

European Space Agency

ministerstvo školstva,

VEDY, VÝSKUMU A ŠPORTU

SLOVENSKEJ REPUBLIKY

SURGE : Simulating the cooling effect of urban greenery based on solar radiation modelling and a new generation of ESA sensors.

Feasibility study Nr. 4000117034/16/NL/NDe



Institute of Geography Faculty of Science P. J. Šafárik University in Košice, Slovakia

Project team: Jaroslav Hofierka, Michal Gallay, Ján Kaňuk, Vladimír Sedlák, Alena Gessert

The aim of our feasibility study is to evaluate the applicability of the Sentinel 2 satellite imagery for monitoring urban greenery and its impact on urban microclimate. The objective is in defining into what extent the Sentinel imagery can be used for parameterizing sun light



transmission of urban greenery for typical annual seasons.





ANDSAT 8 (Red=B4, Green=B3, Blue=B2), cell=30m, Košice, 6. august 2015



 Sentinel 2 mission establishes a new generation of ESA multispectral remote sensing.

- Higher spatial, temporal and spectral resolution than other similar satellites.
- Data freely available via internet.
- Sentinel 2A in operation since June 2015, Sentinel 2B to be launched in 2016.
- 13 spectral bands are well suited for monitoring vegetation and land cover every 5 days.

Vegetation influences heat fluxes in urban space

Land surface temperature (at sensor) Thermal band 10, LANDSAT 8 TIRS sensor Slovakia, Košice, 6 August, 2015, 9:45



Linear greenery between buildings or in parks decrease the ambient temperature.





Higher temperature in the city centre with a limited

The cooling effect is controlled also by seasonal changes of vegetation.

- Periodical terrestrial laser scanning allows for recording 3D geometry of urban greenery within a particular season.
- We aim to downscale the Sentinel 2 imagery based on ground based laser scanning and field observations.





Solar irradiation, 21 June

vegetation cover.



• Using 3D city model,

- time series of vegetation transmittance,
- solar models r.sun, v.sun

Simulating cooling effect via modelling solar irradiation

- considering the seasonal change of vegetation transmittance estimated from Sentinel 2 imagery.
- Is the Sentinel 2 imagery applicable for this task?

