

Theme: Structural Design & Safety

# Foundation instability observed from space: a feasibility study

### Summary

In the Netherlands problems with wooden pile foundations is one of great magnitude. Of at least 200.000 houses it's known they have some kind of foundation damage. In the future this number might increase. The average cost for foundation repair is 70.000 EUR.

To be able to advise partial foundation repair, it's important to know the rate of settlement of the construction walls within the building unit. Currently the most accurate method of measuring the settlement rate uses measuring bolts in combination with a leveling instrument. This method is very labor intensive, costly, and can only be performed if there is an indication of potential settlement.

New geodetic methods for monitoring deformation of the earth have been developed. Recent studies at TU Delft have shown that satellite radar observations are able to detect deformation rates with mm/y precision. As satellite data are acquired frequently (weekly), covering the entire Netherlands, the research question to be posed is whether it is possible to detect settlement of construction walls in relation to foundation instabilities using this new technology.

In a previous MSc study, De Lange (2011) has shown that damage can be related to differential motion. Here we aim for (1) an analysis whether the buildings studied by De Lange are visible in archived satellite radar data, and (2) whether new cases of foundation problems can be detected using the satellite data only.

### Objective

Analyze whether satellite remote sensing can be used to detect and monitor foundation instabilities.

### Students profile

We are looking for a Building Engineering student with apparent interest in structural analysis and remote sensing.

The outcomes of this research are very relevant and publication in a journal will be encouraged.



*Photo: Damage due to foundation problems and the Envisat satellite used for monitoring*

### Obligatory committee members:

Prof. dr. ir. Ramon Hanssen (TU Delft, Geoscience & Remote Sensing)  
ir. H.R. Schipper (TU Delft, Building Engineering)

### Information:

- ir. H.R. Schipper (h.r.schipper@tudelft.nl)  
Stevin II room 1.58 (☎ 015-2789933)

For students of Building Engineering