, metadata and products available as Open Data by default; with minimal restrictions on use and at no more than the cost of reproduction and distribution; and with minimum time delay.

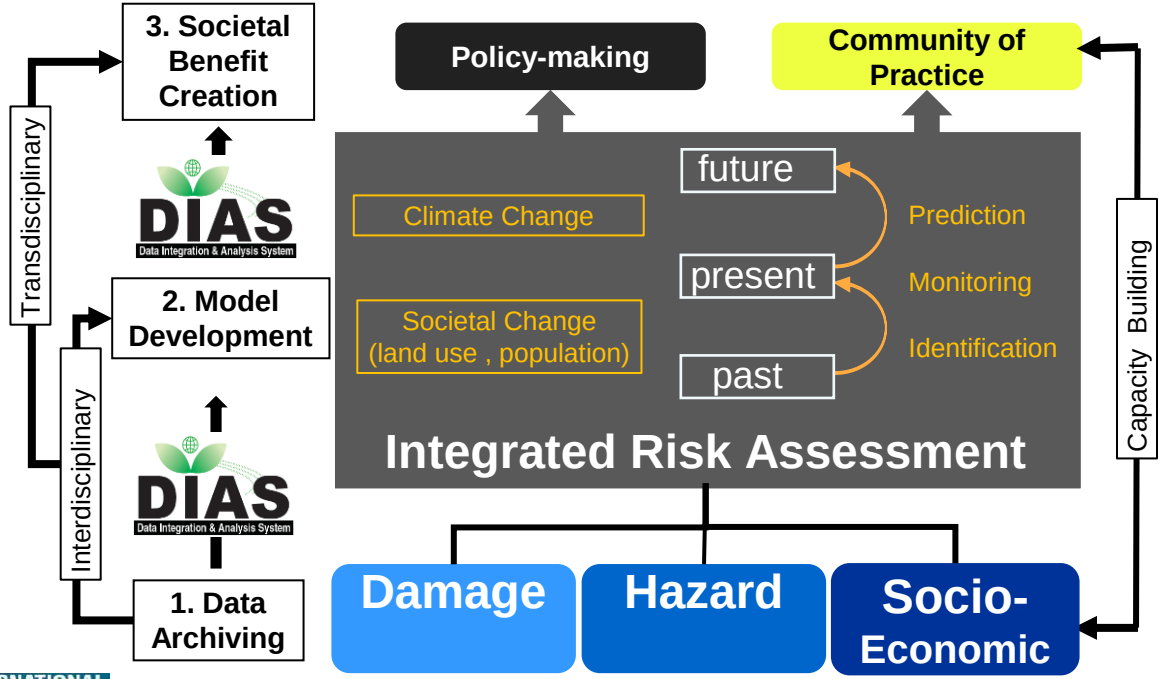
AOGEO Data Management Priority

- Analysis Ready Data (ARD)
- Standardised License to enact the GEO data such as Creative Commons

Continued progress in enhancing and sharing data platforms

- China's MuSyQ and GEOSS Data Sharing Network (China GEOSS DSNet)
- Japan's Tellus and Data Integration and Analysis System (DIAS)
- Open Data Cube (ODC)

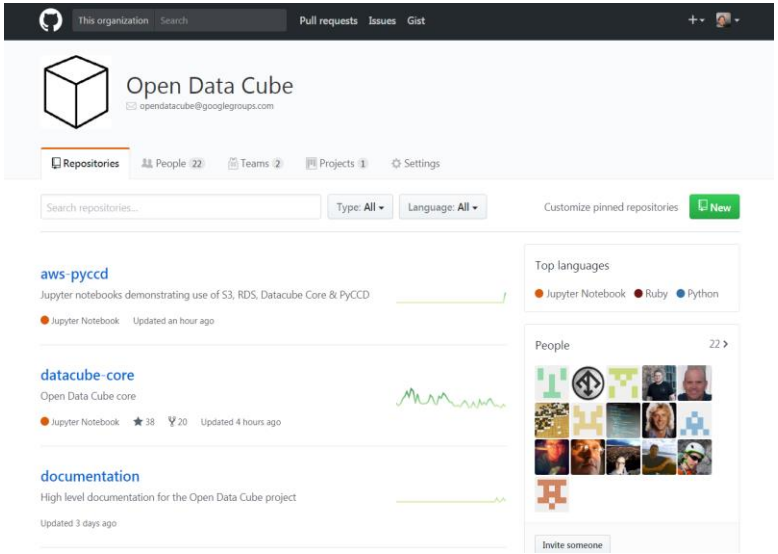
DIAS:
Our model for Co-Design and Co-Production

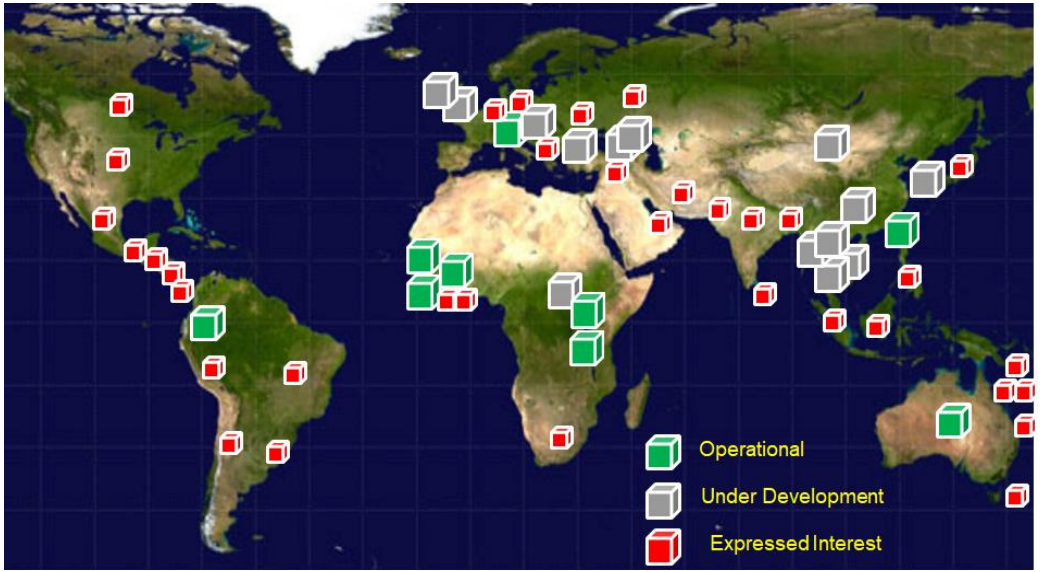


- **Implementations**

- **Pakistan**
- **Myanmar**
- **Philippines**
- **Sri Lanka**
- **Indnesia**

Data Cube: Platform for gridded data analysis and integration





Achieving reproducible knowledge

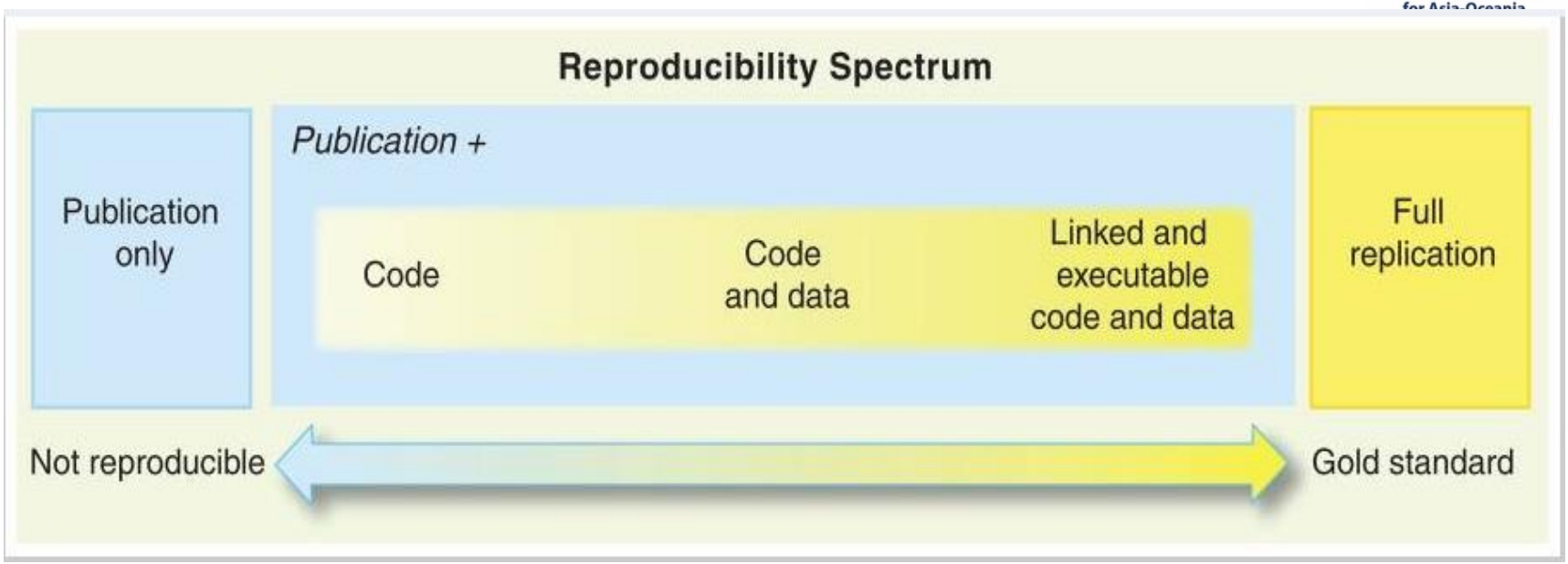
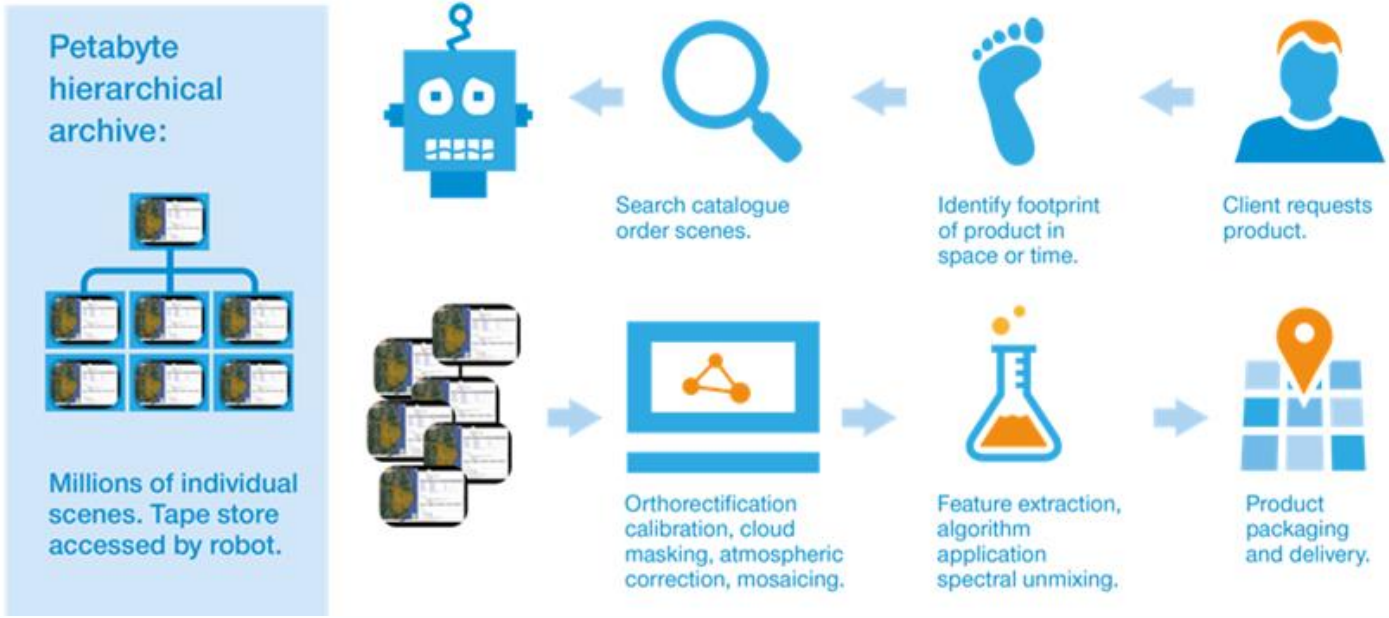


image: Peng (Science, 2011)

Summary of the conversation

- **2000's problem – Nothing could be repeated**
- **2010's problem – Analysis takes too long**



Background of Analysis Ready Data

- **Committee on Earth Observation Satellites Analysis Ready Data for Land (CARD4L) definition:**

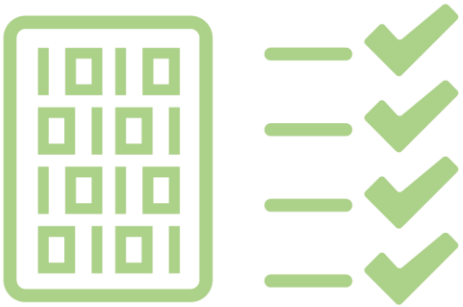
  CARD4L are satellite data that have been processed to a minimum set of requirements and organized into a form that allows immediate analysis with a minimum of additional user effort, and, interoperability both through time and with other datasets

- **CARD4L is a framework for establishing 'minimum requirements' for products that:**

  - Are ready for 'immediate analysis'
  - Require minimal additional user effort to prepare
  - Interoperable with other CARD4L datasets

So we thought…
Get X then process it to inform Y

GLOBAL

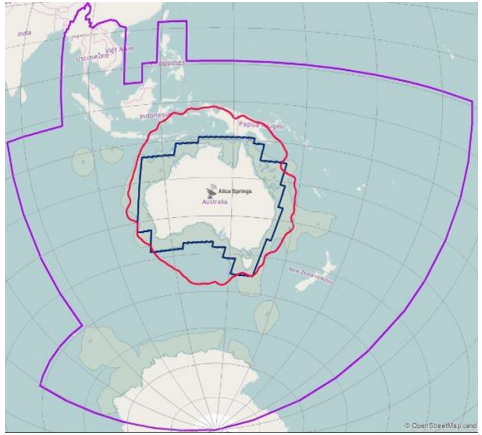


ANALYSIS READY DATA (ARD)

NATIONAL

One of today's problems – Surely getting the data is easy?

- In 2015, GA lead the establishment of a consortium to download the new European Sentinel satellites
  - 2 x radars, 2 x 10m optical capturing globally every week until at least 2030
  - Current data holdings 1.9 PB growing at 108 TB per month
  - ***Open - No login***



Supporting

Consortium

Partners

GROUP ON EARTH OBSERVATIONS

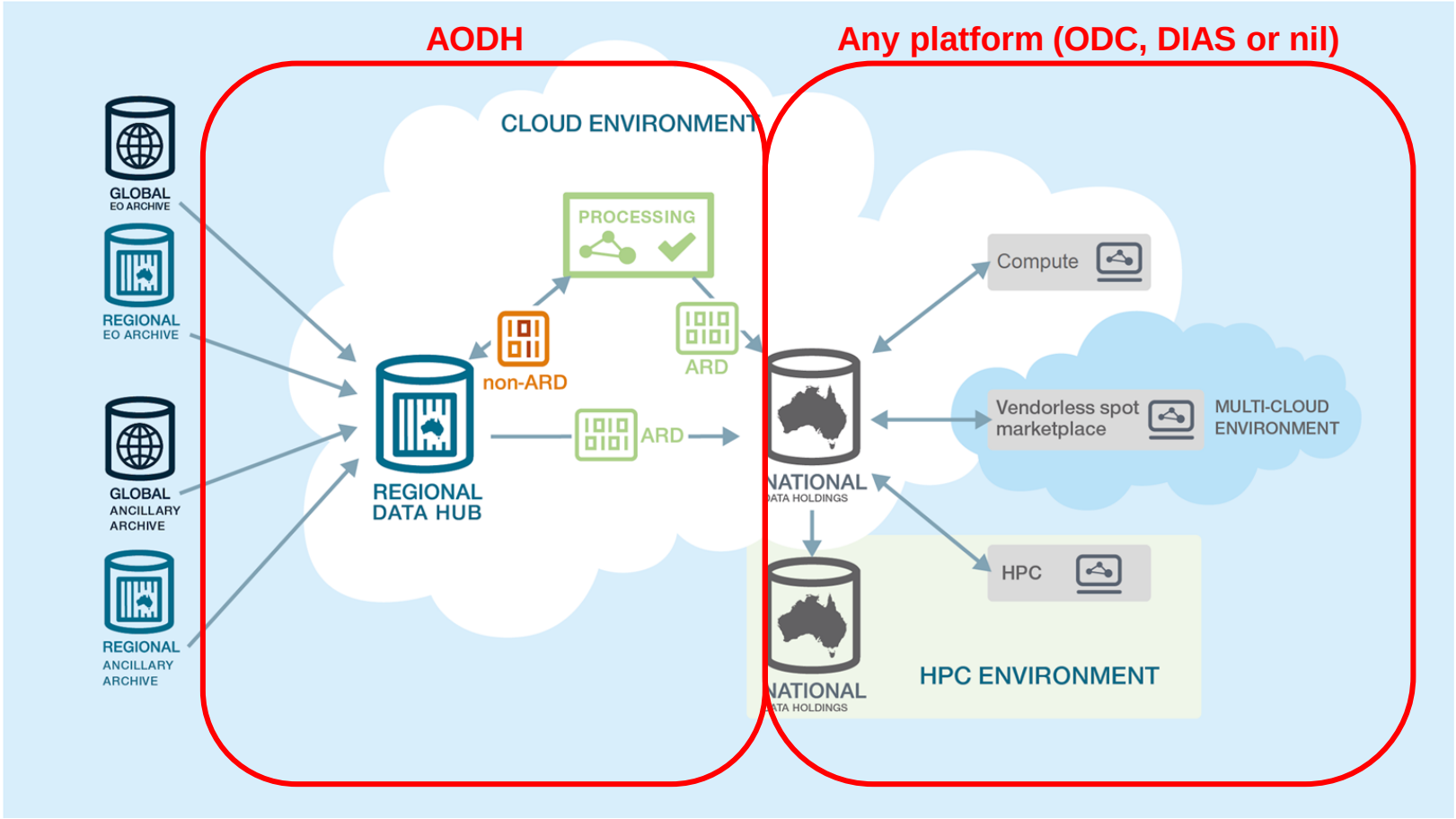
The Asia Oceania Data Hub Concept

What is it?

"The AOGEO Asia-Oceania Data Hub will be a partnership of like-minded Earth observation agencies cooperatively storing Analysis Ready Earth observations in a open, commercial cloud environment."

Definitions:

- Partnership: Signed MoUs in which you agree to contribute money and time
- Like-minded: Agreed set of common principles
- Cooperatively storing Analysis Ready Earth Observations: Common approaches to ARD generation, storage and access
- Open: Anyone, anytime, anywhere can access the data directly - no logins are mandatory
- Commercial cloud: We pay for a defined scalable storage/compute service and others can also pay for additional scalable storage/compute service with access to our data/services


AODH
Any platform (ODC, DIAS or nil)
CLOUD ENVIRONMENT
GLOBAL
EO ARCHIVE
REGIONAL
EO ARCHIVE
GLOBAL
ANCILLARY
ARCHIVE
REGIONAL
ANCILLARY
ARCHIVE
PROCESSING
non-ARD
ARD
REGIONAL
DATA HUB
ARD
NATIONAL
DATA HOLDINGS
Compute
Vendorless spot
marketplace
MULTI-CLOUD
ENVIRONMENT
HPC
NATIONAL
DATA HOLDINGS
HPC ENVIRONMENT

	National	Regional	Global
Data analysis platform	Digital Earth Australia (ODC Deployment), SpectrumEarth	Japan DIAS, Digital Earth Africa (ODC Deployment)	EC DIAS, Google Earth Engine
Climate focused data hub		Japan DIAS, ECMWF	
Earth observation focused data hub	Digital Earth Australia (ODC Deployment)	**Asia Oceania Data Hub**	EC DIAS, USGS Earth Explorer
Metadata database	data.gov.(many)		GEO Discovery and Access Broker
Primary mission archive		JMA HimawariCloud	EC DIAS
Open code base			Open Data Cube

Letters of Support

- Letters of Support: 7
  - Non-financial Letters of Support: 1
    - Australian Bureau of Meteorology
  - Potential financial partner 8
    - Proposing agencies: 2
      - Geoscience Australia (GA)
      - Commonwealth Scientific and Industrial Research Organisation (CSIRO)
    - Letters of Support: 6
      - Australian National Space Agency (ASA)
      - Korea Aerospace Research Institute (KARI)
      - New Zealand Centre for Space Science Technology (NZ CSST)
      - United Kingdom Space Applications Catapult (UK SA Catapult)
      - United States Geological Survey (USGS)
      - Vietnam National Space Center (VNSC)

Capability staging

- The role out of the AODH can be managed using staged in geography, data collections and other dimensions, for example:
- Initial Operating Capability (IOC)
  - Geographic area: AOGEO Integrated Priority Studies: Himalayas, Mekong Basin and Pacific
  - Data collections: Existing open land imaging ARD and related ancillary
- Full Operating Capability (FOC)
  - Geographic area: All of Asia-Oceania
  - Data collections: All open ARD available over Asia-Oceania

AOGEO's strong links to users via our Integrated Priority Studies

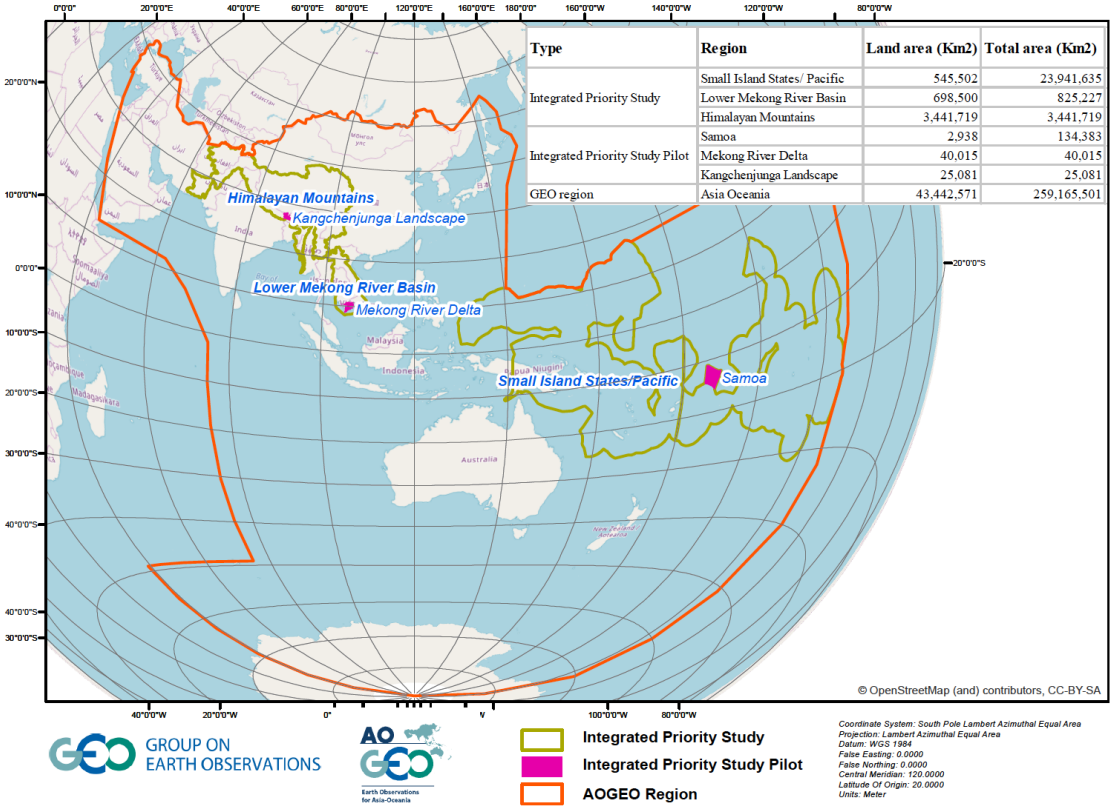
Integrated Priority Studies (IPS)

1. Mekong River Basin
2. Small Island States
3. Himalayan Mountains

Pilot region

1. Mekong River Delta
2. Samoa
3. Kanchenjunga Landscape

Our IPS were founded using the concepts of co-design and co-production such as the EO for Pacific Workshop held in Brisbane October 2018.



Type	Region	Land area (Km2)	Total area (Km2)
Integrated Priority Study	Small Island States/ Pacific	545,502	23,941,635
	Lower Mekong River Basin	698,500	825,227
	Himalayan Mountains	3,441,719	3,441,719
Integrated Priority Study Pilot	Samoa	2,938	134,383
	Mekong River Delta	40,015	40,015
	Kangchenjunga Landscape	25,081	25,081
GEO region	Asia Oceania	43,442,571	259,165,501

Coordinate System: South Pole Lambert Azimuthal Equal Area
Projection: Lambert Azimuthal Equal Area
Datum: WGS 1984
False Easting: 0.0000
False Northing: 0.0000
Central Meridian: 120.0000
Latitude Of Origin: 20.0000
Units: Meter

Creating a data inventory

Collection ID		Collection Overview		Collection parameters
ID	Collection title	Collection data range	Source country	Describe parameters
1	Moderate resolution Optical: Landsat Collection 1 ARD	1987 - ongoing	US	Vegetation cover, sea-surface temperature (Landsat-8), water color
2	Moderate resolution Optical: Sentinel 2 ARD	2014 - ongoing	EC	Vegetation cover, water color
3	Moderate resolution RADAR: Sentinel 1 ARD	2010 - ongoing	EC	water-area detection, land cover change detection
4	Satellite processing ancilary data	1987 - ongoing	Various	DEM, atmosphere parameters (air temp. pressure heights, water vapor, ozone..)
5	High resolution Optical: Kompsat ARD	2008~2019	ROK	Vegetation cover, water color
6	High resolution RADAR: Kompsat ARD	2014~2019	ROK	water-area detection, land cover change detection
7	Data-driven GPP and NEE across Asia	2000 - 2015	Japan	CO2 flux
8	Rice crop map by Japan's SAR	2015 - ongoing	Japan	Rice production
9	Global PALSAR-2/PALSAR/JERS-1 Forest/Non-Forest map	1992 - ongoing	Japan	Forest classifications
10	Moderate resolution RADAR: PALSAR-2/PALSAR/JERS-1 ARD Mosaics	1992 - ongoing	Japan	Forest-area detection
11	Moderate Optical Satellite data(16m)	2012-ongoing	China	Vegetation cover, water color
12	Moderate Optical Satellite data(16m)	2019-ongping	China	Vegetation cover, water color
13	Global Land Cover with Fine Classification System at 30m in 2015 ARD	2015	China	30 land cover types
14	MuSyQ Normalized Difference Vegetation Index(1km) ARD	2010-2015	China	Vegetation index
15	MuSyQ Leaf Area Index(1km) ARD	2010-2015	China	Leaf area Index
16	MuSyQ Fractional Vegetation Coverage(1km) ARD	2010-2015	China	Vegetation coverage
17	MuSyQ Land Surface Reflectance(1km) ARD	2010-2015	China	Reflectance
18	MuSyQ Land Surface Albedo(1km) ARD	2010-2015	China	Albedo
19	MuSyQ Photosynthetic Active Radiation/ Downward Short Radiation(5km) ARD	2010-2015	China	Short wave radiation

Timelines for the pilot

• Asking for help	61 days from launch
• Creating a data inventory	36 days from launch
• Pulling the data together	5 days from launch
• Sharing the data	2 days from launch

Pulling the data together

AOGEO's Data Hub

A public hub for Asia Oceania's Earth Observations.

This repository holds the Public Data Set of AOGEO's Asia-Oceania Data Hub.
To access these files with an AWS S3 client the name of the AWS bucket is **aogeo-ips**

https://aogeo-ips.s3-ap-southeast-2.amazonaws.com /

Key	Size	Last Modified
air/	0	
cnsa/	0	
esa/	0	
ga/	0	
jamstec/	0	
jaxa/	0	
kari/	0	
ngcc/	0	
usgs/	0	
website/	0	
README.txt	1.4 kB	30/10/2019, 3:10:23 UTC
CHANGELOG.txt	0.1 kB	30/10/2019, 3:11:46 UTC

http://aogeo-ips.s3-website-ap-southeast-2.amazonaws.com/

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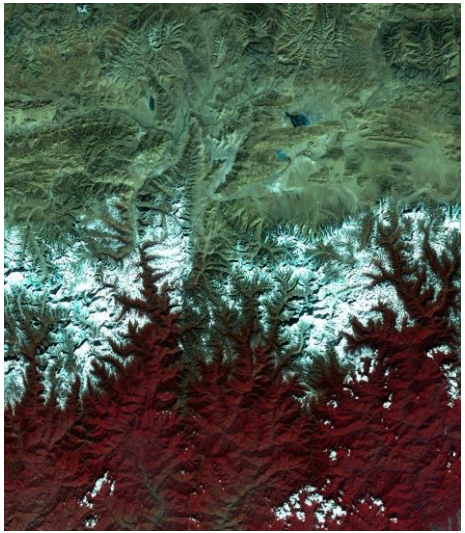
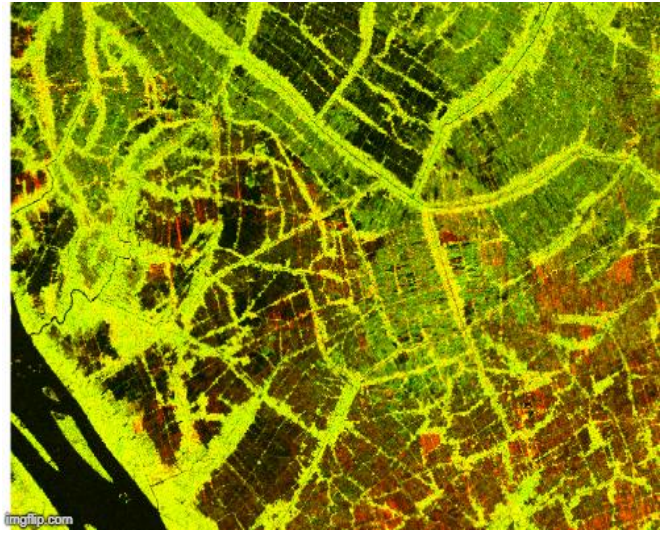
Sharing the data

AO GEO Earth Observations for Asia-Oceania

Kangchenjunga Landscape
GF1 WFV
Thank you China



Mekong Delta
ALOS PALSAR 2007/2008
Thank you Japan



Samoa
KOMPSAT-3
Thank you South Korea

How we will operate

AODH long term

All in GA

IPS datasets in single Postgress DB in GA

aws

OPEN DATA CUBE

jupyter

Analysis remotely by using ODC/jupyter

All users access to GA's ODC via Jupyter

Current focus

OPEN DATA CUBE

jupyter

Australia

OPEN DATA CUBE

jupyter

Korea

Analysis remotely by using ODC/Jupyter

First access

IPS project portal

jupyter

OPEN DATA CUBE

Japan

OPEN DATA CUBE

jupyter

China

Next steps

- Build the community working on the IPS pilots (AOGEO Task Groups, GEO community research call, presenting in regional meetings like APRSAF and APSCO etc)
- Index the data within the hub and prepare an open data cube
- Provide training on the data hub and tools to use our data
- Report on the IPS findings in a special issue of the Journal *Remote Sensing* (https://www.mdpi.com/journal/remotesensing) on *Earth Observations in Asia-Oceania* in late 2020
- National demonstrators
- Discuss at the upcoming AOGEO Workshop being organised by China, 27 – 31 October

GROUP ON EARTH OBSERVATIONS

AO GEO
Earth Observations for Asia-Oceania

Thank you!

Asia Oceania's open collaborative network and platform for Earth observations