K&C Phase 4 – Status report

Global Mangrove Watch

Pete Bunting, Richard Lucas, Ake Rosenqvist et al.

Aberystwyth University,
University of New South Wales,
soloEO

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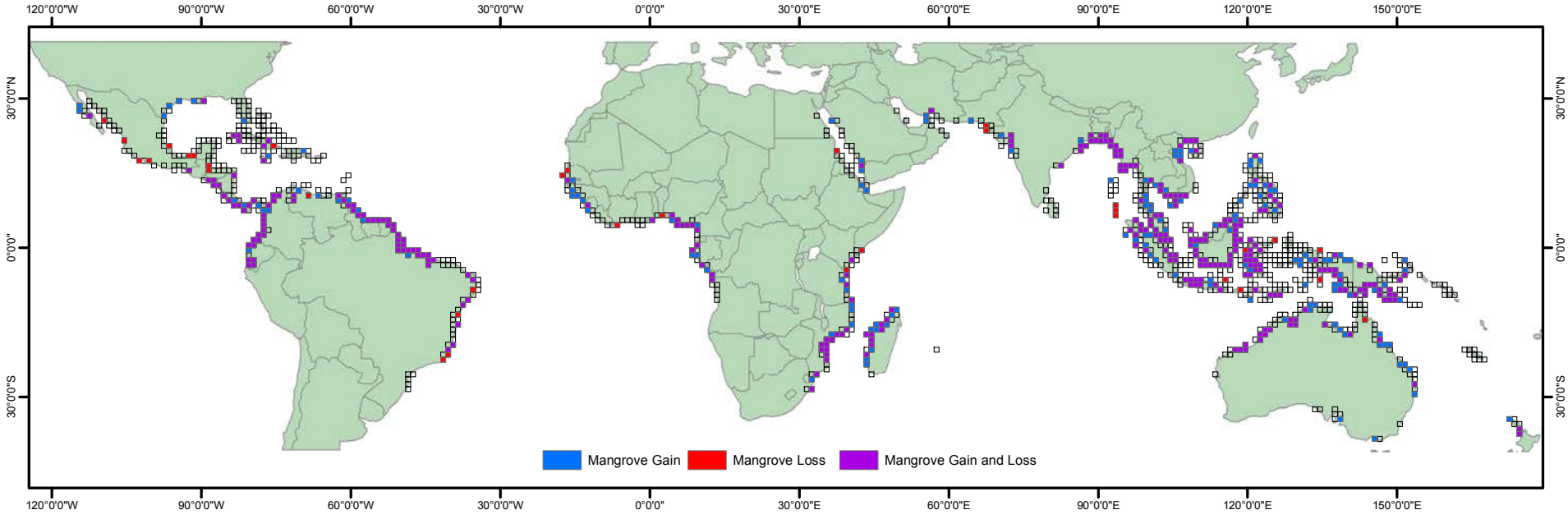
Project outline and objectives

"Map and monitor the extent of mangroves globally"

Mangroves are important:

- Carbon dynamics and store.
- Early indicator of climate changes.



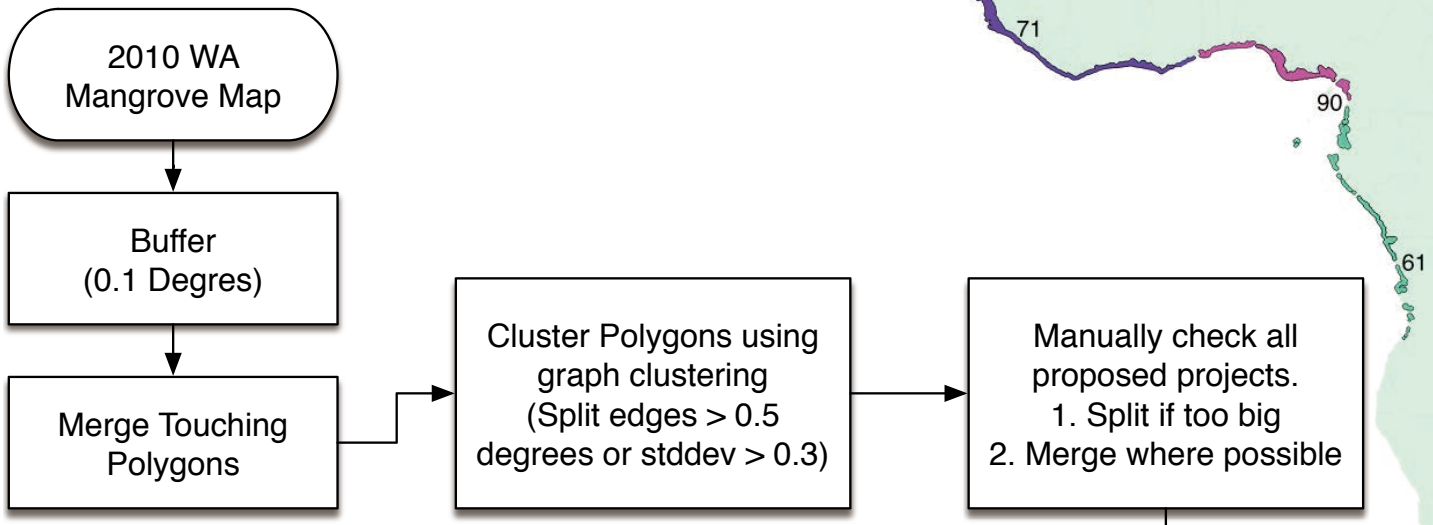
Global Mangrove Watch: Where have we got too?

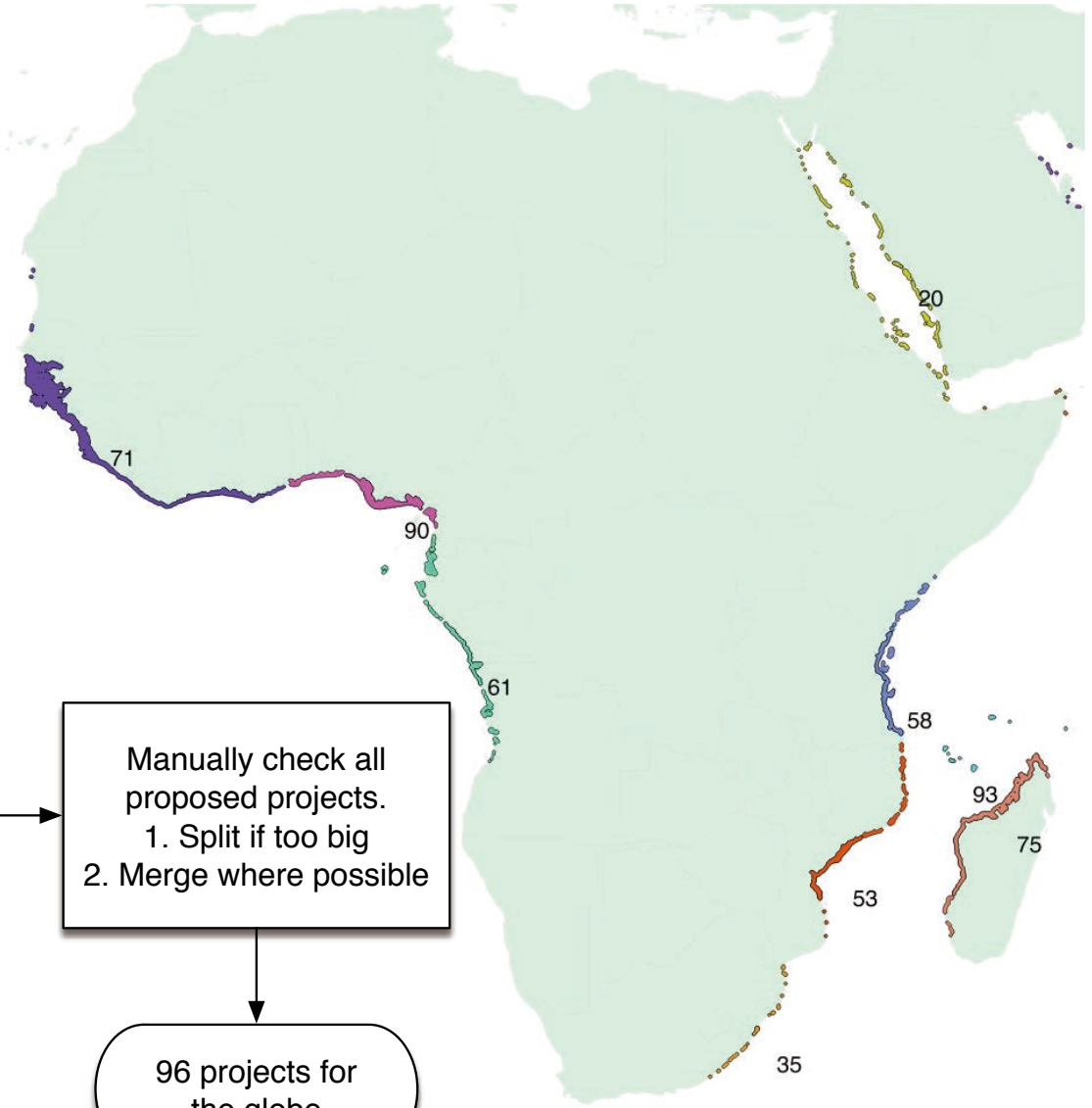
- Regional case studies undertaken by Nathan Thomas during his PhD.
  - Explored different methodologies.

- Currently applying globally:
  - Defined a set of projects (96)
  - Defined a global water mask
  - Defined a global mangrove habitat mask
  - First draft of a 2010 global mangrove baseline
    - Currently refining 2010 baseline
  - Change to 1996 and 2015 – first drafts expected Feb 2017.

Define GMW Projects

- **Inputs**
  - **Wetland Atlas 2010 Mangrove Product**

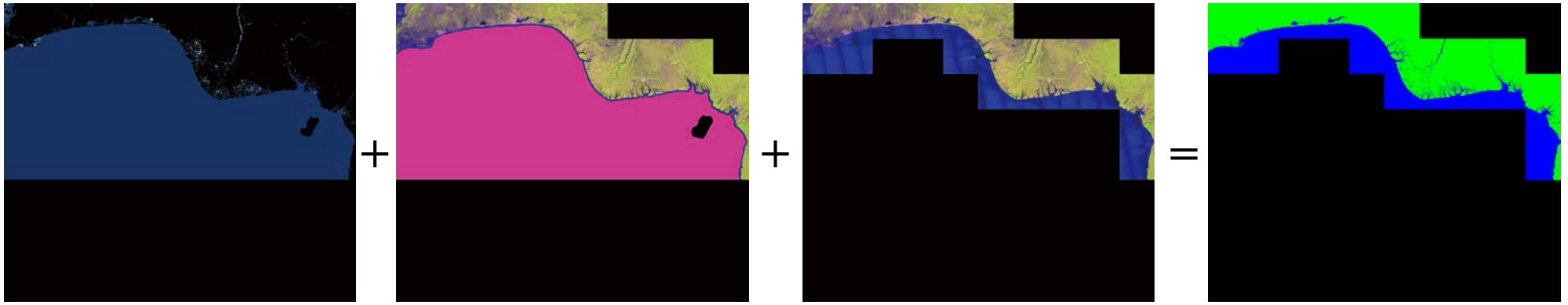




Global Water Mask (Ocean Water) : Method

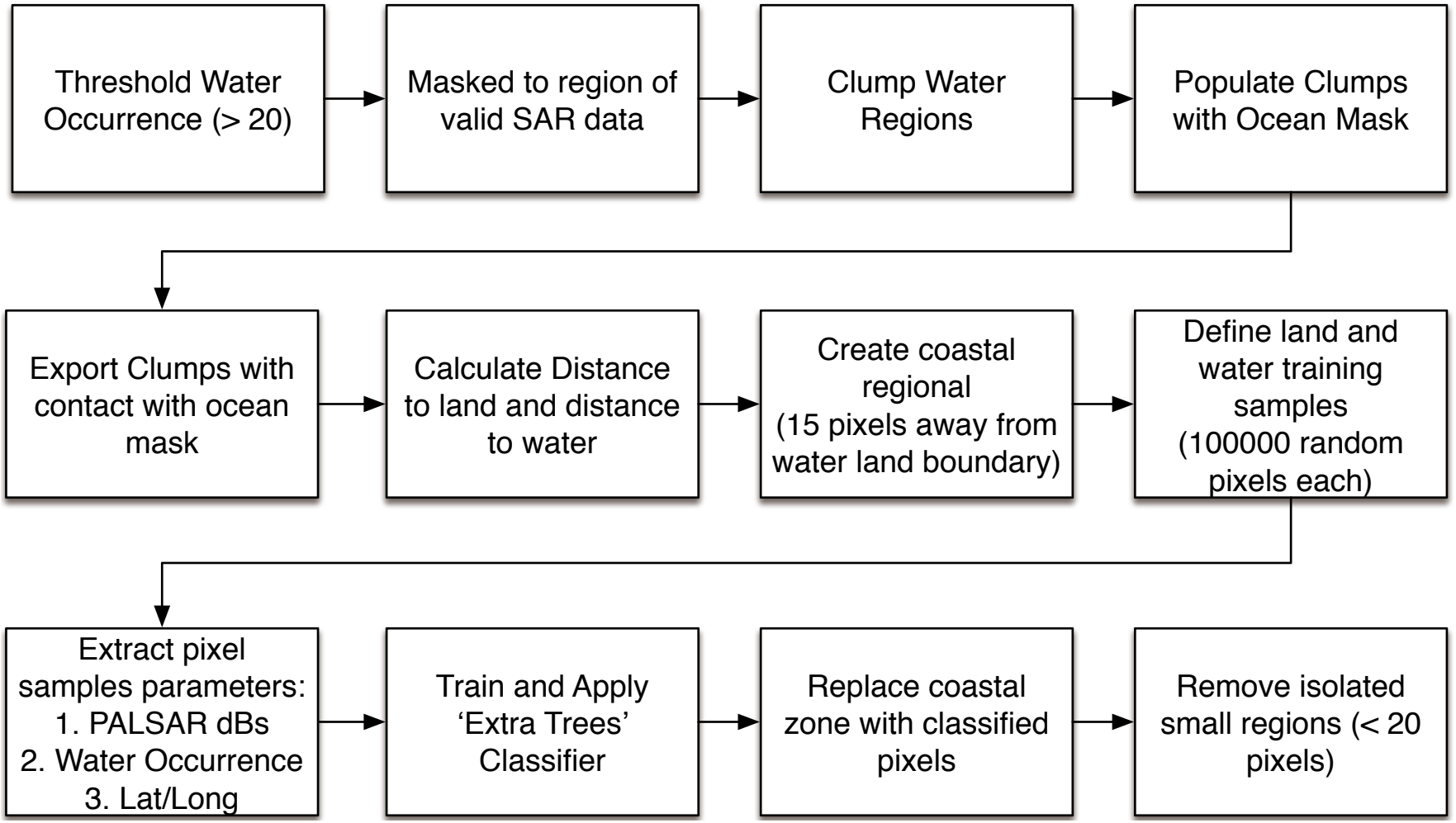
- **Ocean water mask very important as mangroves reside in unique context defined by coastal position.**

- **Inputs**
  - **JRC Water Occurrence (1984 – 2015)**
  - **2010 PALSAR**
  - **Lower resolution land area – buffered and inverted to retrieve lower resolution ocean area.**

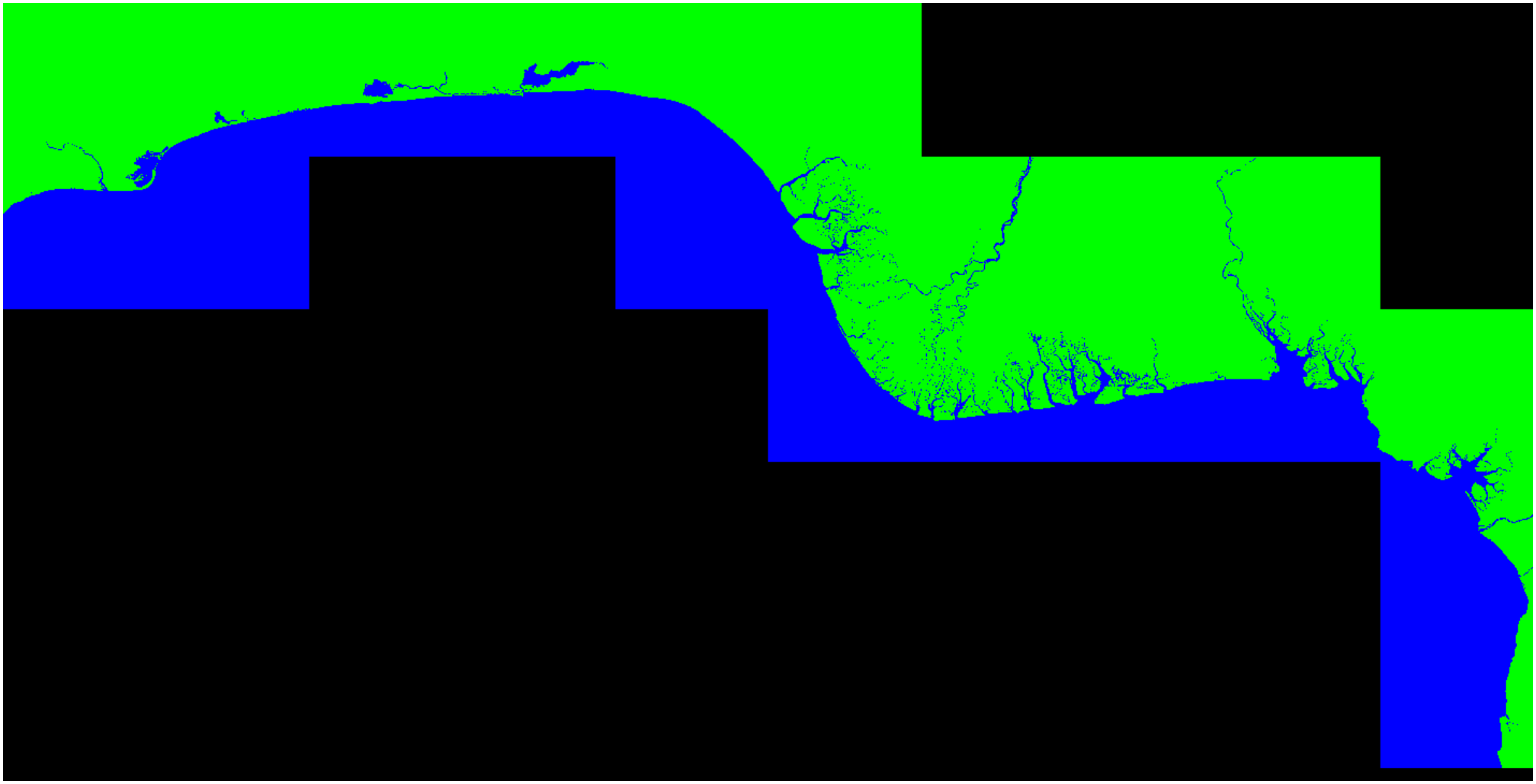


Water Occurrence | Ocean Water | 2010 PALSAR | GMW Water Mask

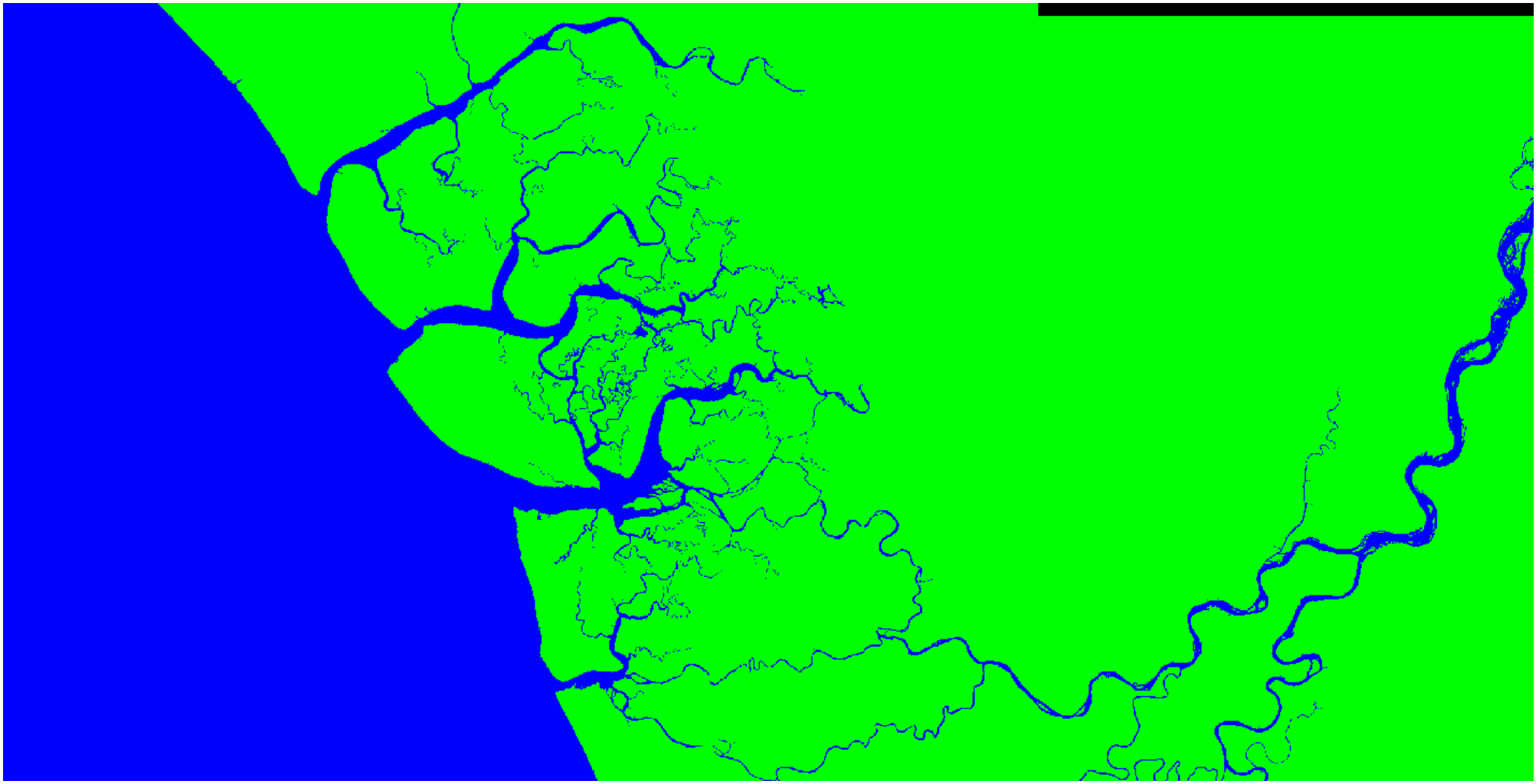
Global Water Mask (Ocean Water) : Method



Global Water Mask (Ocean Water) : Result



Global Water Mask (Ocean Water) : Result

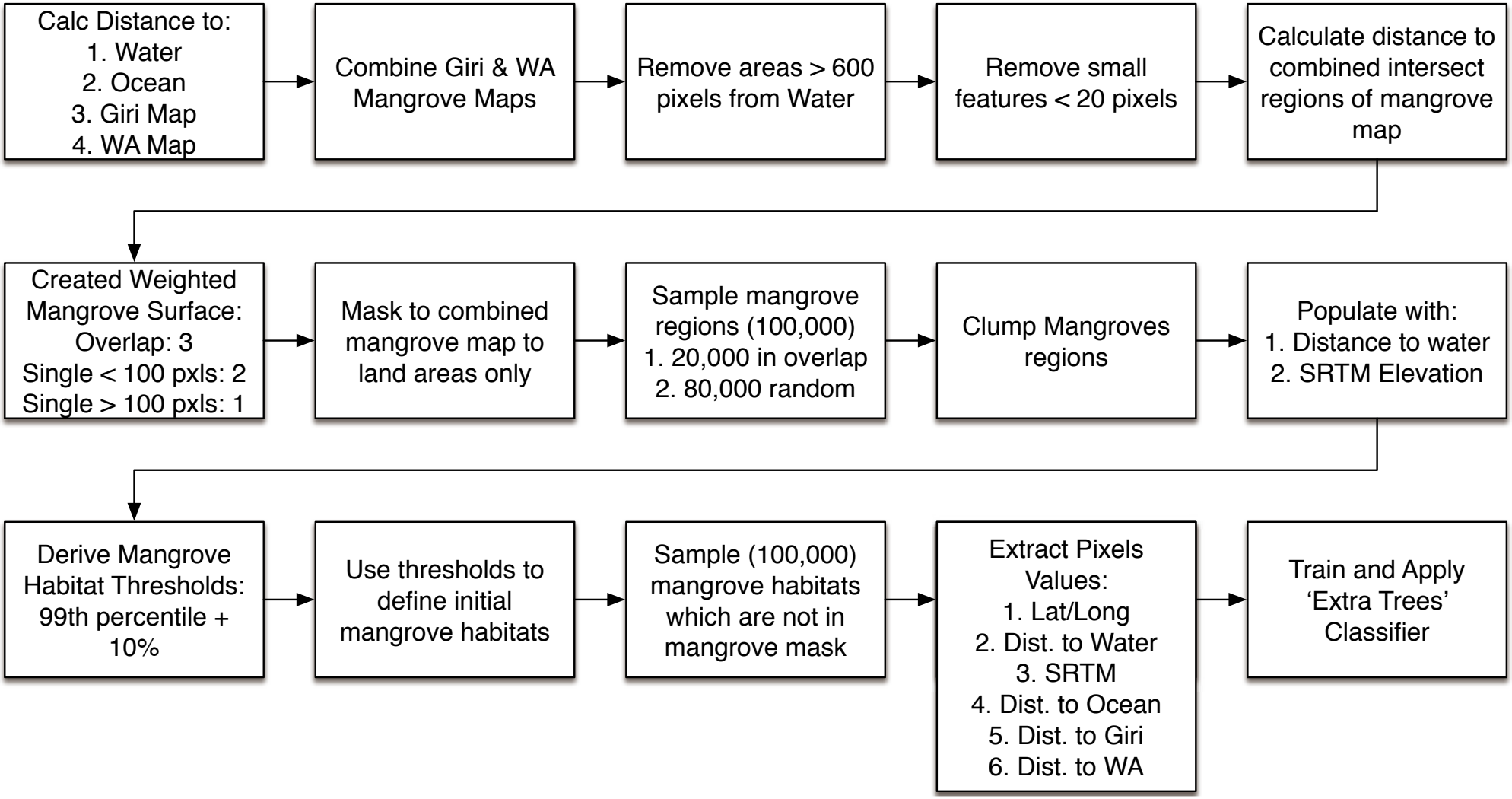


Global Habitat Mask : Method

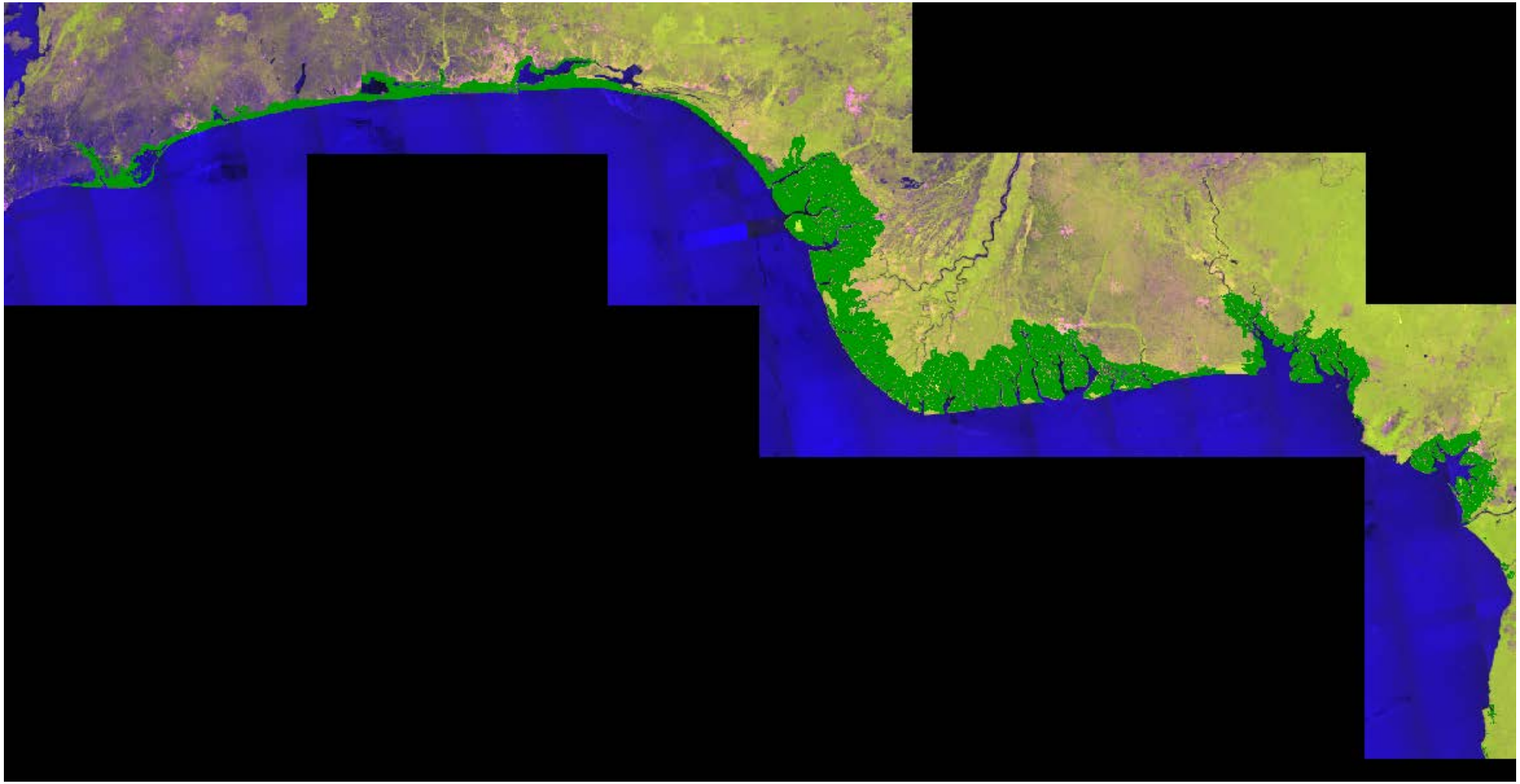
- Before attempting a classification we are defining the unique context of mangroves.
  - With which we will classify the mangroves forests.

- Defined using:
  - Distance to water mask
  - Distance to mangroves regions defined in WA and Giri products
  - Distance to ocean layer
  - Elevation (SRTM)

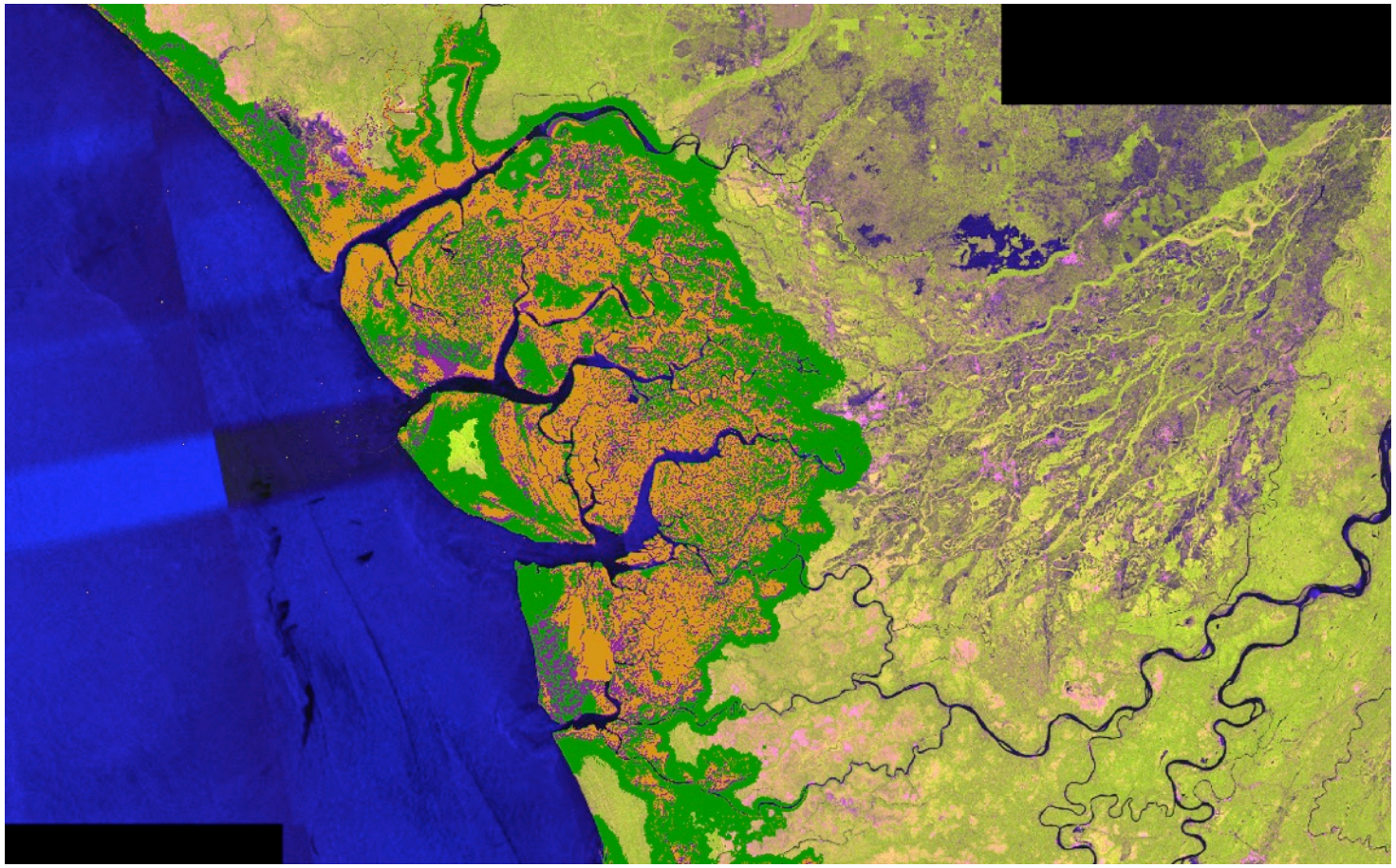
Global Habitat Mask : Method



Global Habitat Mask : Results



Global Habitat Mask : Results



Global Mangrove 2010 Baseline: Method

- Create a new 2010 mangrove baseline using:
  - 2010 PALSAR
  - SRTM
  - Water Mask
  - Mangrove Habitat
  - Giri et al. 2000 Mangrove Map
  - WA 2010 Mangrove Map

- 2010 was selected for the new baseline as this had the most complete PALSAR coverage.

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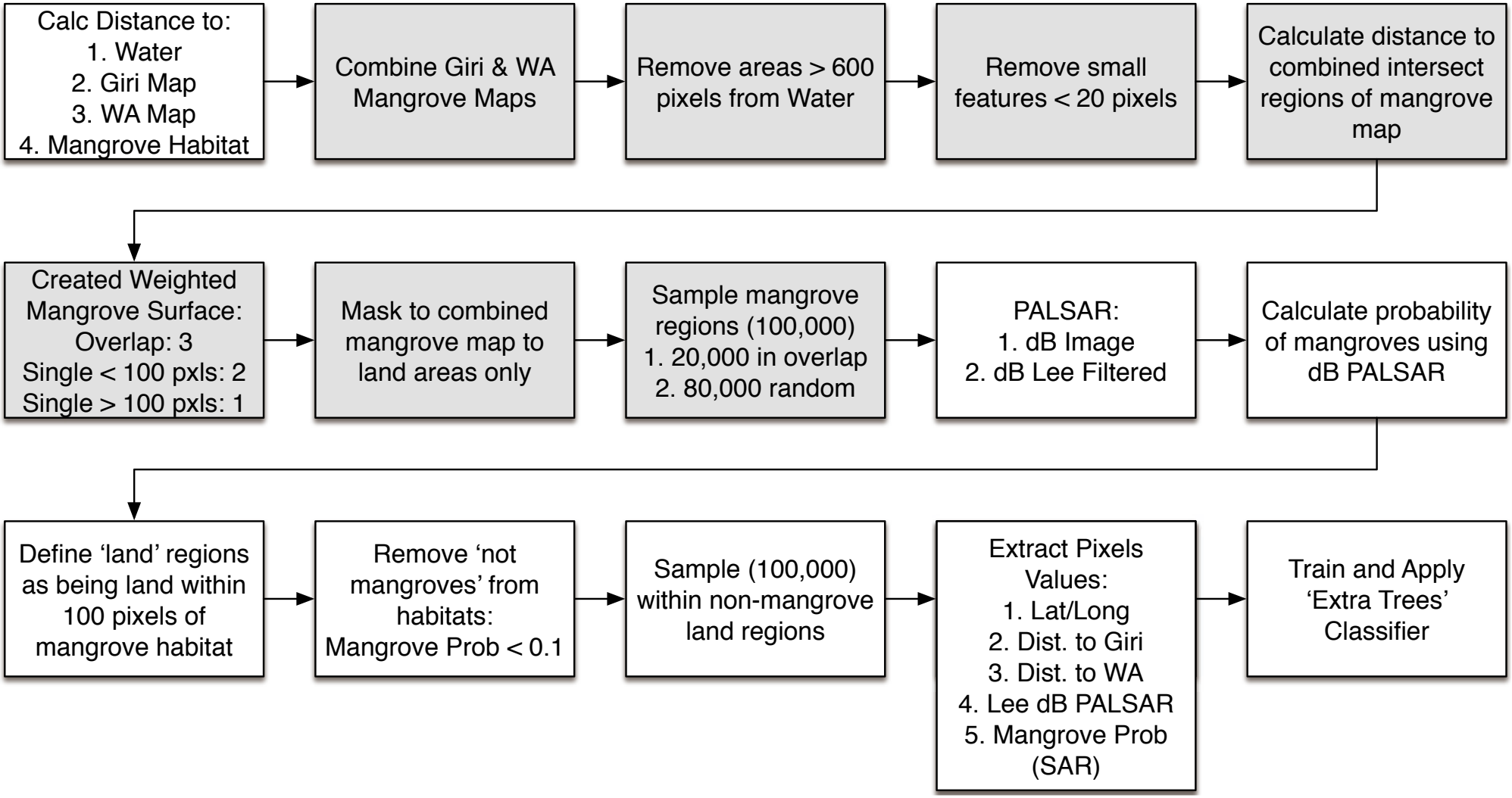
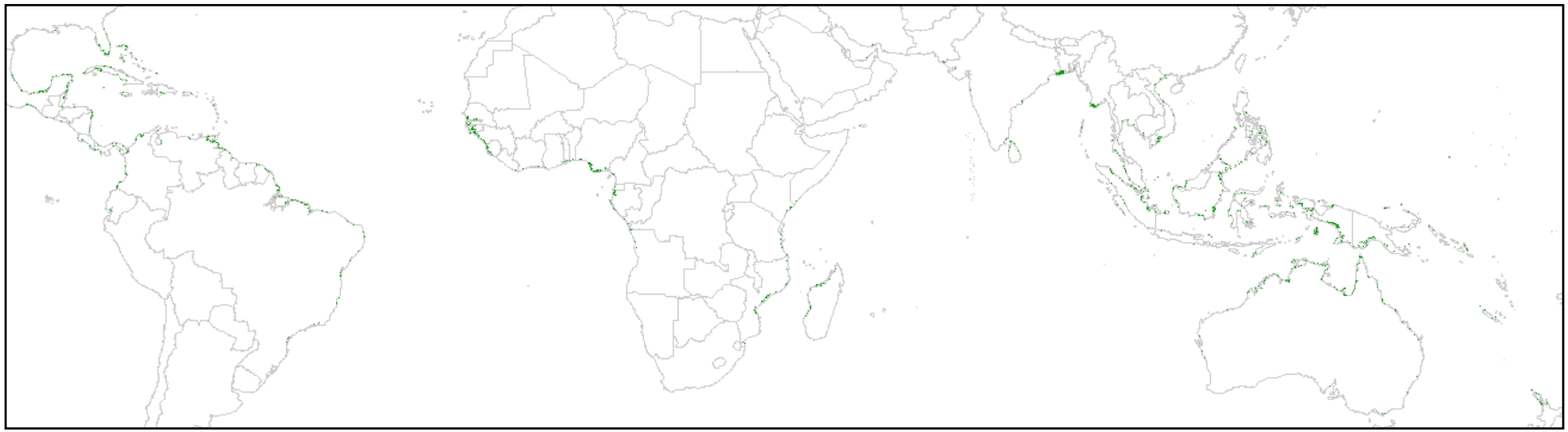
Global Mangrove 2010 Baseline: Method



Global Mangrove 2010 Baseline: Results



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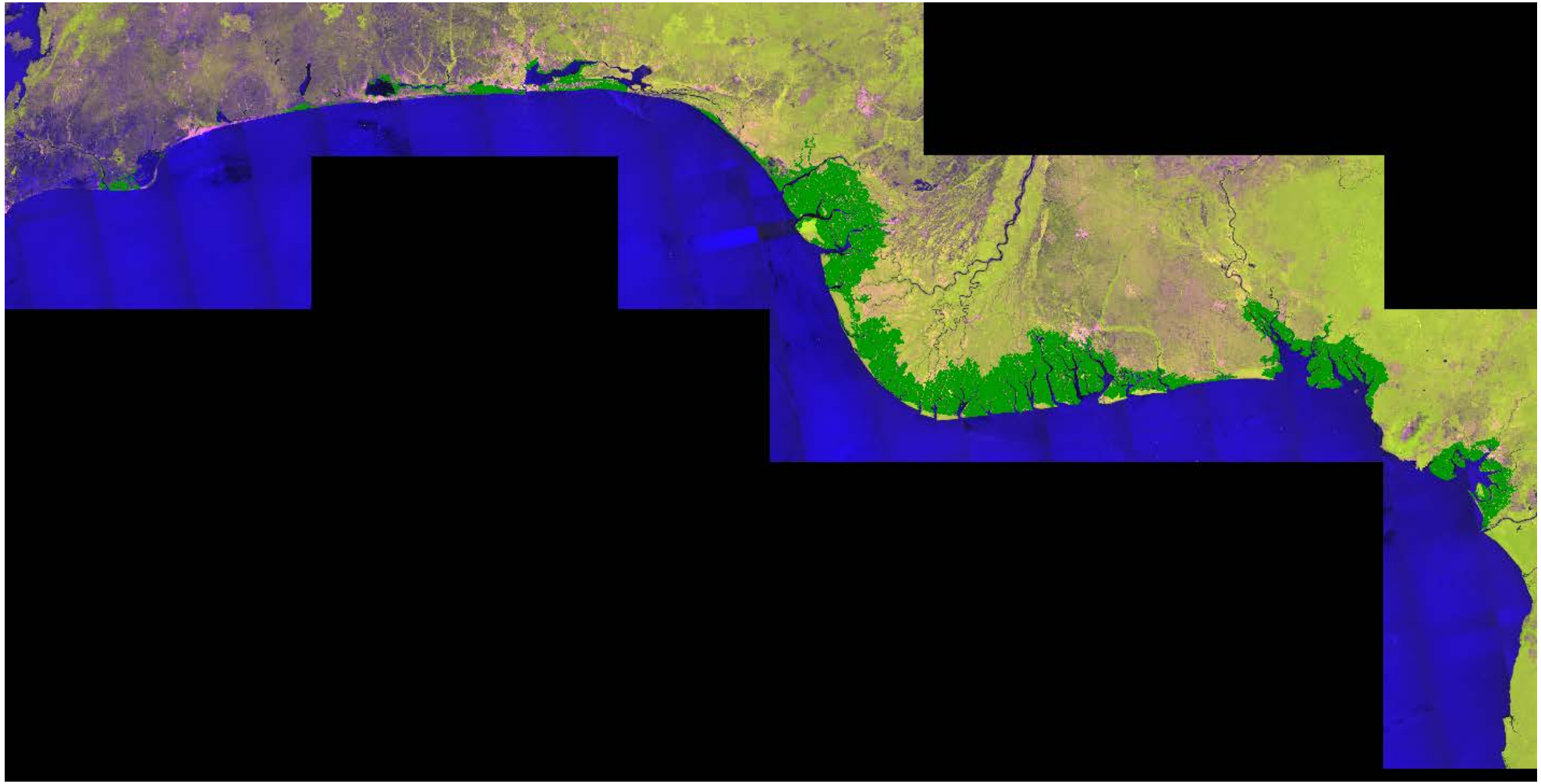

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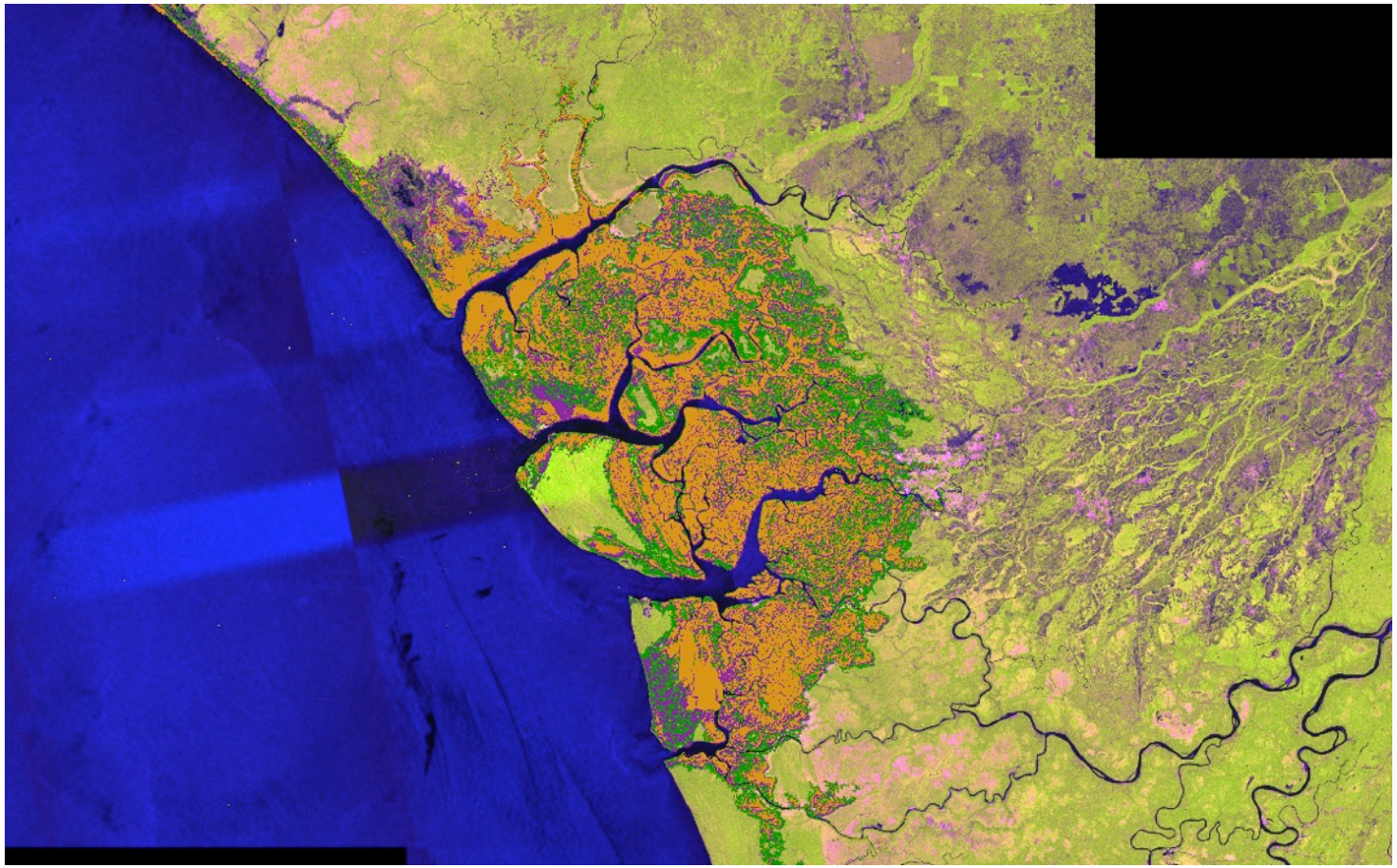

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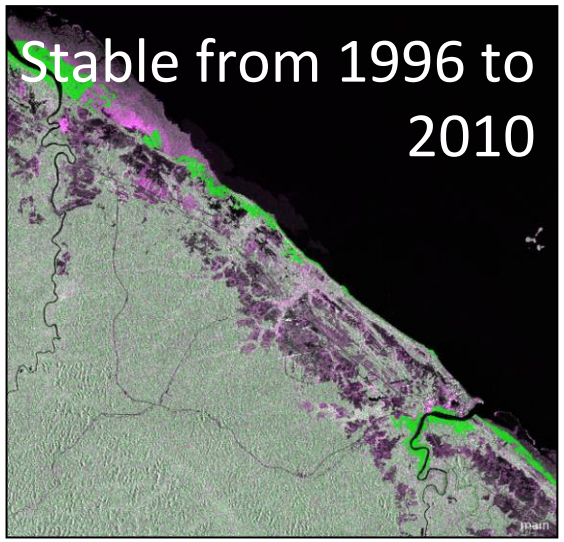
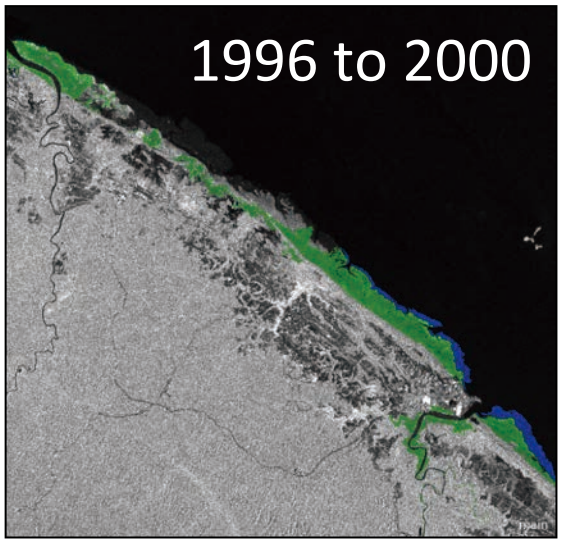
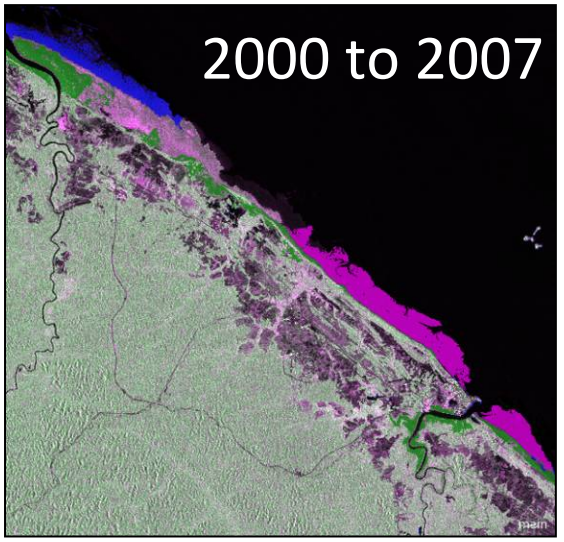
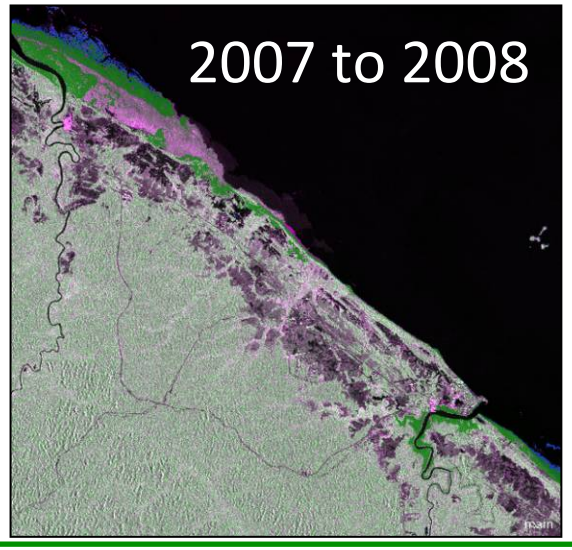
Changes in mangrove extent, French Guyana: 1996 to 2010

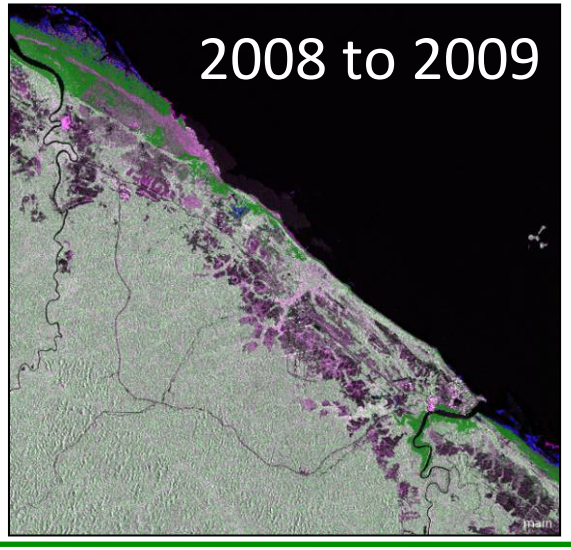
(Blue = Gain, Magenta = Loss, Green = Stable)

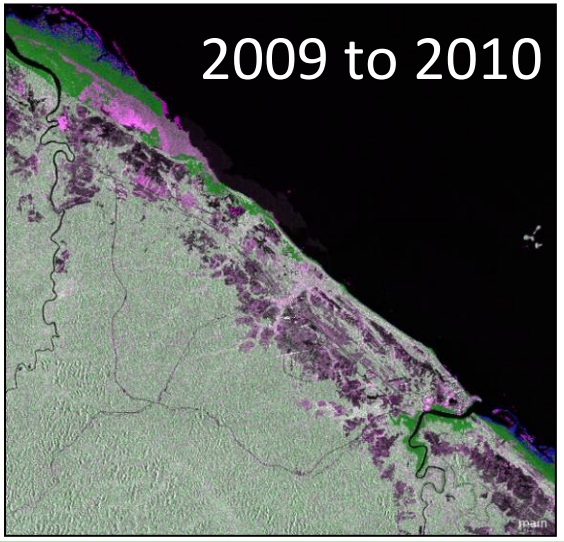






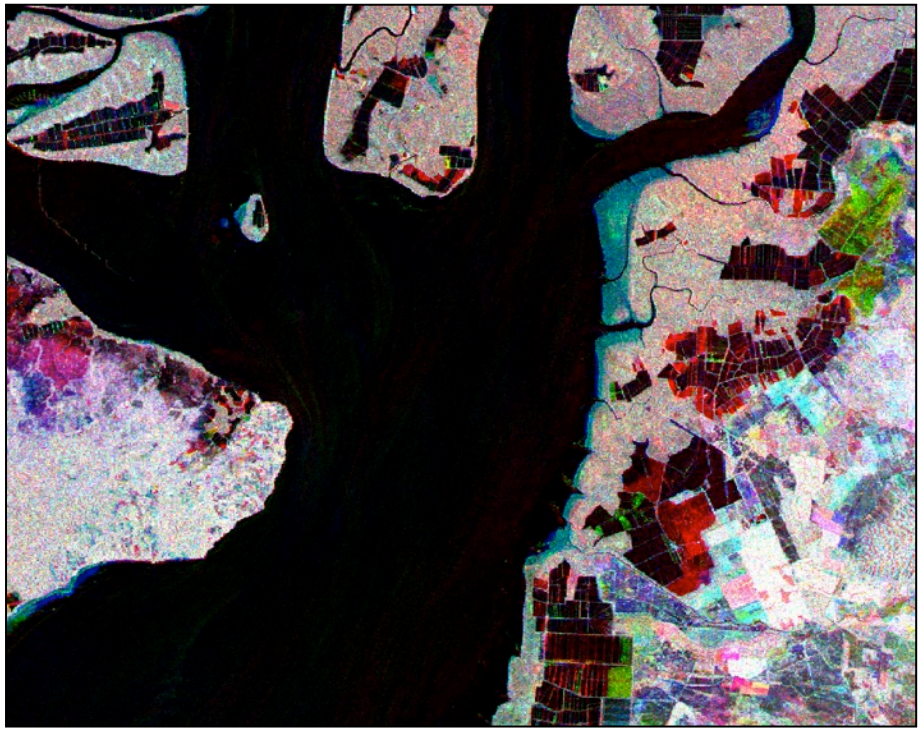






Detection of Change: 1996-2010

Mangrove advance and loss (1996-2010) overlain on a time-series colour composite Image (R: JERS-1 96 HH, G: ALOS 07 HH, B: ALOS 10 HH)



Time-series colour composite Image (R: JERS-1 96 HH, G: ALOS 07 HH, B: ALOS 10 HH)

Project milestones

- Finish Version 1 Global products
  - End of January 2017: Finish 2010 global baseline
  - February 2017: Global change products for 1996 and 2015.
  - April 2017: Global change products for 2007, 2008 and 2009.
- Continue to refine improve baselines – fusion with optical?
  - Study for Australia
  - Study for Africa (Mangrove Watch Africa)
- Include Sentinel-1 for change mapping

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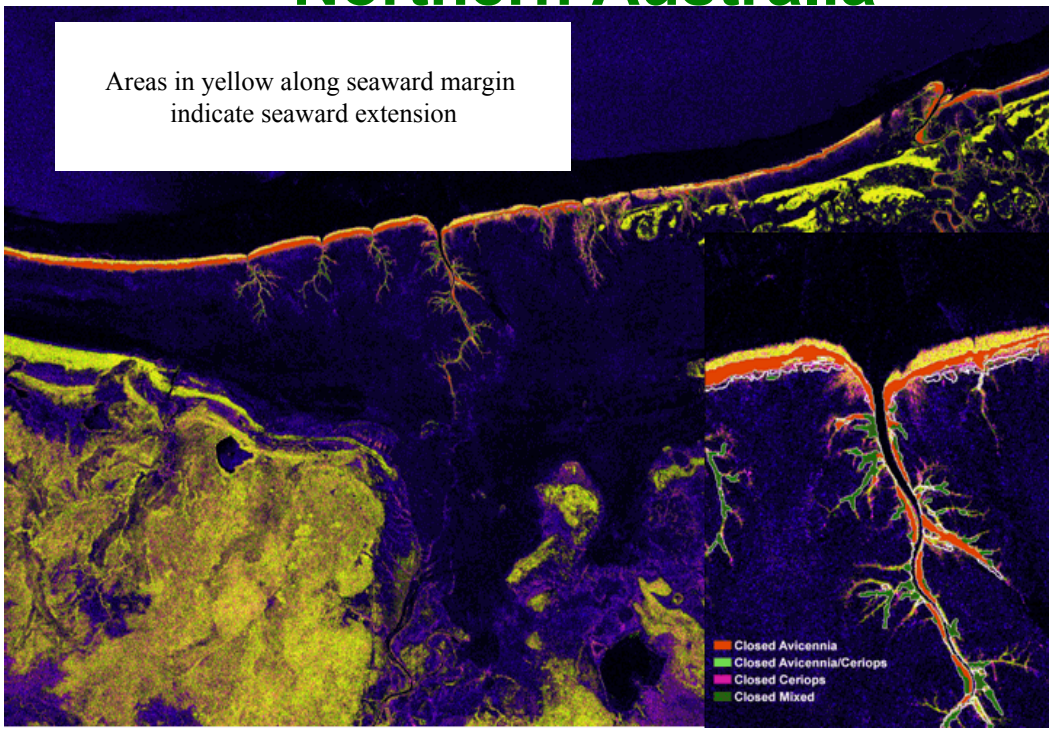
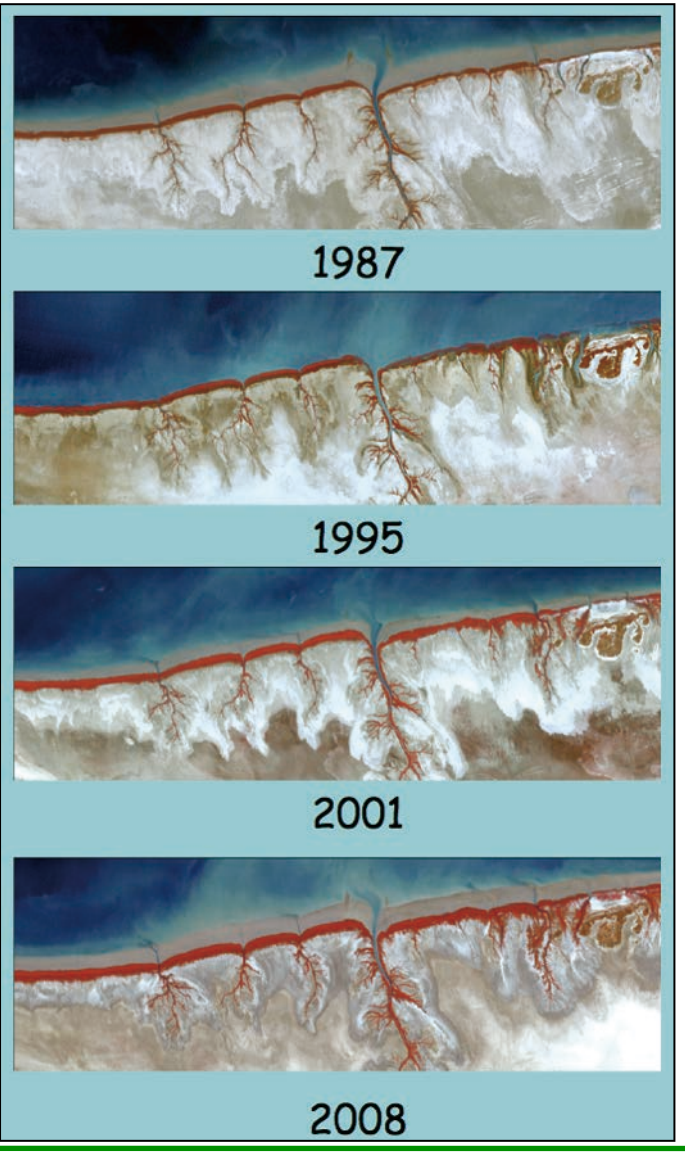
Causes of Change in Mangrove Extent, Northern Australia

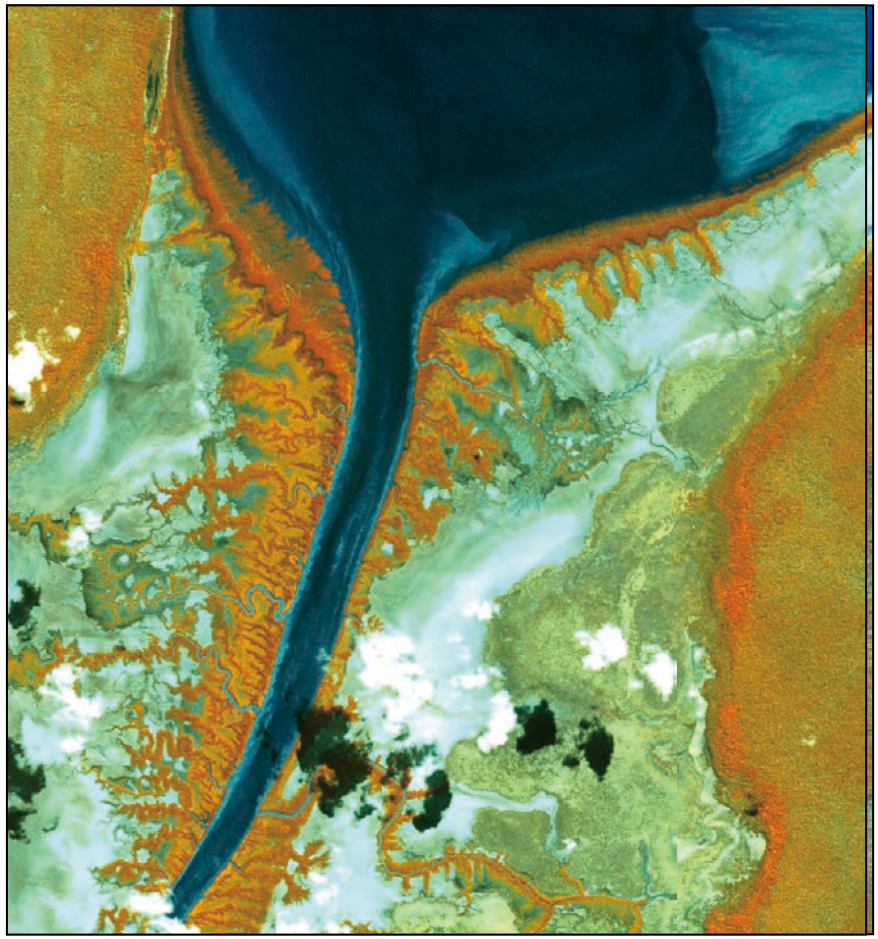


- Mapping from established baselines using ALOS PALSAR indicated relative general stability along Queensland coast
- Exception is the Gulf of Carpentaria
  - Significant seaward expansion
  - Some inland extension
- Associated with:
  - Extensive but periodic flooding and sediment discharge
  - Inland intrusion of sea water

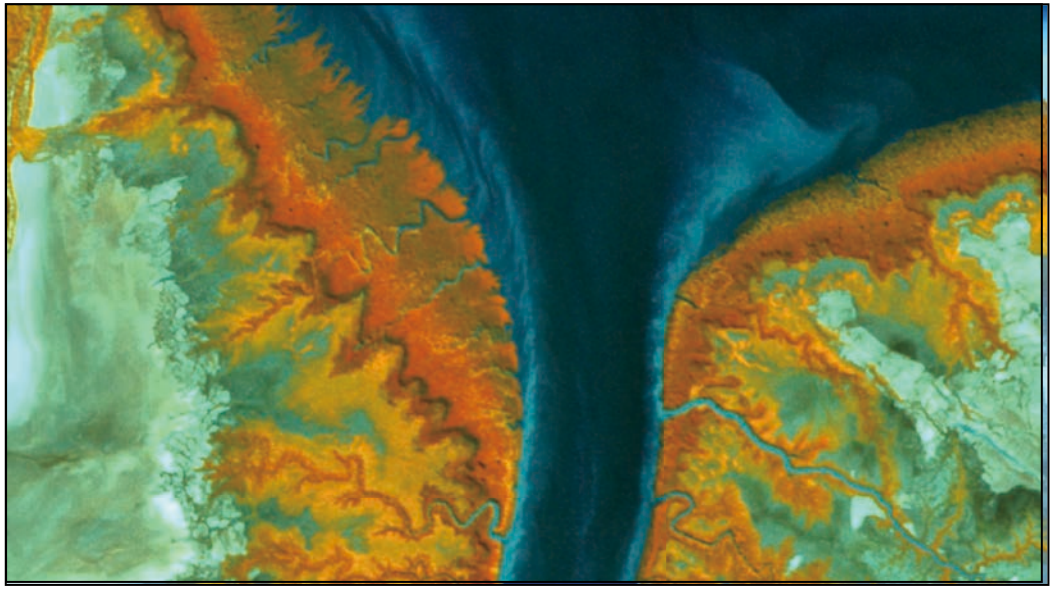
Landsat time series:



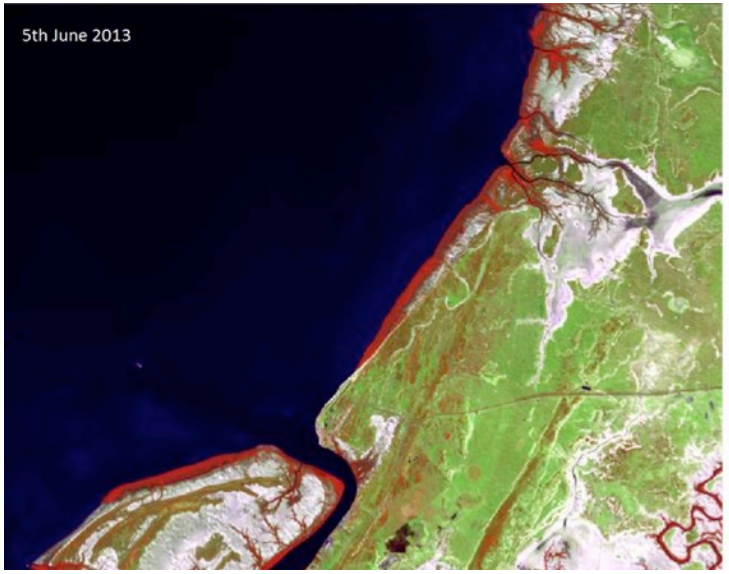
Time-Series of Rapid Eye Data, Kakadu NP

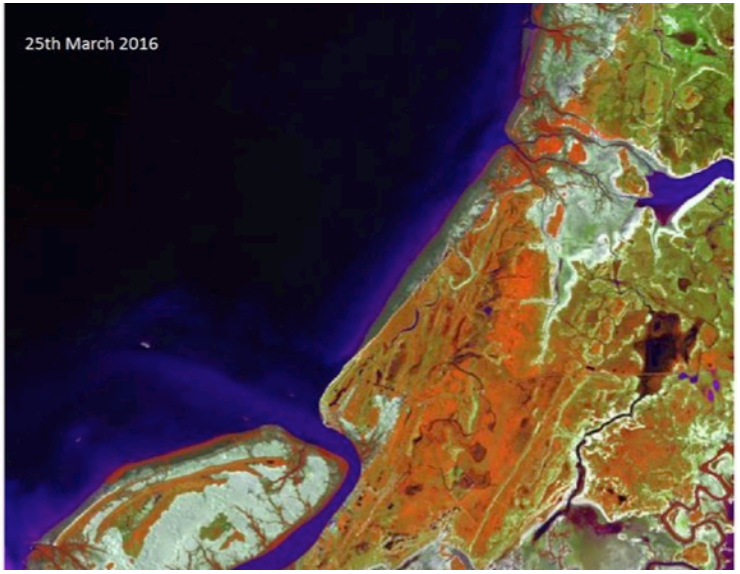


RAPIDEYE Images of the West Alligator acquired prior to (in 2014) and following (2016) the dieback event

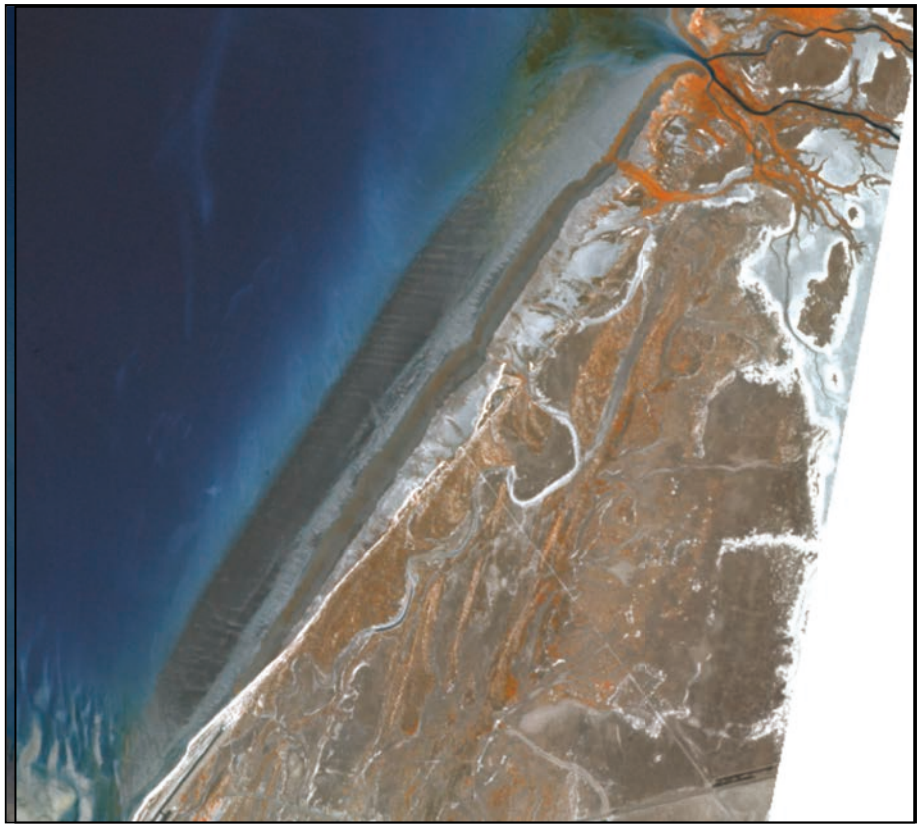


Mangrove Dieback Gulf of Carpentaria (2015/2016)





Time-Series Comparison of RapidEye Data, Karumba, Queensland



RAPIDEYE images of mangroves North of Karumba, acquired prior to (in 2014) and following (2016) the dieback event

Sea Level Rise or Sea Level Drop?






Deliverables

Planned outputs:

- Global mangrove extent maps for:
  - 1996, 2007, 2008, 2009, 2010, 2015, (2016) …
- Freely and open methods for global mangrove monitoring using SAR.
- Other anticipated results:
  - Mangrove dieback extent for Northern Australia