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Potential use of Sentinel-1 data for soil moisture mapping

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2019

Dostupný z http://www.nusl.cz/ntk/nusl-432102

Dílo je chráněno podle autorského zákona č. 121/2000 Sb.

Tento dokument byl stažen z Národního úložiště šedé literatury (NUŠL).

Datum stažení: 18.04.2024

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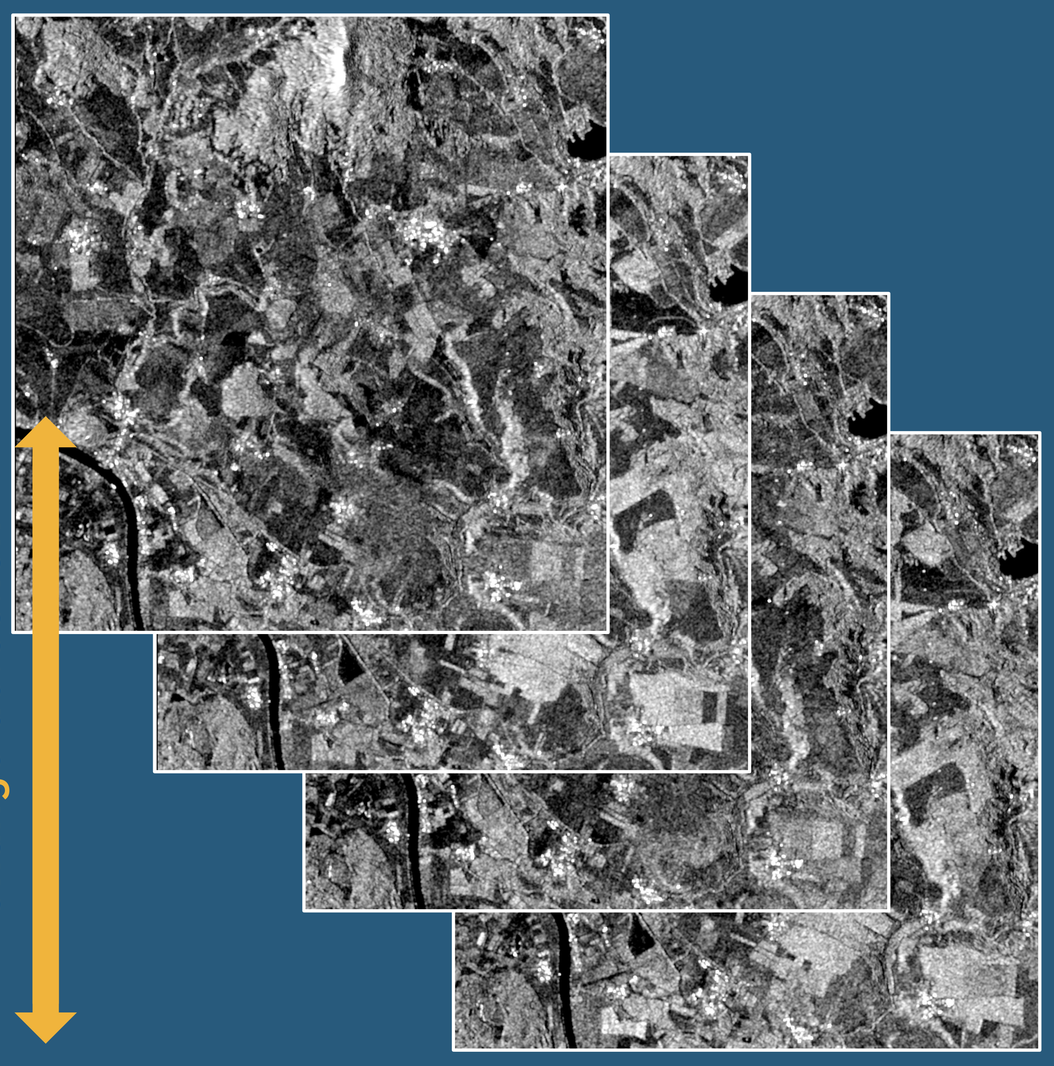
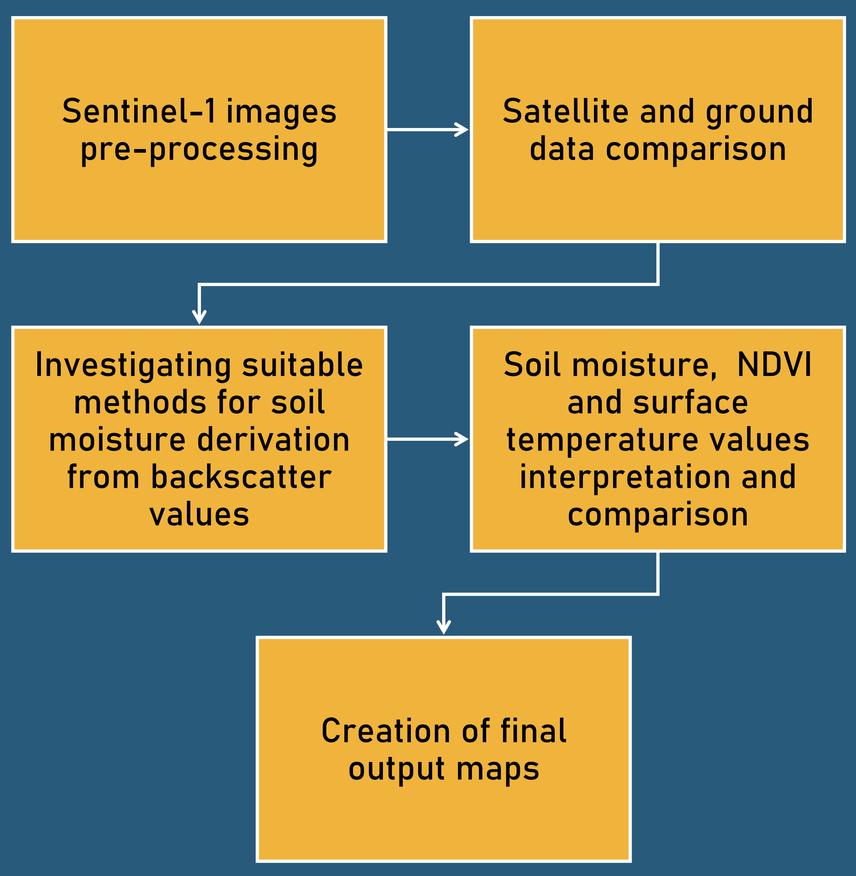
Usage of Sentinel-1 radar data for soil moisture mapping

The Remote sensing laboratory at CENIA is currently focusing on soil moisture mapping using the means of remote sensing as a part of CENIA's ongoing research plan on energy flows in landscape. The soil moisture research also investigates the connection of three related parameters – soil moisture, vegetation index and surface temperature.

Radar images from Sentinel-1A and Sentinel-1B satellites are a key source of the soil moisture research using Sentinel data from the European Copernicus program.
Sentinel-1 satellite images have undergone a pre-processing process and the Remote sensing laboratory is now investigating suitable methods for soil moisture derivation from backscatter values. The values of the vegetation index (NDVI) and surface temperature are obtained from the Remote sensing laboratory archive, which contains already processed data.
So far, the best method for soil moisture retrieval seems to be the Change detection method, where changes of backscatter values are examined within a certain time period. However, these changes can be influenced for instance by change in the shape of surface or roughness.





Comparing satellite and ground data *

Date	Average VH backscatter [dB]	Average VV backscatter [dB]	Ground data: average soil moisture per polygon [%]
02. 06. 2018	-12,29	-8,02	69,7
08. 06. 2018	-12,15	-8,22	64,6
14. 06. 2018	-13,39	-8,70	92,1
20. 06. 2018	-12,87	-8,68	71,5
26. 06. 2018	-15,40	-9,85	53,3
02. 07. 2018	-17,68	-12,60	55,0
08. 07. 2018	-20,39	-13,81	52,2
14. 07. 2018	-20,04	-13,68	41,5
20. 07. 2018	-20,77	-12,50	43,4
26. 07. 2018	-20,80	-12,19	41,0

* First samples of ground data were provided by Insect ecology group from Faculty of Environmental Sciences, CULS Prague

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