

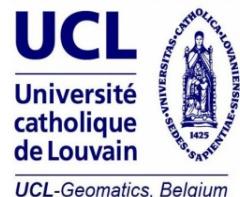
THE LAND COVER COMPONENT OF THE ESA CLIMATE CHANGE INITIATIVE

EXTENDING THE SERIES OF GLOBAL LAND COVER MAPS TO 1992 WITH AVHRR AND TO 2015 WITH PROBA-V: CURRENT ACHIEVEMENTS



Defourny P. (1), Bontemps S. (1), Brockmann C. (3), Achard F. (2), Boettcher M. (3), De Maet T. (1), Gamba P. (4), Hagemann S. (5), Hartley A. (6), Hoffman L. (11), Khlystova I.G. (5), Kirches G. (3), Lamarche C. (1), Lisini G. (4), MacBean N. (7), Mallick K. (11), Mayaux P. (2), Moreau I. (1), Pathe C. (8), Peylin P. (7), Radoux J. (1), Ramoino F. (10), Riedel T. (8), Santoro M. (9), Schmullius C. (8), Smollich S. (4), Van Bogaert E. (1), Wegmüller U. (9), Vittek M. (1), Zuehlke M. (3), Arino O. (10)

(1) UCLouvain-Geomatics, Belgium; (2) JRC, Italy; (3) Brockmann Consult GmbH, Germany;
(4) University of Pavia, Italy; (5) Max Plank Institute for Meteorology, Germany;
(6) MET Office, United Kingdom; (7) LSCE, France; (8) University of Jena, Germany;
(9) GAMMA Remote Sensing, Switzerland; (10) ESA, Italy, (11) LIST, Luxembourg



UCL-Geomatics, Belgium



BROCKMANN
CONSULT

GAMMA REMOTE SENSING



Centre de Recherche Public
Gabriel Lippmann



Met Office

Max-Planck-Institut
für Meteorologie

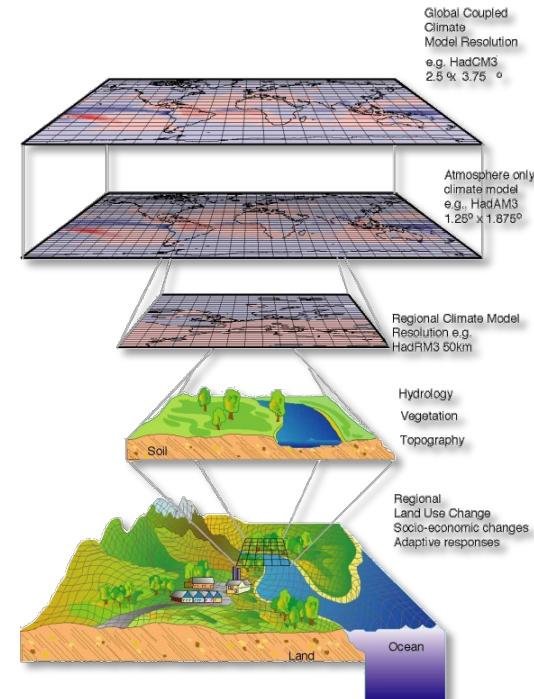
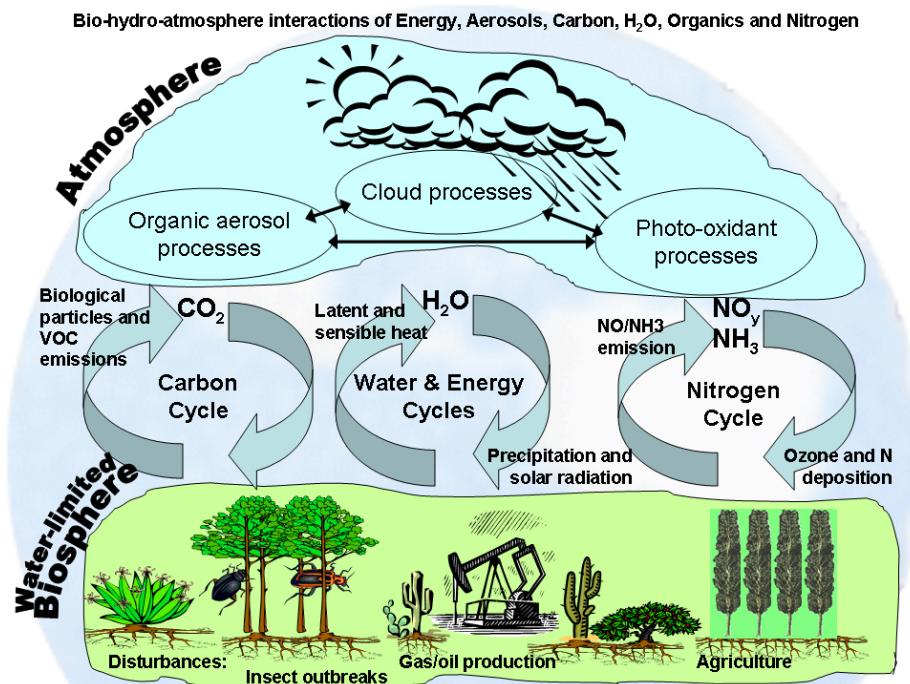
WAGENINGEN UNIVERSITY
WAGENINGEN UR

UCL - EARTH & LIFE INSTITUTE



Why do climate modelers care about land surface ?

- Significant impact of terrestrial part to the climate system for:
 - fundamental climate understanding (fluxes of water, C and energy)
 - used in impact and mitigation assessments at various scales
- (2010 GCOS Implementation Plan)*
- Requirements for a consistent long term time series of land cover**



5 Terrestrial ECVs in the CCI



land cover

fire

ice sheets

glaciers

soil moisture



Pierre Defourny, Emilio Chuvieco, René Forsberg, Frank Paul, Wolfgang Wagner
Science Leaders



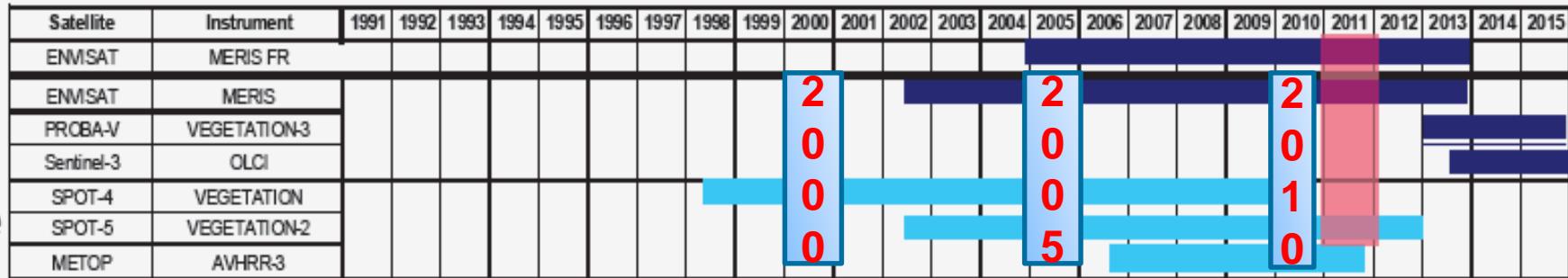


Land cover maps for 3 epochs

2010 (2008-2012), 2005 (2003-2007), 2000 (1998-2002)

- Input EO time series:
 - Envisat MERIS Full Resolution (near-global every 3-9 days 300 m reflectance in 15 bands (blue to NIR), 2003-2012)
 - Envisat MERIS Reduced Resolution (global every 3 days 1.2 km reflectance in 15 bands (blue to NIR), 2003-2012)
 - SPOT Vegetation 1 & 2 (global daily 1-km surface reflectance in 4 bands (blue to SWIR), 1999-2012)
 - Envisat ASAR WS, IMM & GM from 2005 to 2012

ESA
Europe



→ 3rd global full archive reprocessing of MERIS (160 TB) + VGT (10TB)





MERIS 7-d surface reflectance time series (36 TB)

- Full MERIS archive processed in surface reflectance (2003-2012)





Global land/water mask

- 8 years of ENVISAT ASAR data (mainly 150 m WS mode, Global Mode) processed on G-POD

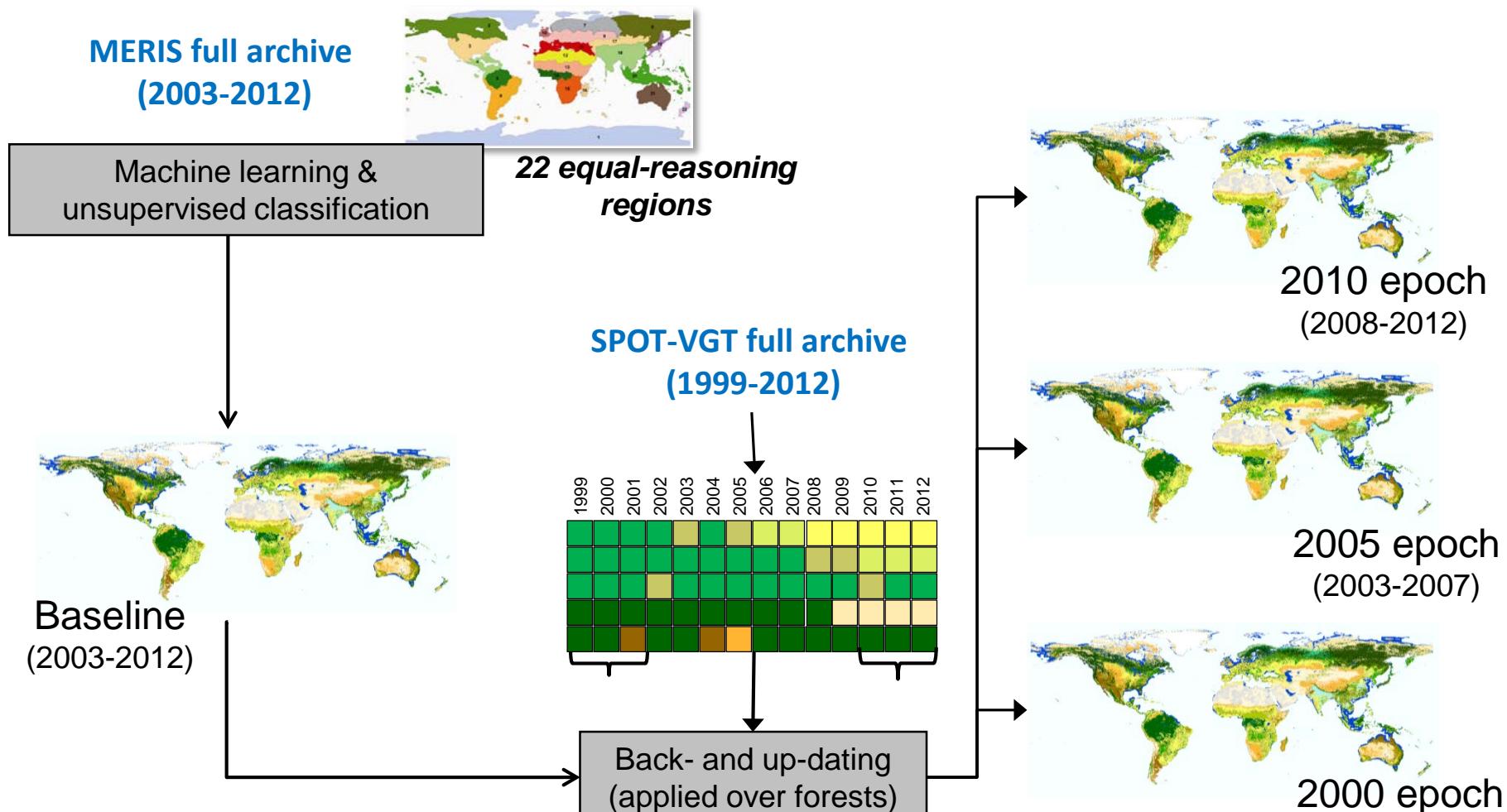


Santoro et al., RS 2014



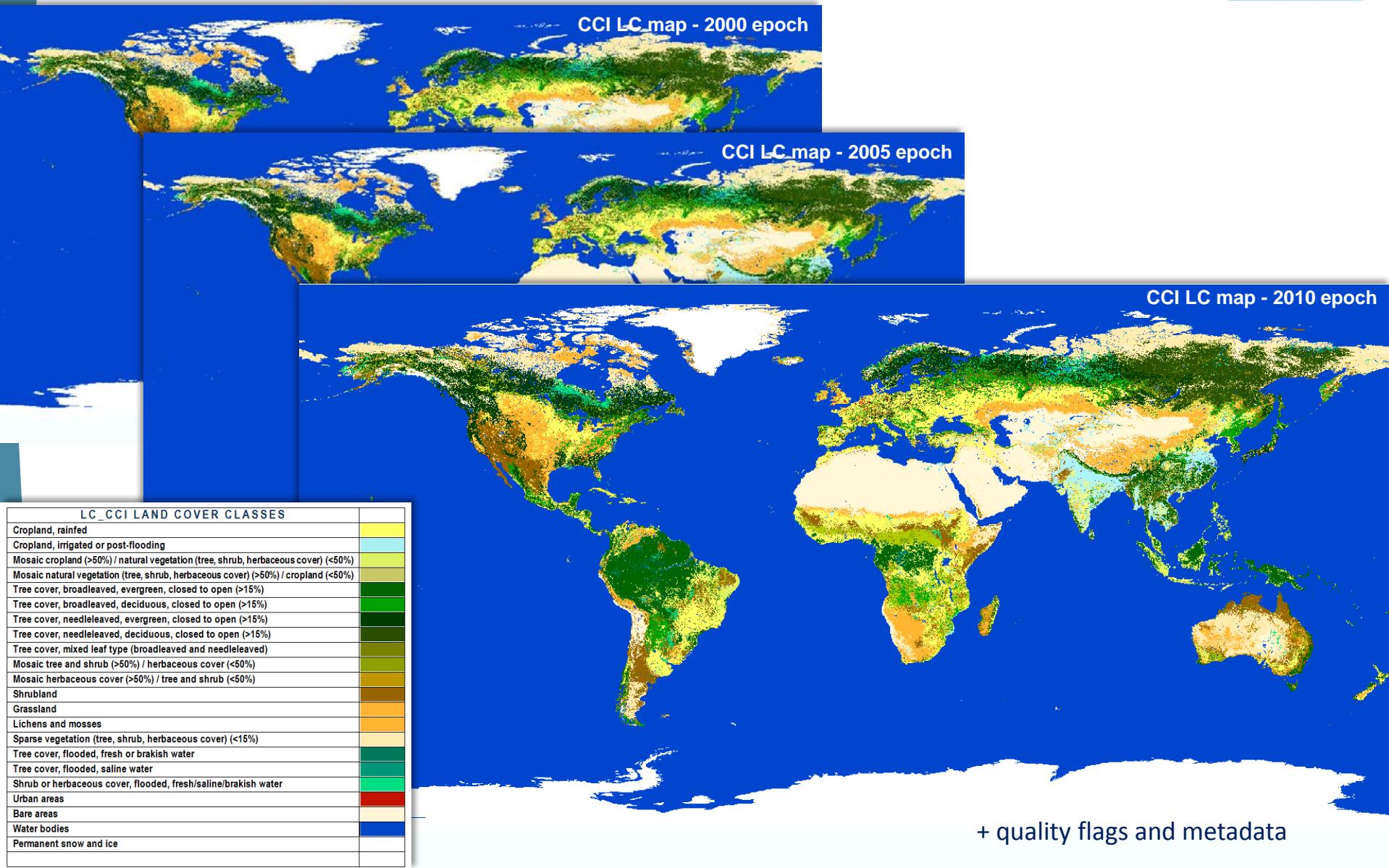
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Classification in 22 LCCS classes



I. Moreau, Thursday, 9:40

2000, 2005 and 2010 CCI Land cover products

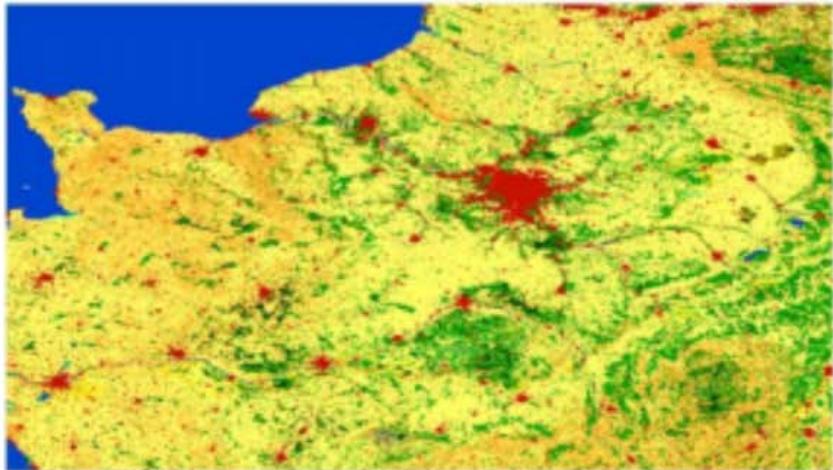


CCI Land Cover products

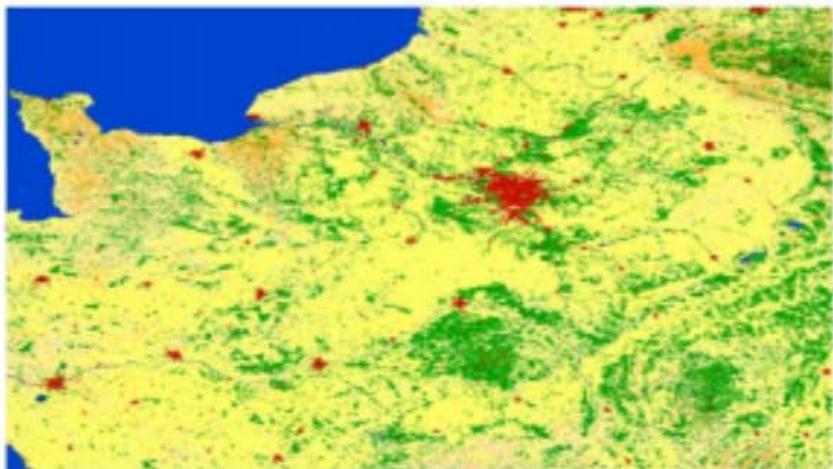
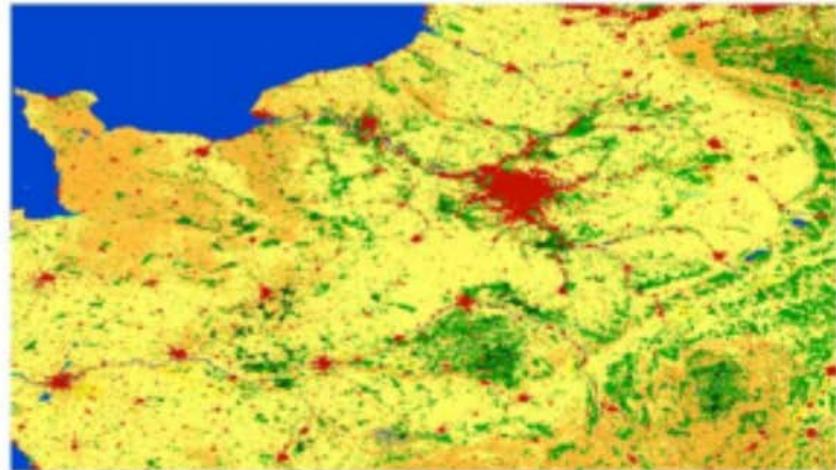
Paris region intercomparison



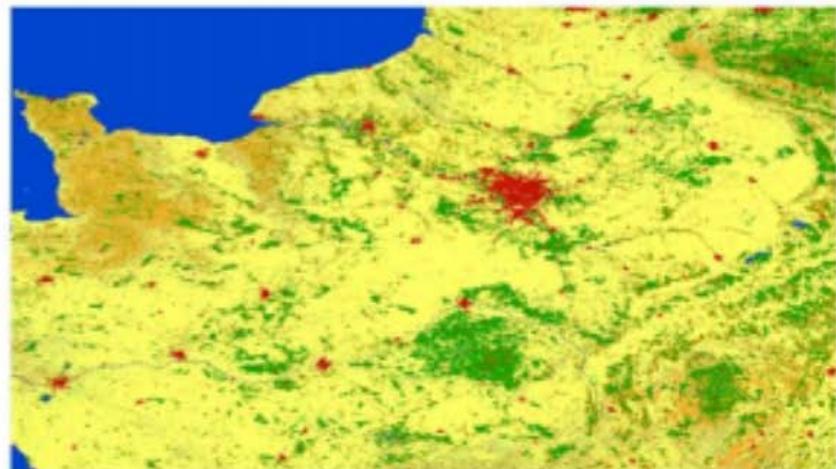
Reference (CLC2006)



CCI-LC 2010



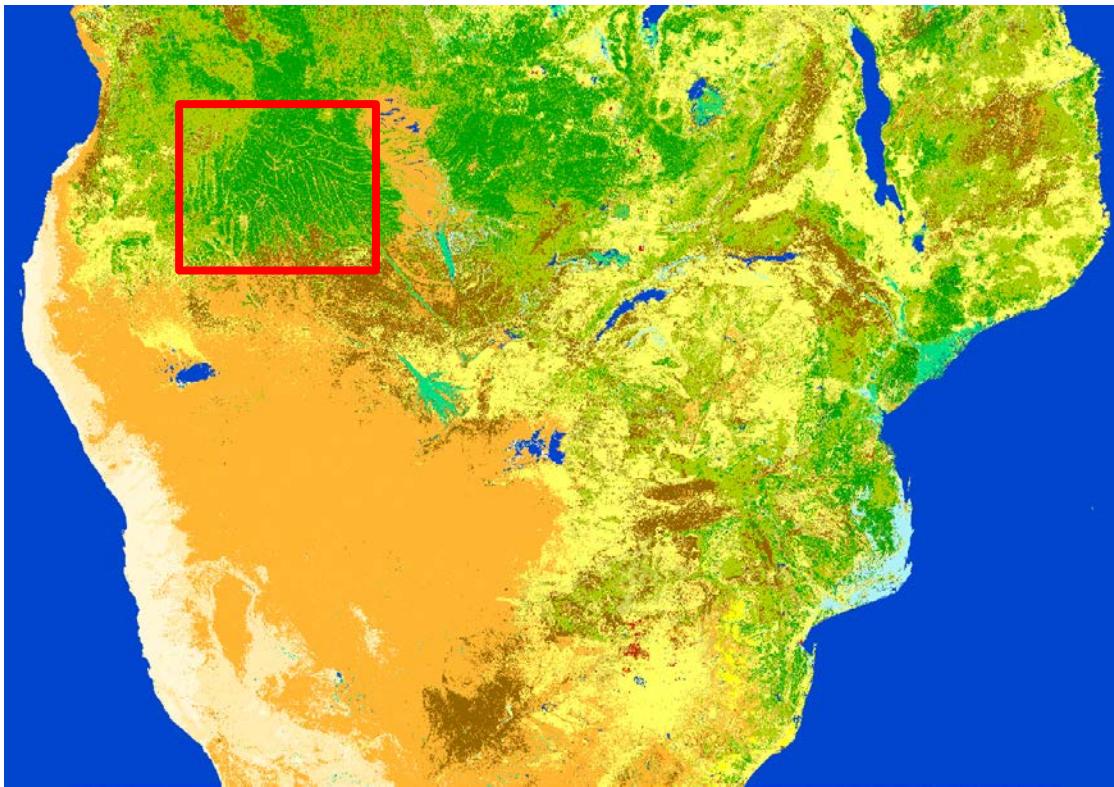
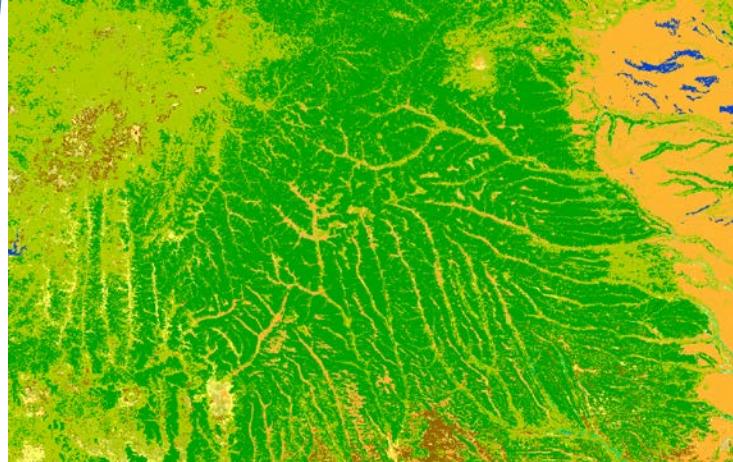
GlobCover 2005



GlobCover 2009



CCI Land cover products South Africa



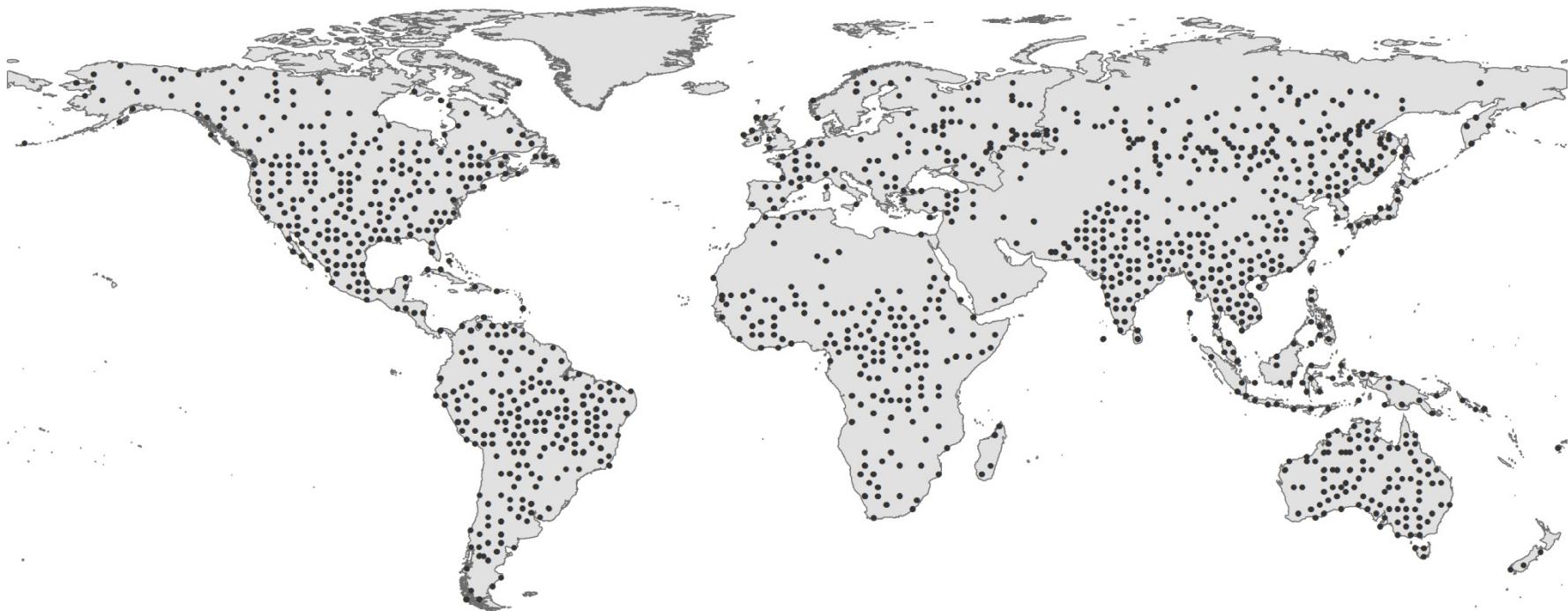
CCI LC 2010



Completion of the multi-epoch CCI LC Validation database

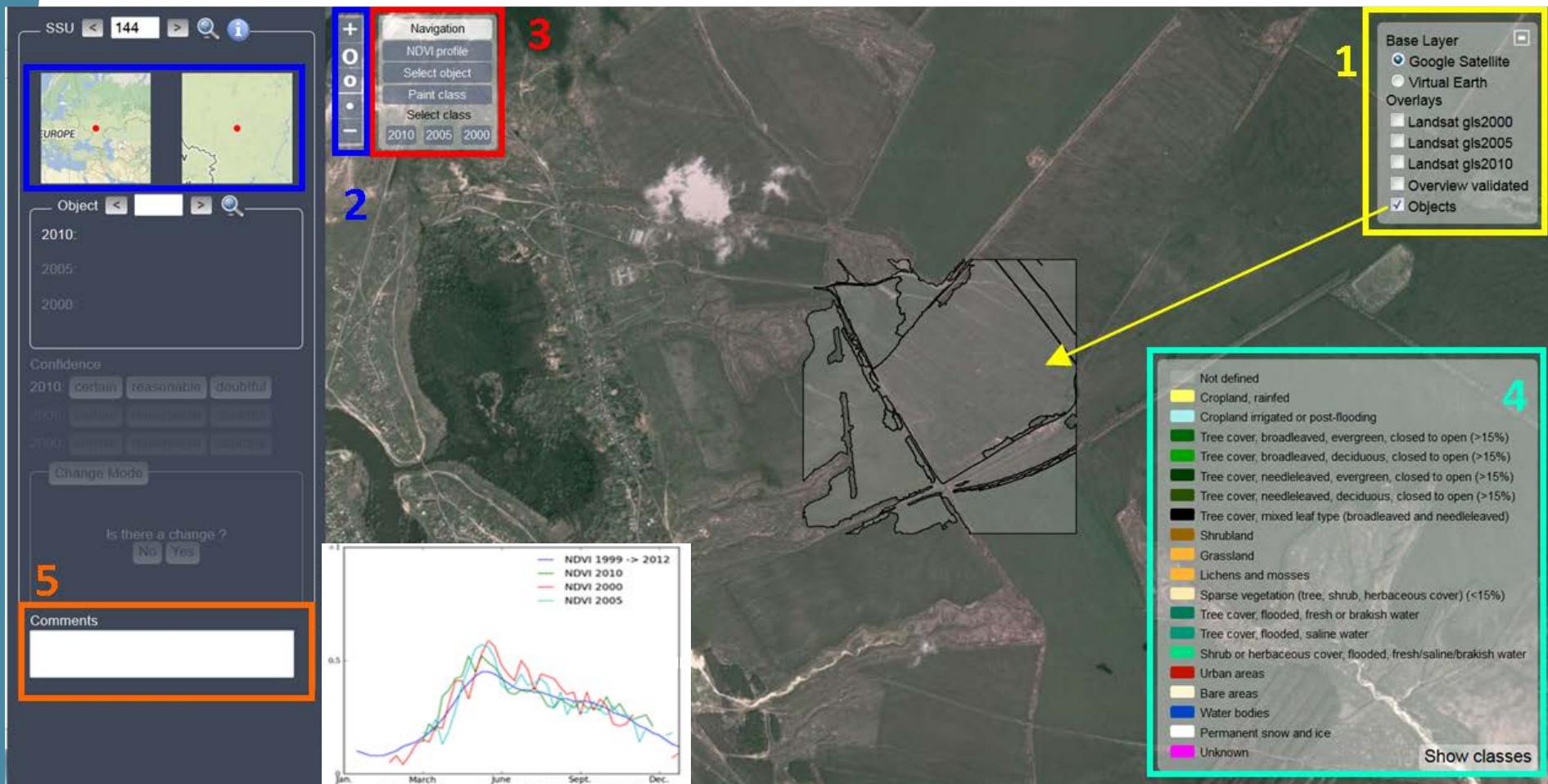


- Network of 19 international experts working on the same interface
 - → 2591 footprints of 900 x 900 m interpreted for each epoch (2000/2005/2010)





Validation interface



1. Layer box
2. Zooms

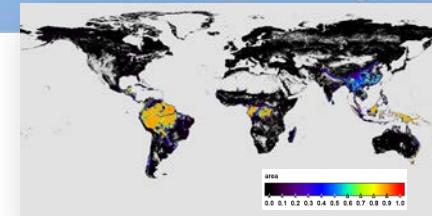
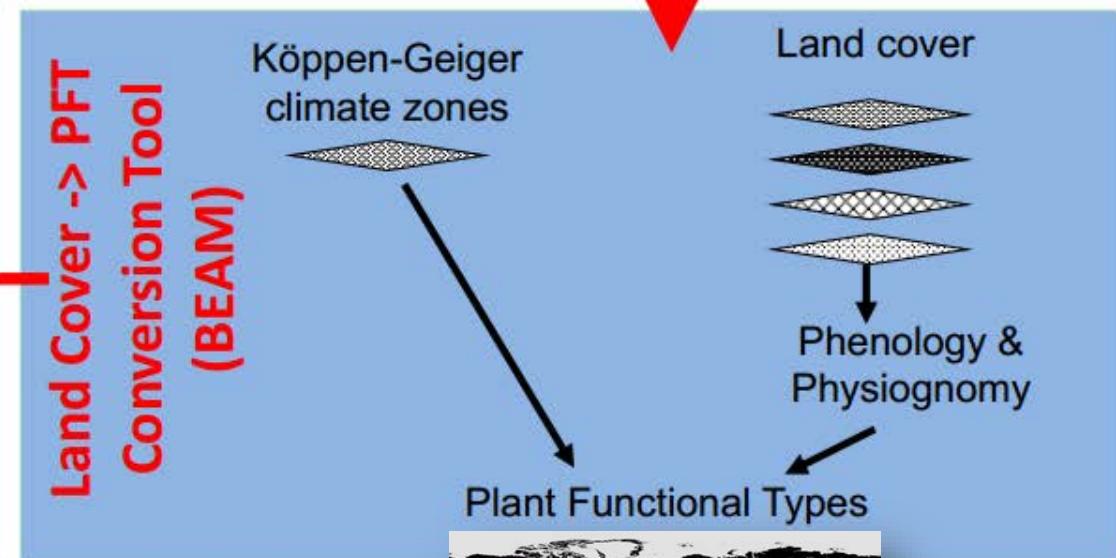
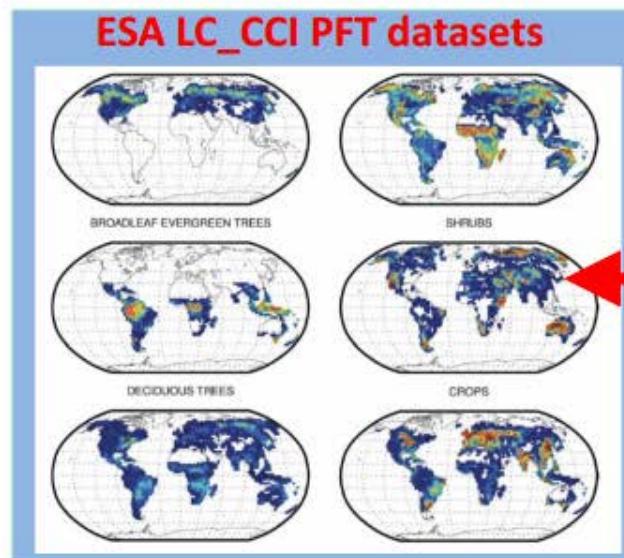
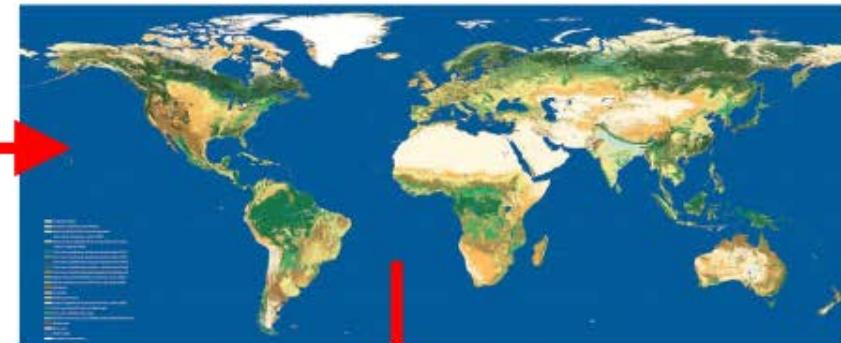
3. Tools (navigation, NDVI, select object, paint class)

4. Legend
5. Comments





User tool for climate modelers to convert in Plant Functional Types



Poulter et al., 2011

Tree broadleaf evergreen
at 9.8 km for 2003-2007



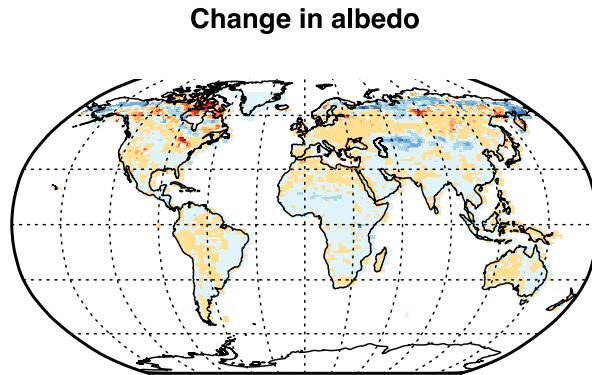
Impact of land cover and cross-walking table on albedo and LST



ESA - REF



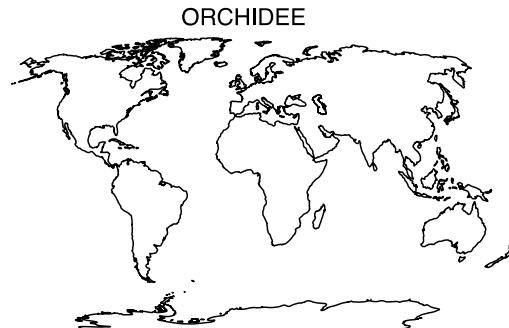
Met Office



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für Meteorologie



LSCE



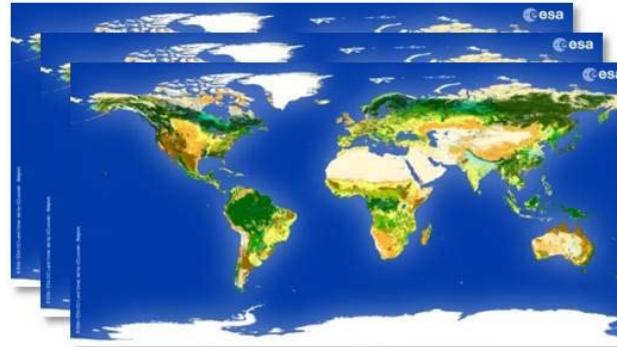
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5 CCI LC Datasets

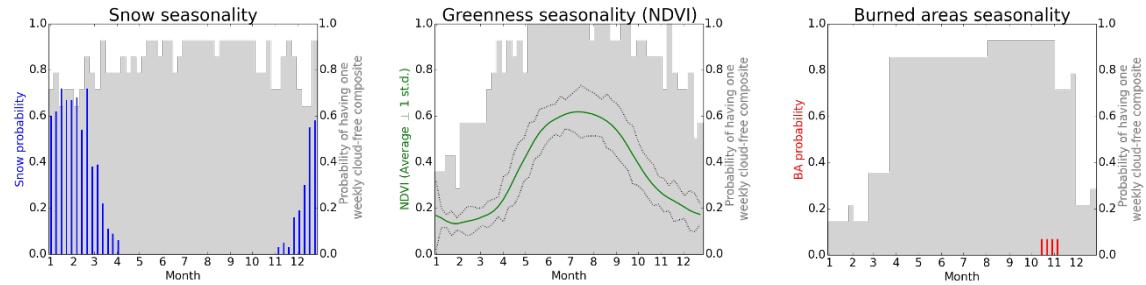
- Stable LC maps for 3 ‘epochs’:

- 2000: (1998-2002)
- 2005: (2003-2007)
- 2010: (2008-2012)

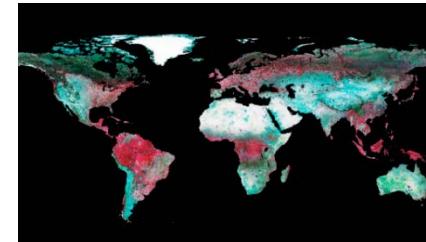
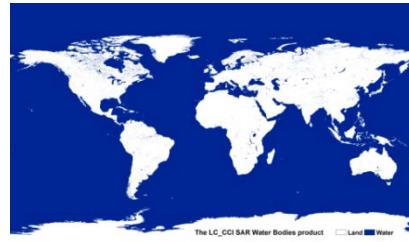


- Land surface seasonality:

- Snow cover
- NDVI
- Burned areas



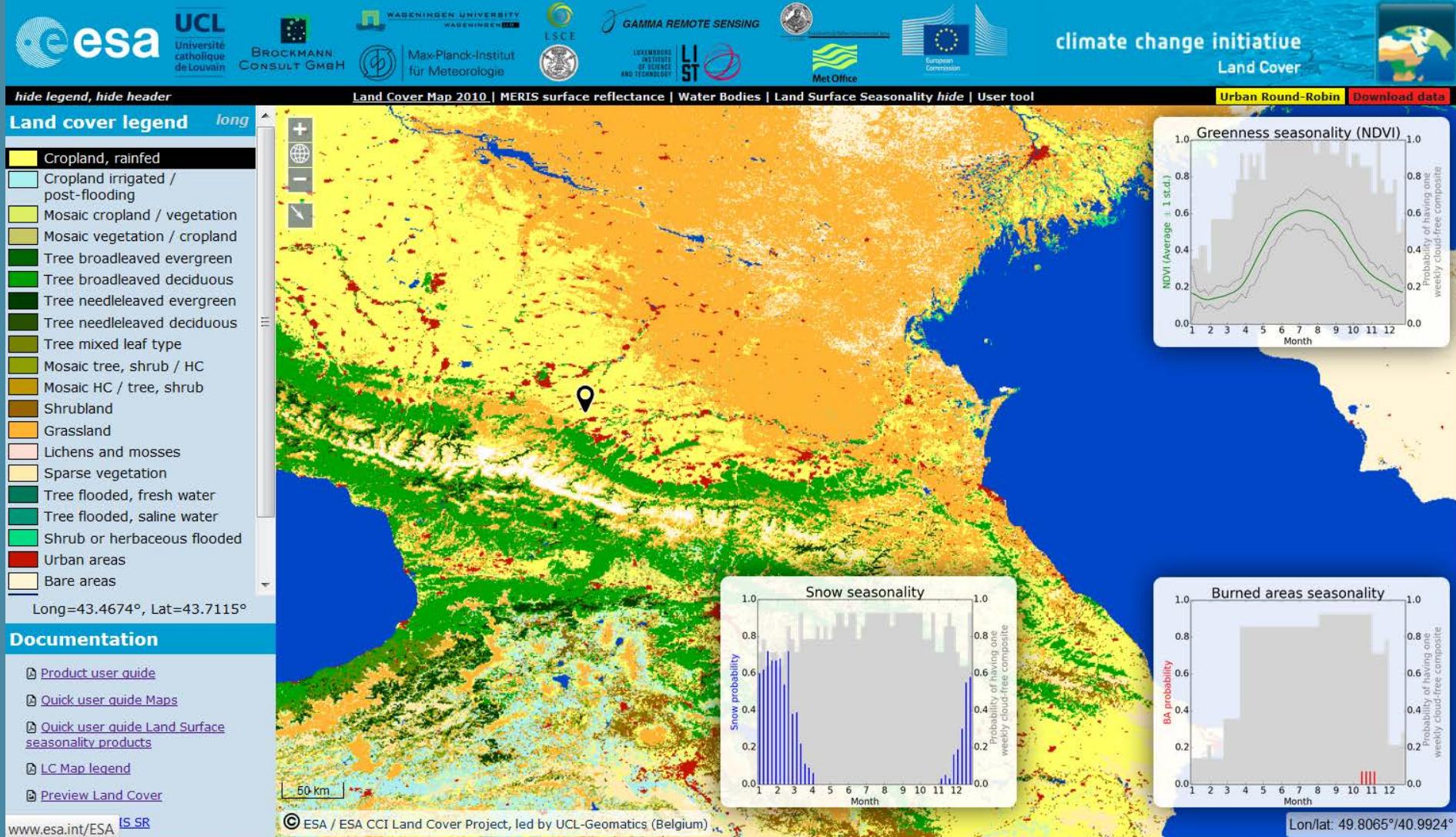
- Global land/water mask
- MERIS Surface Reflectance
- User tool



Downloadable or visible on a viewer



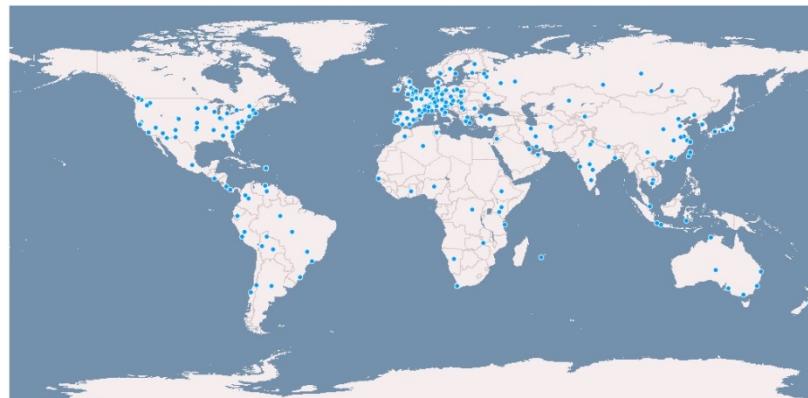
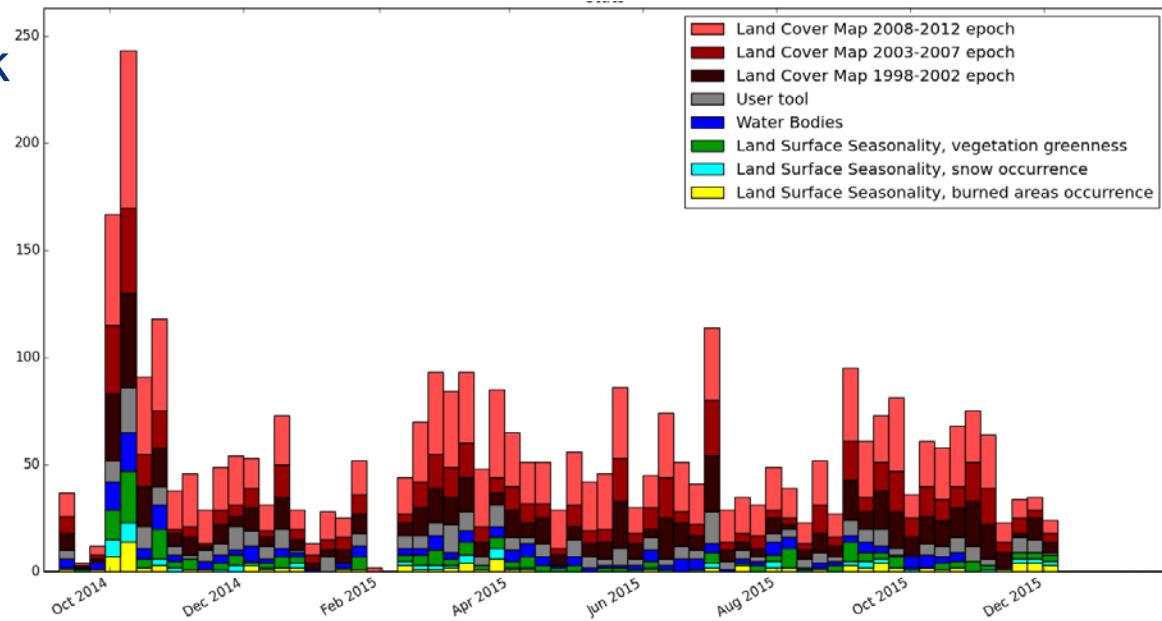
- <http://maps.elie.ucl.ac.be/CCI/viewer/index.html>



CCI-LC products downloads : 754 LC 2010 5246 Gb products and 209 tools



- More than 300 CCI LC full land cover time series
- 141 CCI land/water mask
- 209 User tools
- 117 NDVI LSS (1552 GB)
- 62 BA LSS (214 GB)
- 52 Snow LSS (307 GB)
- MERIS 7-d SR time series
 - ~ 15 subsets requests
- Wide distribution of IP localisation

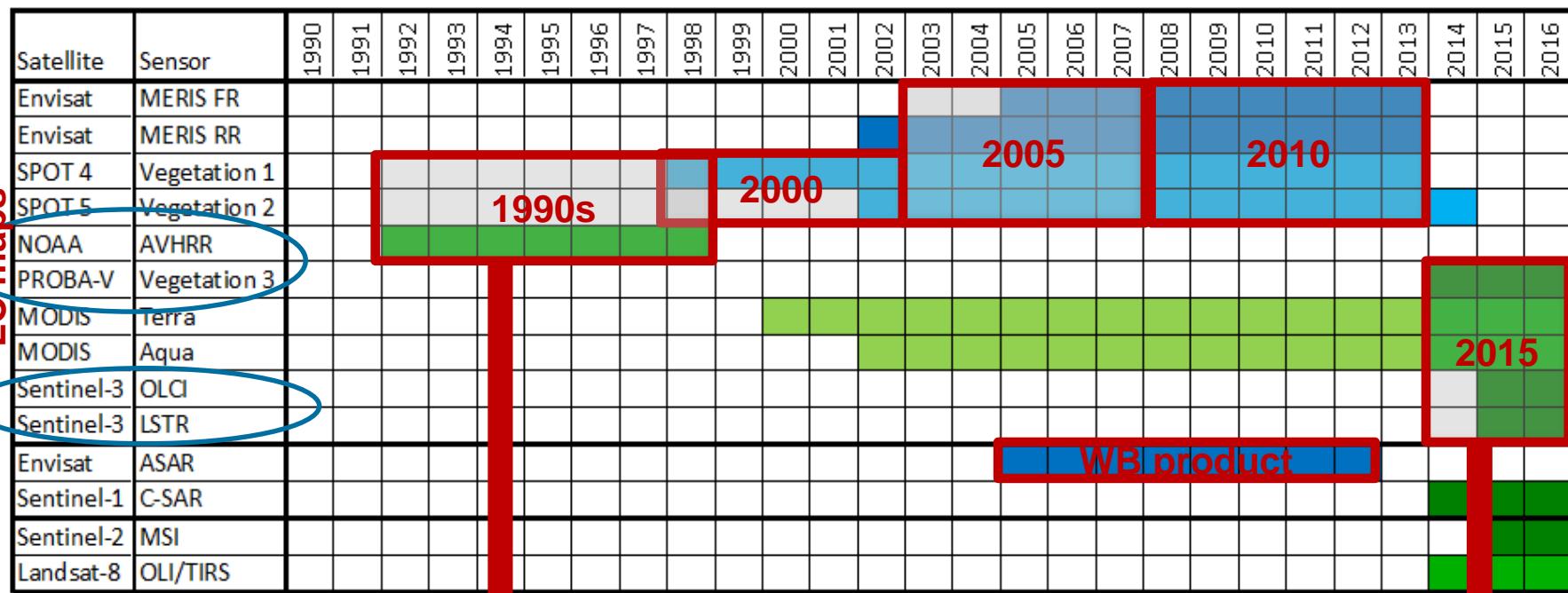


CCI Land Cover: next steps to be completed by the end of 2016



- EO data input to further extend in time the LC time series
 - 7 different instruments including PROBA-V, AVHRR and the Sentinels

SR time series +
LC maps



AVHRR archives – 1km HRPT - 1992-1998

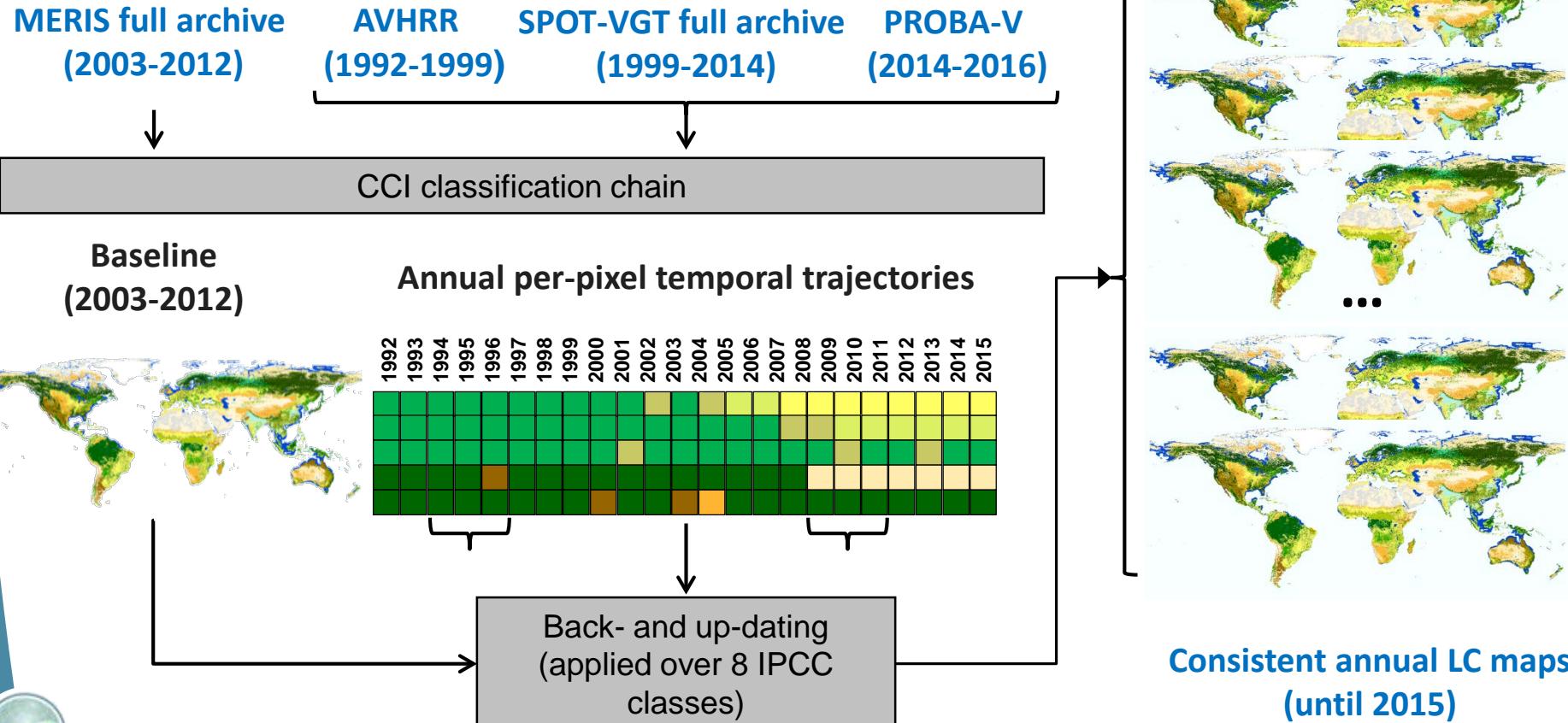
PROBA-V – 1 km, 333 m & 100 m 2014 -...
Sentinel-3 – 300 m



Timeline extension with AVHRR and PROBA-V (TBC by the end of 2016)



- Backdating to 1992 and updating to 2015 based on AVHRR and PROBA-V
- Classification in 22 LCCS classes AND annual change on 8 IPCC classes

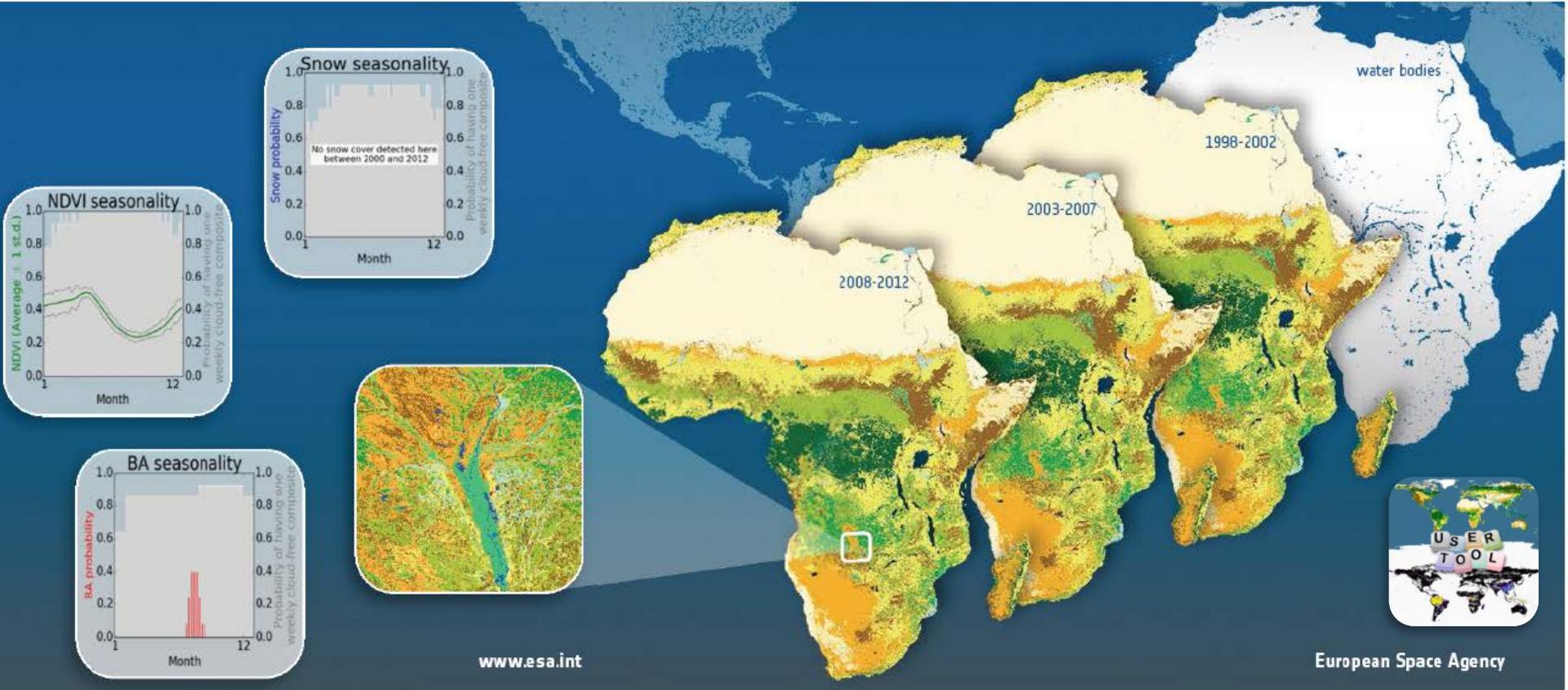


Link between CCI-LC and GlobBiomass



- Use of CCI-LC land/water mask for coastline delineation as well as for inland water bodies
 - New release of land/water mask at 150 m since January 2016
- Possible use of the CCI-LC map translated to forest/non forest
 - Interactions about mosaic classes
- CCI-LC project interested in checking discrepancies/consistencies between our respective products
 - To further improve the LC map
 - To better characterize the LC type (maybe including LCCS conversion to PFT)
- Possible contribution from GlobBiomass to support LC mapping at 10 m for Africa (next target of the CCI-LC project).





Thank you for attention

