

Dynamics of peat soils in the 'Green Heart' of the Netherlands measured by satellite radar interferometry

Heuff, Floris; Mulder, Gert; van Leijen, Freek; Samiei Esfahany, Sami; Hanssen, Ramon

Publication date

2018

Document Version

Final published version

Published in

Geophysical Research Abstracts (online)

Citation (APA)

Heuff, F., Mulder, G., van Leijen, F., Samiei Esfahany, S., & Hanssen, R. (2018). Dynamics of peat soils in the 'Green Heart' of the Netherlands measured by satellite radar interferometry. *Geophysical Research Abstracts (online)*, 20, [EGU2018-17443].

Important note

To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy

Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.



Dynamics of peat soils in the ‘Green Heart’ of the Netherlands measured by satellite radar interferometry

Floris Heuff, Gert Mulder, Freek Van Leijen, Sami Samiei Esfahany, and Ramon Hanssen

Delft University of Technology, Civil Engineering and Geosciences, Geosciences and Remote Sensing, Netherlands
(f.m.g.heuff@tudelft.nl)

The Rhine-Meuse-Scheldt delta is shaped by natural and manmade landscapes. Over many polder areas, soils are drained to be used as pastures. Around 30% of the pastures are situated on peat soils, of which many are located in the western part of the Netherlands, known as the ‘Green Heart’. Peat is composed of organic materials that oxidize and emit greenhouse gases when exposed to air as a consequence of the draining. Oxidation of peat soils results in volume reduction and subsequent subsidence. As a result, the groundwater level rises relative to the surface. Consequently, the soil needs to be dewatered to keep it sufficiently dry for farming, resulting in more oxidation, and therefore more subsidence. This process is bound to continue until the peat soils have disappeared completely. The societal cost of land subsidence due to peat soils are estimated to be 5200 million euro for urban areas and 200 million euro for peatland pastures, for a period until 2050.

Measuring the subsidence is not straightforward, if not impossible, with conventional terrestrial geodetic means as soft soils make it impossible to install fixed benchmarks for repeated surveying. Satellite InSAR surveys have yielded promising results over spatially limited areas [1], but suffer from the very fast temporal decorrelation over pastures [2].

Here we processed and analyzed surface deformation over the entire Green Heart region using Sentinel-1 SAR images, which yields a time series of data with a typical revisit rate of 2 days. An improved time series InSAR algorithm was applied, including atmospheric phase corrections aided by the Harmonie numerical weather model.

We evaluate the observed surface dynamics in relation to peat layer thickness and compare differences between sandy, clay and peat soils.

[1] Morishita, Y., & Hanssen, R. F. (2015). Deformation parameter estimation in low coherence areas using a multisatellite InSAR approach. *IEEE Transactions on Geoscience and Remote Sensing*, 53(8), 4275-4283.

[2] Morishita, Y., & Hanssen, R. F. (2015). Temporal decorrelation in L-, C-, and X-band satellite radar interferometry for pasture on drained peat soils. *IEEE Transactions on Geoscience and Remote Sensing*, 53(2), 1096-1104.