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Global land cover products tailored to the needs of the climate modeling community - Land Cover project of the ESA Climate Change Initiative

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Improving the systematic observation of land cover, as an Essential Climate Variable, will support the United Framework Convention on Climate Change effort to reduce the uncertainties in our understanding of the climate system and to better cope with climate change. The Land Cover project of the ESA Climate Change Initiative aims at contributing to this effort by providing new global land cover products tailored to the expectations of the climate modeling community.

During the first three months of the project, consultation mechanisms were established with this community to identify its specific requirements in terms of satellite-based global land cover products. This assessment highlighted specific needs in terms of land cover characterization, accuracy of products, as well as stability and consistency, needs that are currently not met or even addressed. Based on this outcome, the project revisits the current land cover representation and mapping approaches.

First, the stable and dynamic components of land cover are distinguished. The stable component refers to the set of land surface features that remains stable over time and thus defines the land cover independently of any sources of temporary or natural variability. Conversely, the dynamic component is directly related to this temporary or natural variability that can induce some variation in land observation over time but without changing the land cover state in its essence (e.g. flood, snow on forest, etc.).

Second, the project focuses on the possibility to generate such stable global land cover maps. Previous projects, like GlobCover and MODIS Land Cover, have indeed shown that products' stability is a key issue. In delivering successive global products derived from the same sensor, they highlighted the existence of spurious year-to-year variability in land cover labels, which were not associated with land cover change but with phenology, disturbances or landscape heterogeneity. An innovative land cover mapping approach, based on global multi-year SPOT-Vegetation and MERIS time series, is proposed to reduce this variability. Assuming that no land cover change has occurred during the multi-year period, this approach should allow generating consistent suites of global land cover products over time.

Based on a new land cover concept and on innovative mapping methodologies, the project will deliver three global land cover databases, made of stable and dynamic land cover products, for three epochs centered on the years 2000, 2005 and 2010. The mapping approach developed in the project is designed to be able to take the most of new generation sensors. It therefore constitutes a unique opportunity to get ready for an efficient exploitation of the huge amount of high spatial and temporal resolution images coming from the Sentinel-2 sensor.