



Global Mangrove Watch (GMW) – project update and progress in its implementation as a pilot to the Ramsar GWOS

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The Ramsar GWOS (by Wetlands Int'l)

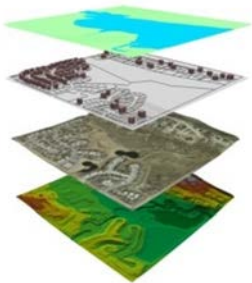


- User needs assessment completed
- Data availability & accessibility
- Explored options for collaboration:
 - Global Mangrove Watch (GMW)
 - GEO-Water
 - Global Inundation Map
 - Globolakes project
- Horizon 2020 submission on a regional GWOS–SWOS
- JAXA–Ramsar collaboration on GMW a direct contribution to GWOS
- GMW selected as GWOS pilot at STRP-17



The GWOS process (by WI)

Engine room



- Operating principles
 - Governance
 - Ownership
 - Data sharing
 - Funding strategy
 - Marketing strategy
 - Communication
- Geospatial infrastructure
- Information lifecycle mgmt

Process

External inputs

Outputs

- **Global Mangrove Watch**
- State of the Worlds Wetlands
- Sahelian Atlas

Better information

Users

- Basin authorities
- Decision makers
- Policy makers
- Government
- NGOs
- Corporates



Feedback

Wiser use

Collaborative effort



Background



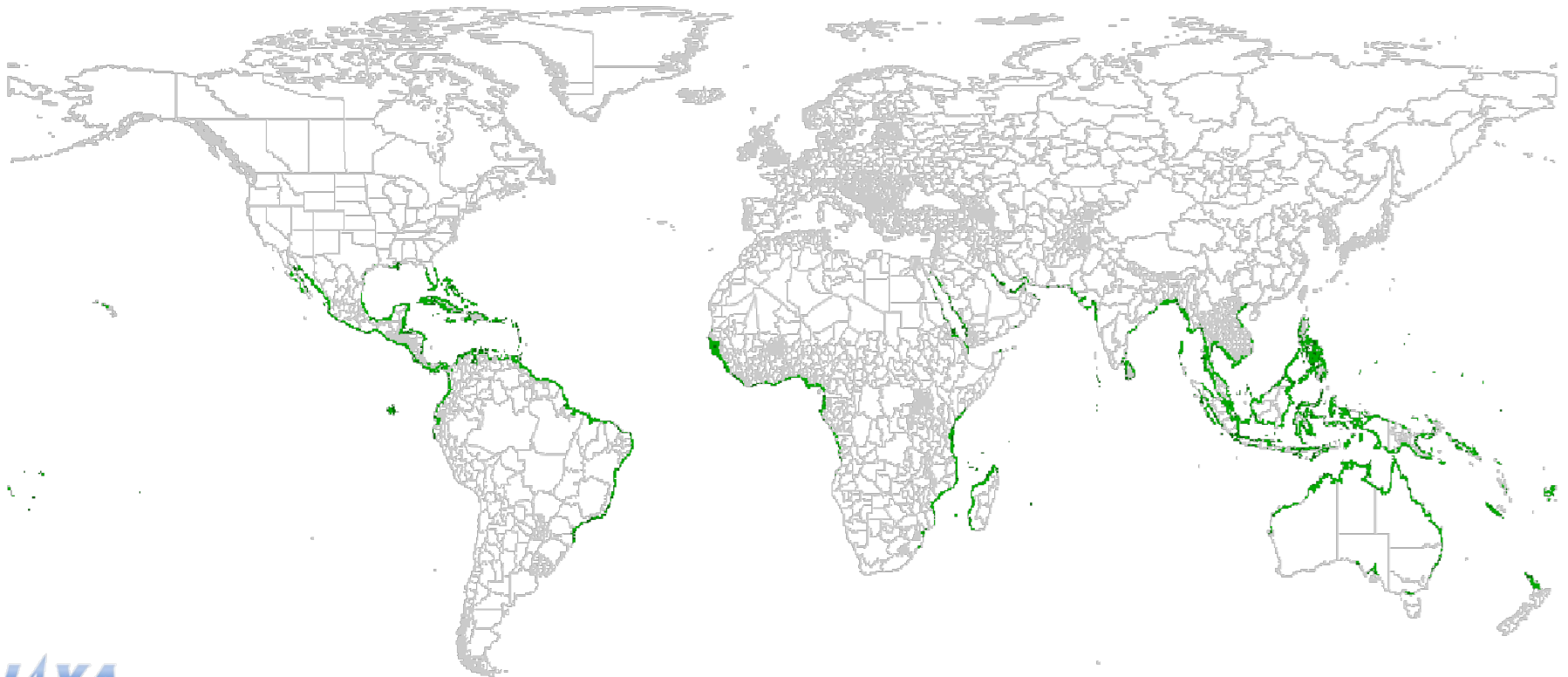
Mangroves and Earth Observation

- Earth observation satellites well suited for **wide-area mapping** of forest and vegetation
- Using time-series of satellite data, **changes** in the vegetation cover can be **detected and quantified**
- Longer and more frequent **time-series** help to improve classification **accuracy**
- Recent **advances in computing power** enables processing and storage of the very large data amounts involved.

Background

USGS-2000 - the first global effort

The first satellite-based, fine resolution global map of mangrove extent generated by the US Geological Survey (USGS) based on 30m Landsat data from the years 1998-2000.



Continuous updates required

- Changes in mangroves occur fast and updated information about the change status required.
- For countries participating in REDD+, UNFCCC requires inclusion of mangroves in national reporting.
- **Cloud cover** limits optical satellite observations in the tropical zone. Radar satellites can acquire data regardless of clouds, smoke and haze.

Global Mangrove Watch



- International collaborative project initiated as part of JAXA's Kyoto & Carbon (K&C) Initiative science programme.
- Key partners: JAXA, Univ. New South Wales, Aberystwyth Univ., Wetlands International, IWMI, NASA (JPL/GSFC)

Objectives:

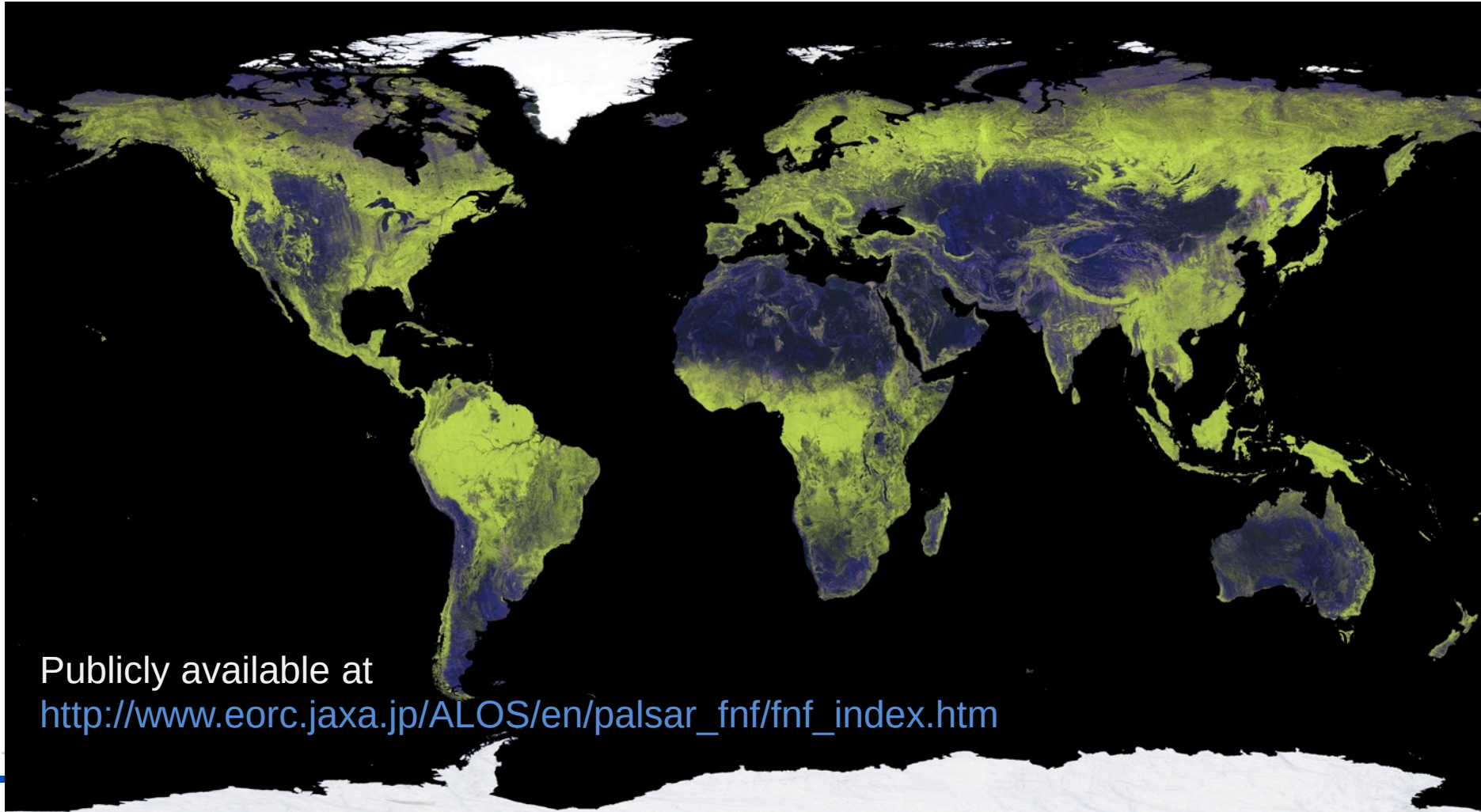
- Overall: Mapping of extent and changes in global mangrove areas using satellite radar at 25m spatial resolution
- Generation of **maps of annual changes** in the global mangrove areas (compared to USGS-2000 baseline map)
- Generation of an updated **baseline map** of the global mangrove extent for the year 2015, at a spatial resolution of 25 m.
- R&D: mangrove structural classification and above-ground biomass



Global Mangrove Watch

Global radar mosaics @25m from 1996, 2007, 2008, 2009, 2010.

To continue with ALOS-2 from 2014



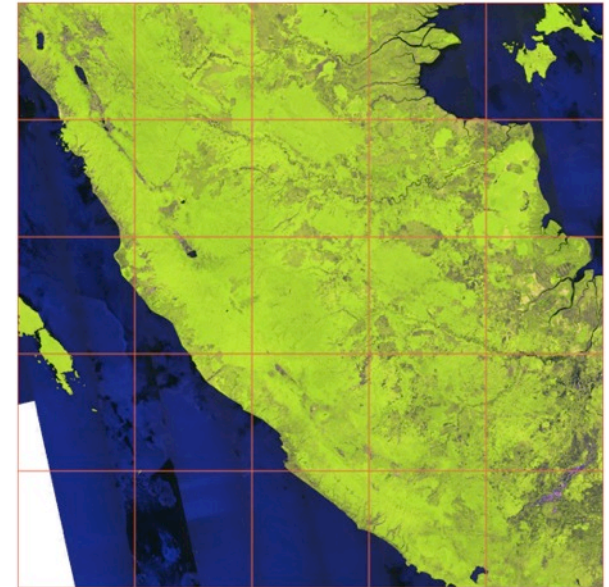
Publicly available at

http://www.eorc.jaxa.jp/ALOS/en/palsar_fnf/fnf_index.htm



Radar satellite datasets used

- 1996: JERS-1 SAR
- 1998/2000: USGS-2000 map
- 2007: ALOS PALSAR
- 2008: ALOS PALSAR
- 2009: ALOS PALSAR
- 2010: ALOS PALSAR
- 2014 & annually: ALOS-2 PALSAR



SAR mosaic data in
1°x1° tiles

Challenge – detecting many different types of changes

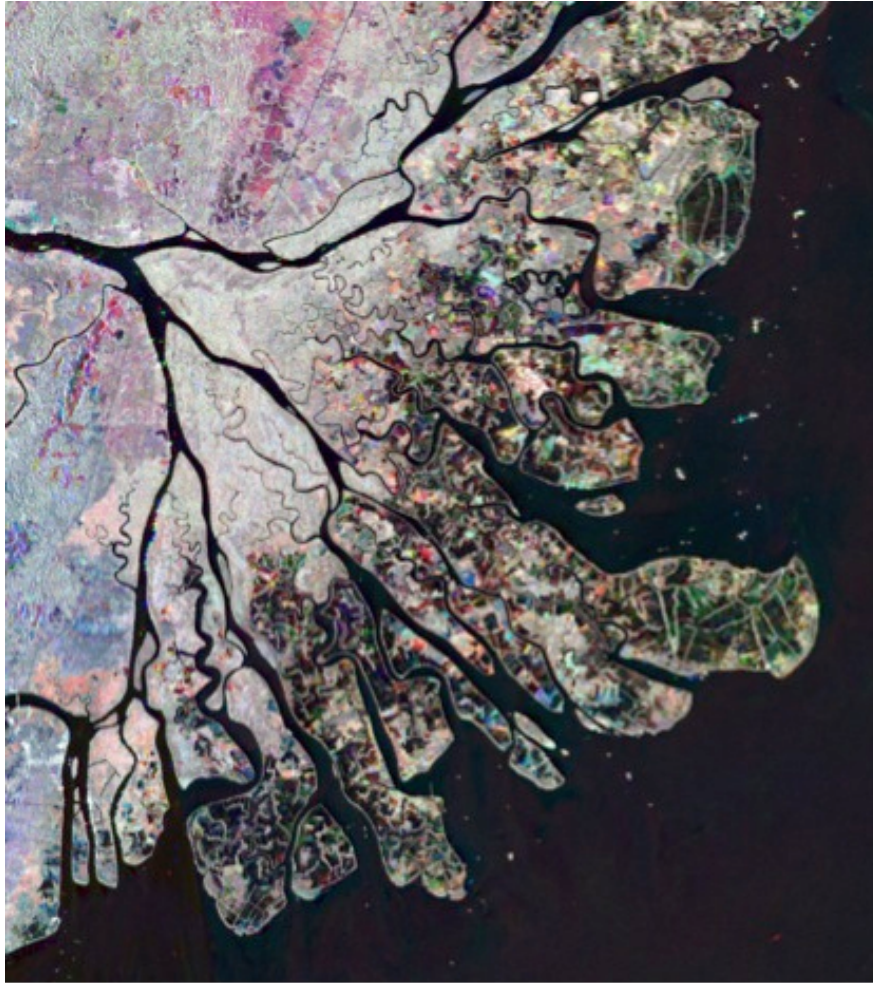
Losses

- Aquaculture
- Oil and gas exploration
- Urbanisation and infrastructure
- Logging for firewood and other uses
- Degradation
- Others...

Gains

- Natural migration
- Seaward expansion (natural / antropogenic)
- Inland expansion (e.g. due to sea level rise and flooding)
- Large-scale replanting projects

Anthropogenic change: Samarinda, E. Kalimantan

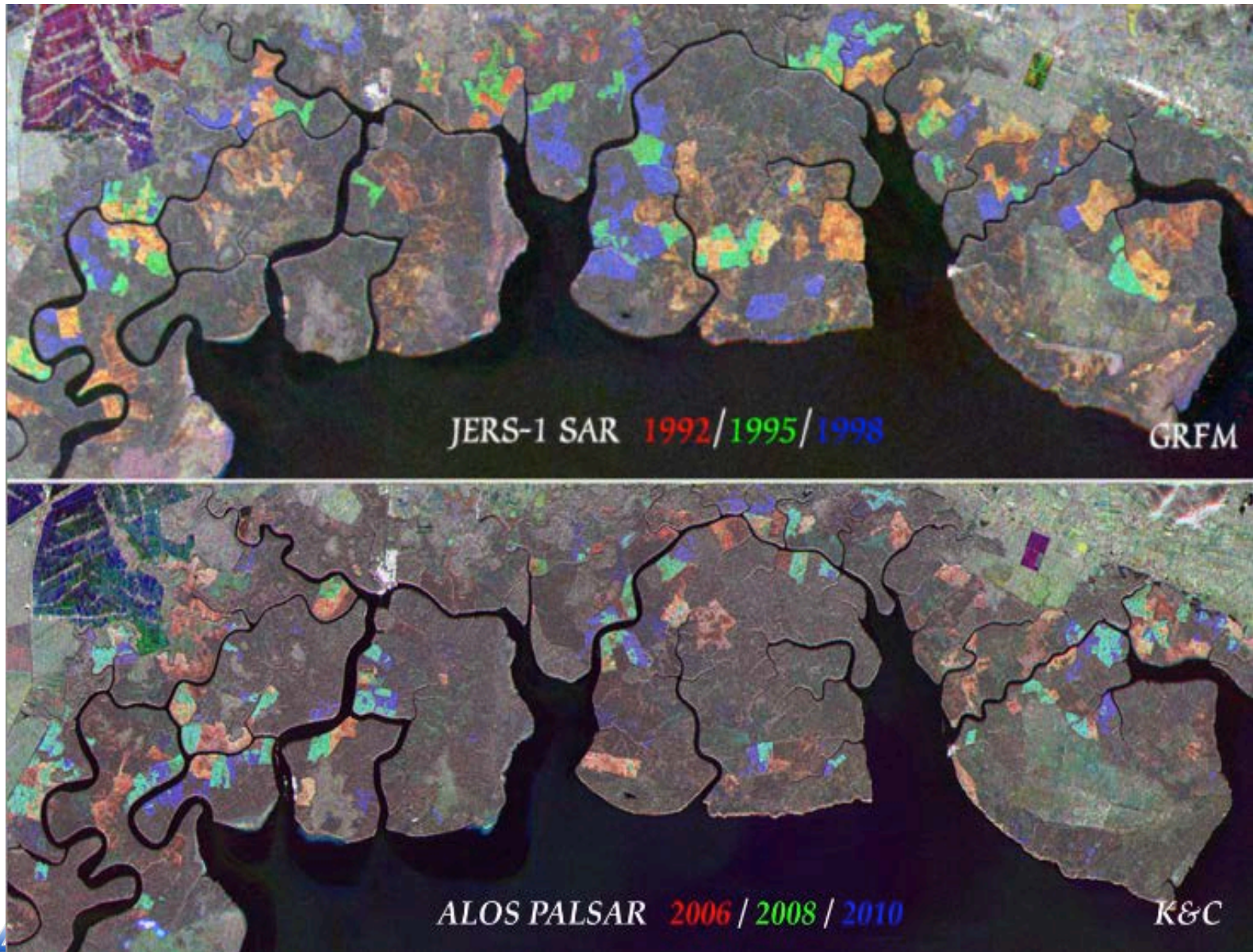


ALOS PALSAR 2007/2010
(1°x1° tile)



JERS-1 1996 – ALOS PALSAR 2010
Red: loss of mangrove

Managed mangroves : Perak, Malaysia



GMW products/information foreseen to be provided through the GWOS



- Mangrove change maps for years 1996, 2007, 2008, 2009, 2010, and 2014+, compared to 2000 baseline
- Baseline map of mangrove extent (derived from USGS-2000 classification)
- Format specs: Maps provided as 1°x1° tiles in GEOTIF format
- Statistical information on changes (areas/rates) by 1°x1° tiles, or - on request - by country

For transparency

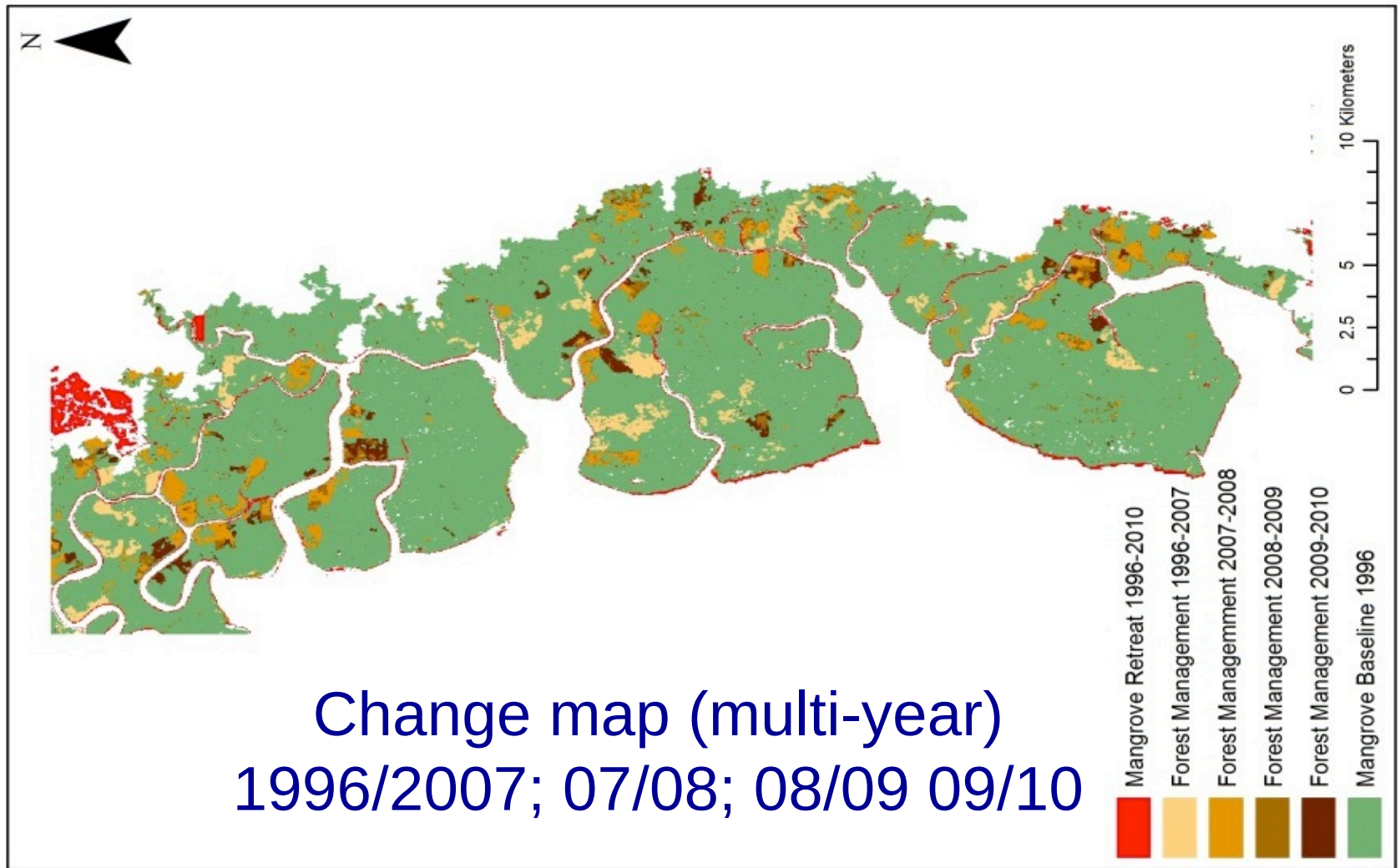
- The satellite data tiles used for the classifications
- Classification software (open source: RSGISLib)
- Algorithms and rule settings



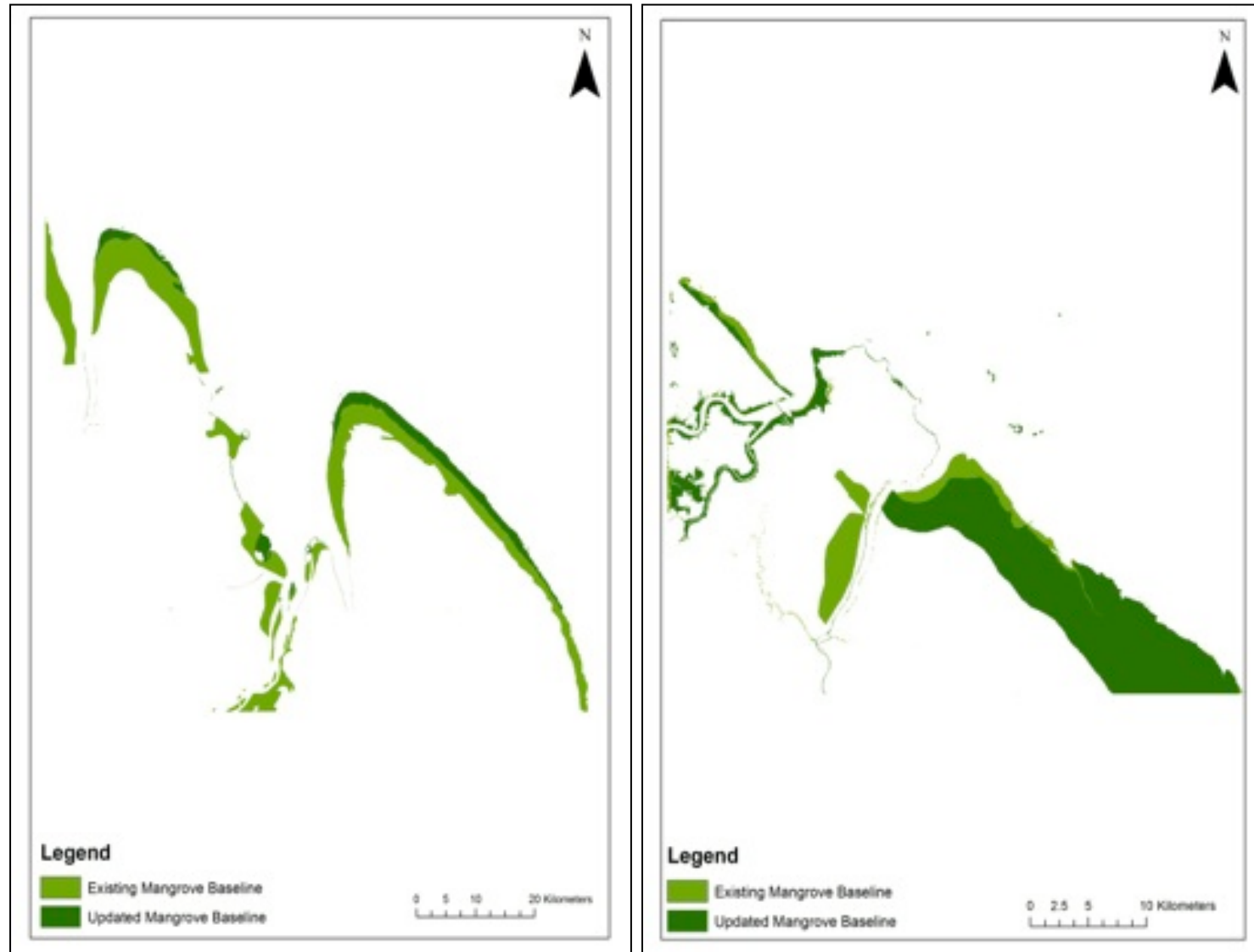
GWOS/GMW product examples



GWOS/GMW product examples

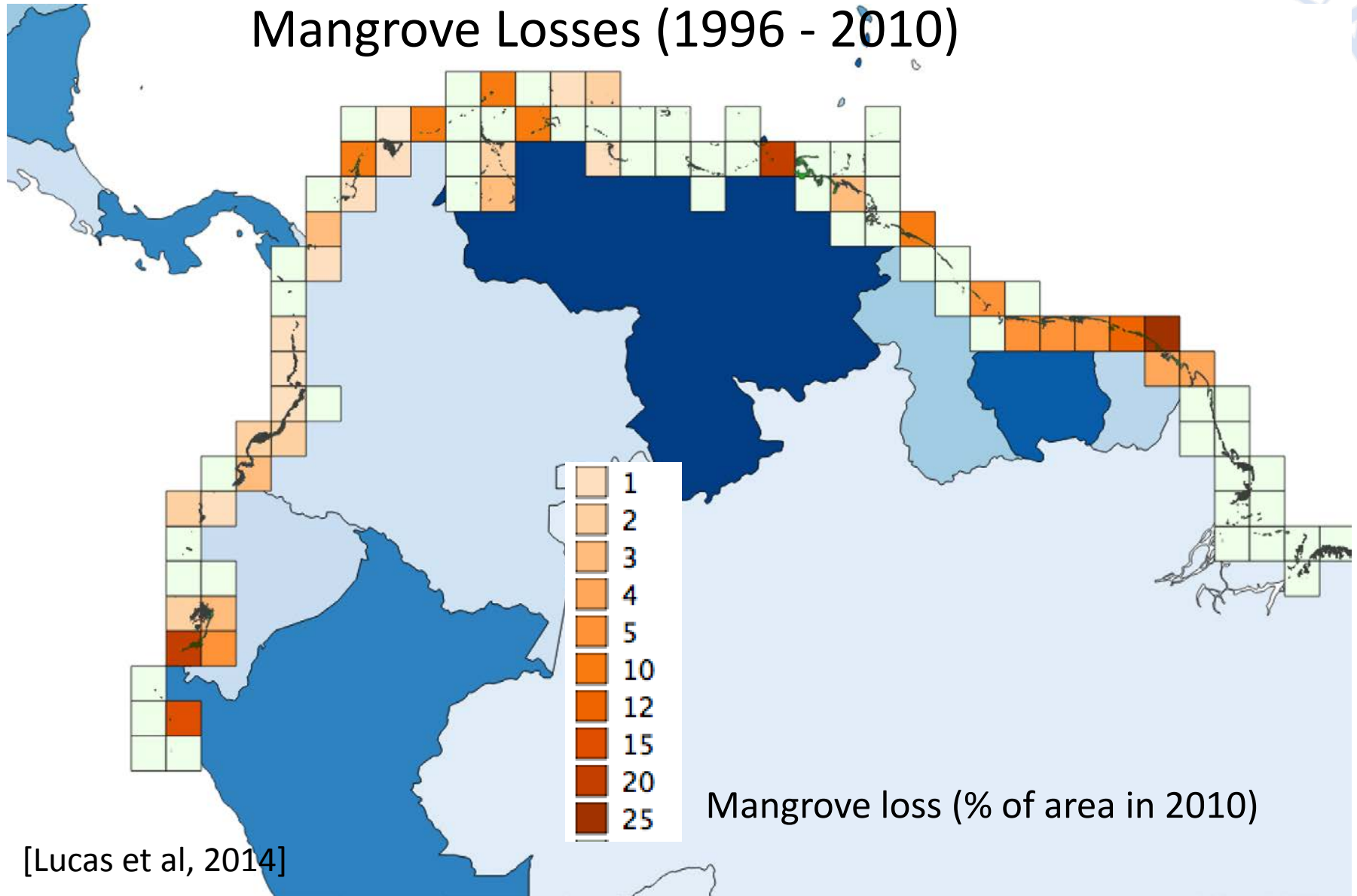


GWOS/GMW product examples

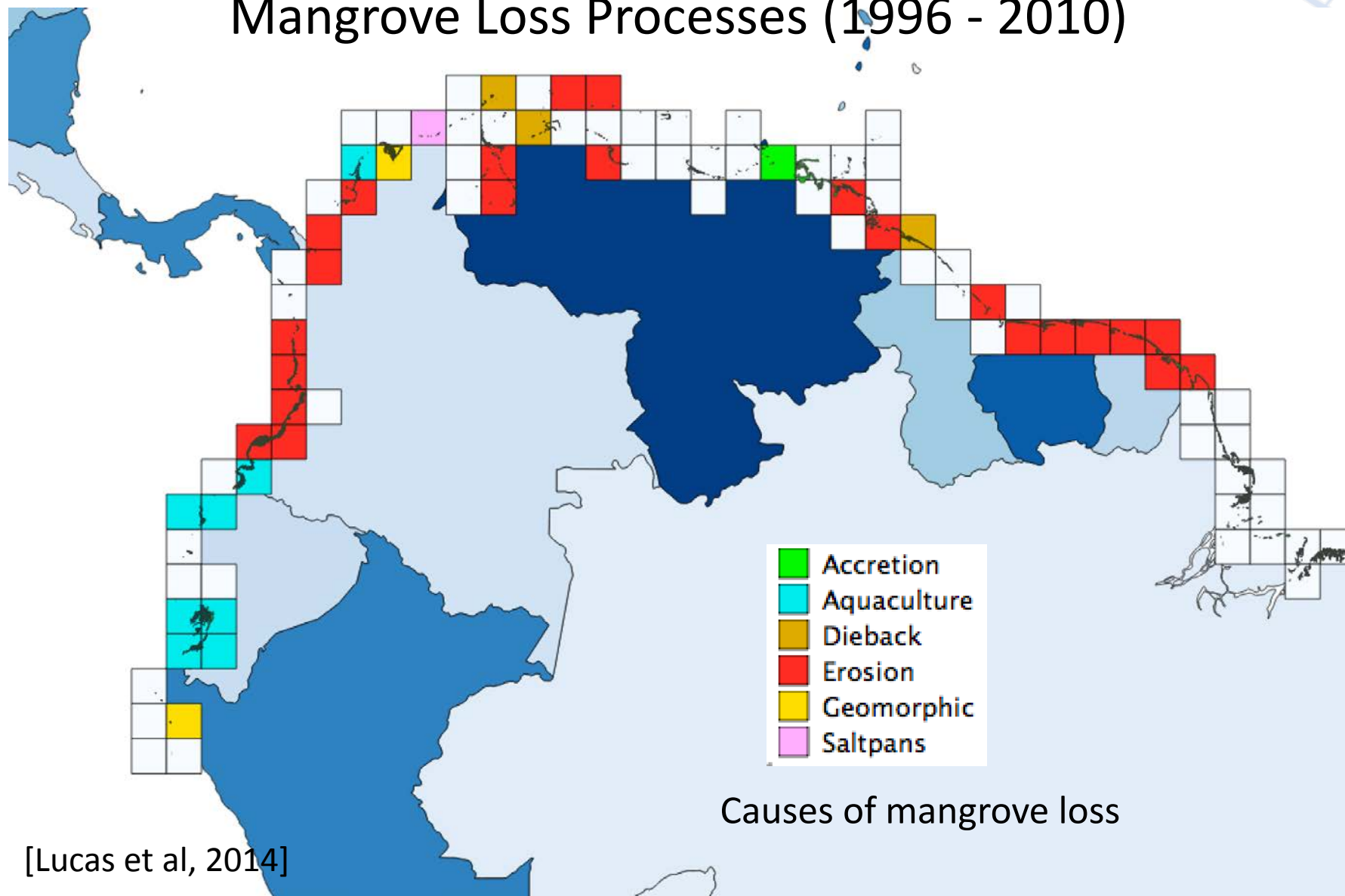


Change maps 2000/2010

Mangrove Losses (1996 - 2010)



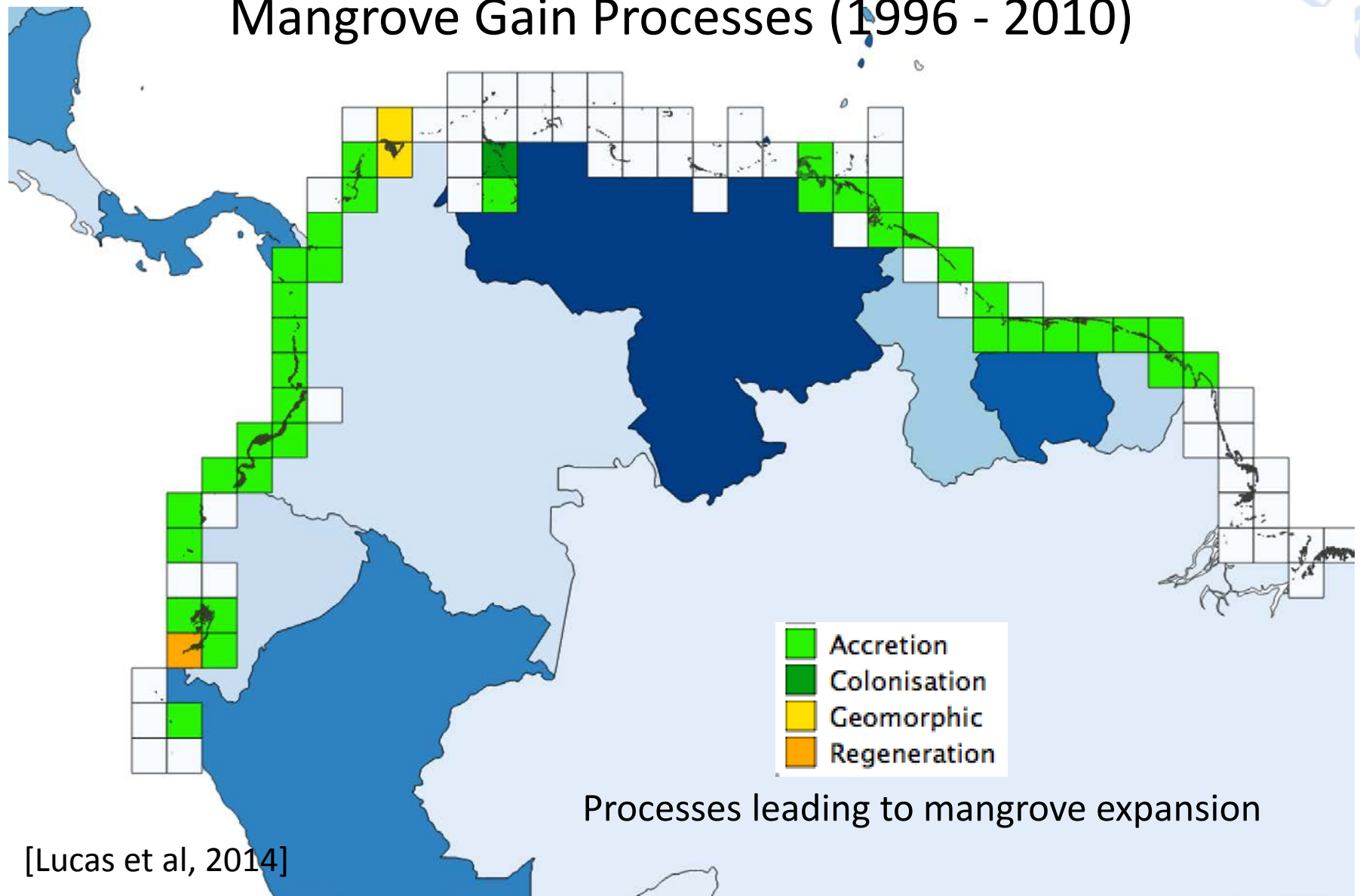
Mangrove Loss Processes (1996 - 2010)



[Lucas et al, 2014]

GMW statistical information

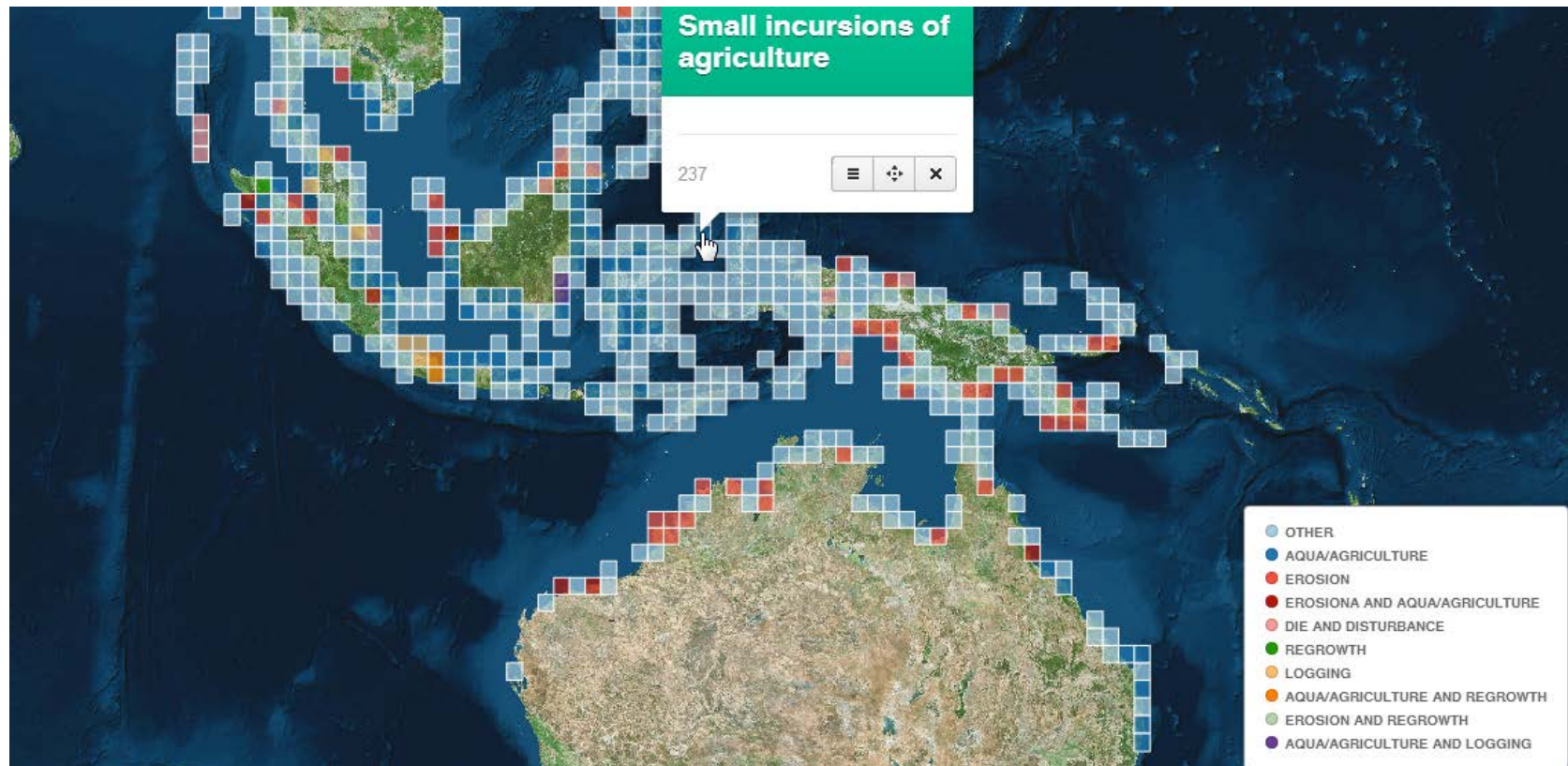
Mangrove Gain Processes (1996 - 2010)



The Ramsar GWOS User Interface



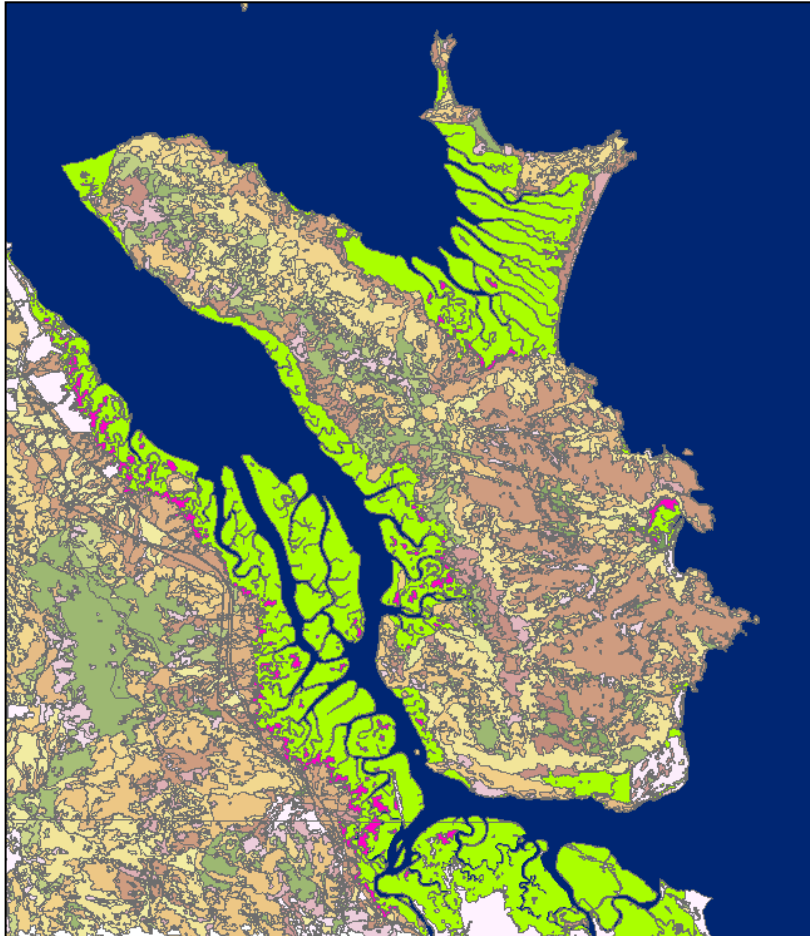
Graphical interface under development



1°x1° tile unit based

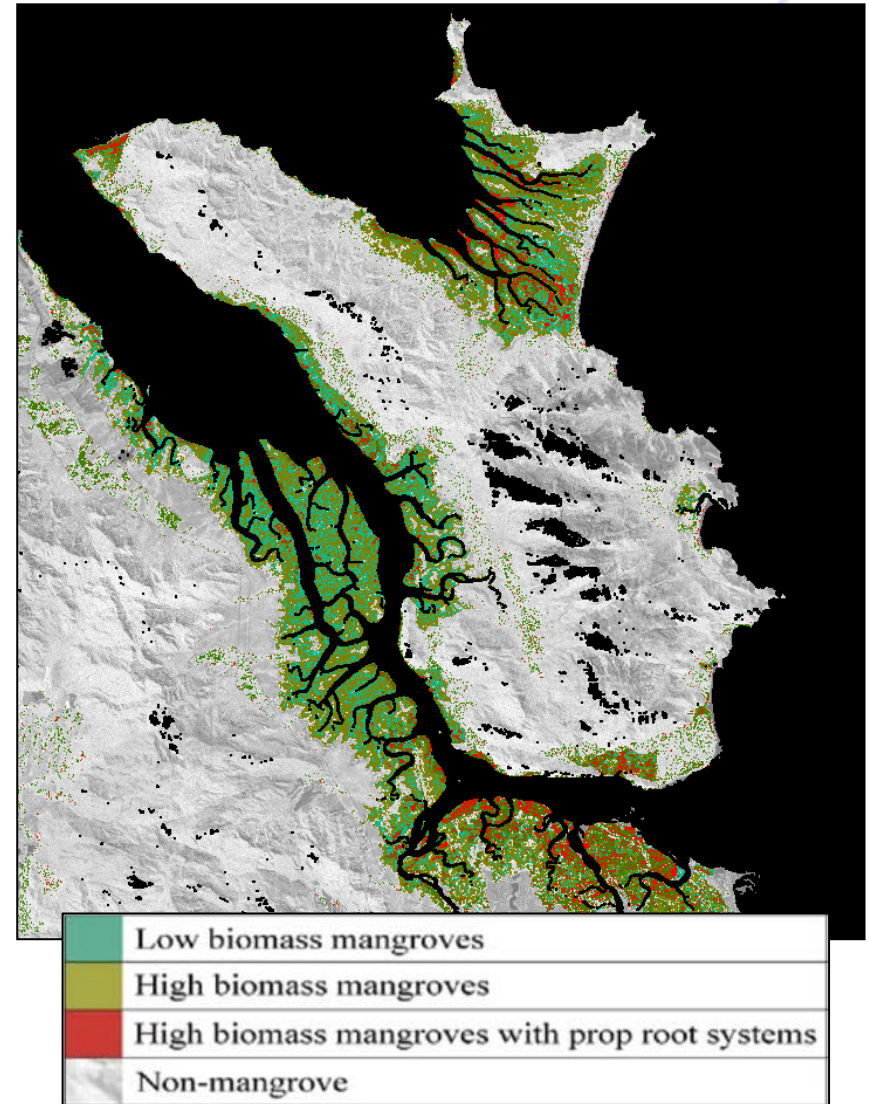
R&D: Structural classification and ABG (selected sites)

Queensland LC Map



Hinchinbrook Island, Queensland, Australia

PALSAR Structural classification



GMW implementation in GWOS



GMW implementation schedule

- Finalisation of methods for change classification – Q2/2015
- Web interface for access to GMW products – Q2/2015
- Implementation of change detection algorithms at regional and global scales – Q3/2015
- Validation of change maps – Q4/2015
- Operational aim – 2016
- Potential demo for COP-12 (if desired/to be discussed)



Thank you

JAXA GMW homepage:

<http://www.eorc.jaxa.jp/ALOS/en/kyoto/mangroviewatch.htm>

Reference on mangroves and Earth observation:

Lucas, R.M. *et al.* (2014). **Contribution of L-band SAR to systematic global mangrove monitoring.** *Marine and Freshwater Research*, No. 65, pp 589-603.

