

Development of earth observation data cubes for monitoring land degradation processes in South Africa

Insa Otte (1), Steven Hill (1), Andreas Hirner (2), Marcel Urban (3), Ursula Gessner (2), Christiane Schmullius (3), Jussi Baade (4)

(1) Department of Remote Sensing, University of Würzburg, Campus Hubland Nord, 97074 Würzburg, Germany

(2) Earth Observation Center, German Aerospace Center (DLR), 82234 Wessling, Germany

(3) Department for Earth Observation, University of Jena, Löbdergraben 32, 07743 Jena, Germany

(4) Department of Geography, University of Jena, Löbdergraben 32, 07743 Jena, Germany

Global biodiversity and ecosystem services are under high pressure of human impact. Although avoiding, reducing and reversing the impacts of human activities on ecosystems and especially on protected areas should be an urgent priority, the loss of biodiversity continues. One of the main drivers of biodiversity loss is land use change and land degradation. In South Africa land degradation has a long history and is of great concern. The project SALDi (South African Land Degradation Monitor) aims on developing new, adaptive, and sustainable tools for assessing land degradation by addressing the dynamics and functioning of multi-use landscapes with respect to land use change and ecosystem services.

Within SALDi ready-to-use earth observation (EO) data cubes are developed. EO data cubes are useful and effective tools utilizing earth observations to deliver decision-ready products to non-remote sensing experts. By accessing, storing, and processing of remote sensing products and time-series in data cubes, the efficient monitoring of land degradation in time and space can therefore be enabled. Within the SALDi data cube pre-processed optical (Sentinel-2) and radar (Sentinel-1) satellite data since 2015 is ingested. It is mainly designed to monitor intra- and interannual vegetation dynamics as well as change detection and land degradation in a spatial high resolution (up to 10 m pixel size) in various region of South Africa. Two areas are located in the coastal lowlands, while the other four areas are located on the central high plateau. Those six research areas are evenly distributed in various regions of South Africa and cover both, a climatological as well as an ecological gradient in different ecosystems and some of them are in protected areas. To analyse these diverse regions, not only the Sentinel satellite data, but also further ready-to-use datasets are included in the data cube: 10+ vegetation indices, soil indices, digital elevation model, water mask, 70+ land cover classes. Besides building the technical infrastructure and providing the EO data, training materials and courses are designed to enable users working on the SALDi data cube.