

This abstract is intended for the special session on Time Series Analyses revealing Land Surface Dynamics, 1, Keynote.

## Time series analysis: Potentials and challenges exploiting optical satellite data for Land System Science

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### ABSTRACT

Global population growth, changing lifestyles and related consumption patterns create an increasing demand for goods and services related to global land use. Human land use hence is a major driver of global change, interacting with and often amplifying effects of climate change. Land use change and land use intensification are multi-faceted, including the rapid sprawl of urban areas, the logging of pristine forest ecosystems, the regulation of water bodies, or the expansion and intensification of agricultural practices. Monitoring land cover and land use change with remote sensing time series is therefore of utmost importance to better quantify and mitigate changes related to human land use.

During the last decade, satellite data providers started to make data freely available to the science community. Be it the Landsat archive spanning over four decades, the large amount of value added products supplied by the MODIS Science Team, ESA's ENVISAT archives, or the ongoing and upcoming ESA Sentinel missions: "Big data" is coming into focus of Land System Science and remote sensing based time series analysis will create unprecedented research opportunities.

We here present a conceptual framework on time series analyses and will focus on three related aspects that are vital to create new research opportunities:

- a) Existing and upcoming sensors and archives motivating innovative pathways
- b) Methodological frameworks that allow better exploitation of dense / deep time series and provide pathways towards multi-sensor data integration
- c) Processing environments and related needs for big data analyses

We will accordingly provide examples that relate to the global coverage and depth of the Landsat archive, the new opportunities created by the forthcoming Sentinel-2 mission and to multi-sensor approaches. We present time series analysis applications, regionalized results, and finally discuss the potential and challenges of existing and future approaches for deriving improved information on land surface dynamics and for Land System Science at large.

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