First observations from SPOT 4 Take 5 data over inter-tropical regions

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Spot 4 Take 5 user day
Toulouse 2/10/2013

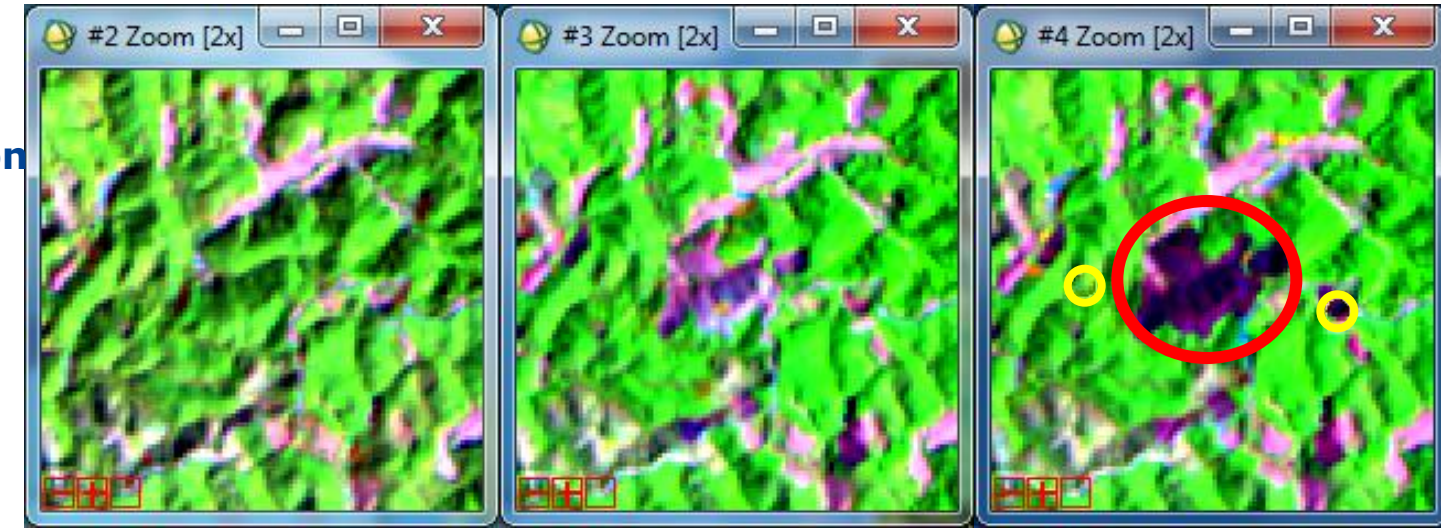
Applications at JRC

- Focus on forest as well as on non forest ecosystems in humid and sub-humic inter-tropical regions

- Can we improve mapping
  - In areas not or poorly covered so far (humid tropics)
  - In areas with rapid changes (forest exploitation / agric extension)

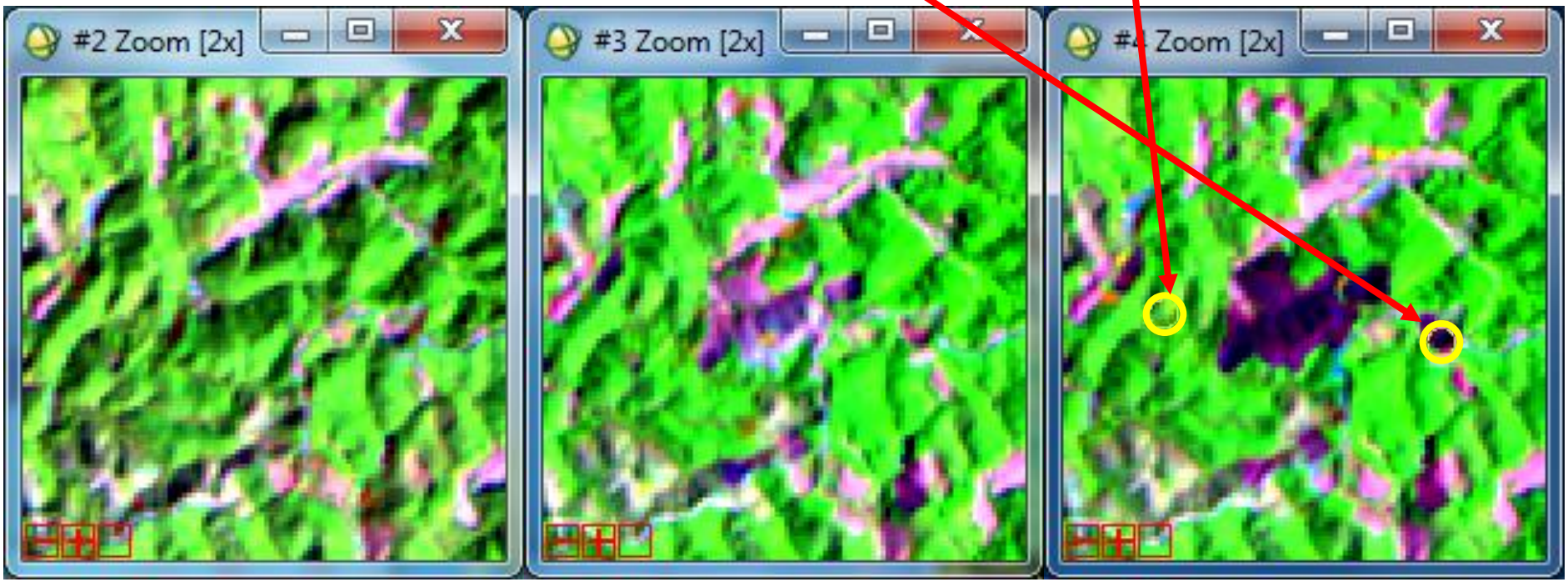
- Initial evaluation on: Thailand, Sumatra, Borneo, Cameroon, Congo, Tanzania

E. g. Shifting cultivation Thailand 12/02→29/03→03/04 Yellow circles: MODIS hot spots



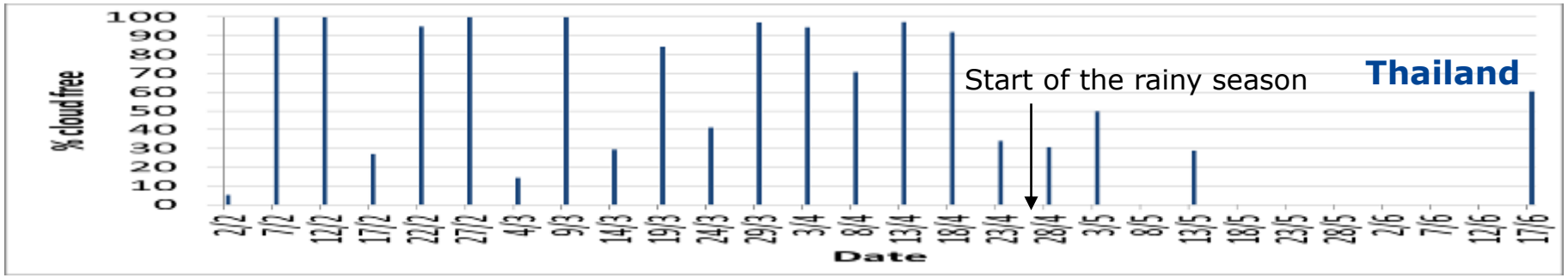
Example: shifting cultivation in Thailand

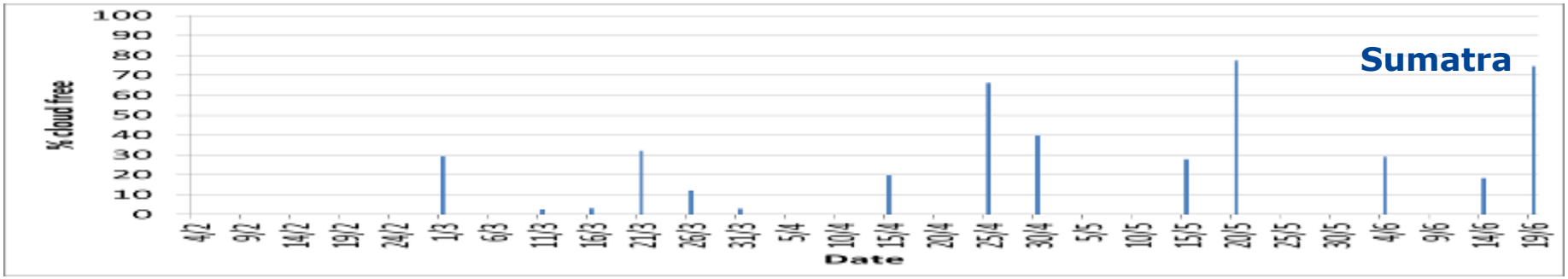
- Progression of shifting cultivation clearance from February to April.
- MODIS hotspots detected in the area 1st April (right) and 5th April (left) marked as yellow circles.

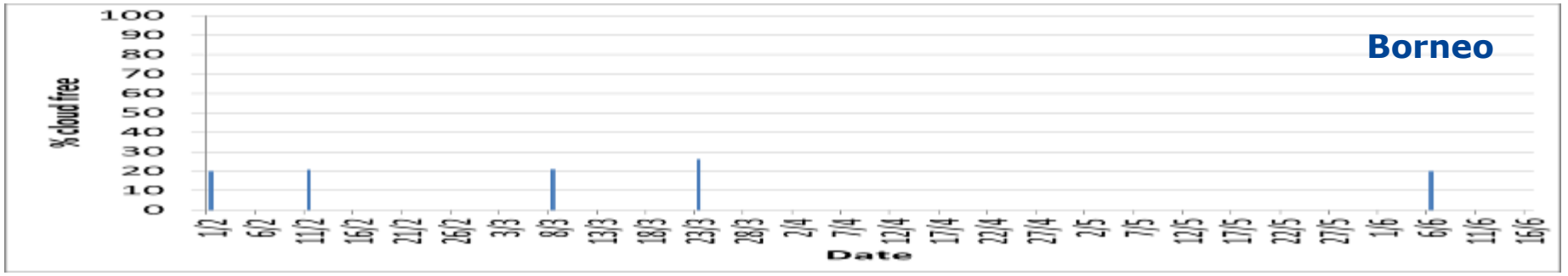


Thailand 12th Feb 29th Mar 3rd April

Observation frequency

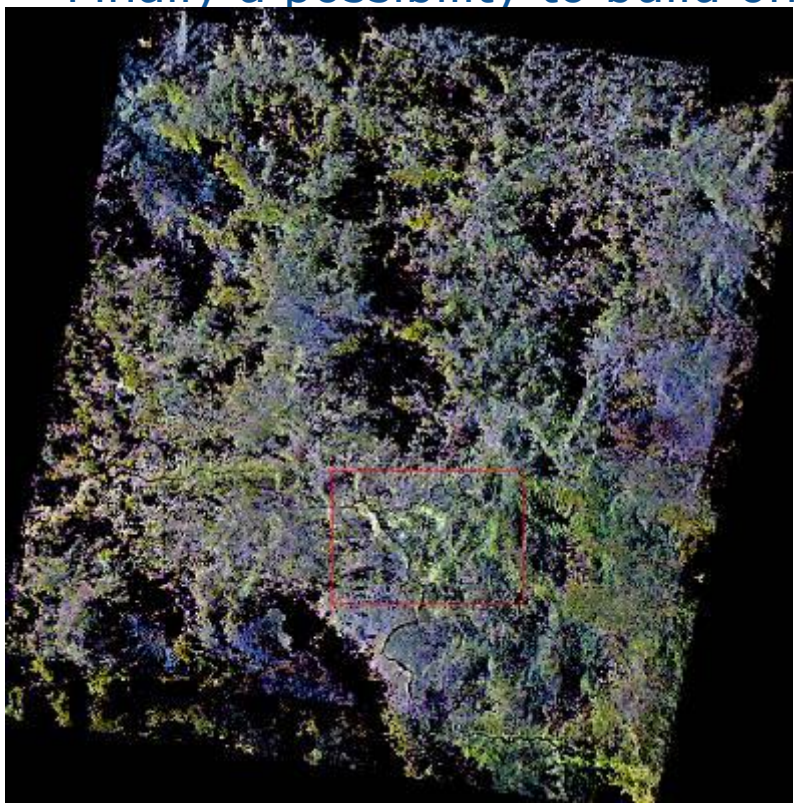


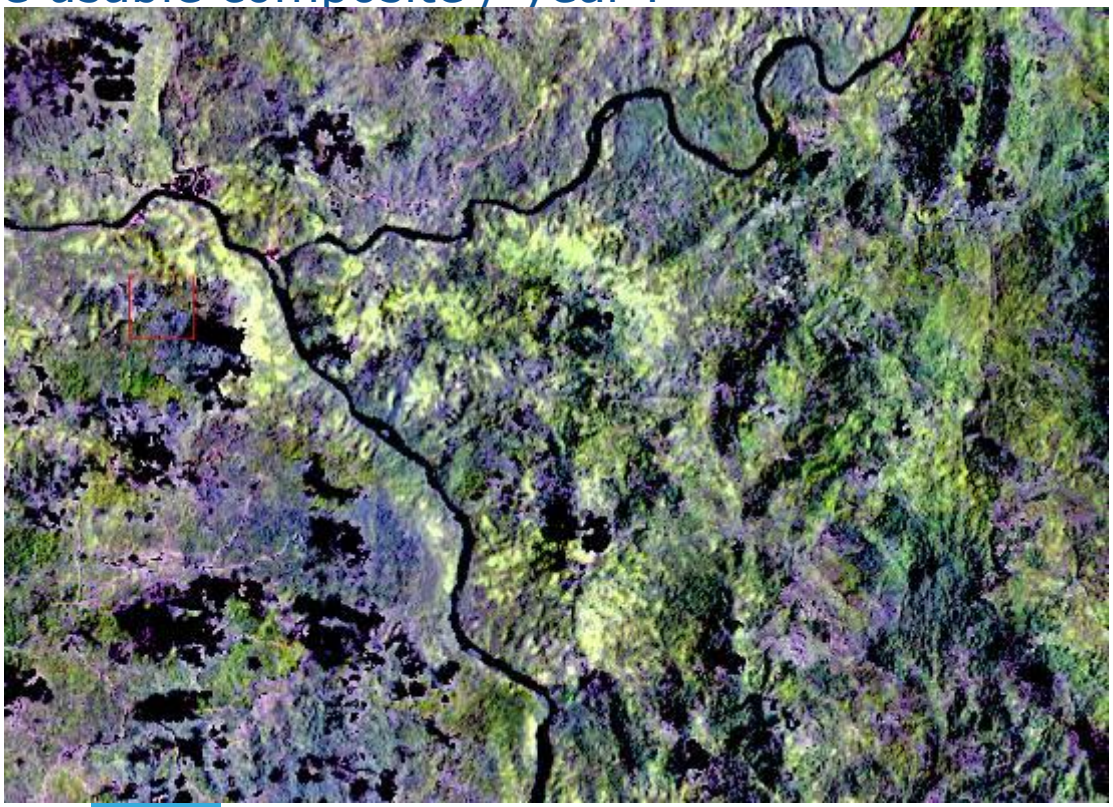




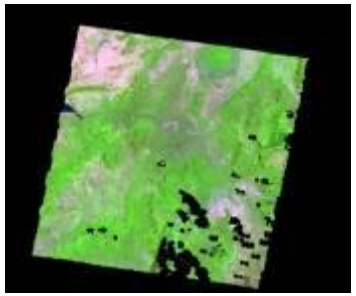
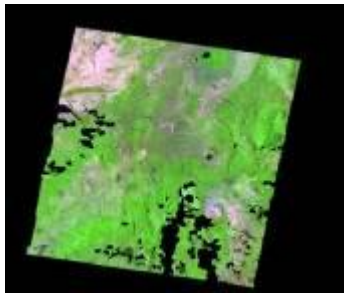
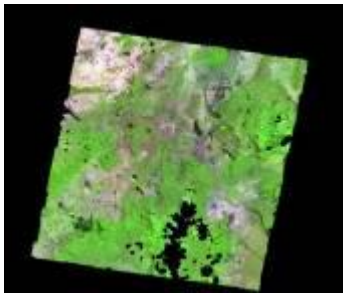
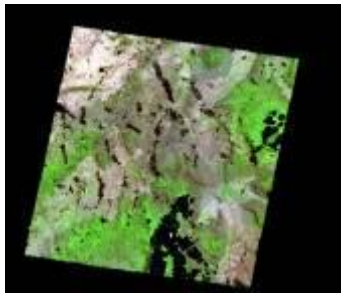
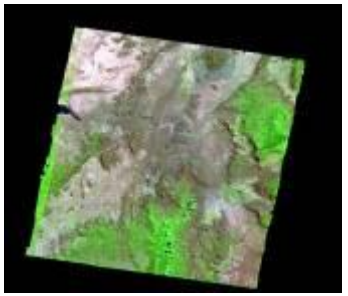
Seasonal composite – Borneo (4.5 months)

- Average number of valid observations per pixel was 1.1 (std 1.1)
- 36% of pixels did not have any valid observations during this 4.5 months
- Finally a possibility to build one usable composite / year !



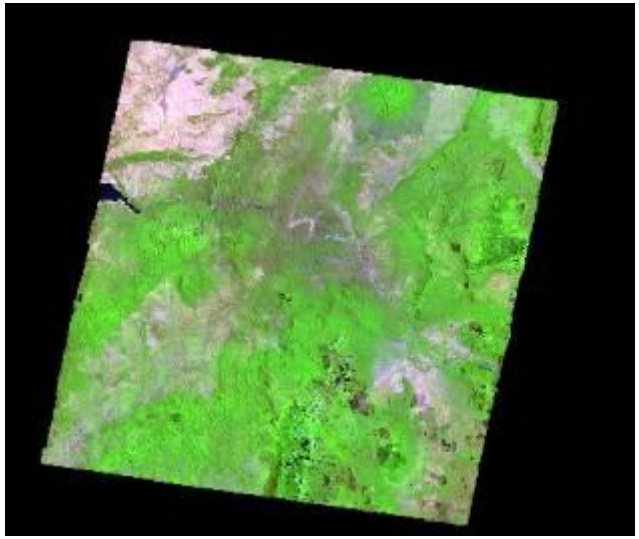


Compositing strategies

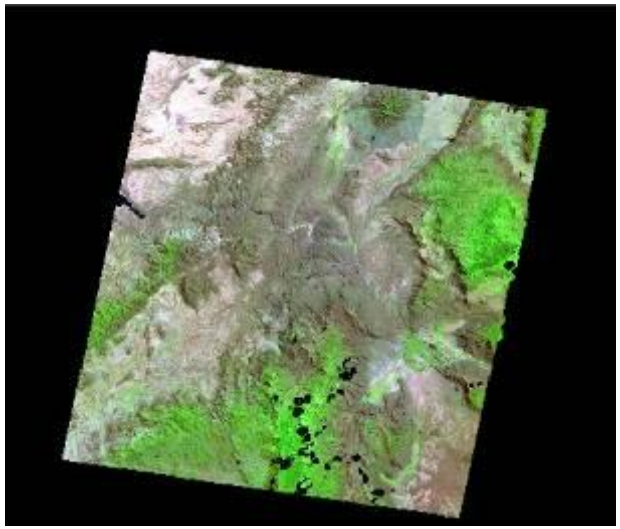
Feb March April May June

Monthly composites based on median after cloud masking



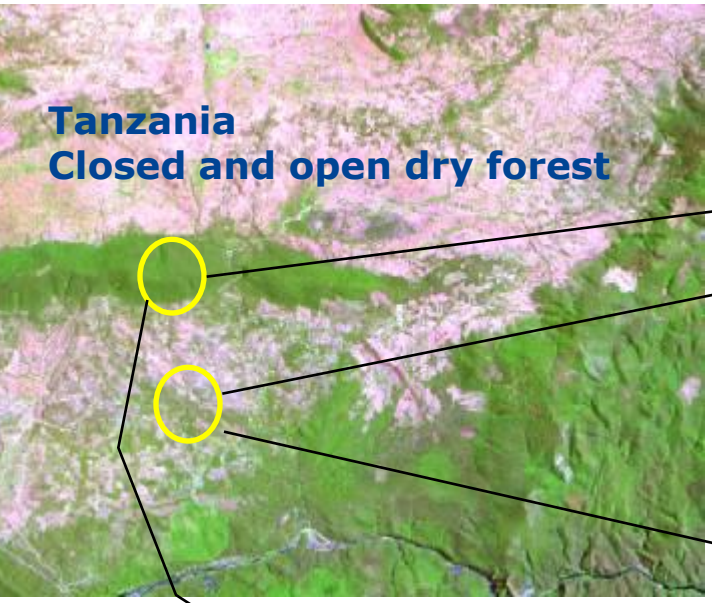
Seasonal compositing
Based on median of all images

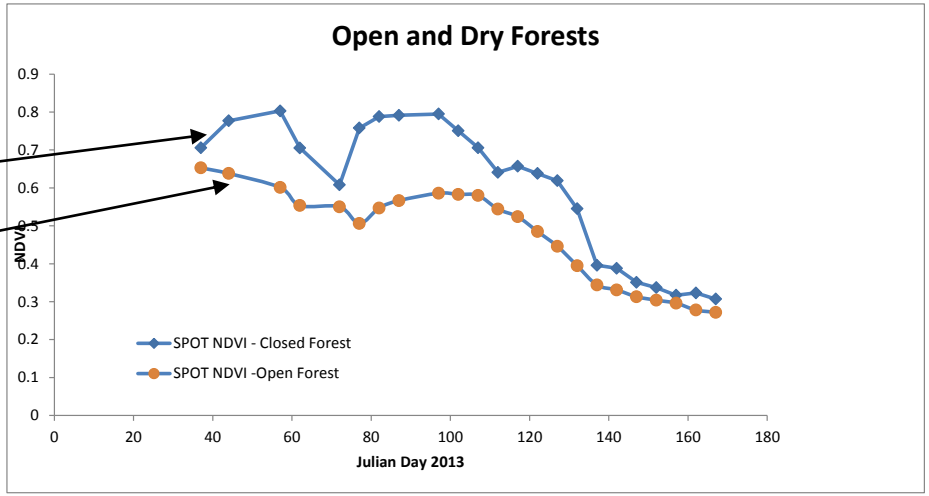
Tanzania

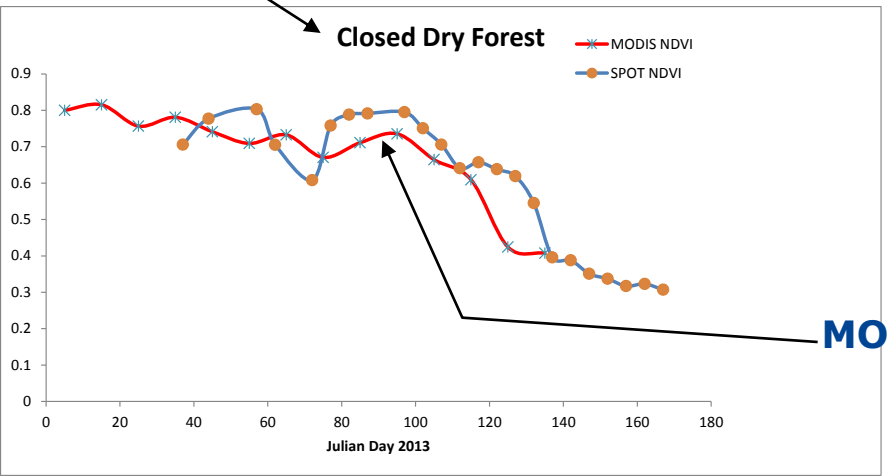


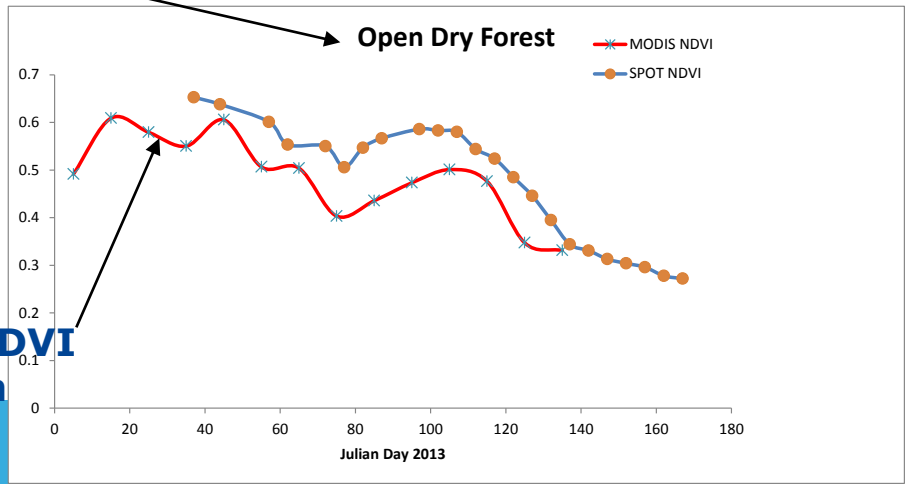
Seasonal compositing Based
dry season (June) image

NDVI Time series analysis









MODIS NDVI 250 m

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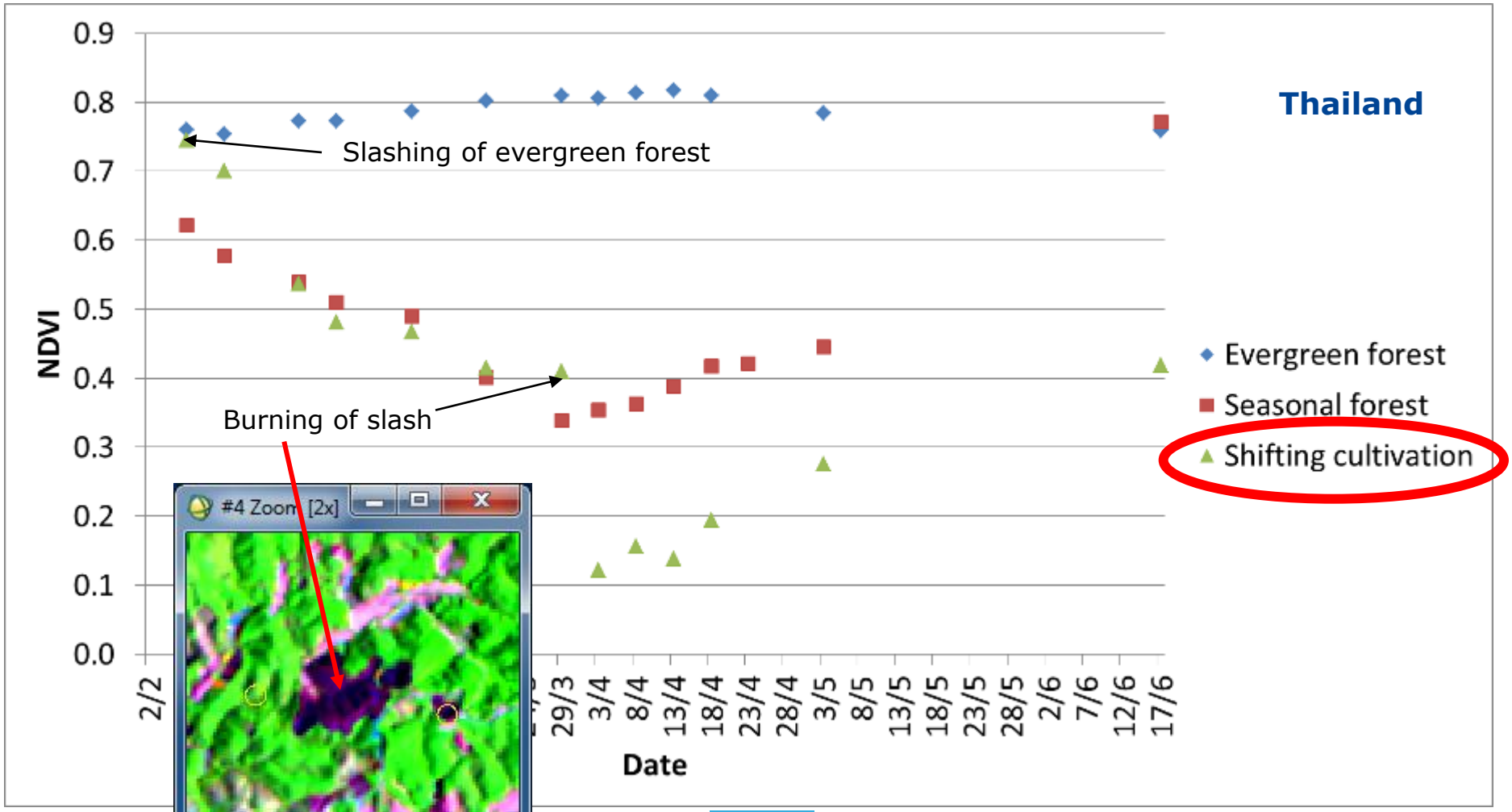
Usability of NDVI time profile



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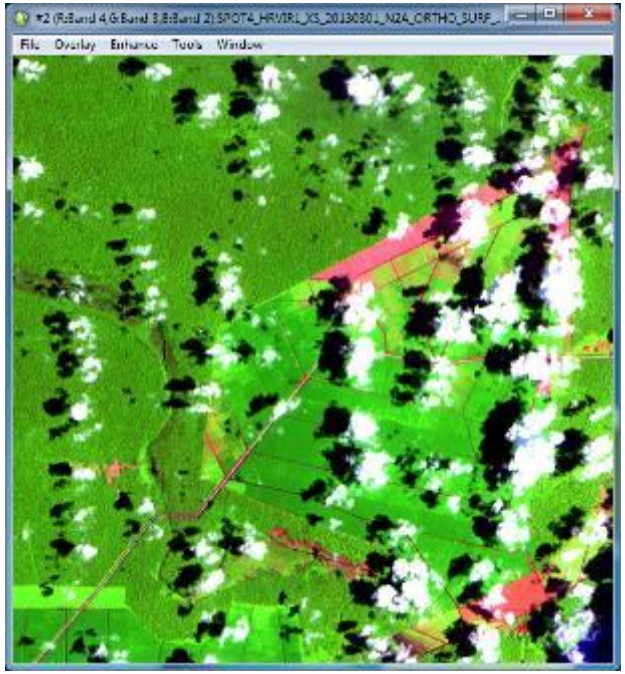
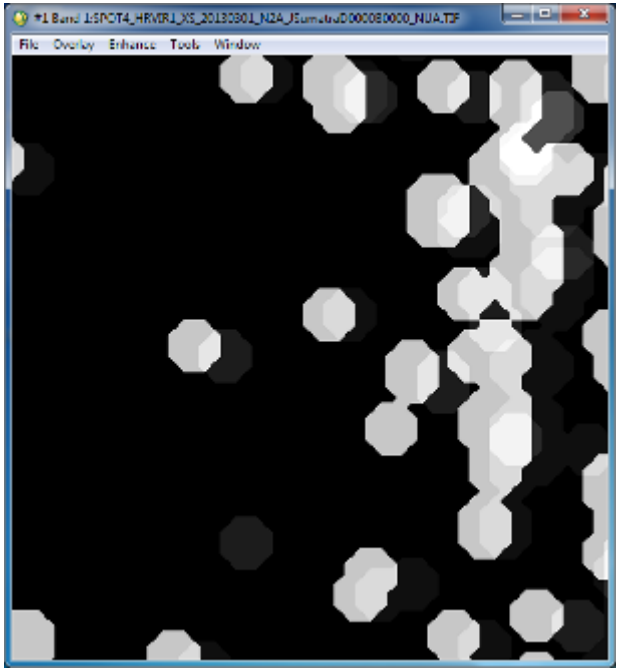
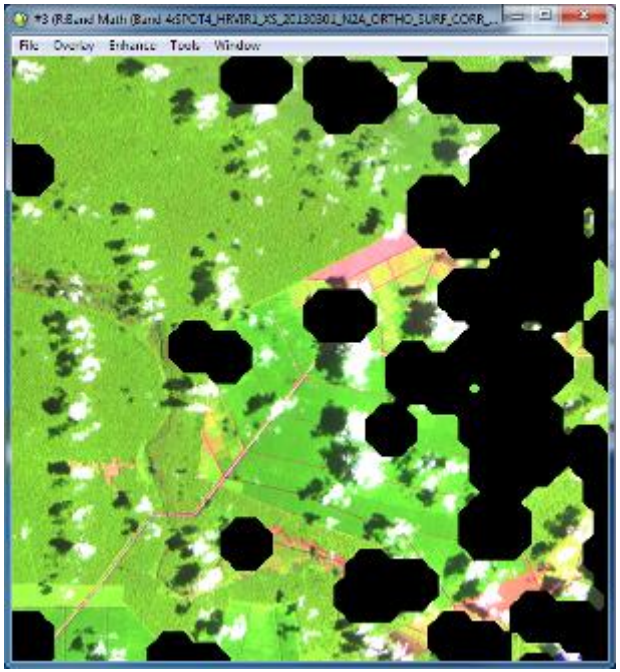
Cloud masking: room for improvement…

Close up Sumatra 01/03/2013





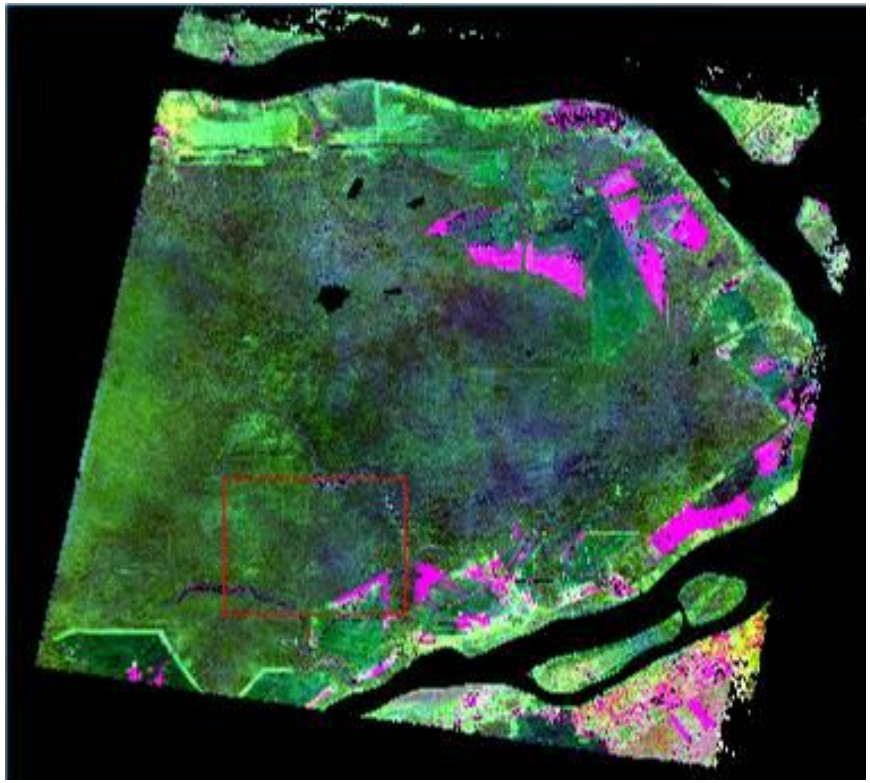


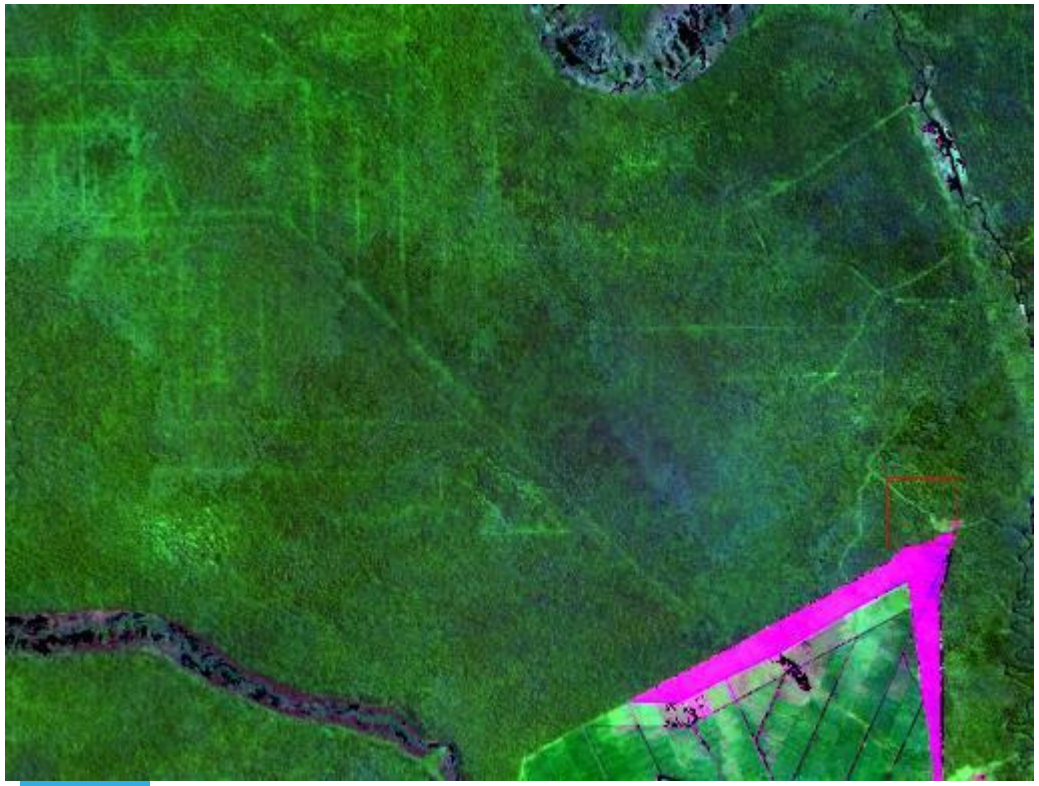
Sumatra seasonal composite after home-made cloud screening

- Average number of valid observations per pixel was 4.3 (std 1.5)
- Only 0.7% did not have any valid observations during these 4.5 months

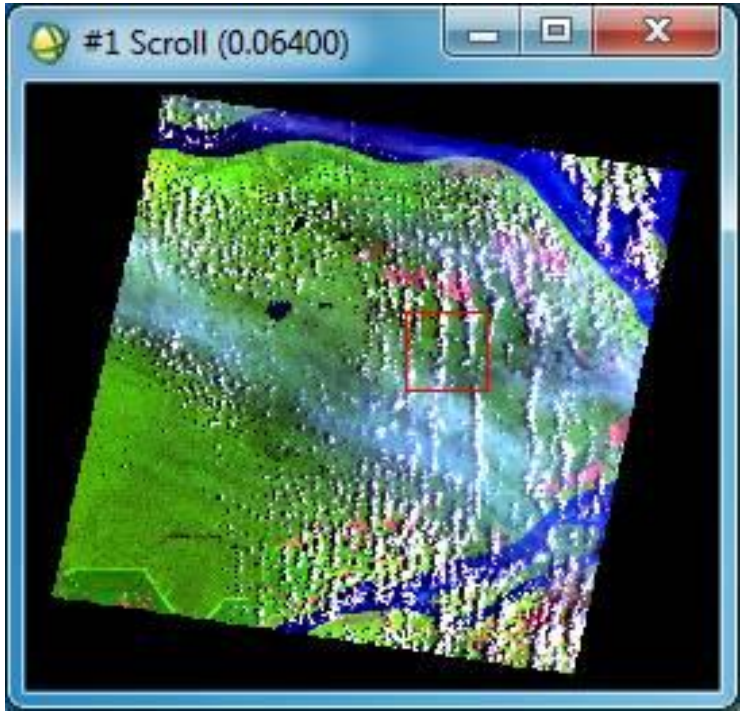
(and part of this is due to erroneously masked out drainage canals in peat!)

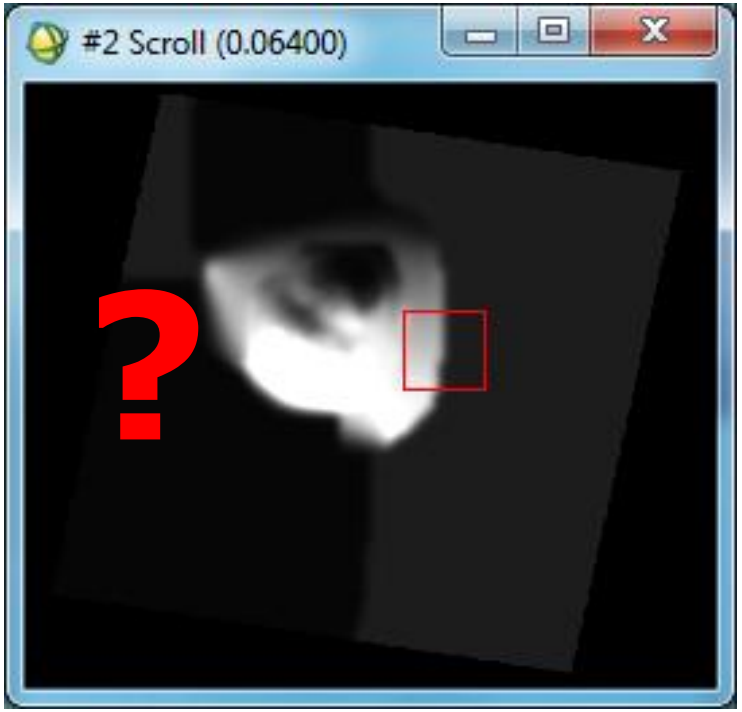
Sumatra





Aerosol optical thickness (AOT)



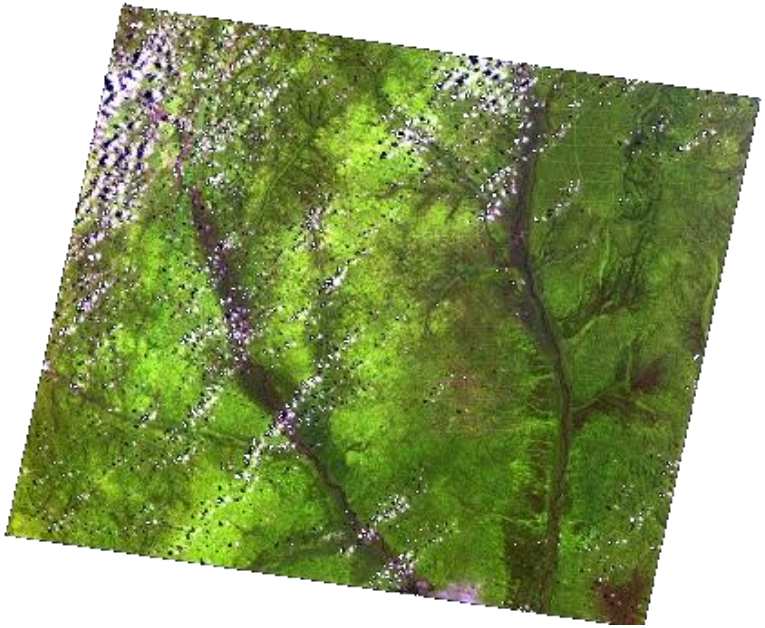


- We hope it is not he last word…

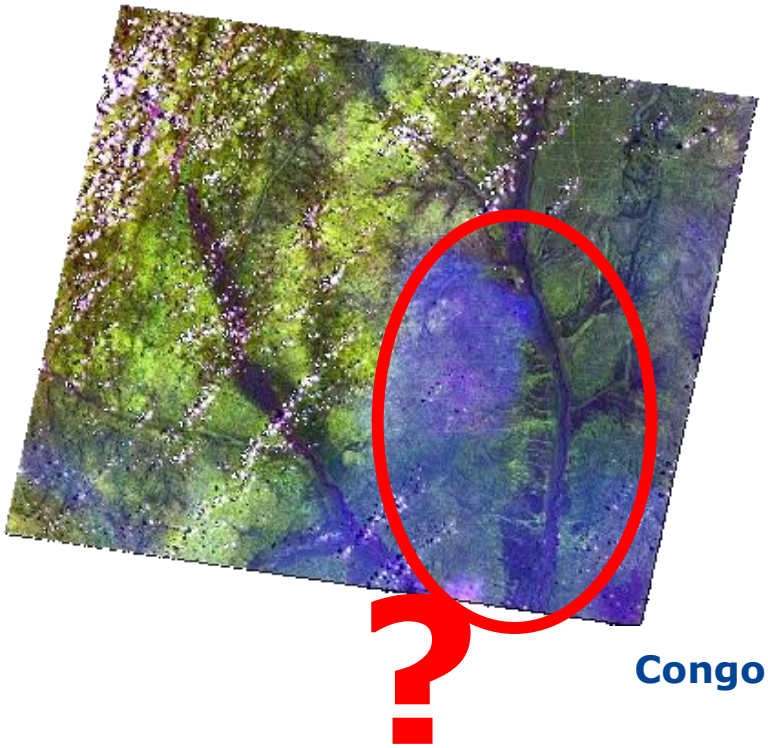
Sumatra

Atmospheric correction

L1C: TOA Reflectance



L2A: Toc reflectance



Congo

Conclusions 1

- **2A data usability:** (where it works)

  - allows vegetation **temporal behaviour analysis**, as already done, and consistent with LR/MR data
  - allows **vegetation mapping** in regions which so far couldn't be covered with single image acquisition (humid rainforest)
  - **image compositing** requires **flexibility and improved strategy** to adjust
    - to the speed of phenological changes (1 month ore more)
    - to the annual frequency of cloud cover (six-monthly to annual syntheses)

Conclusions 2

- **Geometry**:
  - **OK where it works**, (constrained by mage size and cloudiness)
  - waiting for the processing of "difficult" sites

- **reflectance stability** (over stable ground targets)
  - **significantly improved**,

- **atmospheric correction**
  - **questions about the aerosol optical thickness** in specific cases
  - the **cloud screening is not enough** for what regards small cumulus (and shadows)
  - **haze** screening or correction: **needs further improvement**