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COMBATING DROUGHT, LAND DEGRADATION AND DESERTIFICATION FOR POVERTY REDUCTION AND SUSTAINABLE DEVELOPMENT

The contribution of science, technology, traditional knowledge and practices

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Quantification of Land Degradation and Productivity of Agro-ecosystems under Changing Climate and Land Use

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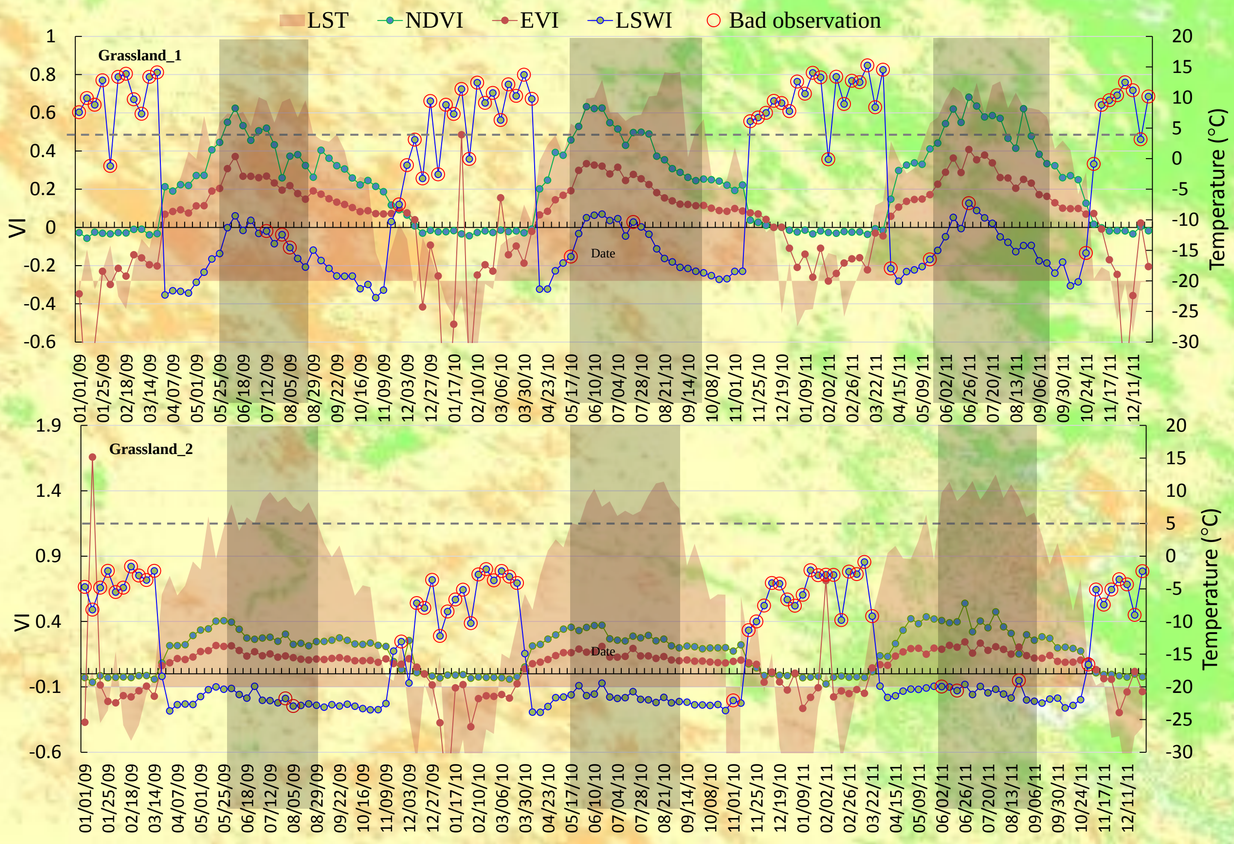
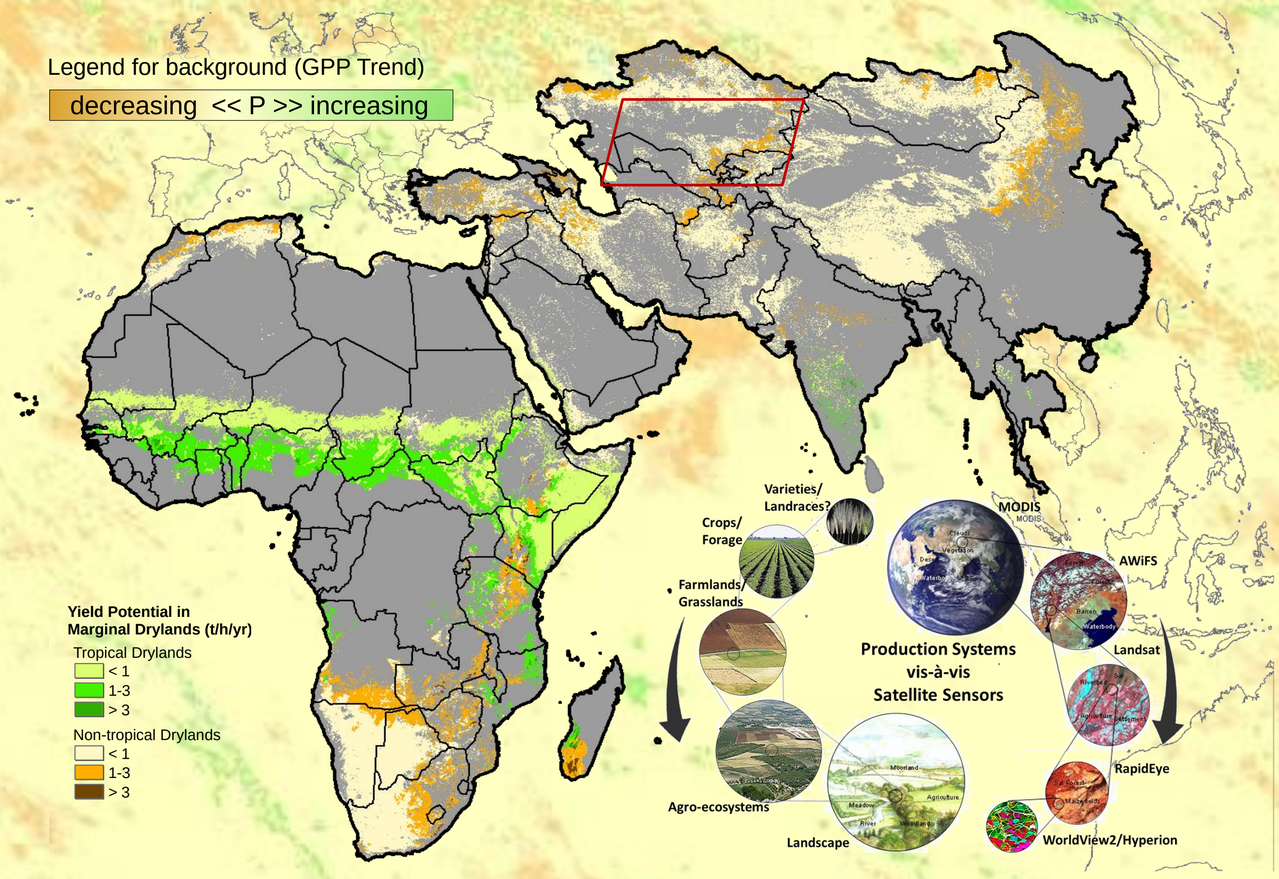
Agro-ecosystems in dry areas are sensitive to changes in climate and land use. The productivities of these agro-ecosystems are highly variable in both spatial and temporal scales. Accurate and up-to-date information on these production systems at farmscape to landscape scales are important for understanding the food security and sustainability of socio-ecological systems. Due to lack of such information, satellite remote sensing has been used to quantify the land productivity and degradation dynamics of agro-ecosystems under changing climate and land use. In this research, we provide an overview of satellite and in-situ based observations and modeling of land use dynamics, coupled with edaphic and climatic factors in dryland production systems. Our efforts highlights recent advances in satellite-based mapping and monitoring of an integrated agro-ecosystems using time-series vegetation indices, land use pattern, and vegetation photosynthesis model (VPM) to understand the dynamics, pattern as an indicators for prioritizing landscape for better interventions for sustainable developments.

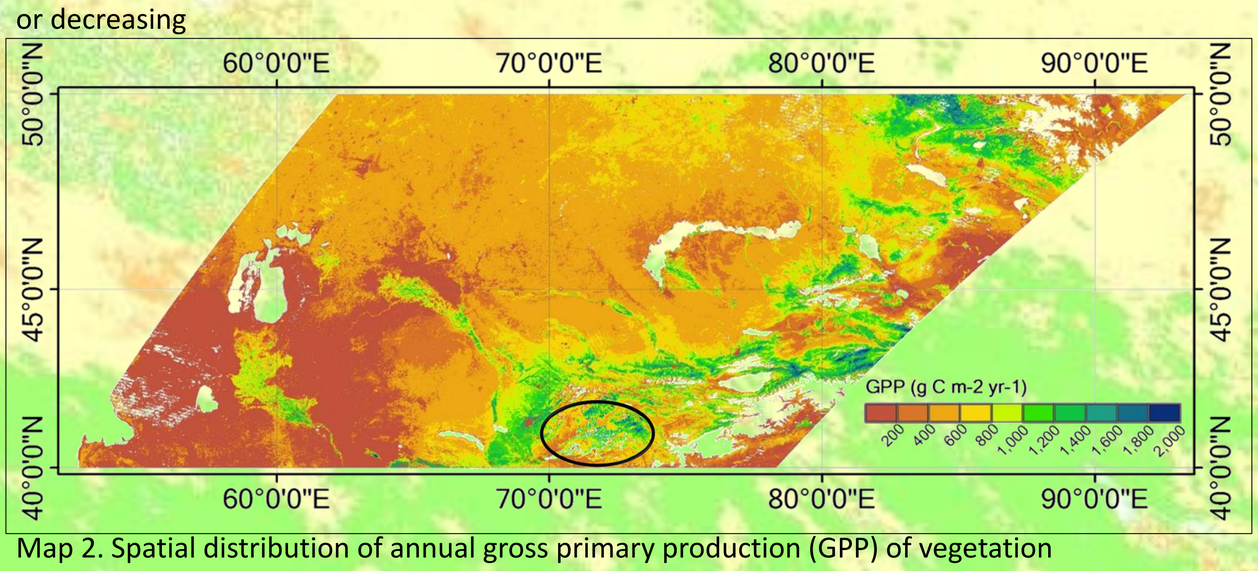


Graph 1. Seasonal dynamics of LST, NDVI, EVI and LSWI for a MODIS pixel of two grasslands: productive (above) and degraded (below)

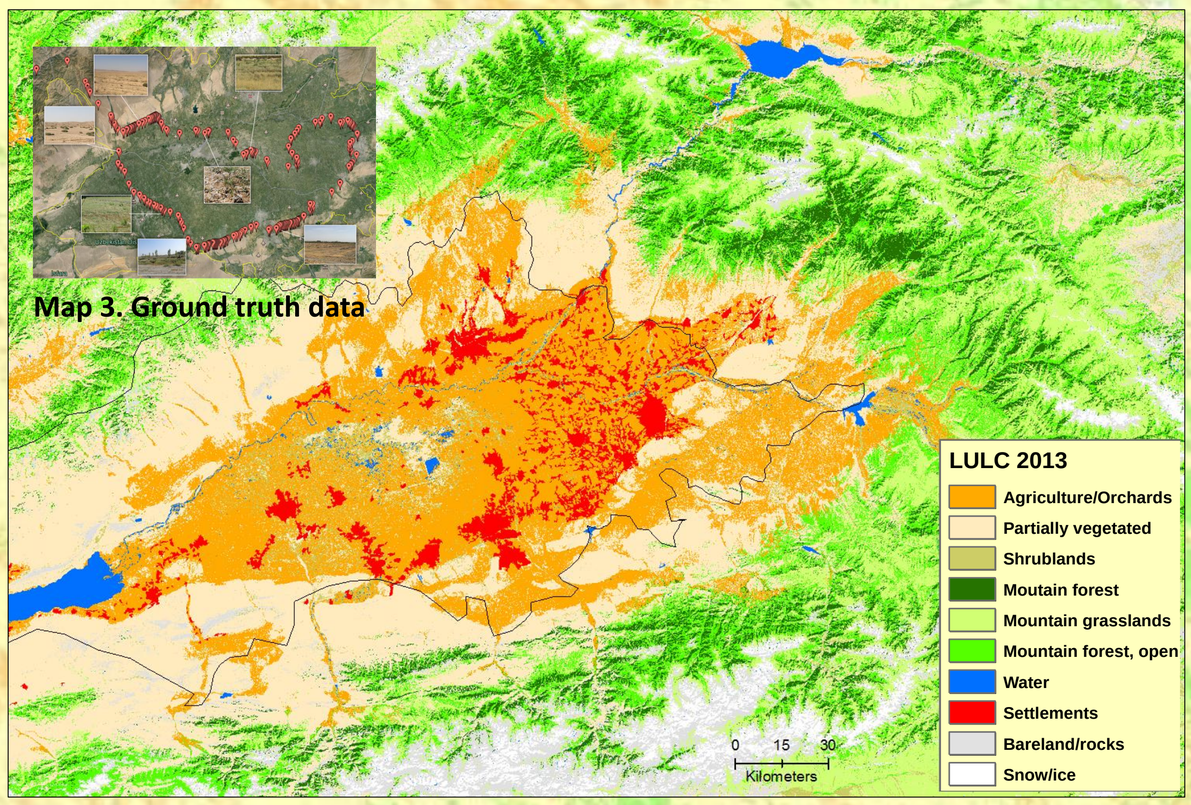
Here we attempted to show initial results in the pictorial representation of the outputs/outcomes at spatio-temporal scales ranging from farmscape (<1m), landscape (5-30m), to national-regional (250-500mm) and global scale (1km).



Map 1. Productivity of the marginal lands in the tropical and non-tropical drylands at global scale at 1km. Poster background map shows the annual trends of the GPP where P value is increasing or decreasing



Map 2. Spatial distribution of annual gross primary production (GPP) of vegetation predicted by the satellite-based Vegetation Photosynthesis Model (VPM) using MODIS and climate data at regional scale (500m to 1km)



Map 4. land use and land cover map of the basin sale (30m) Fergana valley, central Asia

Map 5. Indication of agricultural productivity and degradation at basin scale (250-500m)

Map 6. Agricultural productivity and degradation status at farm level (5-30m)

Map 7. Land and water productivity at field scale, inter and intra field variability (1-5m)

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