Monitoring Restoration Measures in Tropical Peatlands using Radar Satellite Imagery

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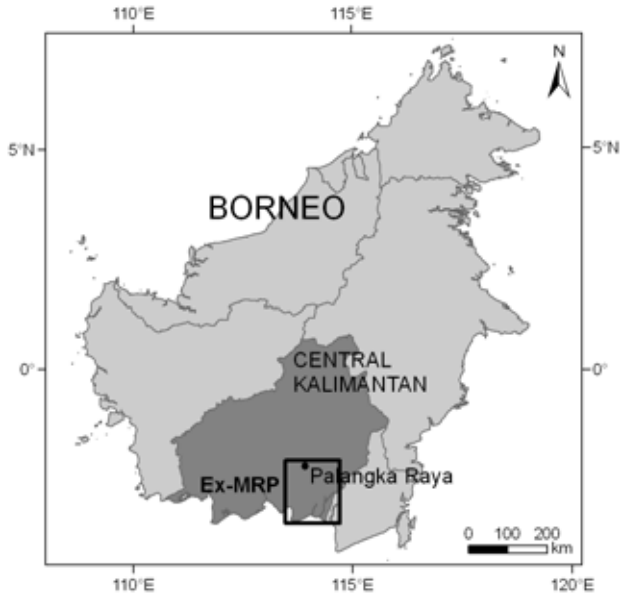
OVERVIEW

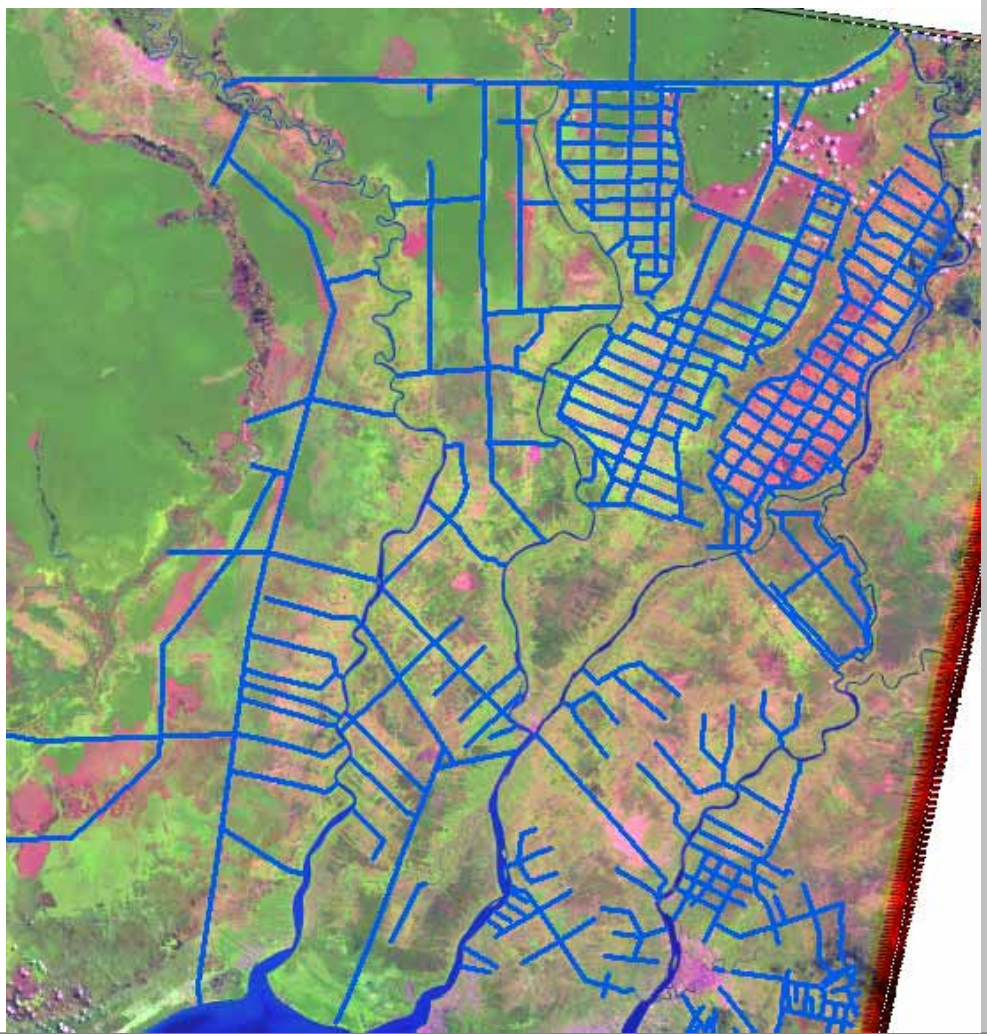
- **Study Area**
- **Materials**
- **Method**
- **Results**
- **Conclusion & Outlook**

STUDY AREA



Ex – Mega Rice Project Area

4,500 km drainage canals



Landsat ETM
5. August 2007

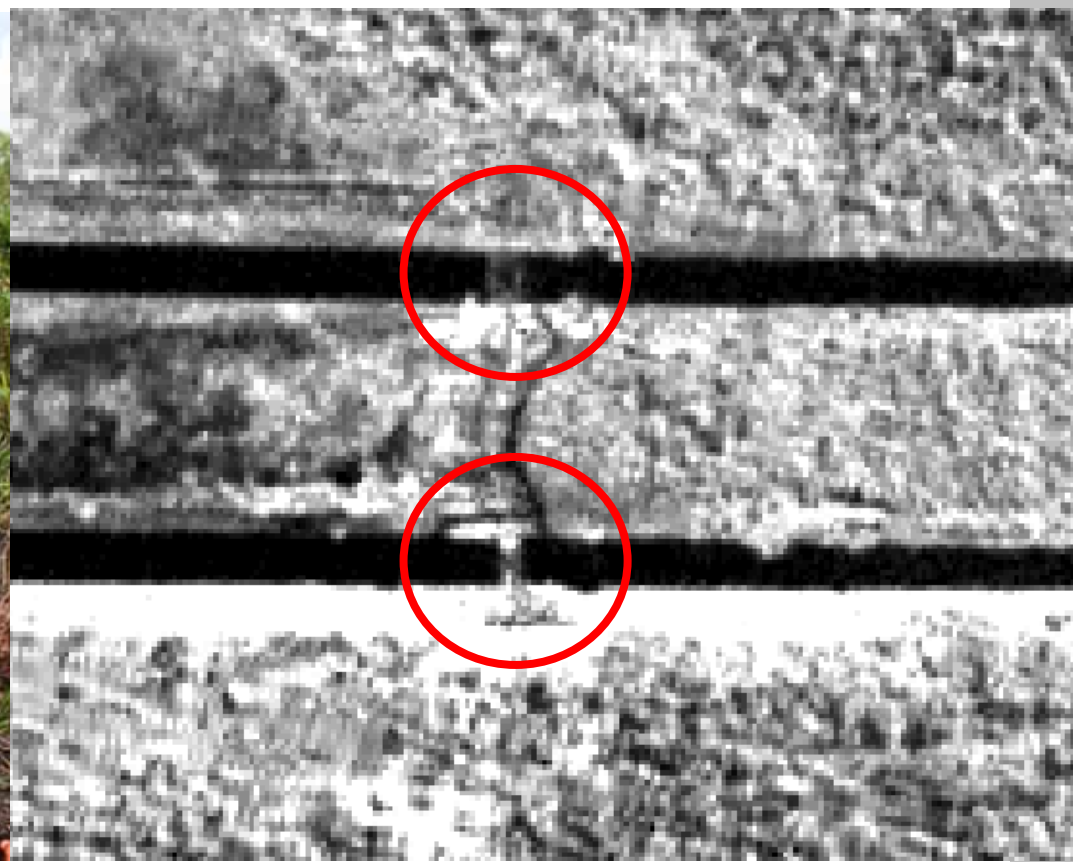
WHY RESTORATION MEASURES?

Disturbed hydrology -> main reason of fires

DAM CONSTRUCTION

Restoration of hydrology by canal blocking

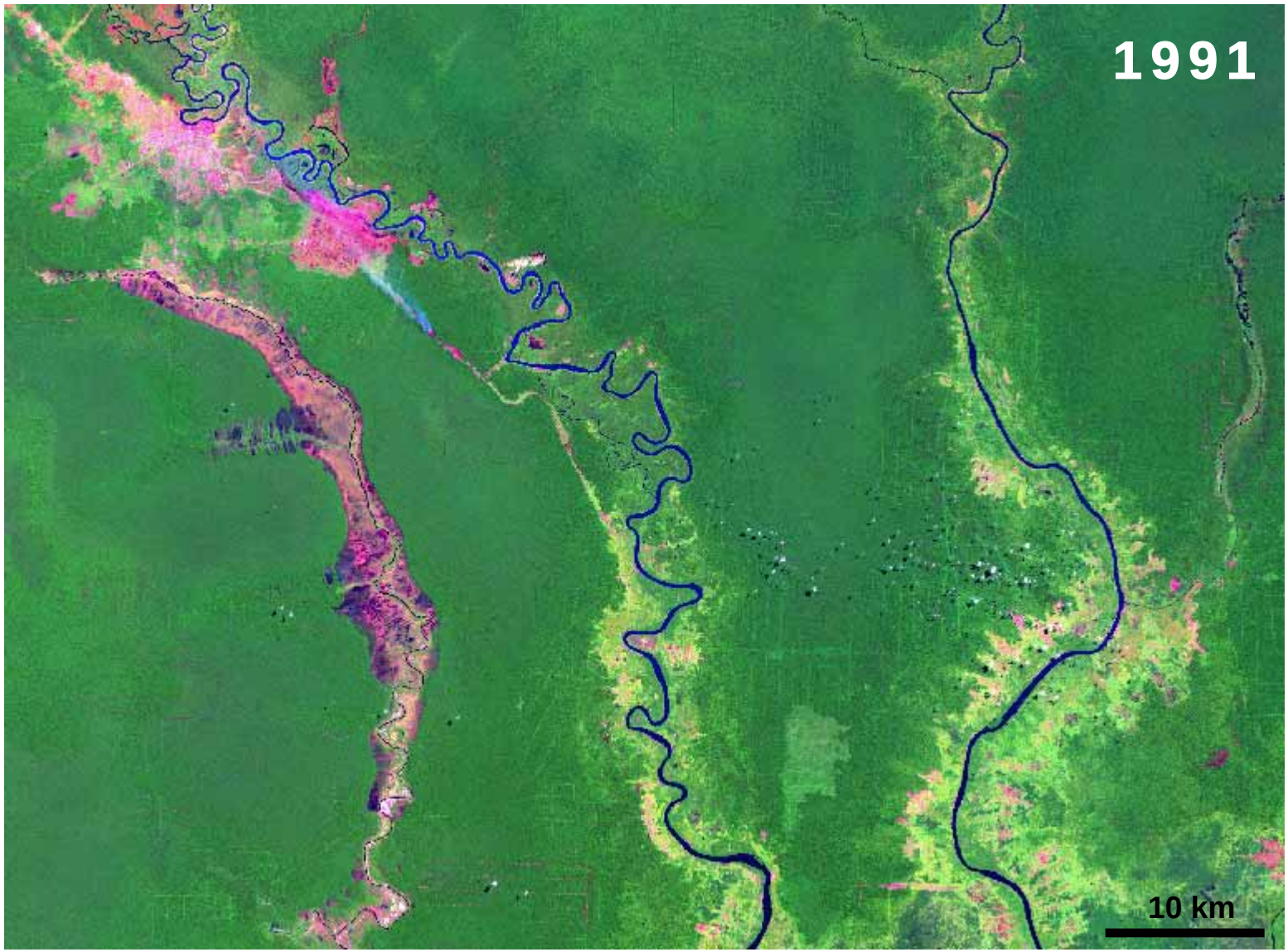
Block C



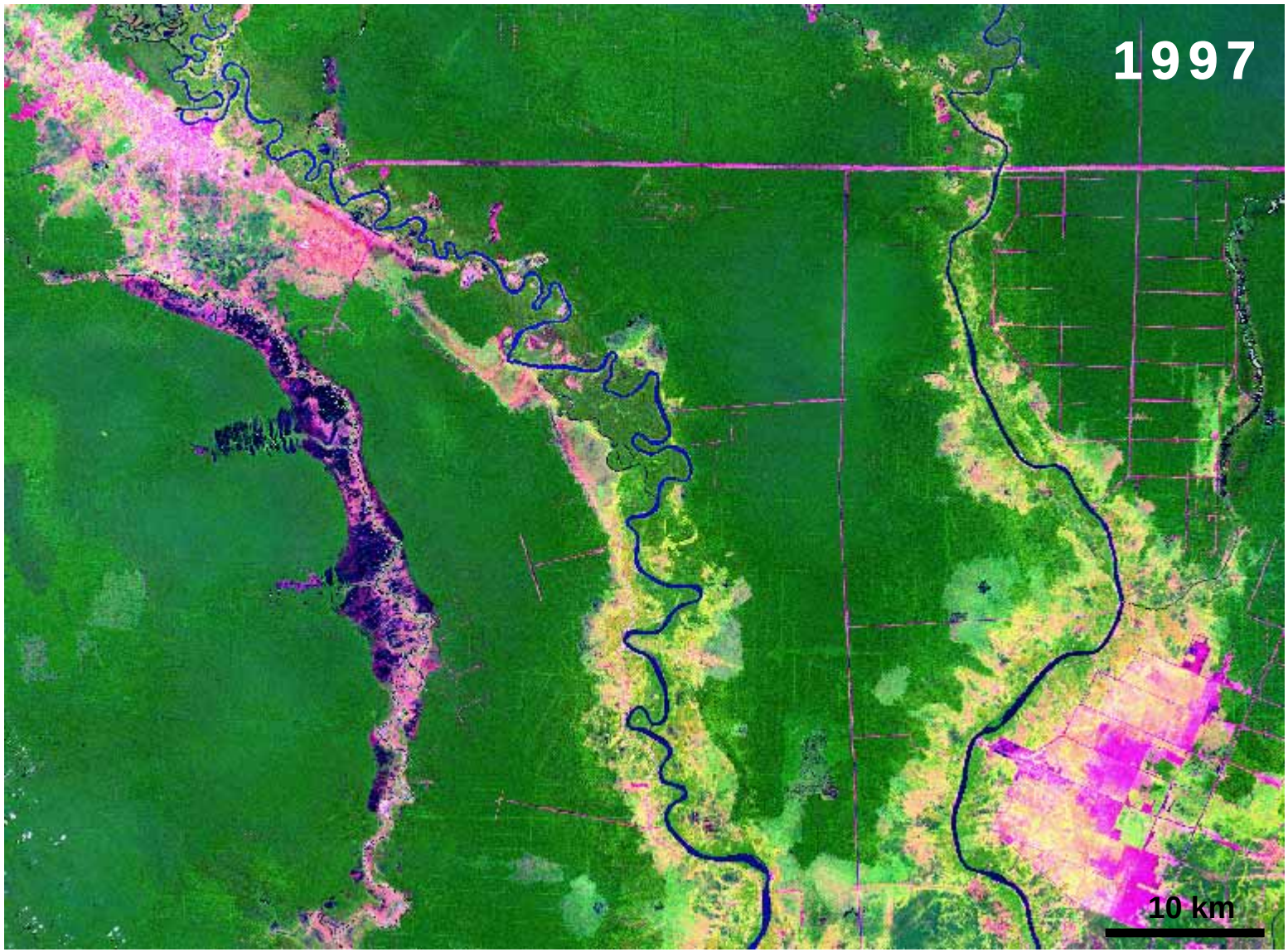
Dams observable with satellites
(ALOS PRISM, 2.5 m resolution)

IMPRESSIONS

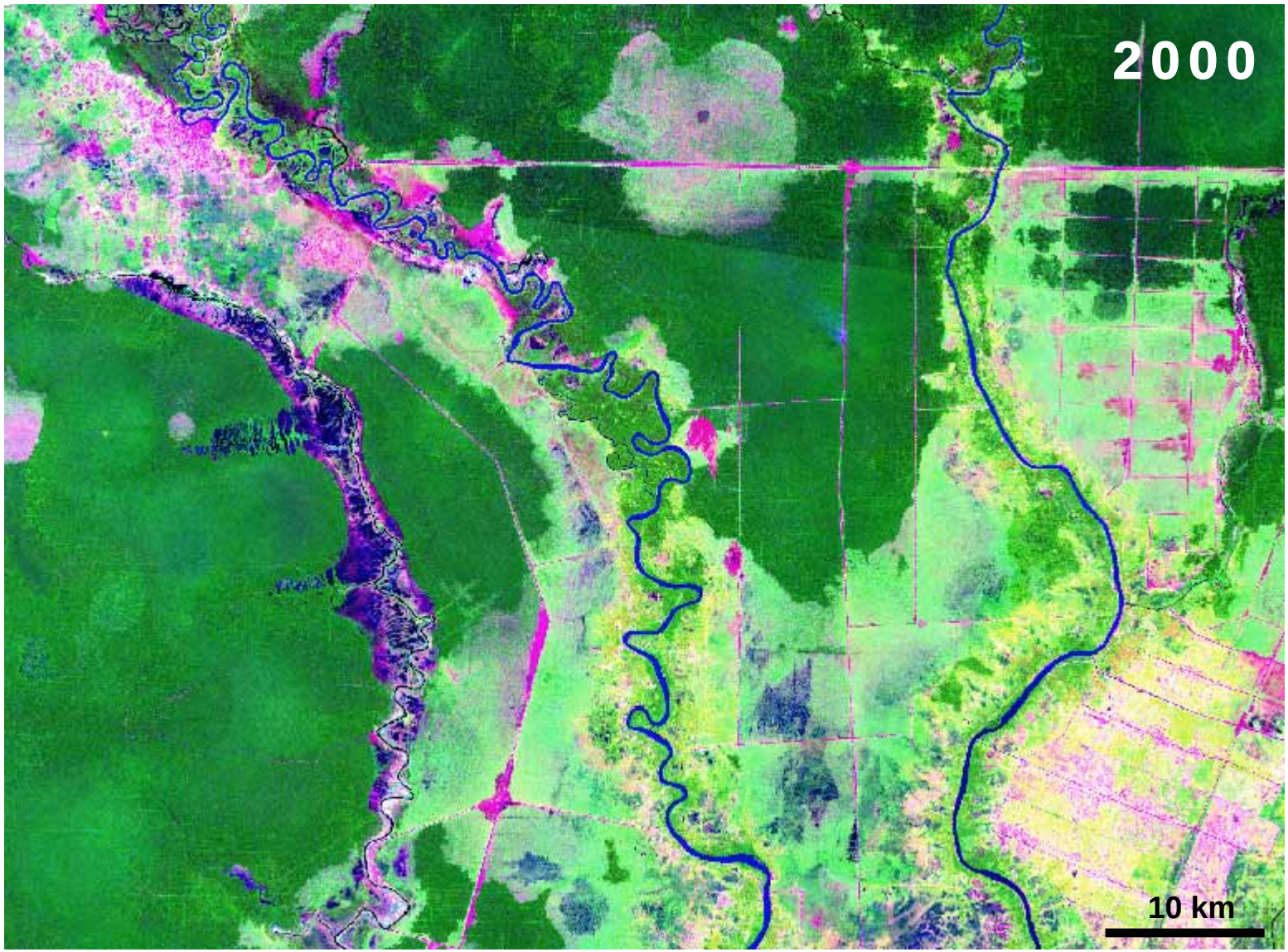
LANDSAT TIME SERIES



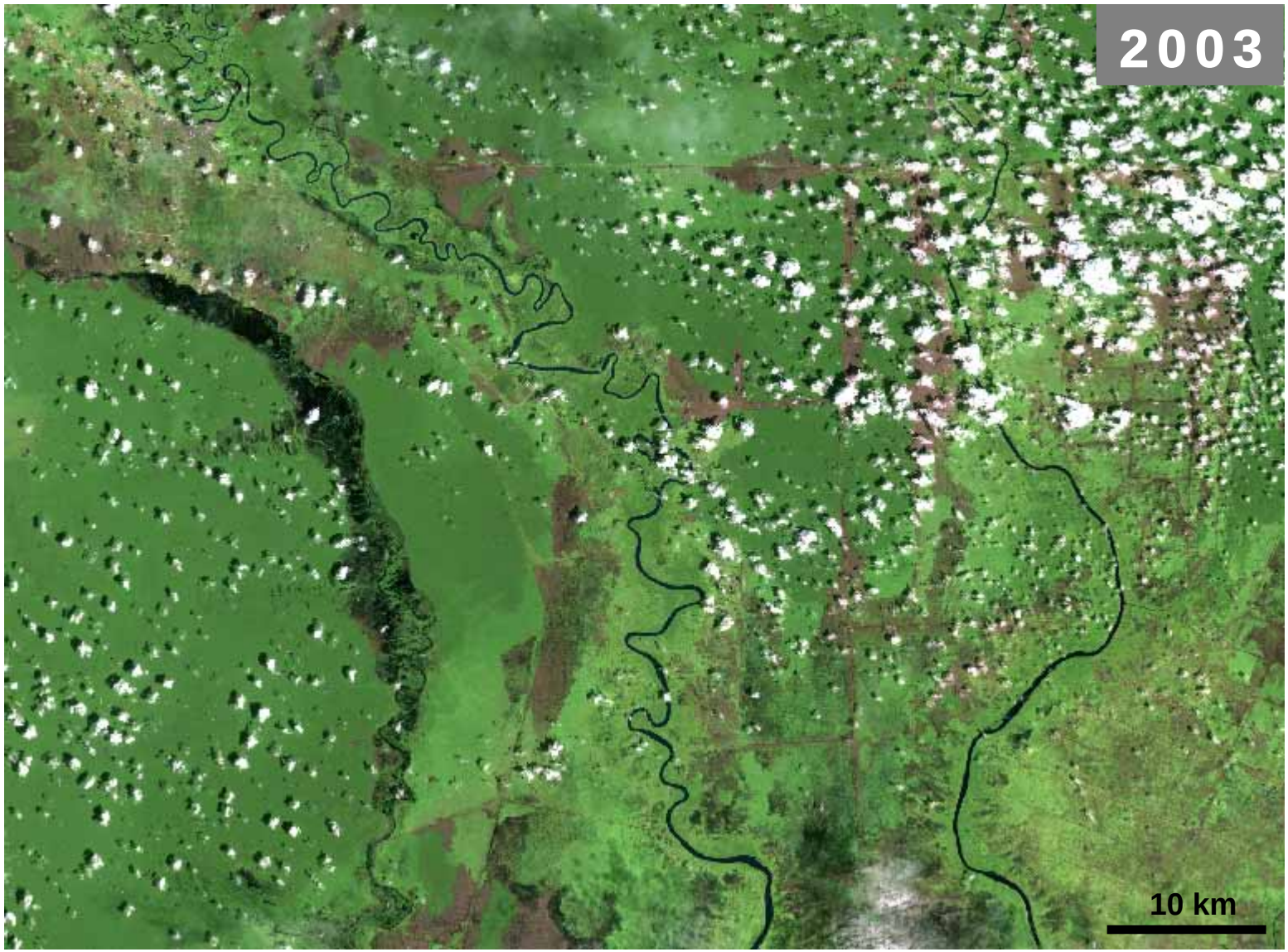
LANDSAT TIME SERIES



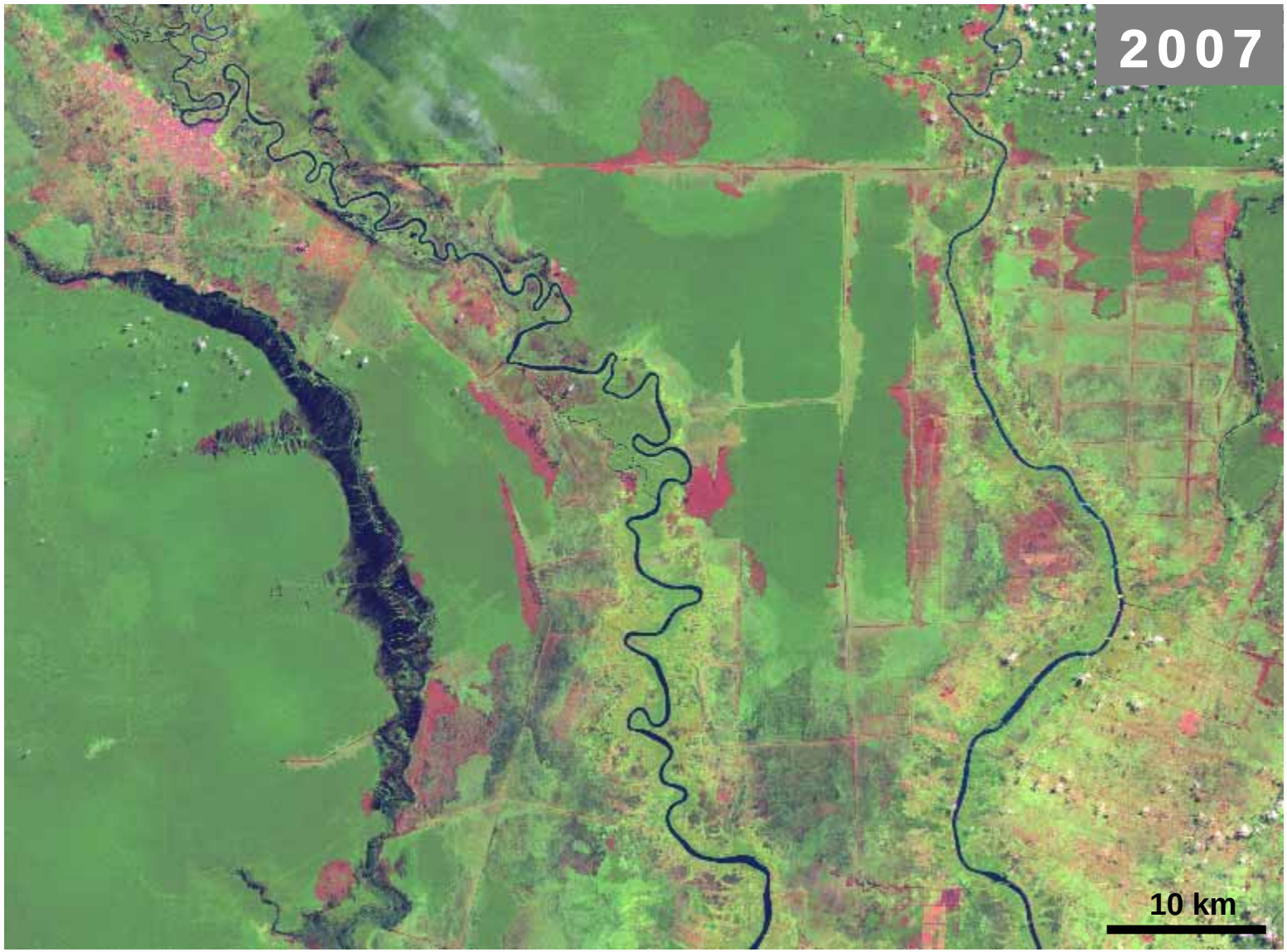
LANDSAT TIME SERIES



LANDSAT TIME SERIES

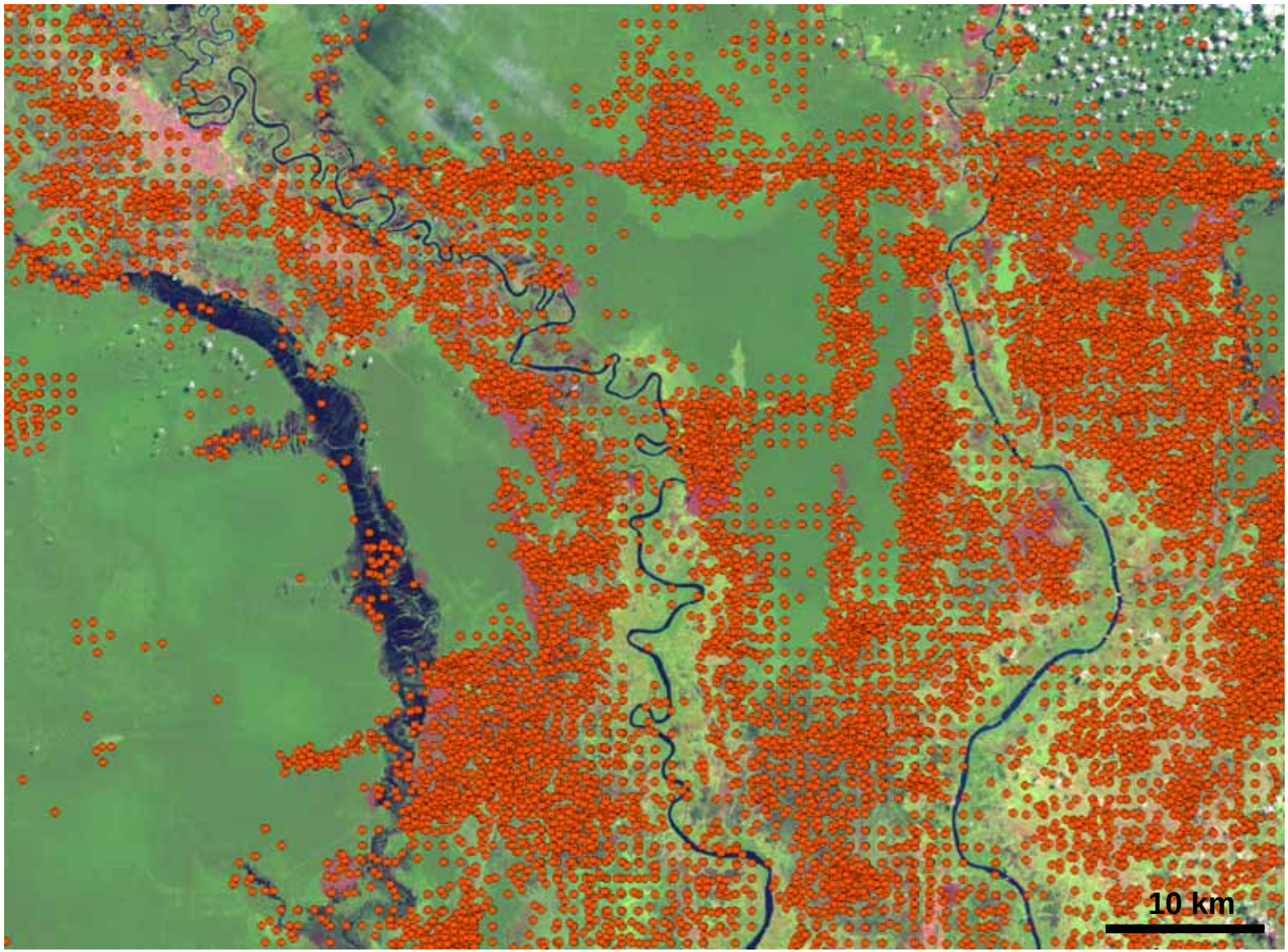


LANDSAT TIME SERIES

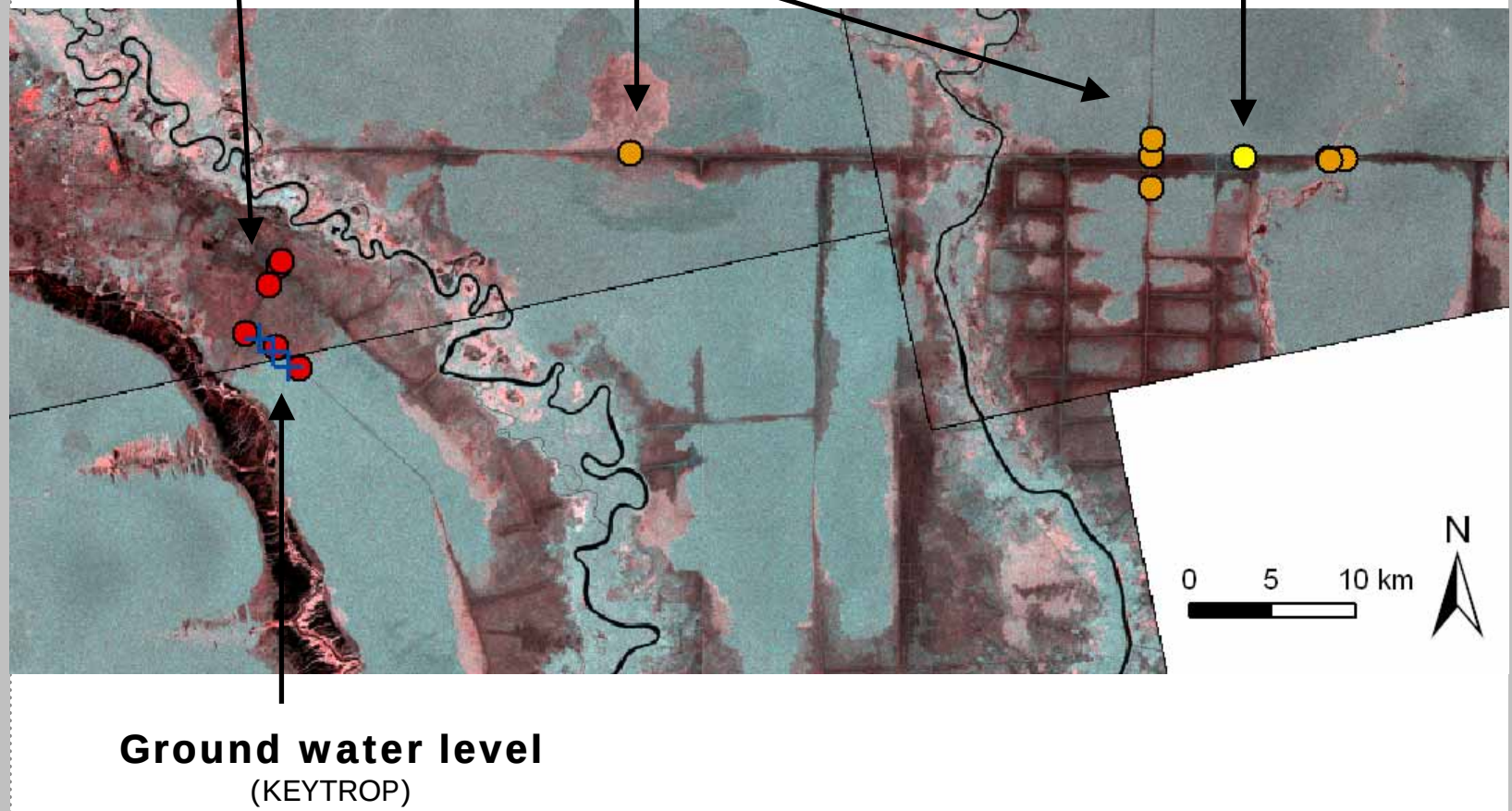


FIRE HOTSPOTS

1997-2007

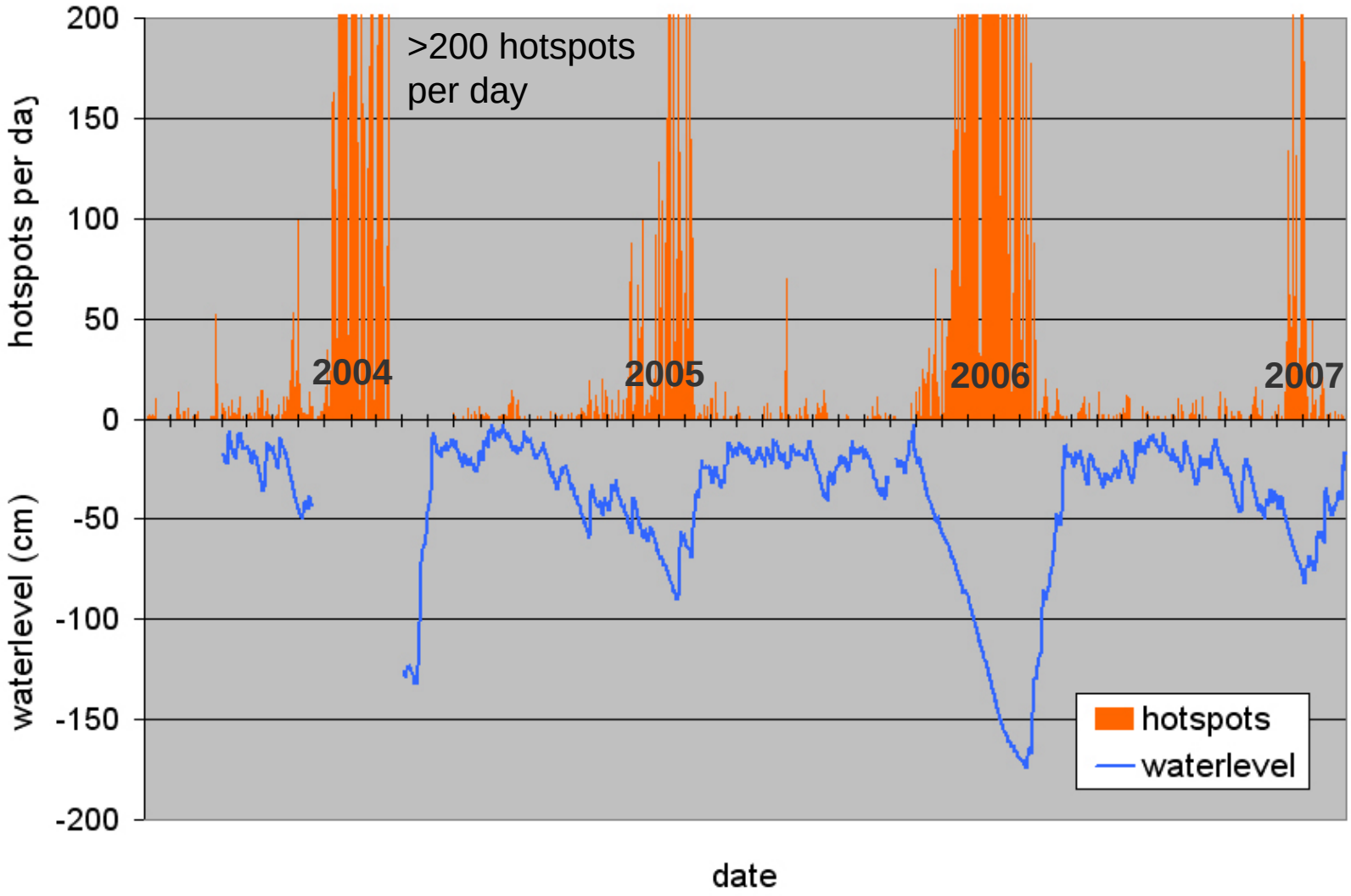


LOCATION OF DAMS



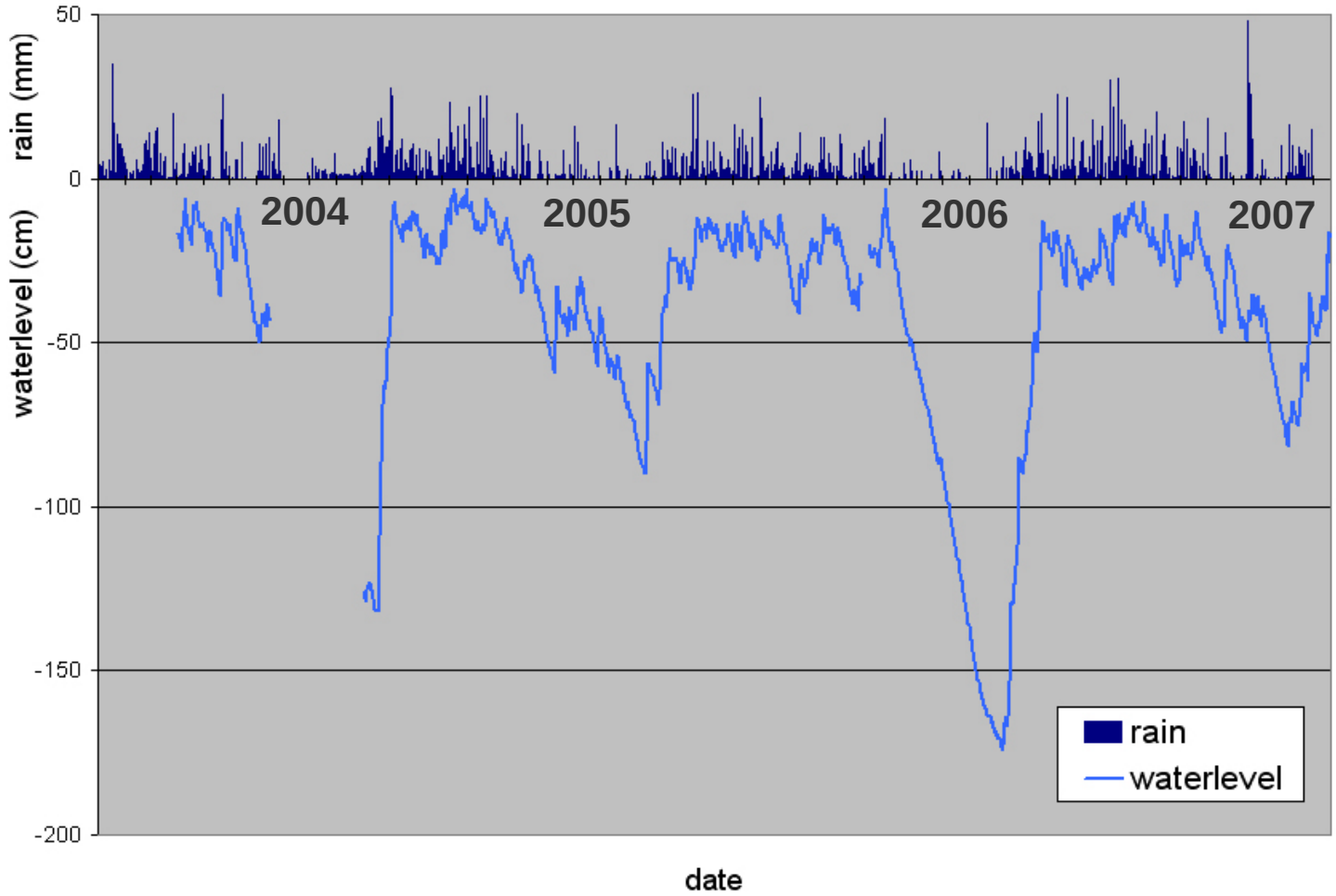
CORRELATION WATERLEVEL - HOTSPOTS

Central Kalimantan



CORRELATION WATERLEVEL - RAIN

Central Kalimantan

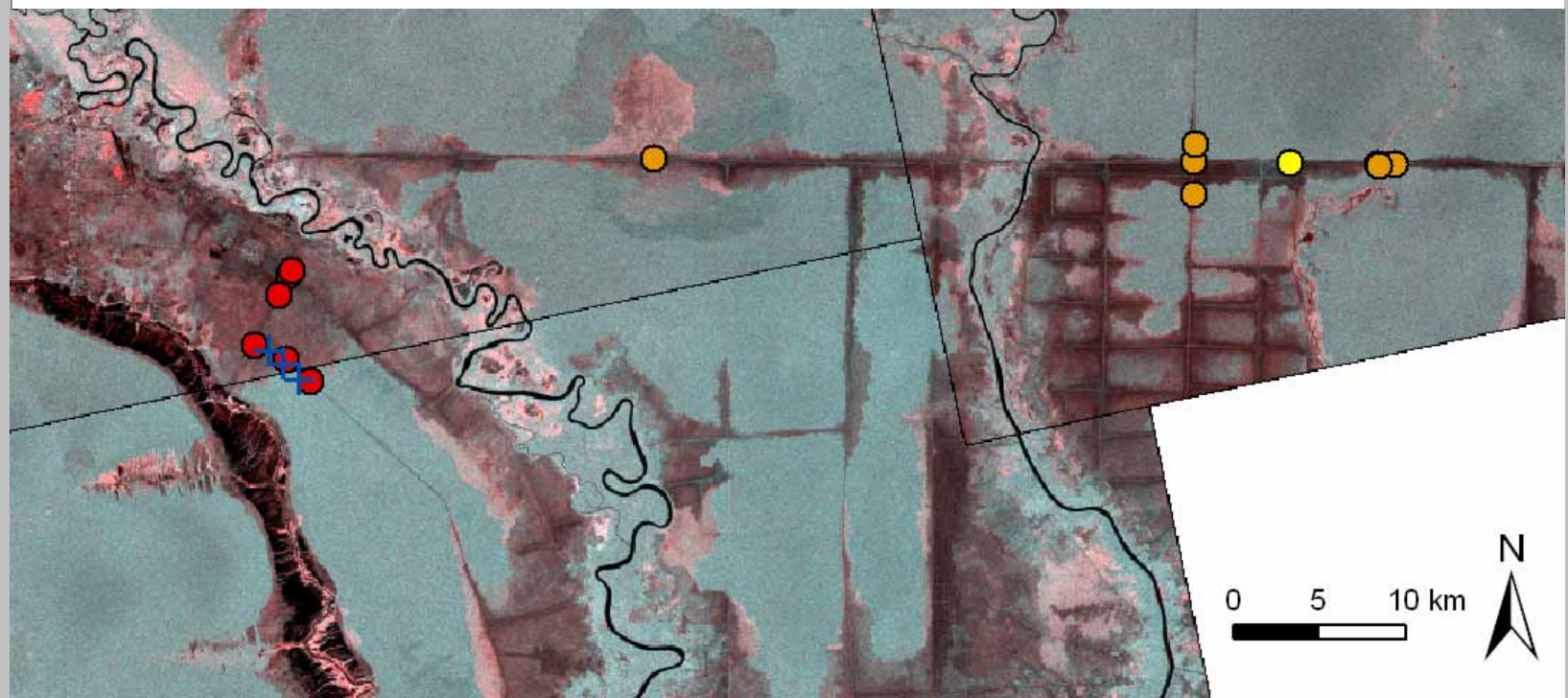


- **TRMM (Tropical Rainfall Measuring Mission) by NASA**
- **satellite data (microwave and infrared)**

CHARACTERISTICS OF RADAR

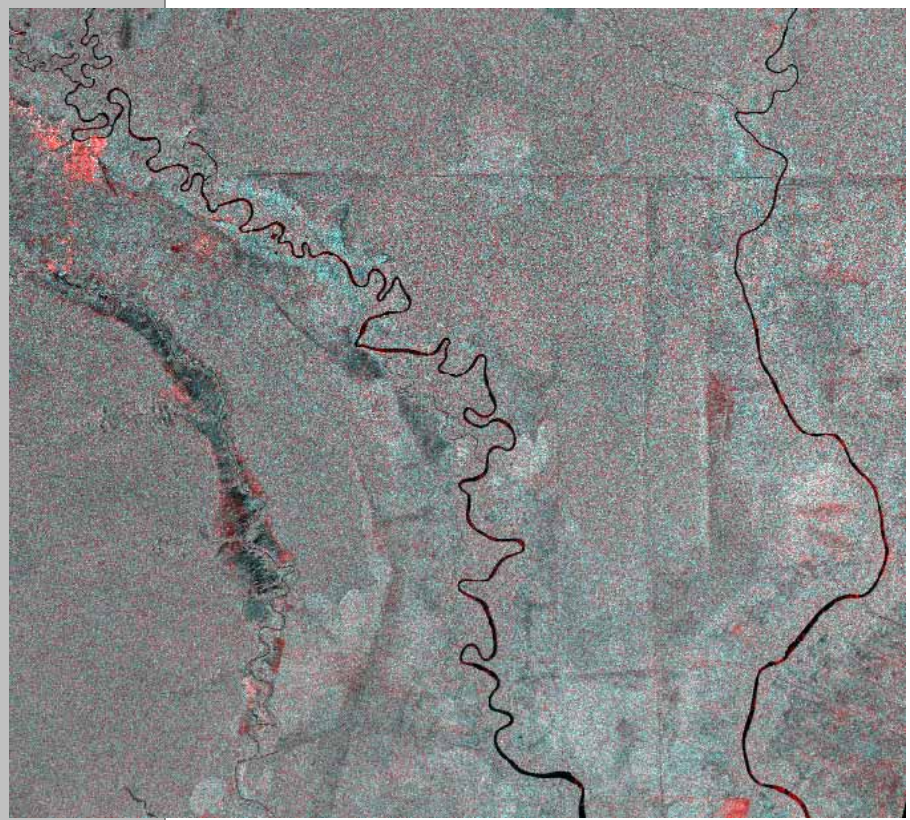
- large scale data collection
- cloud independent -> high temporal frequency
- radar backscatter is sensitive to soil and vegetation moisture (moisture increase -> backscatter increase)

  → Drawback: radar influenced by weather conditions

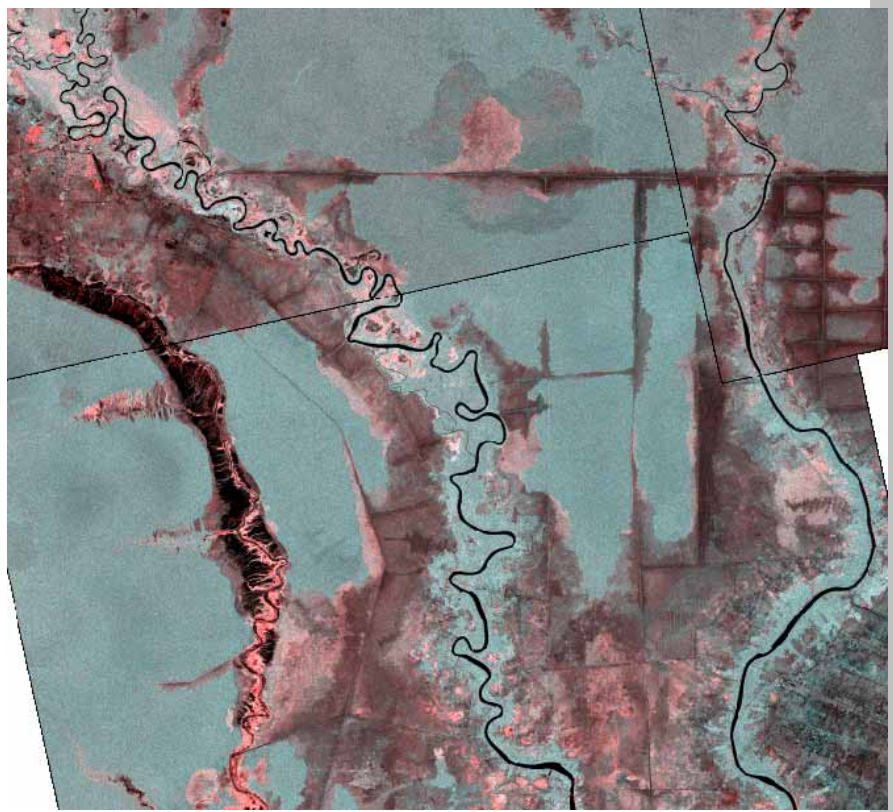


RADAR IMAGERY

- **ENVISAT ASAR time series July 2004 –2007 (25 images)**
- **ALOS PALSAR since July 2006 (20 images)**



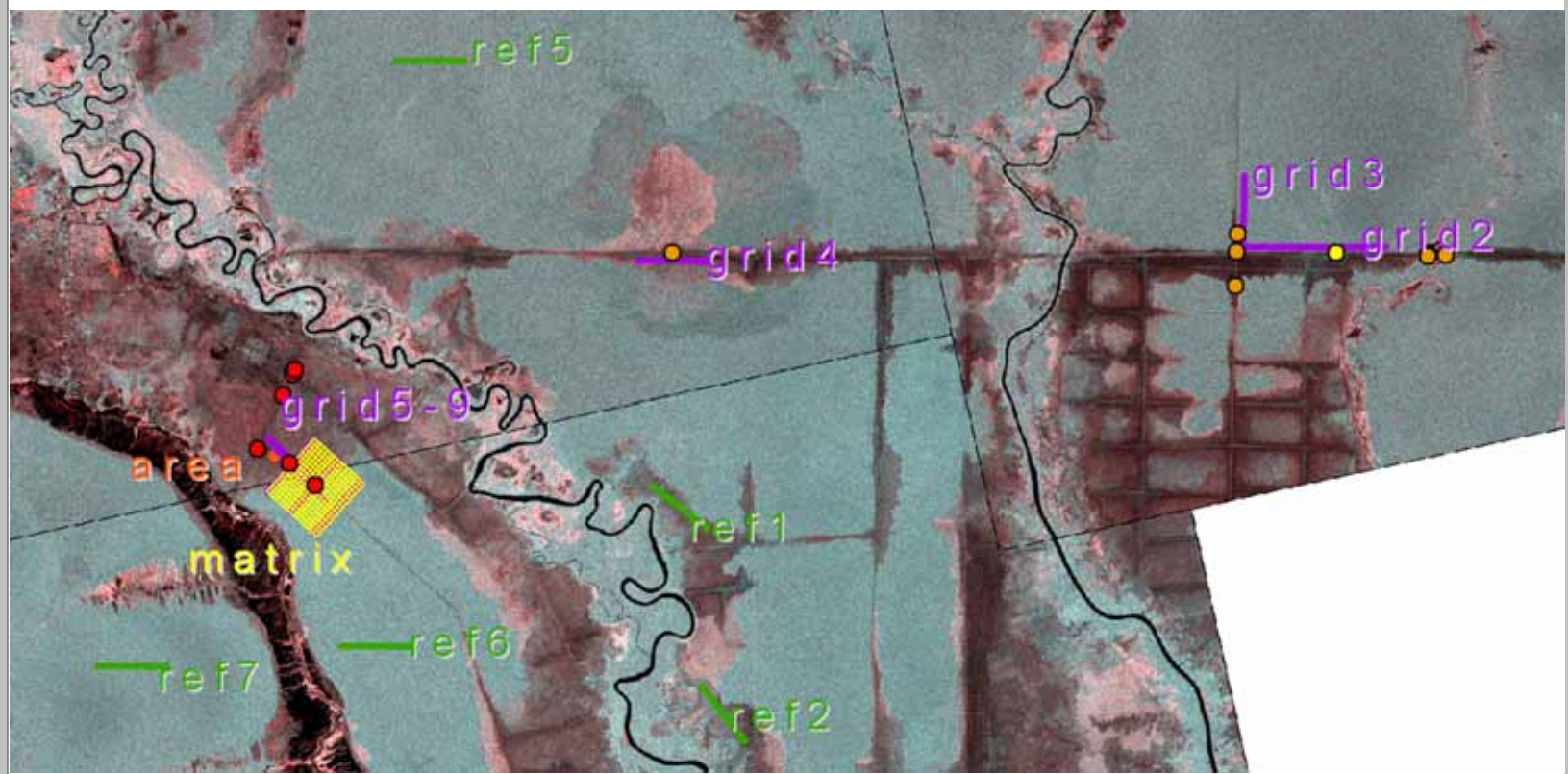
ASAR
C-Band
VV, VH Polarisation



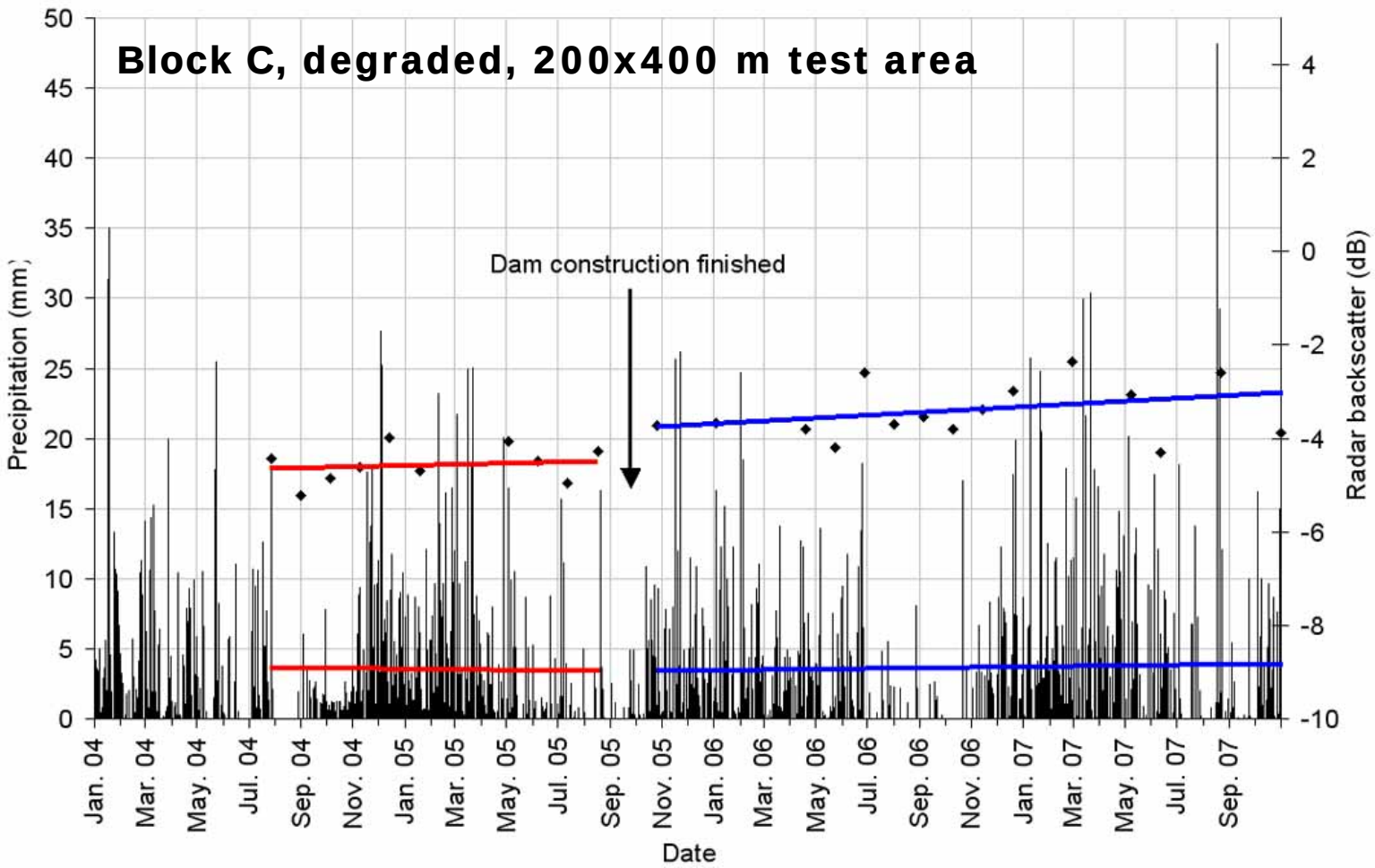
PALSAR
L-Band
HH, HV Polarisation

TEST AREAS

- **Areas 200x400m**
- **Transect grids 125x4000m**
- **Matrix 4000x4000m**
- **Discrimination: Forest and Degraded**
- **Reference Areas**



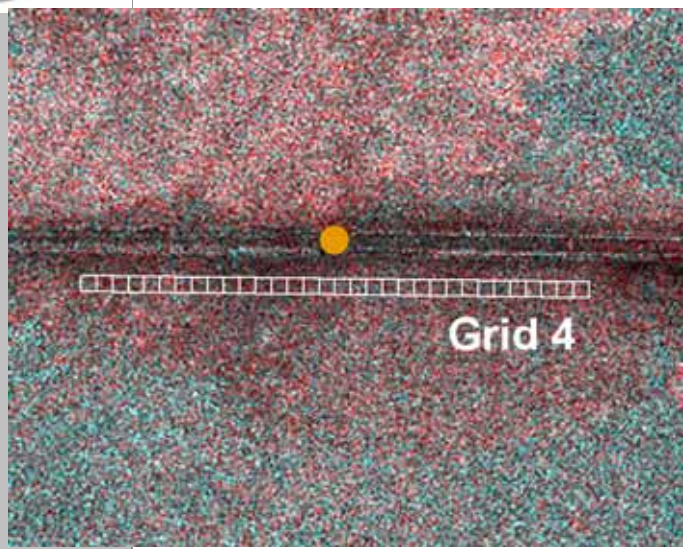
CHANGE DETECTION ANALYSIS



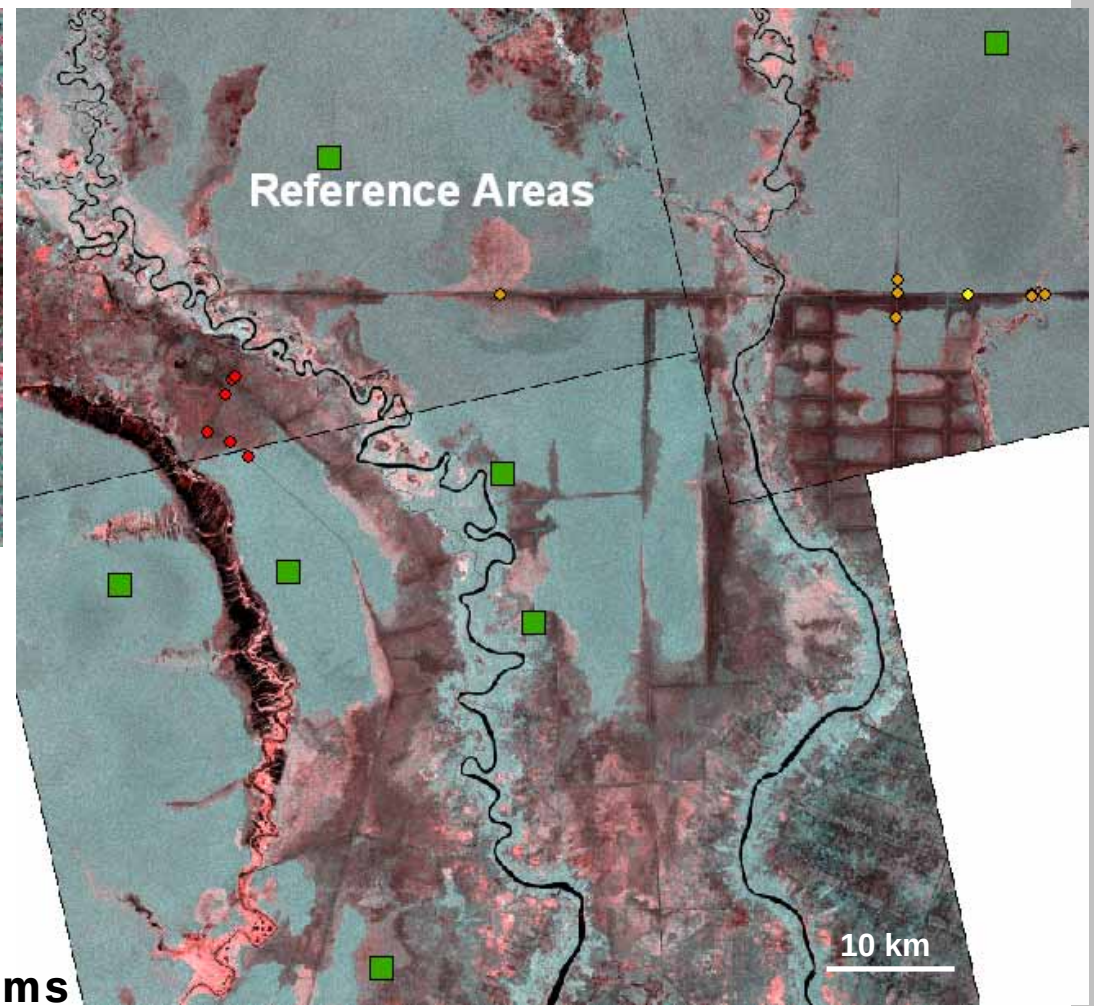
ENVISAT ASAR time series (VV polarisation)

COMPARISON WITH REFERENCE AREAS

for verification of the results



Test areas near dams



Reference areas far away from dams

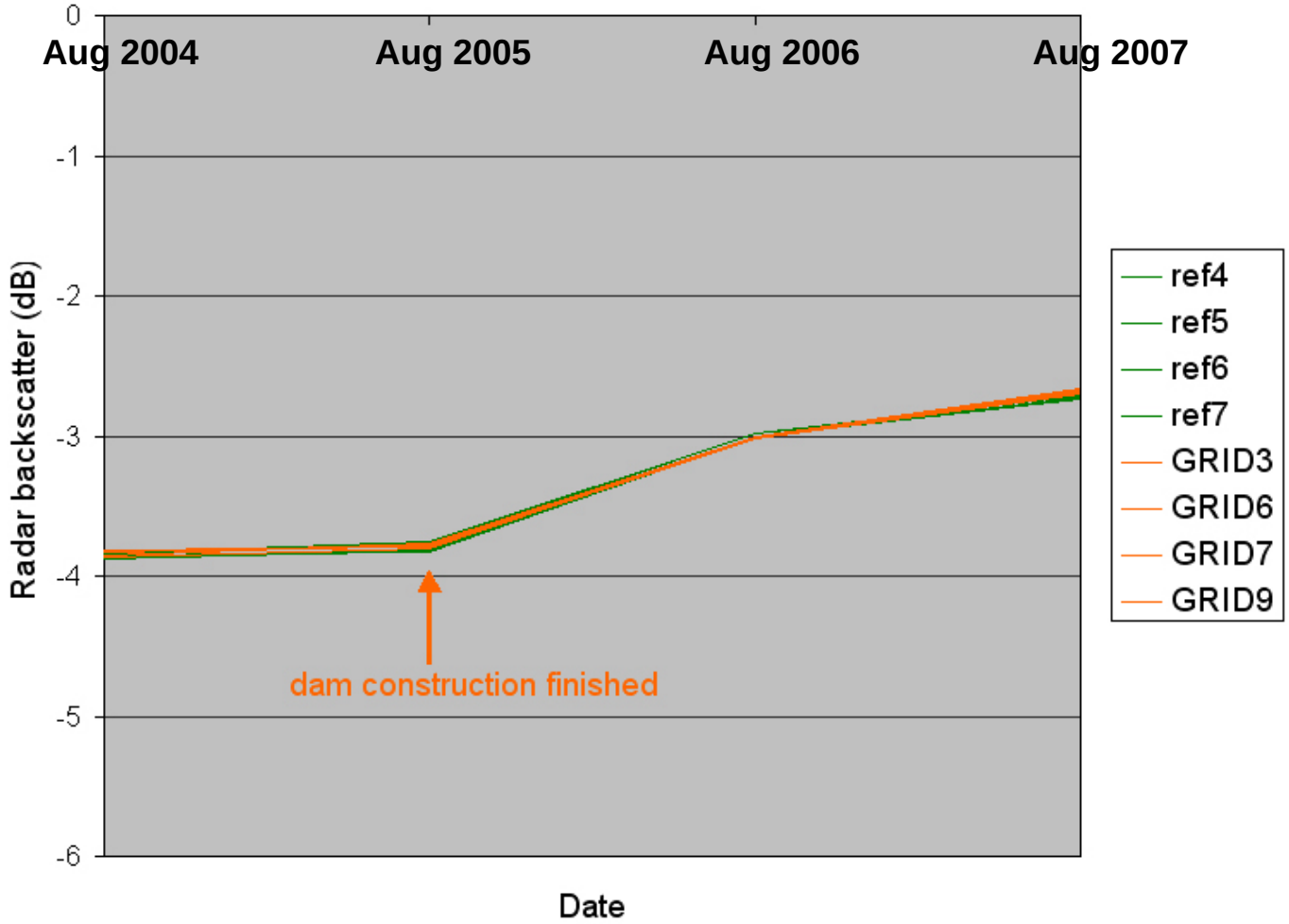
COMPARISON WITH REFERENCE AREAS

- DEGRADED -

Increase Reference Areas < Increase near Dams (ca. 0.5-1 dB)

COMPARISON WITH REFERENCE AREAS

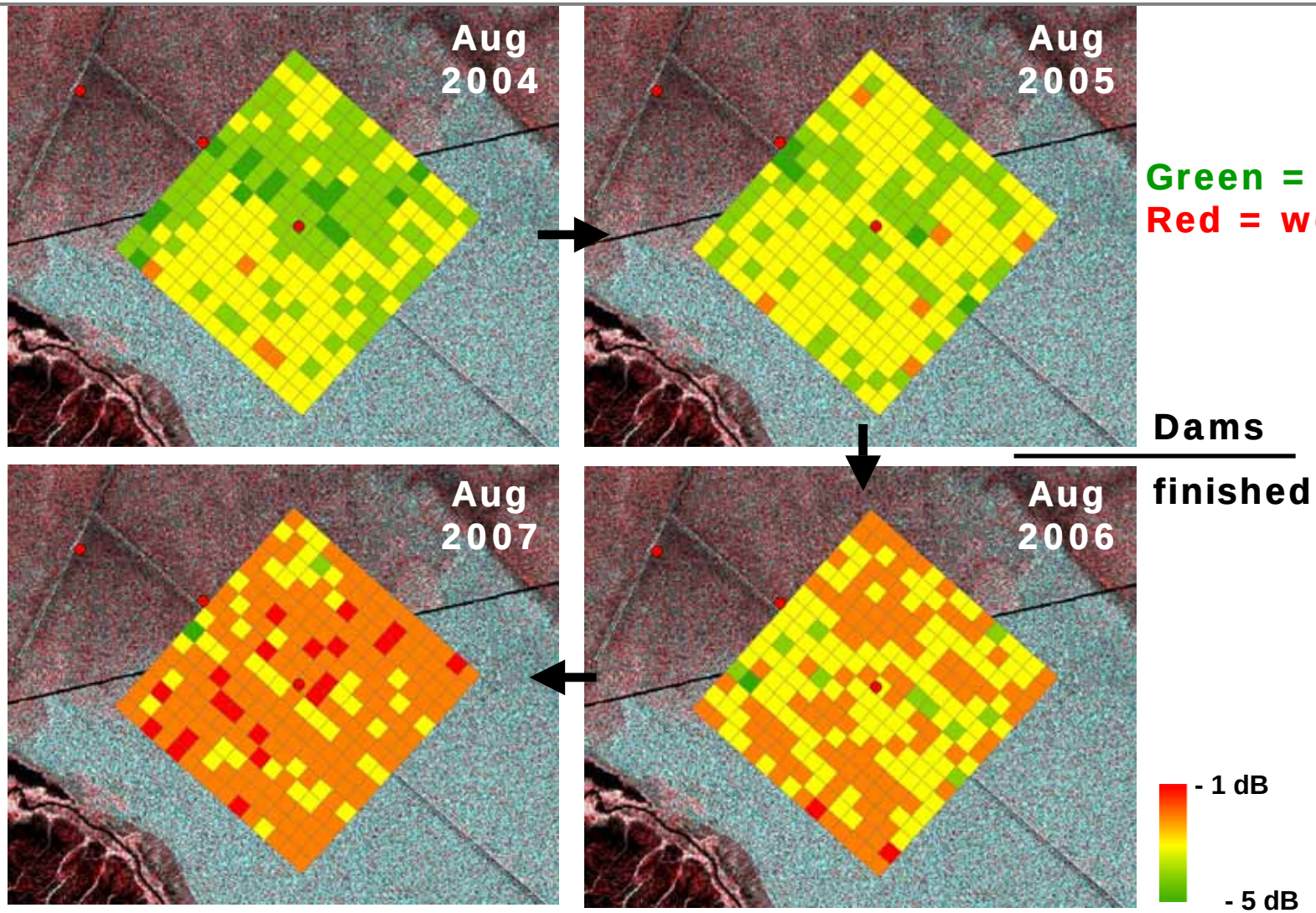
- FOREST -



Forest backscatter more stable (ca. 0.1 dB increase)

MATRIX ANALYSIS

- BLOCK C -

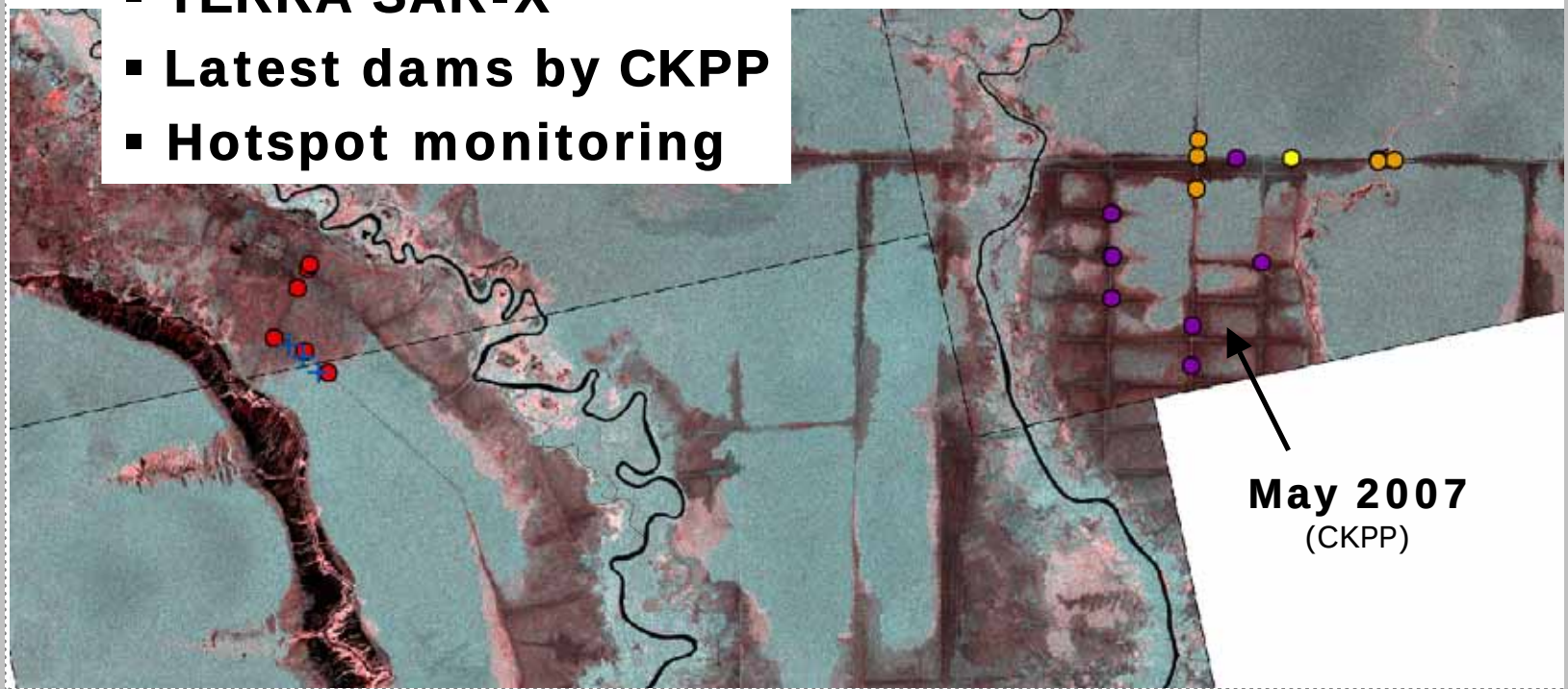


Increase in backscatter suggests increase in soil moisture

CONCLUSION & OUTLOOK

- **Results promising**

- **Further investigations are ongoing:**
  - **ERS-2 data**
  - **PALSAR data**
  - **TERRA SAR-X**
  - **Latest dams by CKPP**
  - **Hotspot monitoring**



THANK YOU!

ENVISAT satellite

Degraded peat