



CCI-LC seasonality products

Characterizing the reference dynamics of the land surface

C. Lamarche^{(1)*}, S. Bontemps⁽¹⁾, C. Rousseau⁽¹⁾, T. de Maet⁽¹⁾, A. Verhegghen⁽¹⁾, J. Radoux⁽¹⁾, E. van Bogaert⁽¹⁾, O. Arino⁽²⁾ and P. Defourny⁽¹⁾

⁽¹⁾ Earth and Life Institute (ELI) Geomatics – Université catholique de Louvain (UCLouvain-Belgium)

⁽²⁾ European Space Agency (ESA), Frascati, Italy

*Contact address: celine.lamarche@uclouvain.be

Abstract

Land Cover (LC) was listed as an Essential Climate Variable by the Global Climate Observing System and was included in the ESA Climate Change Initiative (CCI). The ESA CCI aims at providing global long-term satellite-based products tailored to the need of the climate modelling community. In the framework of the CCI-LC project, the LC concept was revisited in order to reconcile the LC users' divergent needs for both stable/consistent global LC products over time and a more dynamic description of the land surface processes. Three global CCI-LC seasonality products were therefore generated in response to the need for dynamic information. These climatologies describe the average behaviour of the green vegetation phenology, the burned areas and snow occurrences over the 1999-2012 period. They are based on existing products, independent sensors, spatio-temporal resolutions and algorithms. The integration of 13 or 14 years of observations allows characterizing the land surface even in the cloudiest regions of the world. These CCI-LC seasonality products, thanks to a processing step of compliance, can be used together and with the CCI-LC Maps to describe the land surface in a detailed and consistent manner.

A new land cover concept (Defourny and Bontemps, 2012) to reconcile the **STABLE** and **DYNAMIC** components of LC and meet the needs of the CCI-LC users.

The LC state component

- Refers to a set of LC features remaining stable over time
- Defines the LC independently of any sources of temporary variability
- Consistent over time

The LC seasonality component

- Relates to the temporary or natural variability
- Induces variation in land obs. over time (!not a permanent LC change)
- Driven by biogeophysical processes: green vegetation phenology, burned areas (BA) and snow coverage.

General approach for the LC seasonality products

Input data

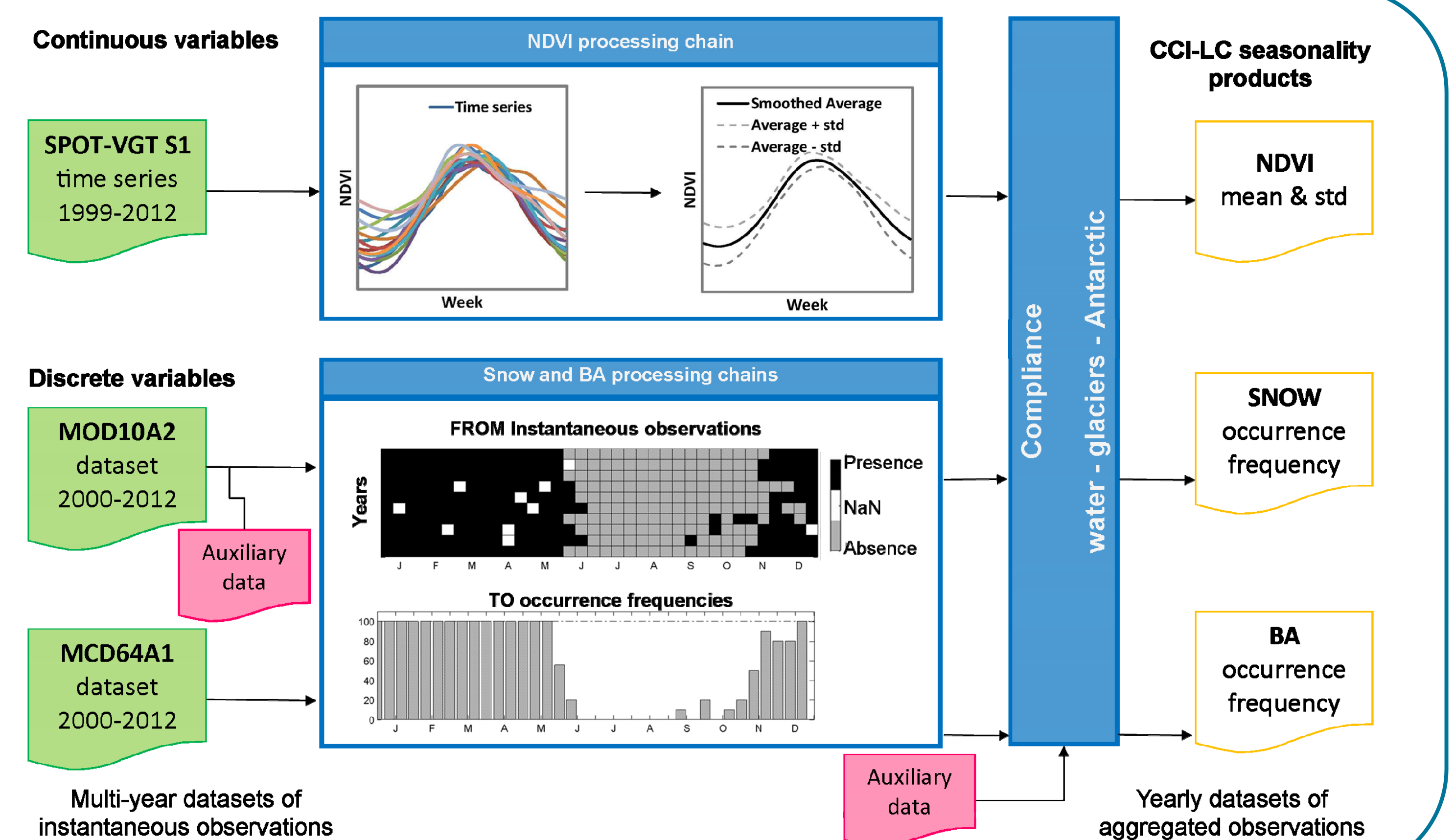
- NDVI SPOT-VGT S1 archive from 1999 to 2012 (SPOT-VGT, 2014)
- Snow MODIS/Terra Snow Cover 8d L3 Global 500m SIN Grid product (MOD10A2) (Riggs et al., 2006)
- BA MODIS Direct Broadcast Monthly Burned Area product (MCD64A1) (Giglio et al., 2009)

Method

- Compilation of 13 or 14 years of 7-day instantaneous obs. into 1 temporarily aggregated profile
- Compliance ensured between CCI-LC seasonality and CCI-LC maps products

Results

- The global CCI-LC seasonality products depict, along the year, the reference behaviour of the vegetation greenness, snow and BA.

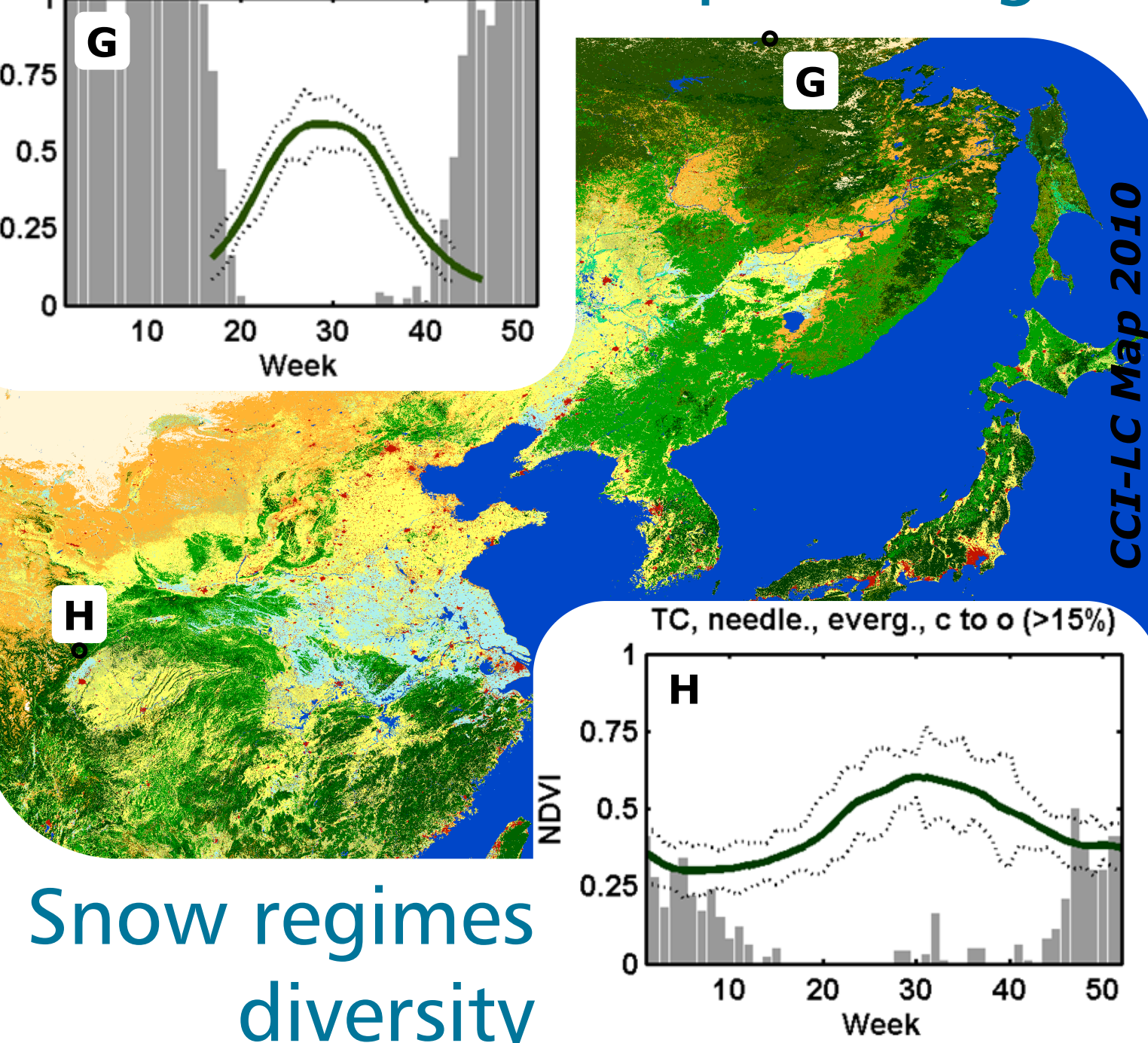


Data package Measurements and quality flags, delivered in time series of 52 files (1per week)

CCI-LC Seasonality	Measurements	Spatial coverage and resolution	Temporal resolution	Data Volume
NDVI	- Average - Standard deviation - Number of valid weekly composites - Status	Global 1000m	Weekly	30GB
Burned Areas	- Percentage of occurrence - Number of valid weekly composites	Global 500m	Weekly	5GB
Snow				8GB

Similar LC classes with various phenologies & fire regimes can be distinguished, even in areas with persistent cloud cover

Similar leaf types with various leaf phenologies



High consistency between CCI-LC seasonality products although built from independent datasets

