

Orfeo/Pléiades Forest WG - Activities and Plans -

Michel Deshayes, Anne Jolly, Thuy Le Toan,
Francis Després, Nicolas Stach

- Thematic Group Composition
- Forest issues
- Fine scale forest needs
- New needs
- WG activities
- Conclusions and next steps



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Forest Thematic Group

- ▲ Forest owners/managers :
 - Francis Despres, *National centre of private forest owners (CNPPF)*
 - Anne Jolly, Nathalie Morin, *French forestry board (ONF)*
- ▲ Forest services
 - Nicolas Stach, Anne Salvado, *French forest inventory service (IFN)*
- ▲ Forest research
 - Michel Deshayes, *Cemagref (WG Coordinator)*
 - Dominique Guyon, *INRA*
 - Thuy Le Toan, *CESBIO*
 - Josiane Zerubia, *INRIA*

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Forest issues

Traditional roles & needs

- **resource management/assessment**
 - National forest inventory: forests area, wood volume
 - Risk / damage assessment (fire, windstorms, forest pests...)
 - Local forest mapping, monitoring
- **Protection**
 - Soil protection (to avoid erosion, to restore): area identification, monitoring
 - Fauna/flora (forest reserves)
- **Recreation/other**
 - Need for Nature (peri-urban forests, tourism...)
 - Other non-wood products (mushrooms, hunting...)

Rise of environmental concerns

- **Sustainable forest management**
 - Certification (PEFC...)
- **Conservation, biodiversity**
 - Forest fragmentation (infrastructure), forest habitats, landscape structure...
- **Global change issues**
 - C-sequestration & GHG (UNFCCC, Kyoto protocol, ARD, biomass & carbon, REDD...)
 - Wood energy
- **Climate change**
 - Forest decline (drought...)
- **Scientific needs**
 - Ecosystem functioning

PEFC: Pan European Forest Certification
GHG: Green House Gases
UNFCCC: United Nations Framework Convention on Climate Change
ARD: Afforestation-Reforestation-Deforestation
REDD: Reduced Emissions from Deforestation and Degradation in Developing Countries

Synthesis on fine scale forest needs

Information on forests and forested areas

- **Physical environment, DTM (*Digital Terrain Model*)**
- **Mapping / monitoring of forested areas**
 - Fine scale forest areas: *tree clumps, hedges, isolated trees...*
 - Higher intensity forests: *Plantations*
 - Forest road network
 - Habitat mapping Biodiversity Natura 2000 network,
 - Support to forest management: stands to be thinned
 - Control of bush clearing (fire risk context e.g. Mediterranean areas)
- **Forest changes**
 - Slow : Mapping of naturally afforested areas, health indicators, ...
 - Quick : Damages (winstorm, fire), clearfelling or thinning
- **Forest parameters**
 - Height, density, biomass (*wood energy, carbon budget...*) ...
 - Leaf Area Index (*functioning, forest decline...*)

Recent needs

a) New wood energy sources

▲ New interest for wood as energy source

- Wood energy = renewable (*sustainable development*)
- Increasingly competitive (*increasing cost of energy*)

▲ In Mediterranean areas

- Mediterranean forest
 - less managed, because less productive
 - more susceptible to fire risk (*and the less managed, the most fire prone...*)
- Mainly oaks and pines, often in mixed stands
 - Oaks: used for fire wood (coppices)
 - Pines: growing after fires, but 'bad' wood (as log, as fire wood -tar) but new uses with recent furnaces meant for heating large facilities
- Mediterranean Pine resource not well known
 - Mixed stands on maps
- Need for an improved map of conifers

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Recent needs

b) Forest decline in French forests

▲ Forest decline, a new concern for forest managers

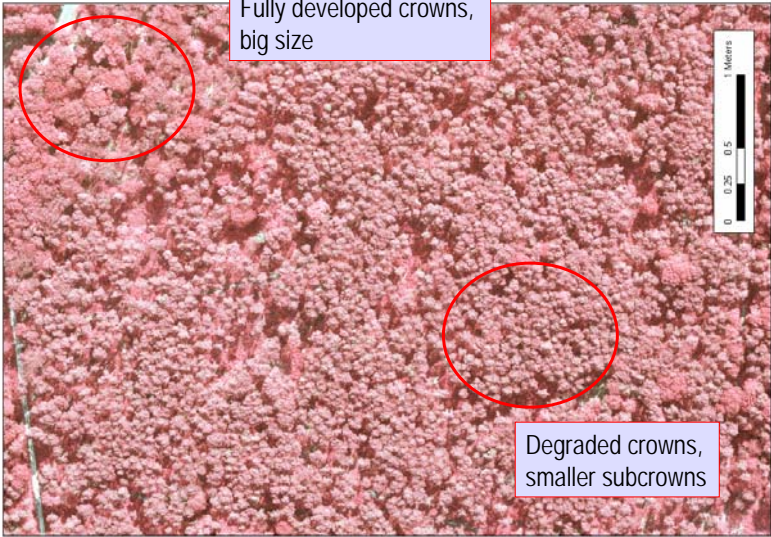
- In many regions, with different species...
- Causes not yet known (multifactor): droughts (e.g. 2003)...
- Looming background: climate change...
- Intensity and extent of forest decline unknown
 - Forest monitoring systems not planned for forest decline mapping
- Concern for public and private owners

▲ Need for mapping forest decline extent

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Recent needs
b) Forest decline in French forests



Fully developed crowns,
big size

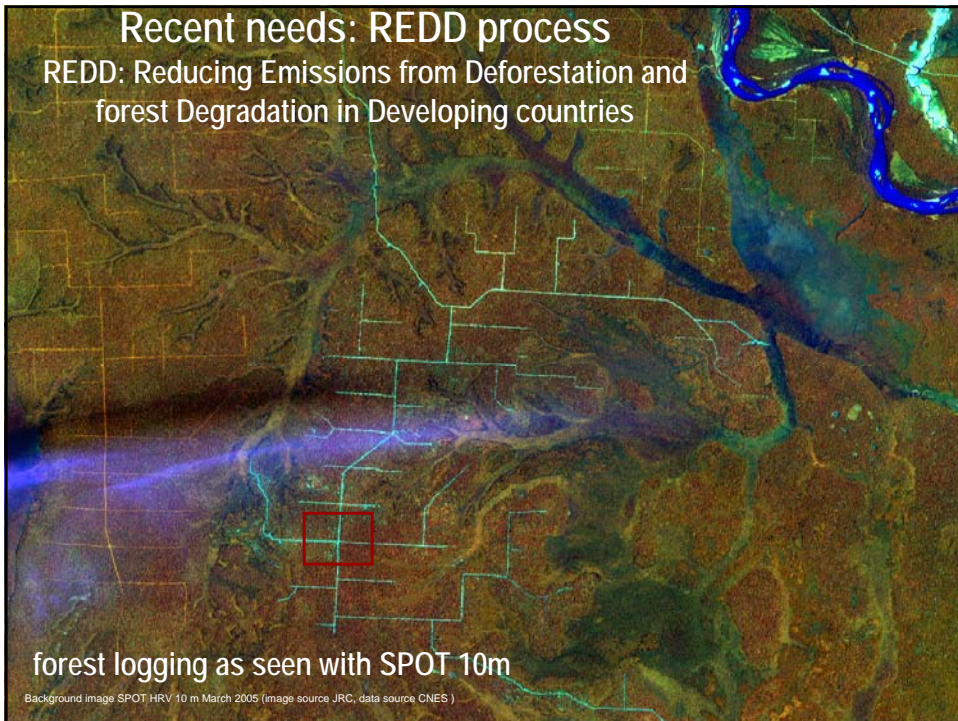
Degraded crowns,
smaller subcrowns

0 0.25 0.5 1 Meters

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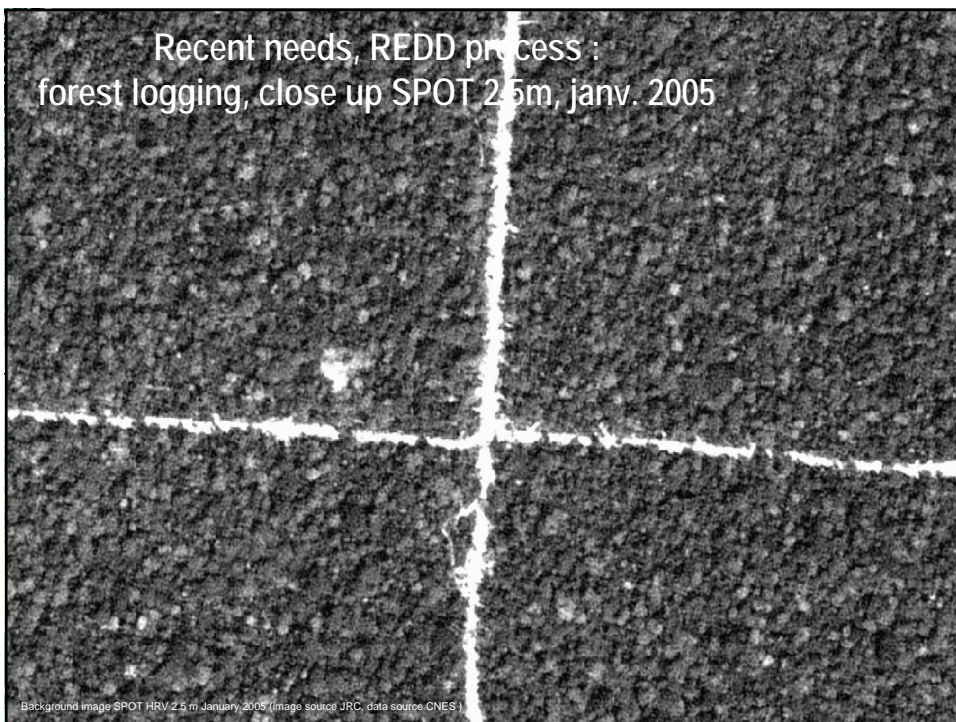
Recent needs: REDD process
REDD: Reducing Emissions from Deforestation and forest Degradation in Developing countries



forest logging as seen with SPOT 10m

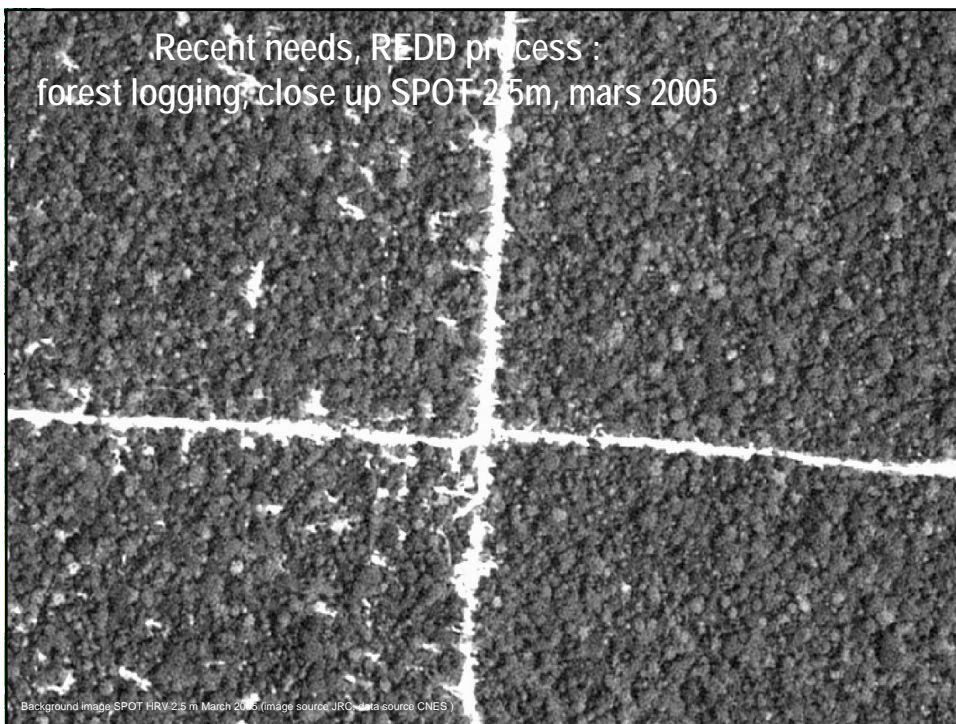
Background image SPOT HRV 10 m March 2005 (image source JRC, data source CNES)

Recent needs, REDD process :
forest logging, close up SPOT 2.5m, janv. 2005



Background image SPOT HRV 2.5 m January 2005 (image source JRC, data source CNES)

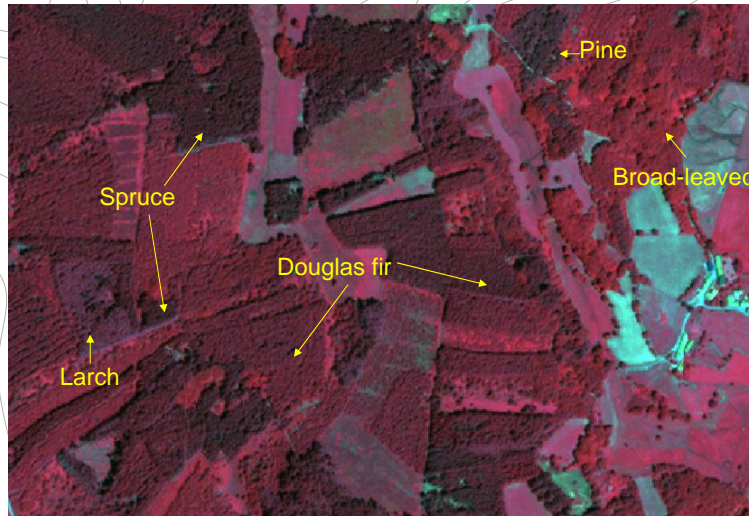
Recent needs, REDD process :
forest logging, close up SPOT 2.5m, mars 2005



Background image SPOT HRV 2.5 m March 2005 (image source JRC, data source CNES)

WG activities: a) Forest species mapping

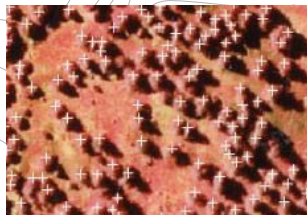
▲ Interest of Near Infrared to discriminate species



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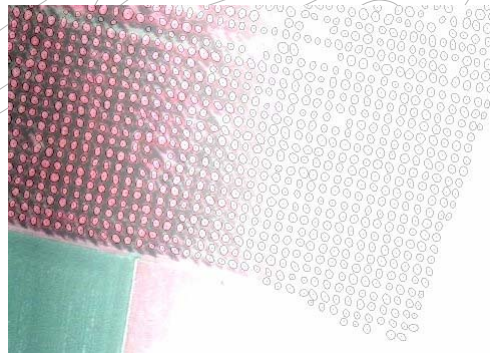
WG activities: b) Tree-level mapping

▲ VHR = access to the tree level



Isolated tree mapping,
Alpes-Maritimes, France.

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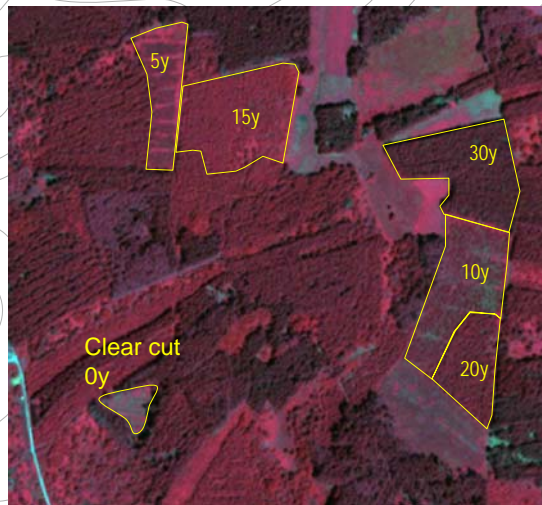
Poplar plantation image, and derived crown map.

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WG activities: c) Biophysical parameters

▲ Age classes :

- Radiometry
- Texture



age classes in Douglas fir stands
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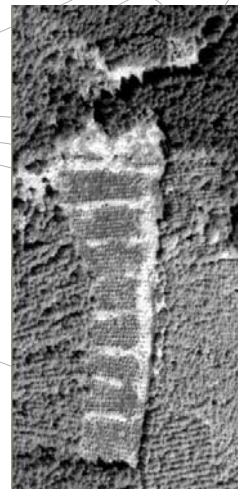
WG activities: d) Forest activities

▲ Interest of Very High Resolution Panchro data

Young plantation \approx 5-year old

Multispectral 2.8m :
pinkish radiometry + logging heaps
> supposed plantation

Panchromatic 0.7m : individual young
trees
> plantation is sure

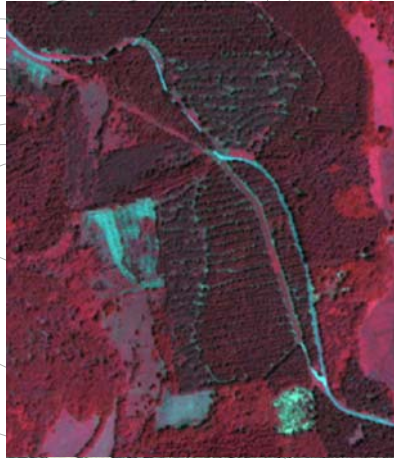


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WG activities: d) Forest activities

- ▶ Systematic thinning in a coniferous stand



Quilbrodt (2005)
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WG activities: d) Forest activities

- ▶ Selective thinning in a mixed stand



Removal of a proportion of
broad-leaved trees

Quilbrodt (2005)
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Conclusions and next steps

Large amount of data

- Forest data / GIS from users (forest cooperatives)
- Wide range of satellite data

Collection of forest features of interest

- Comparison of Image data / forest data
- Qualitative analysis on going
- Quantitative Image analysis to be done
 - Manual Photo-interpretation of the images
 - Image segmentation and classification tools to be tested (OTG)

Multi-temporal analysis

- Interest to detect forest activities
- Interest to monitor post clear cut / thinning evolutions
 - crown coverage evolution / land use and land use changes
- Summer 2007 image acquisition failed,
summer 2008 image acquisition planned