

Quantifying Land-Surface-Temperature changes related to land cover transitions



Land surface temperature (LST) trends (1984-2022) derived from Landsat time series

Background & Relevance:

Land surface temperature (LST) plays a crucial role in the Earth's climate system, as it reflects the energy and water balance between the land surface and the atmosphere. LST affects vegetation growth and land use and land cover dynamics. Satellite-derived LST measurements are widely used in various applications such as drought monitoring, soil moisture estimation, evapotranspiration modeling, air temperature retrieval, urban heat island studies, and climate change research. LST is therefore an essential climate variable for assessing land-atmosphere interactions and monitoring surface temperature changes from local to global scales. This MSc thesis helps understanding LST changes and mid-term trends related to land cover and land cover changes. The findings of this thesis are important for comprehending climate dynamics and informing sustainable land management and climate change mitigation strategies.

Study area:

- Space: European Alps
- Time: 2000 today

Data Input:

- Satellite data:
 - LST: MODIS Terra & Aqua LST day-time + night-time, Landsat 5, 7, 8, 9 LST



- o Land cover: Corine Land Cover, Copernicus Global Land Cover, DynamicWorld
- Ground observations: IMIS, water temperatures

Analysis tasks:

- Validation of satellite-based LST trends and changes using ground observations
- Quantifying Land Cover Changes and associated LST changes
- Analysing LST trends of different Land Cover Classes and topographic settings

Objectives:

- Quantify magnitudes of LST changes associated with land cover conversions
- Quantify LST trends of land cover classes
- Identify drivers for opposing day- and night-time LST trends

Links & References:

- Estimation of daily mean land surface temperature at global scale using pairs of daytime and night-time MODIS instantaneous observations
- <u>A global historical twice-daily (daytime and night-time) land surface temperature</u> <u>dataset produced by Advanced Very High Resolution Radiometer observations from</u> <u>1981 to 2021</u>
- <u>Variability in the surface temperature and melt extent of the Greenland ice sheet</u> <u>from MODIS</u>

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