ALOS

Mapping and monitoring of mangroves and wetlands

K&C Initiative

An international science collaboration led by JAXA

Project objectives

1. To generate maps of mangrove structure and proximal wetlands for selected regions (e.g., Australia, Belize).
2. To generate maps of mangrove change for selected regions (Australia, Belize, Amazon-influenced coast and SE Asia).

Mangrove characterisation

- Requires use of digital elevation data (e.g., SRTM, Nextmap Intermap or LiDAR) and methods for determining extent of mangroves (existing coverage or Landsat-derived classifications).
- Using these data layers, mapping undertaken within eCognition to classify low (< 10 m) and high (> 10 m) mangroves (from the DEM). The ALOS PALSAR data are used primarily to differentiate mangroves with rooting systems (for stands > ~ 10 m) and with relative biomass levels.
- Draft mapping completed for Belize and Australia.
- Rule-set is being progressively applied to other regions following generation of mosaics.

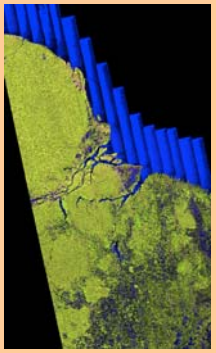
Mangroves dominated by *Rhizophora stylosa* with extensive prop root systems. These mangroves are of high biomass but exhibit low L-band HH and HV backscatter.

Rule-based classification of mangroves along Australian coast. Areas in red associated with mangroves with prop root systems. Classification is significant advance in terms of structural mapping

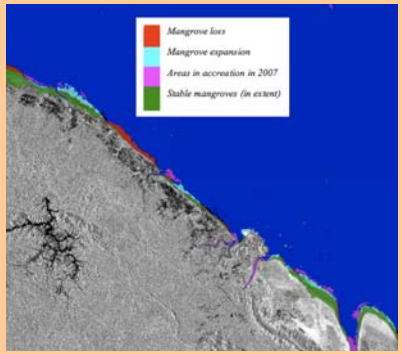
Classification of mangroves structural types, Belize (yellow, green and red represent low, high without roots and with roots)

Detection of change: Amazon-influenced coast

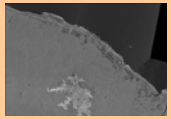
- Change mapping (from baselines) along Amazon-influenced coast indicates significant changes associated with erosion and accretion (often exceeding tens of kms over decadal periods).
- Change detection best achieved through time-series of ALOS PALSAR data based on 2007-2009 mosaics, particularly where reliable baselines are not available.



ALOS PALSAR mosaic generated for the Amazon coastline for 2007.



Areas of change mapped for the Amazon influenced coast (mid 1990s to 2007).

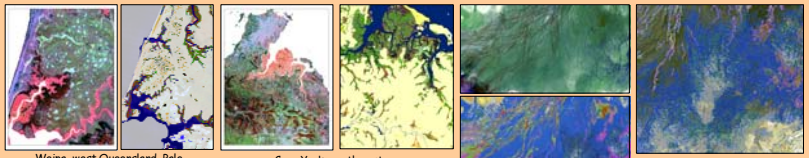


JERS-1 SAR image of French Guiana (mid 1990s)

ALOS PALSAR image (2007)

Wetland classifications, Queensland, Australia

- Object-orientated classifications of wetlands undertaken within eCognition
- Requires use of additional data layers (Landsat FPC and other optical data).
- Success of classification varies with wetland type and inundation state
- Classifications developed only for significant wetlands
- Marine, estuarine, riverine, lacustrine and palustrine classes defined
- ALOS PALSAR primarily facilitates mapping of open water and flooded forest.



Weipa, west Queensland. Pale blue areas represent paperbark swamps

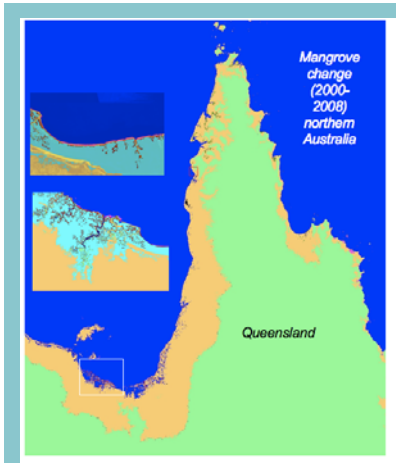
Cape York, north east Queensland. Classification of estuarine, laustrine and palustrine classes

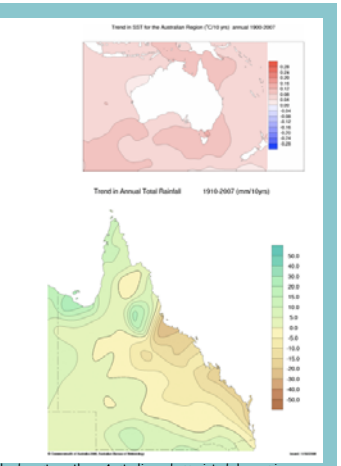
Channel Country, south-west Queensland,. Red areas represent woody vegetation in floodplain

Examples of classifications of wetlands, Queensland, Australia. All classifications have been undertaken within eCognition using object-oriented approaches and ALOS PALSAR and other data layers as input (e.g., SRTM DEMs, SPOT HRG, Landsat Foliage Projected Cover): Courtesy Queensland Herbarium.

Mangrove Dynamics: Australian coast

- Limited change along the coast, with most smaller in magnitude than the spatial resolution of the ALOS PALSAR mosaics.
- Only significant changes in the Gulf of Carpentaria, with seaward movement (identified through K&C).
- Attributed to dynamic (inter-annual) flooding cycles associated with increased rainfall.

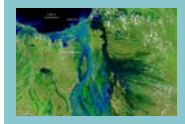




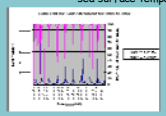
Classification of mangrove and mangrove change along the Queensland coast, northern Australia, and associated changes in sea surface temperature and rainfall

ALOS PALSAR Change

MODIS - low runoff



MODIS - high runoff



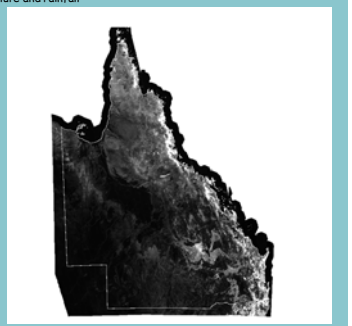
1987

1995

2001

2008

Changes observed from the mapped baseline of mangroves using ALOS PALSAR data. Change is attributed to periods of sediment release into the Gulf of Carpentaria following flooding. Some inland intrusion identified. Rates of change also captured through time-series comparison of Landsat and ALOS PALSAR data



Revised mosaic HV (2007) of Queensland, Australia, generated using strips acquired during periods of minimum surface moisture. The revised mosaic now allows implementation of eCognition ruleset for better classification of mangrove and wetland extent, characteristics and change (Courtesy, Queensland Department of Natural Resources and Water)

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