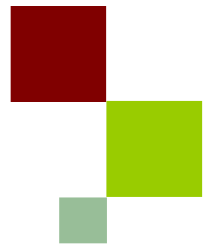


# Complementarity and Processing Of Radar and Optical Imagery

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**I. Why use different data**

**II. Interest of Radar and Optical data**

**III. How to combine data ?**

**IV. The choice**



# Why use different data



## Different kind of data

- **Map**
  - Land Cover
  - Infrastructures (road, building, cadastre...)
  - Precipitation
  - Climate
  - ...
- **Remote sensing**
  - Optical
  - Radar
  - Lidar
  - ...

## Different information / Complementarity

*Take the best of different sources*

## Fill the gap



# Interest of Radar and Optical data



## Radar - Sensitivity

- *Centimeter scale = Your Hand*
- *Penetration in the vegetation*
- *Roughness*
- *Moisture*

## Optical - Sensitivity

- *Molecular scale*
- *Top of landscape*
- *« Color » of landscape (visible, IR...)*



# Interest of Radar and Optical data



## Radar

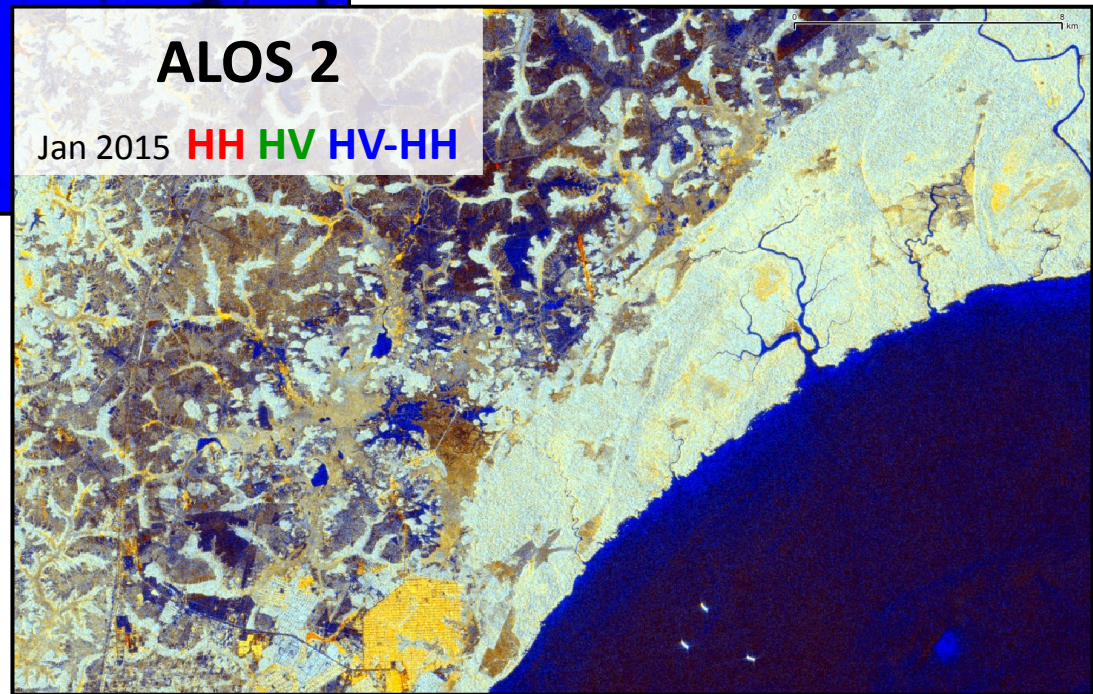
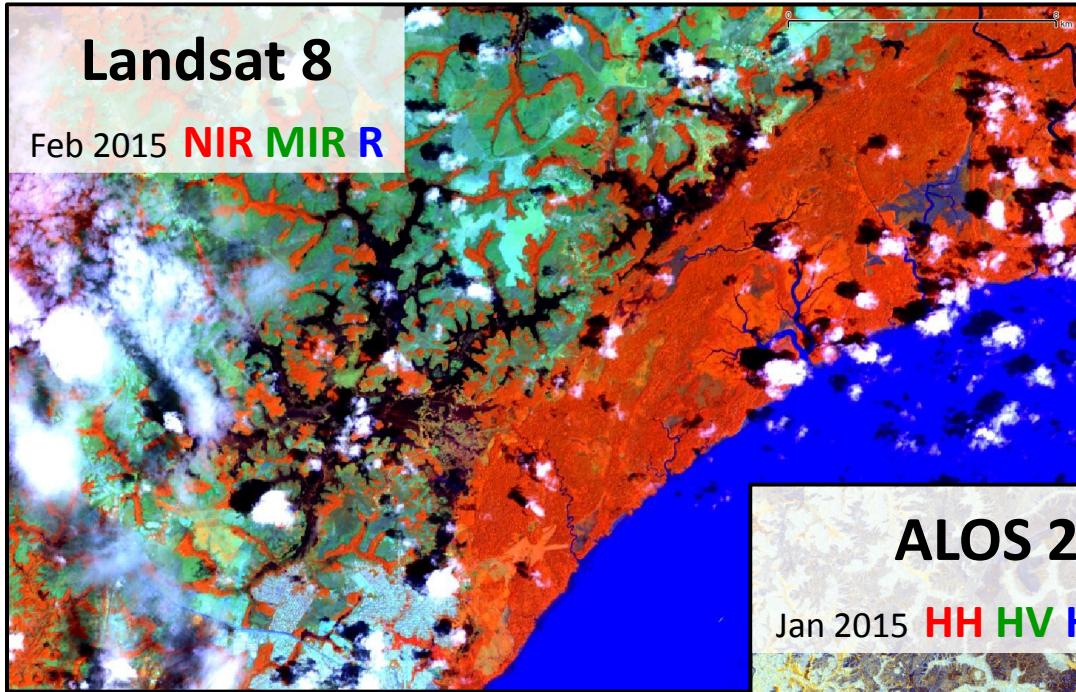
- **The pros**
  - No cloud
  - Highly calibrated product  $\approx$  radiometry stable in the time
  - Relief sensitivity
- **The cons**
  - Relief distortion
  - Speckle
  - lower resolution than optical

## Optical

- **The pros**
  - More comon
  - better resolution than Radar
- **The cons**
  - Cloud
  - Even with atmospheric correction radiometric variation
  - Relief distortion



# Interest of Radar and Optical data



# How to combine them ?



- **Resolution improvement:**  
*Pan-sharpening of one data based on the other one*
- **Layer stacking** of all the data → usual processing
- **Decision tree** between the different data
- **Process individually** each data → *fusion of result*





## Classification fusion

- **Fill the gaps**
  - Create one classification by sensors using same classes
  - Remove gap area
  - Merge the classification  
(using Vector/Raster tools or using raster mask and mosaic)
- **Take the best of each sensor**
  - Create one classification by sensors using the best classes
  - Extract the relevant part of each classification
  - Merge the classification

