

Detection of soil compaction effects using UAV

Michael Kuhwald, Frauke Lindenstruth, Katja Augustin and Rainer Duttmann

Objectives:

The use of UAV aims to characterise crop growth and yield responses on soil compaction and field traffic intensity using spatially high-resolution multispectral data. The main objectives are:

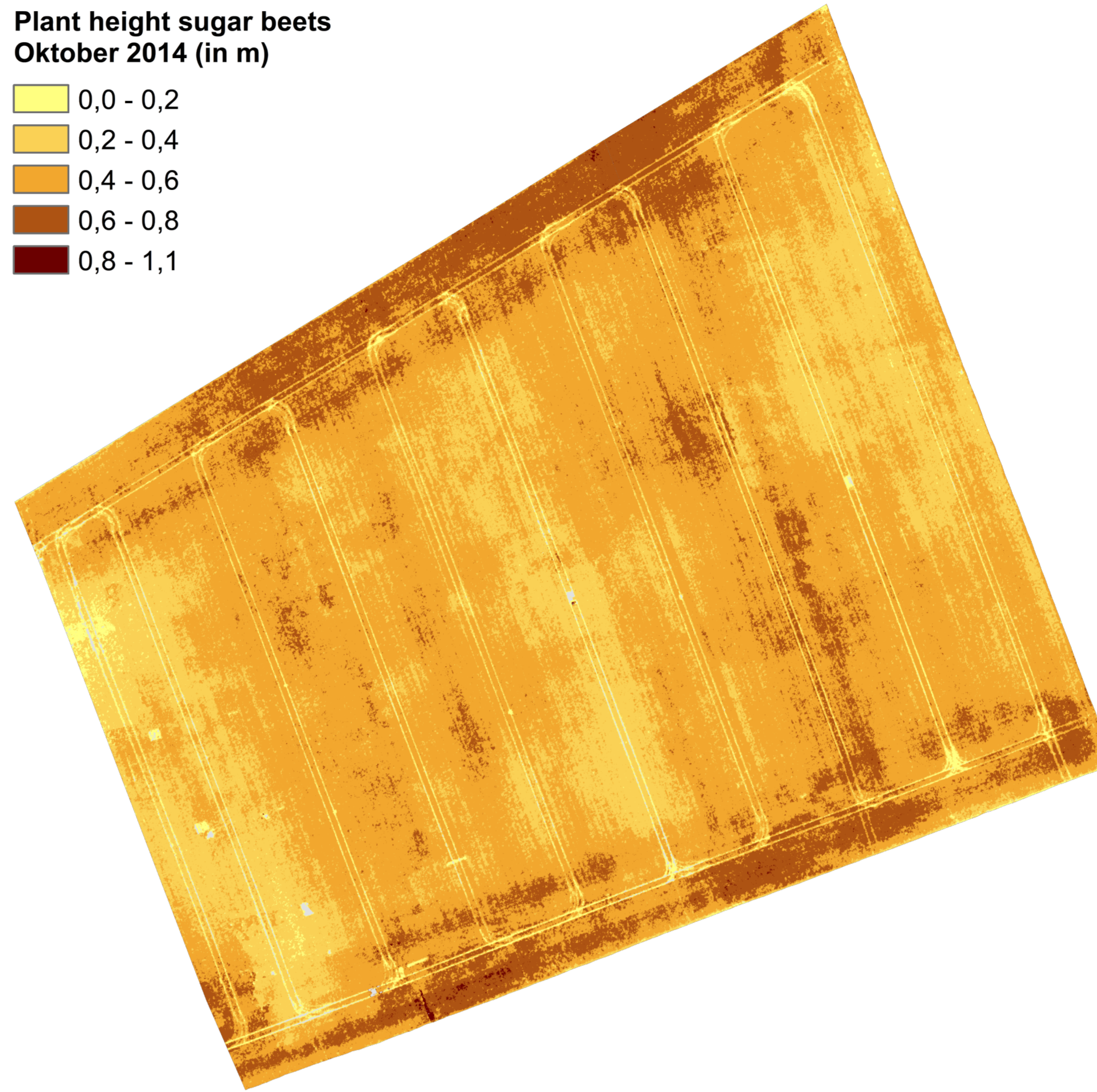
- (1) the spatial detection of soil compaction using vegetation indices and crop growth information,
- (2) the recognition of the field-internal spots of permanent (sub)soil compaction,
- (3) the differentiation between traffic-induced compaction signals and signals related to naturally given soil structure by using multivariate pattern recognition algorithms,
- (4) the verification and evaluation of UAV-derived soil compaction patterns by field measurements.

Crop surface models by structure from motion

CSM-Sugar beets

Plant height sugar beets
Oktober 2014 (in m)

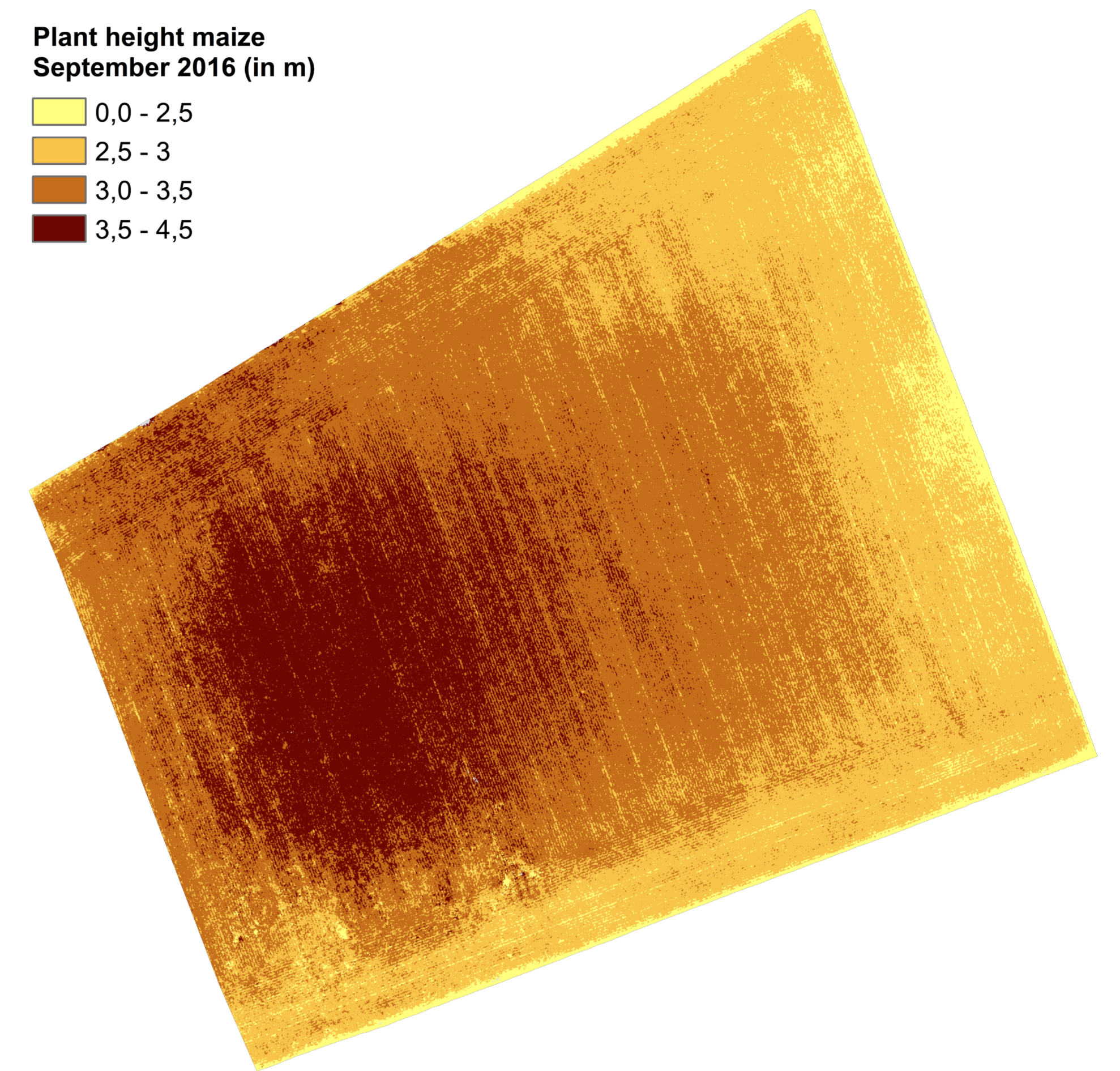
0,0 - 0,2
0,2 - 0,4
0,4 - 0,6
0,6 - 0,8
0,8 - 1,1



CSM-Maize

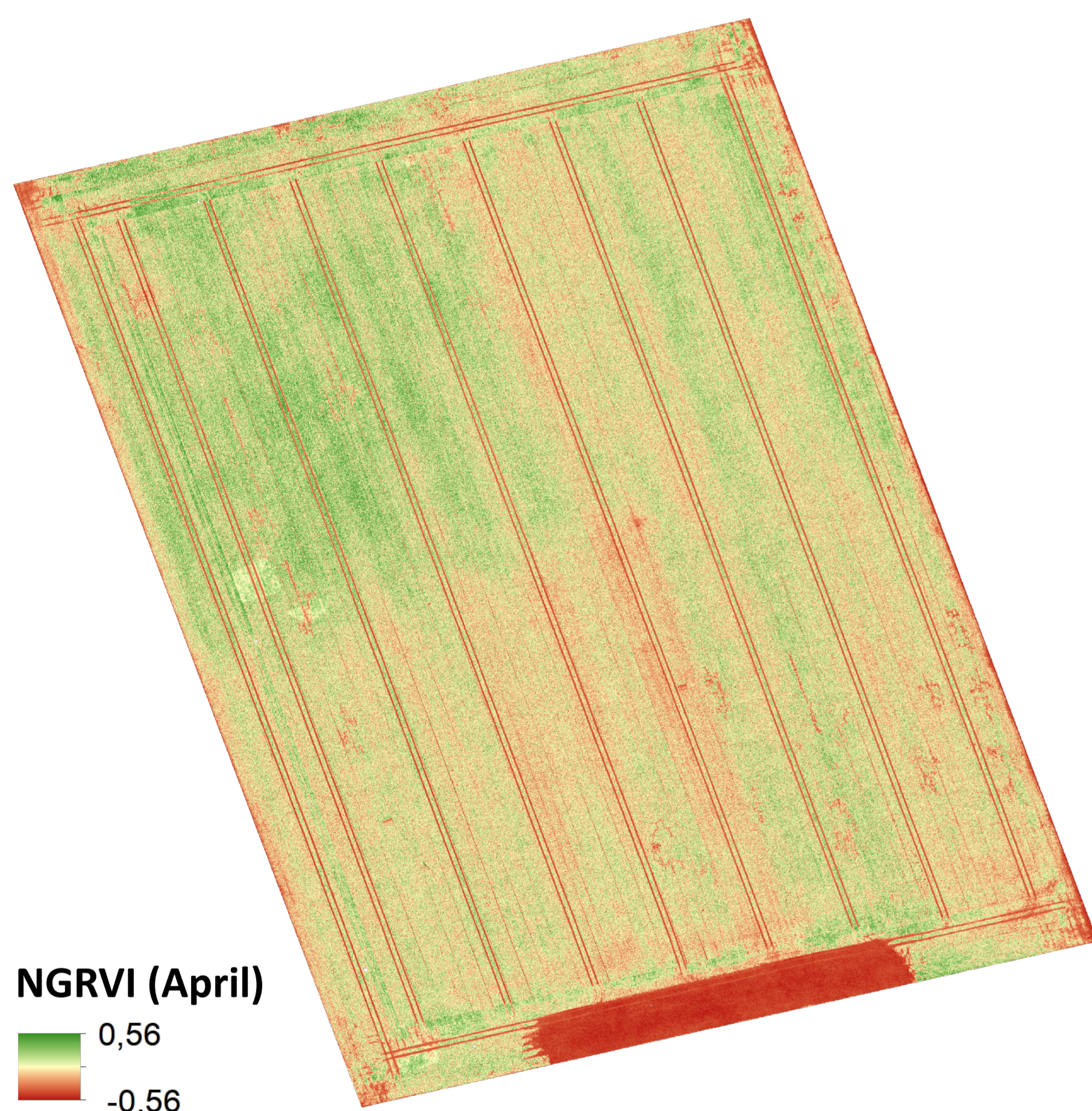
Plant height maize
September 2016 (in m)

0,0 - 2,5
2,5 - 3
3,0 - 3,5
3,5 - 4,5

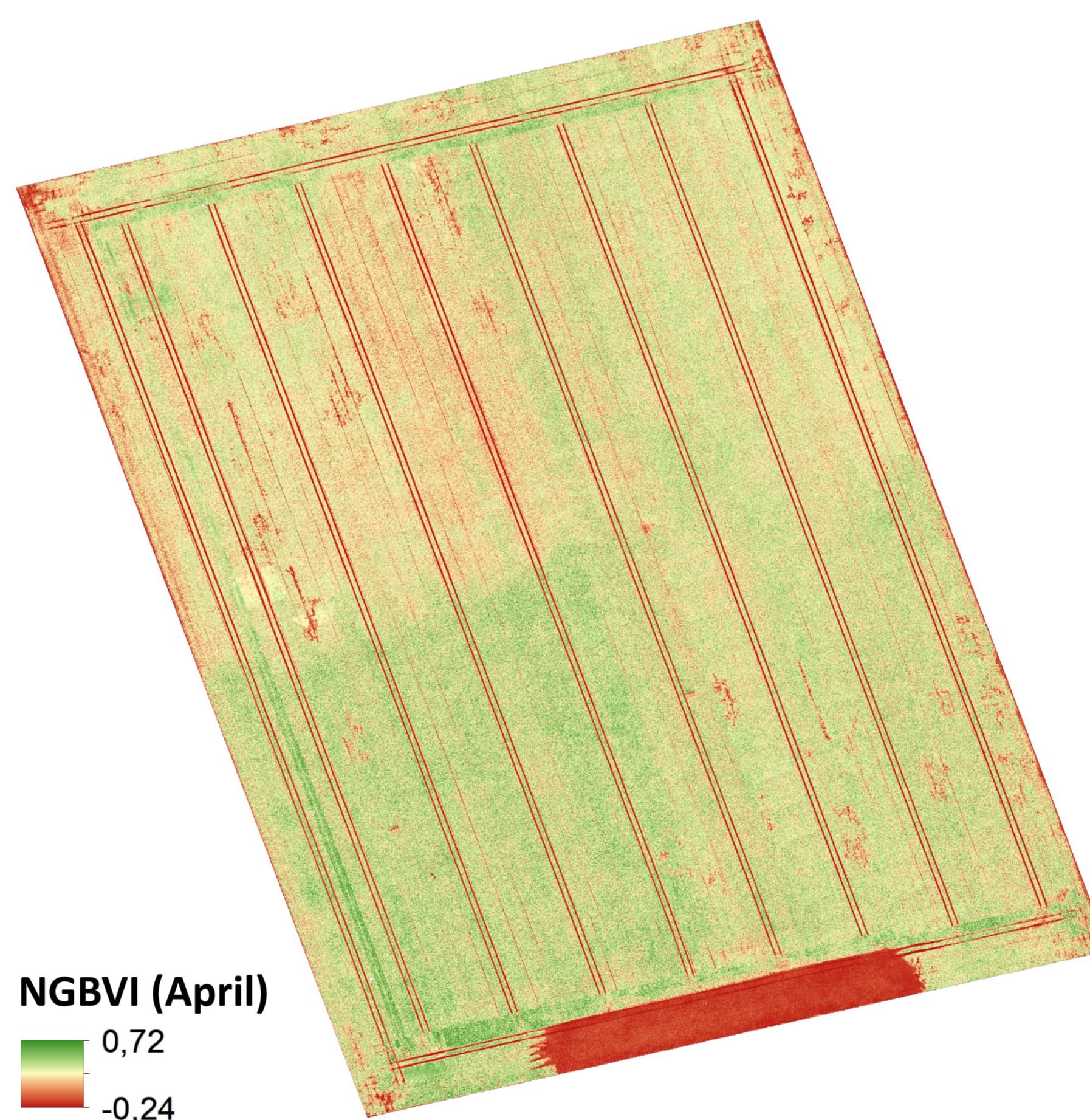


Spectral analyses of UAV-data for crop status detection

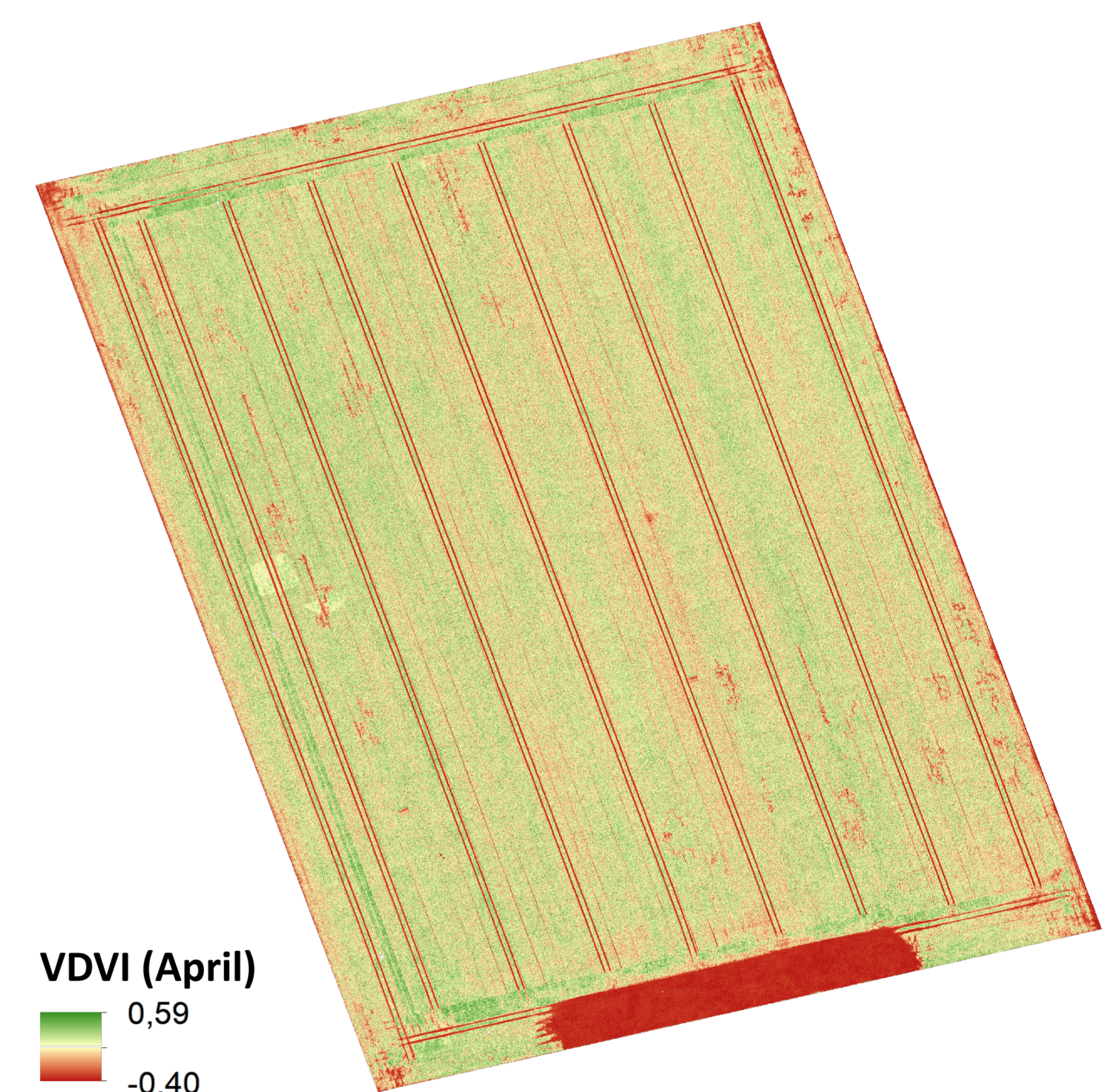
NGRVI-winter wheat



NGBVI-winter wheat



VDVI-winter wheat



Crop pattern evaluation by soil compaction related information

Traffic information



Soil information



Yield information

