Hydrological application of Airborne TDEM in the dunes along the Dutch coast

Vitens

hoogheemraadschap Hollands Noorderkwartier

SKYTEM

waternet

dunea DUIN & WATER

vrije Universiteit

HydroGeophysics Group AARHUS UNIVERSITY

PWN

Wiertsema & Partners RAADGEVEND INGENIEURS

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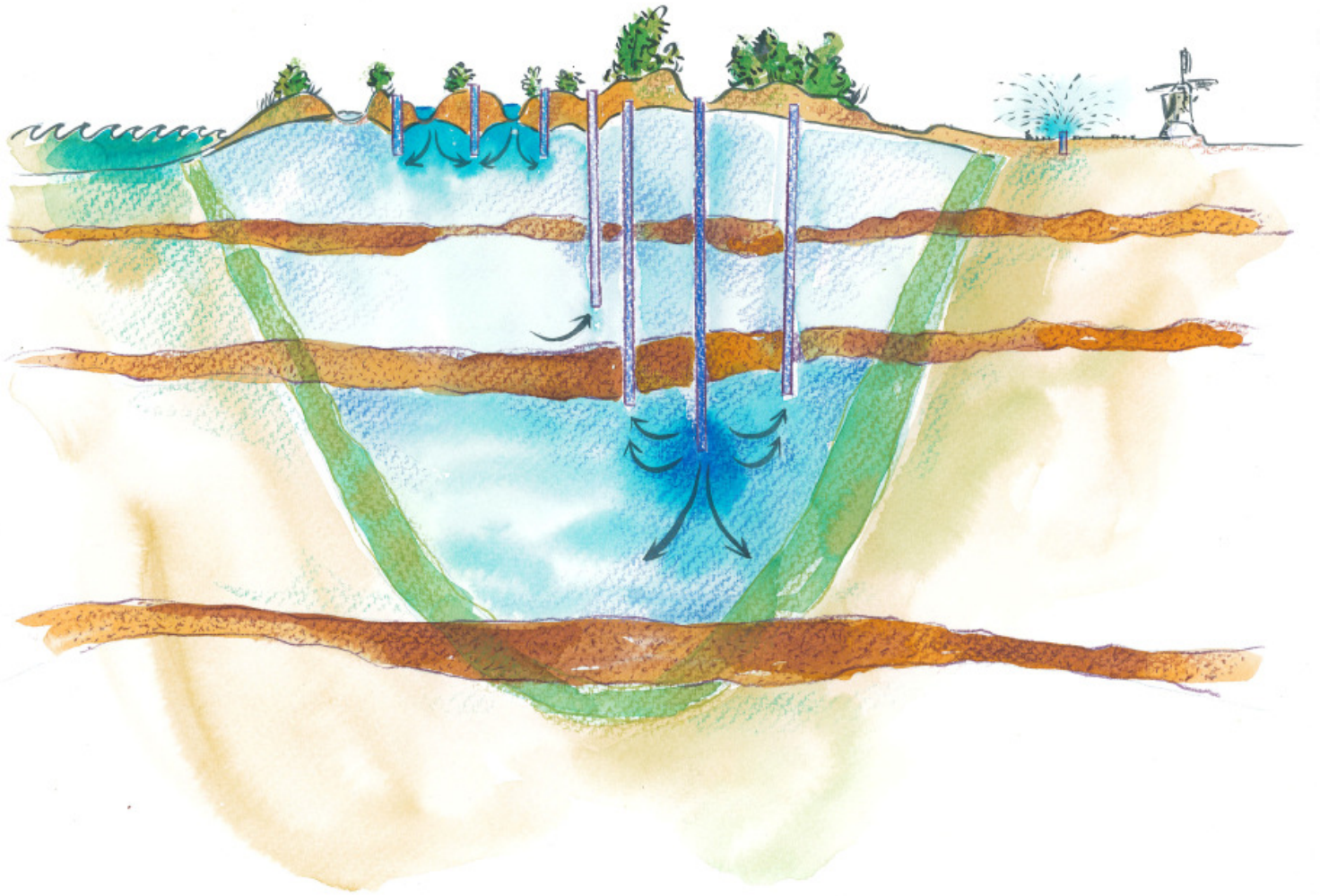
Dune area

sands and clays fresh water pocket



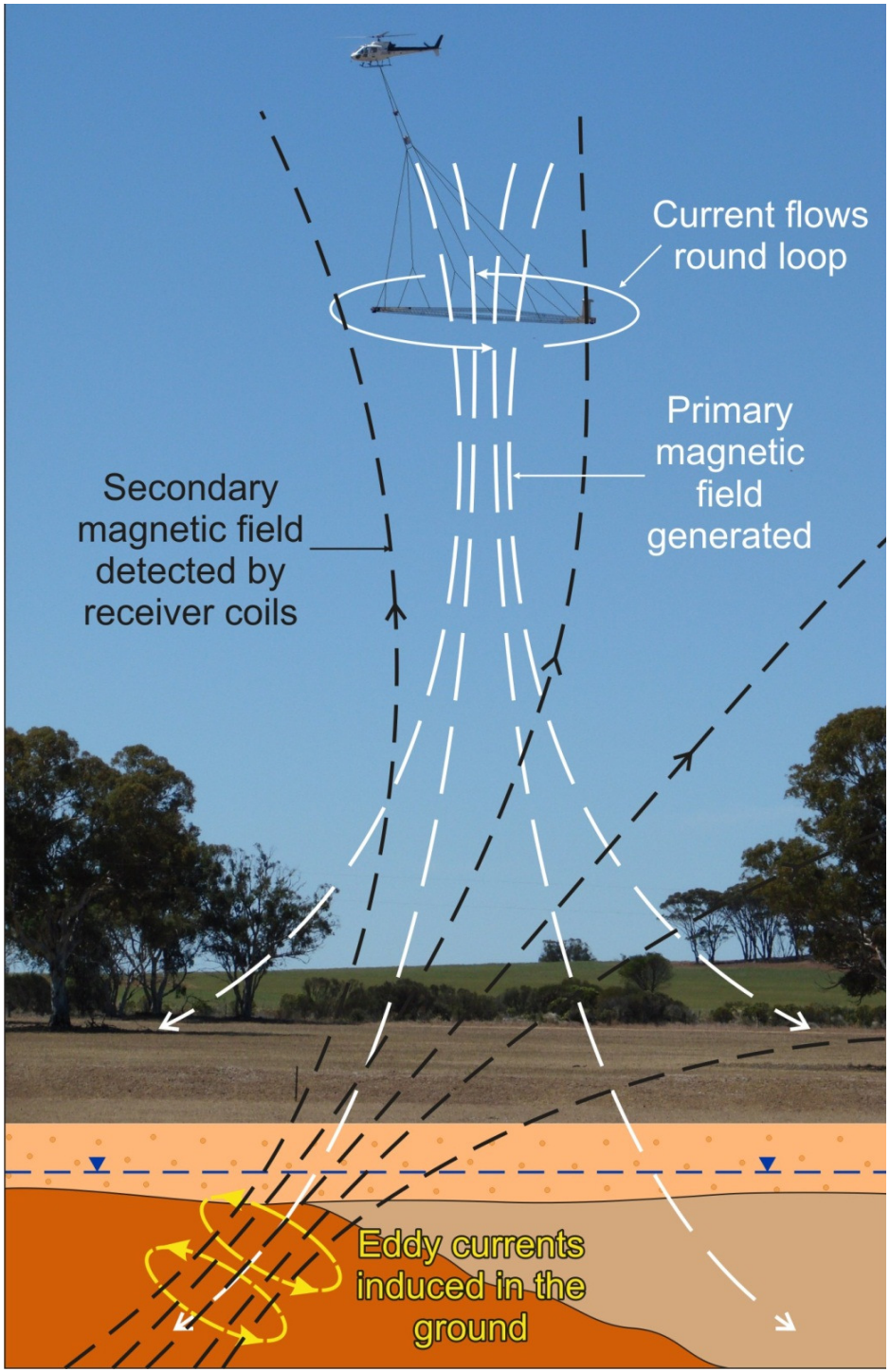
TDEM Time Domain Elektromagnetics

Current through a frame under helikopter

primary EM field

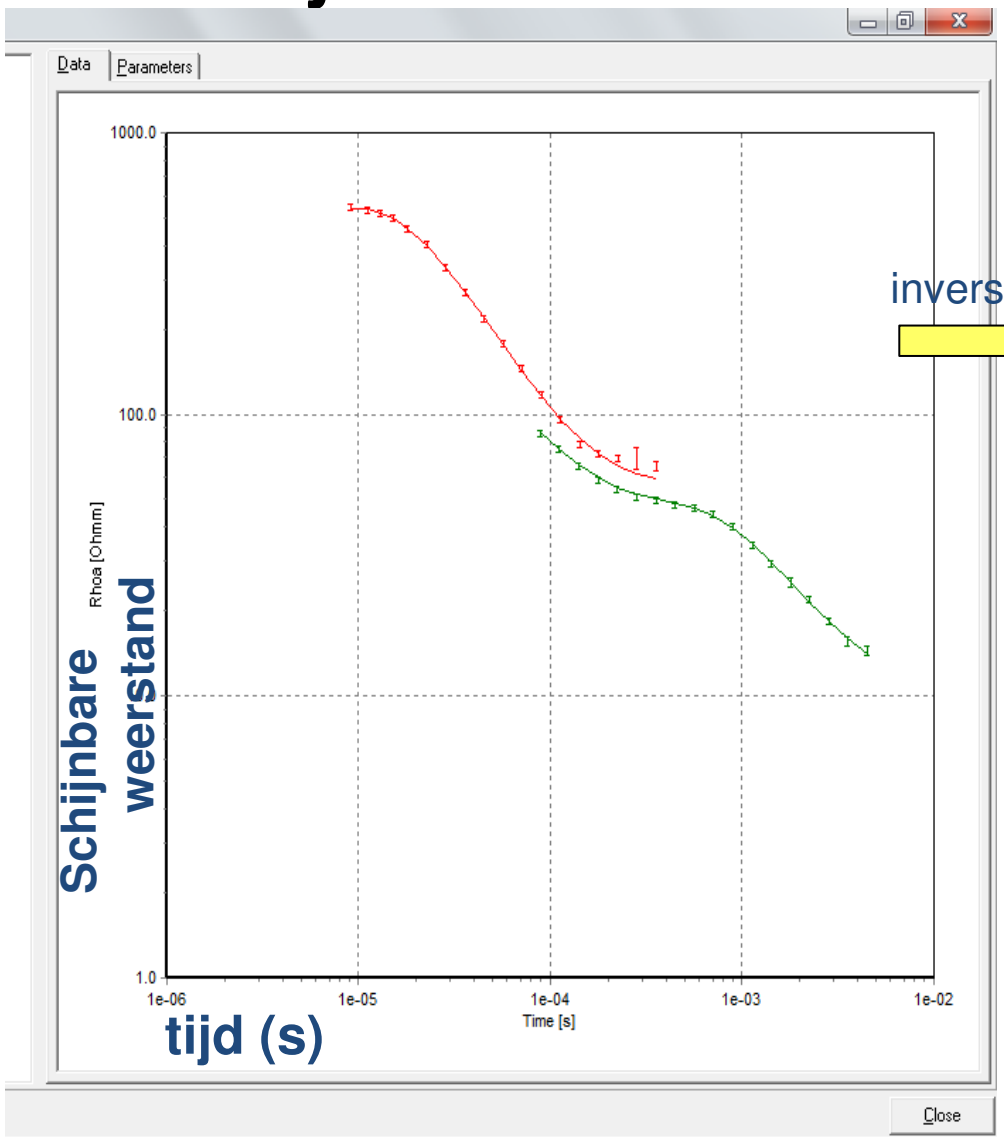
secundary field coming from the underground

Measured by the receiver hanging also under the helikopter



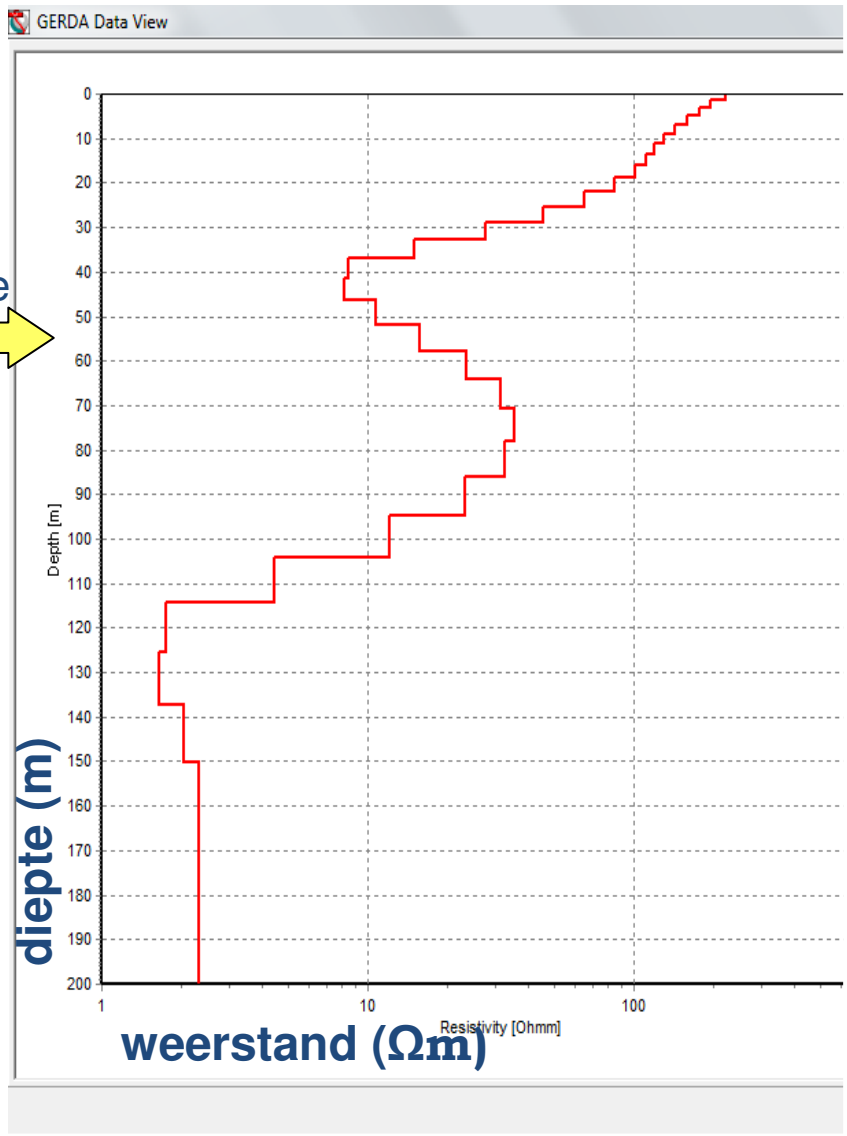
INVERSION from measured line to resistivity model

Meetlijn



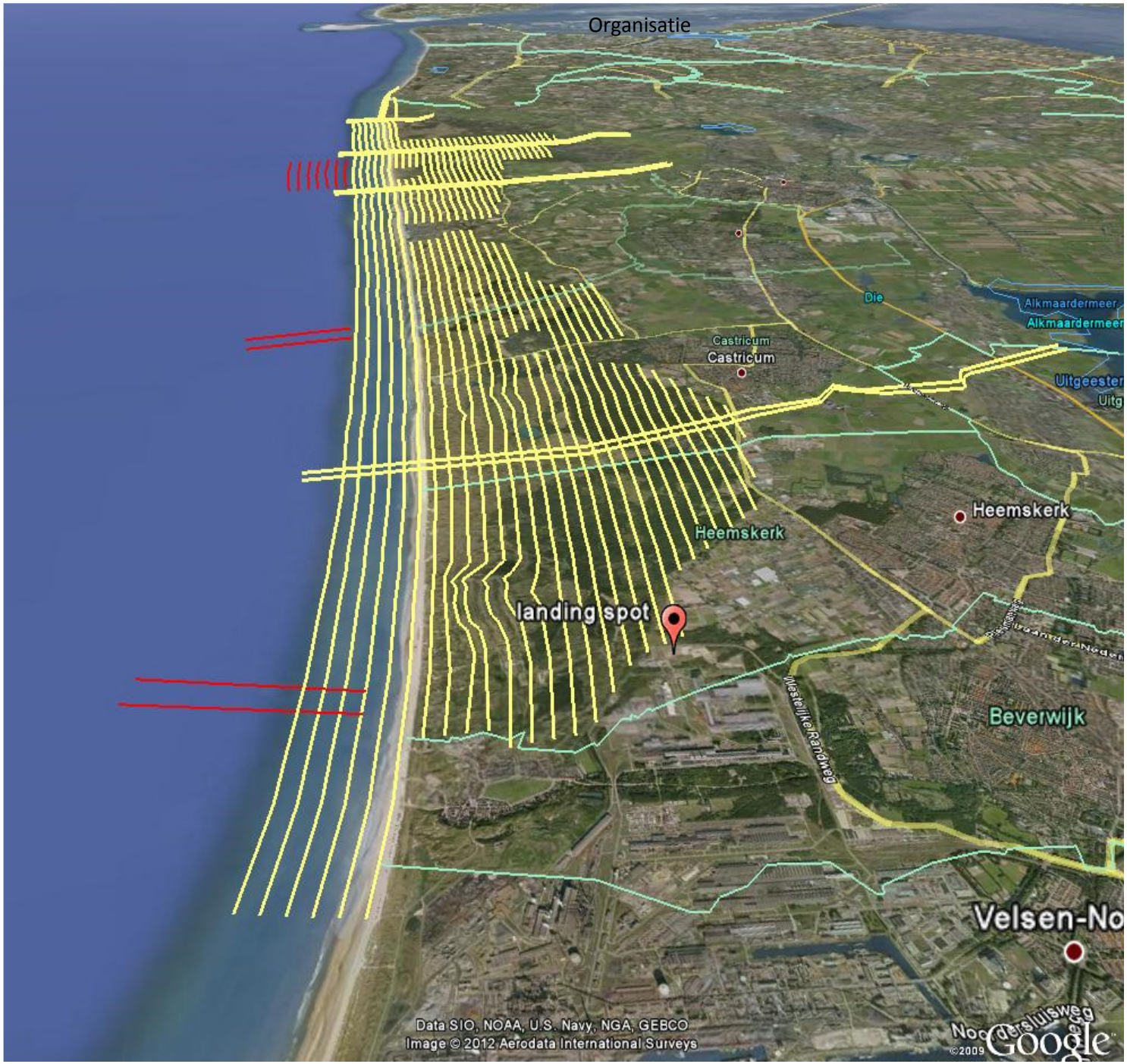
inversie

lagenmodel



Flight plan

Keuze gebied
Keuze meetinstrument
Instellingen
Landingsplaats
Vluchtlijnen
Planning



Onderlinge afstand 150 m

Totaal 762 km

Tot 700m (2,5 km) uit de kust

25000 metingen

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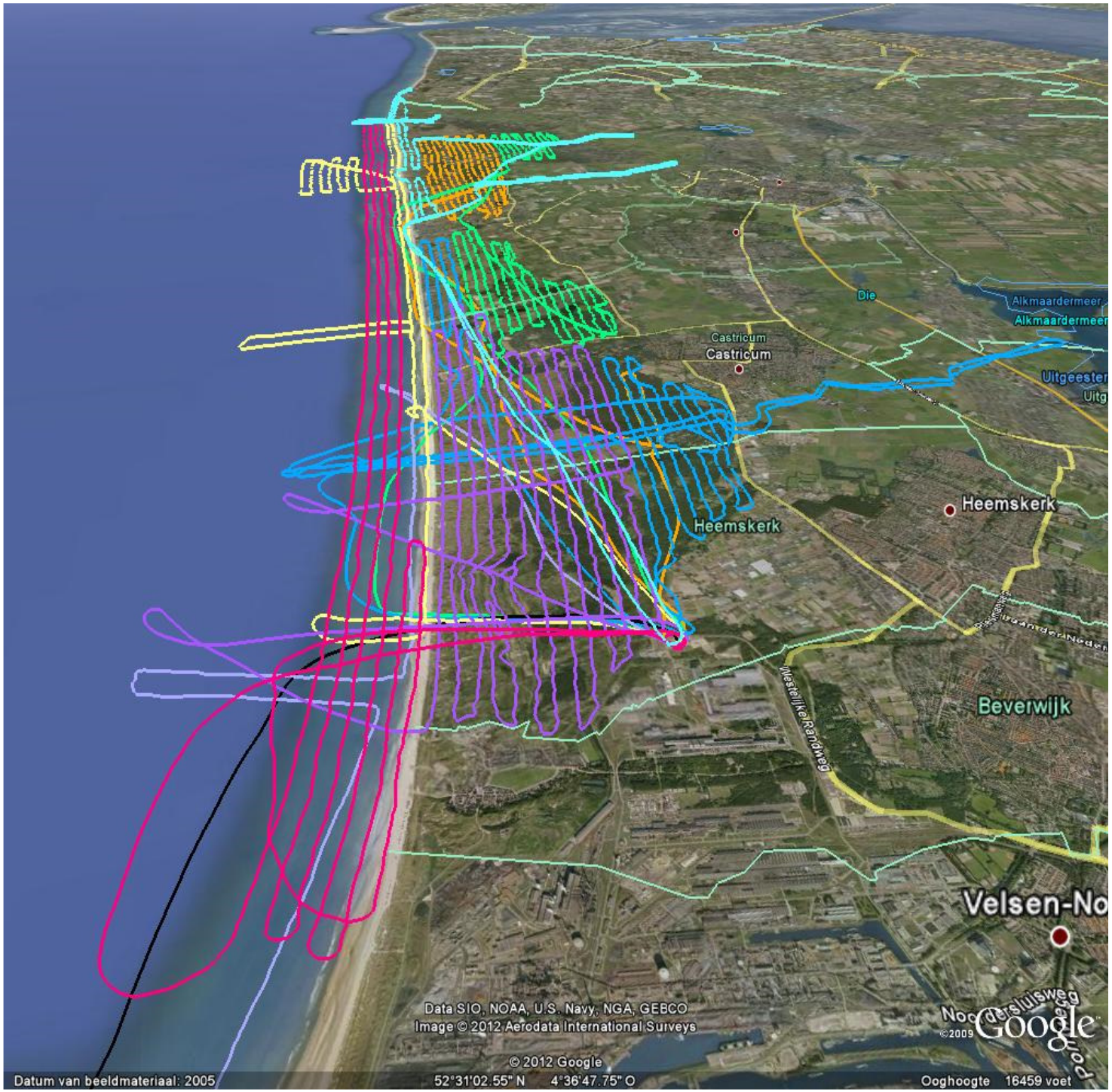

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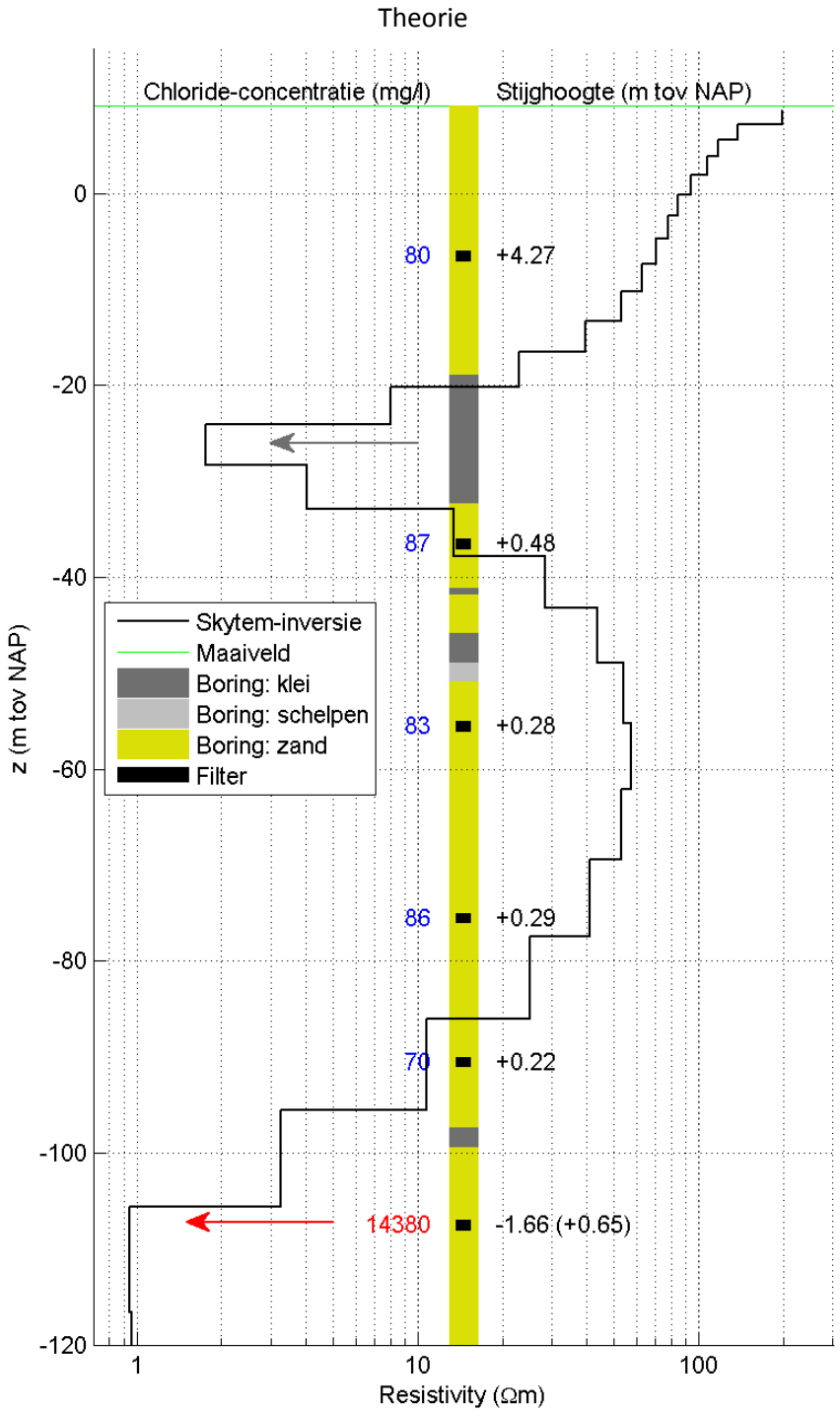

Comparing to borehole data

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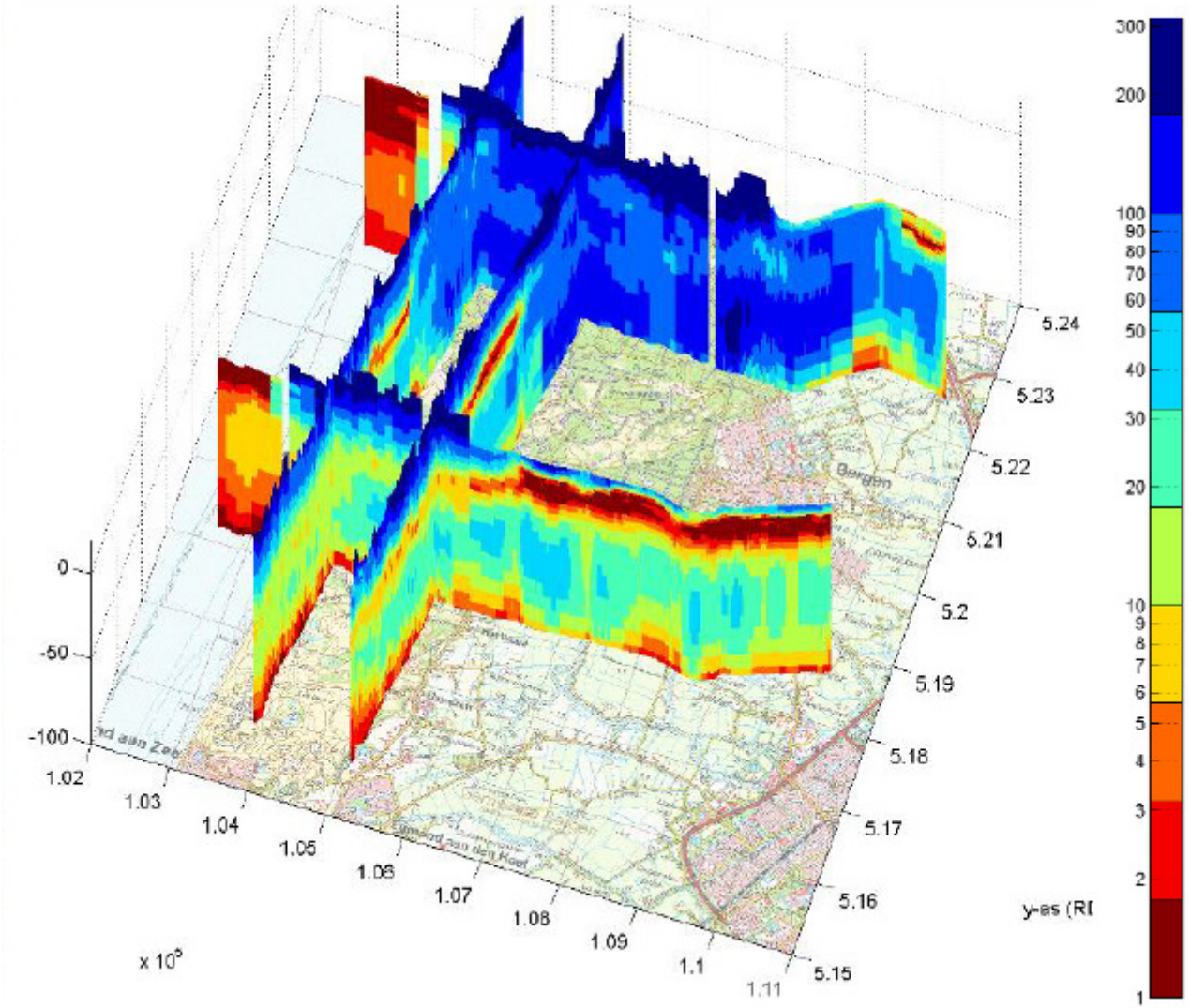
Resultaat: een 3d resistivity model



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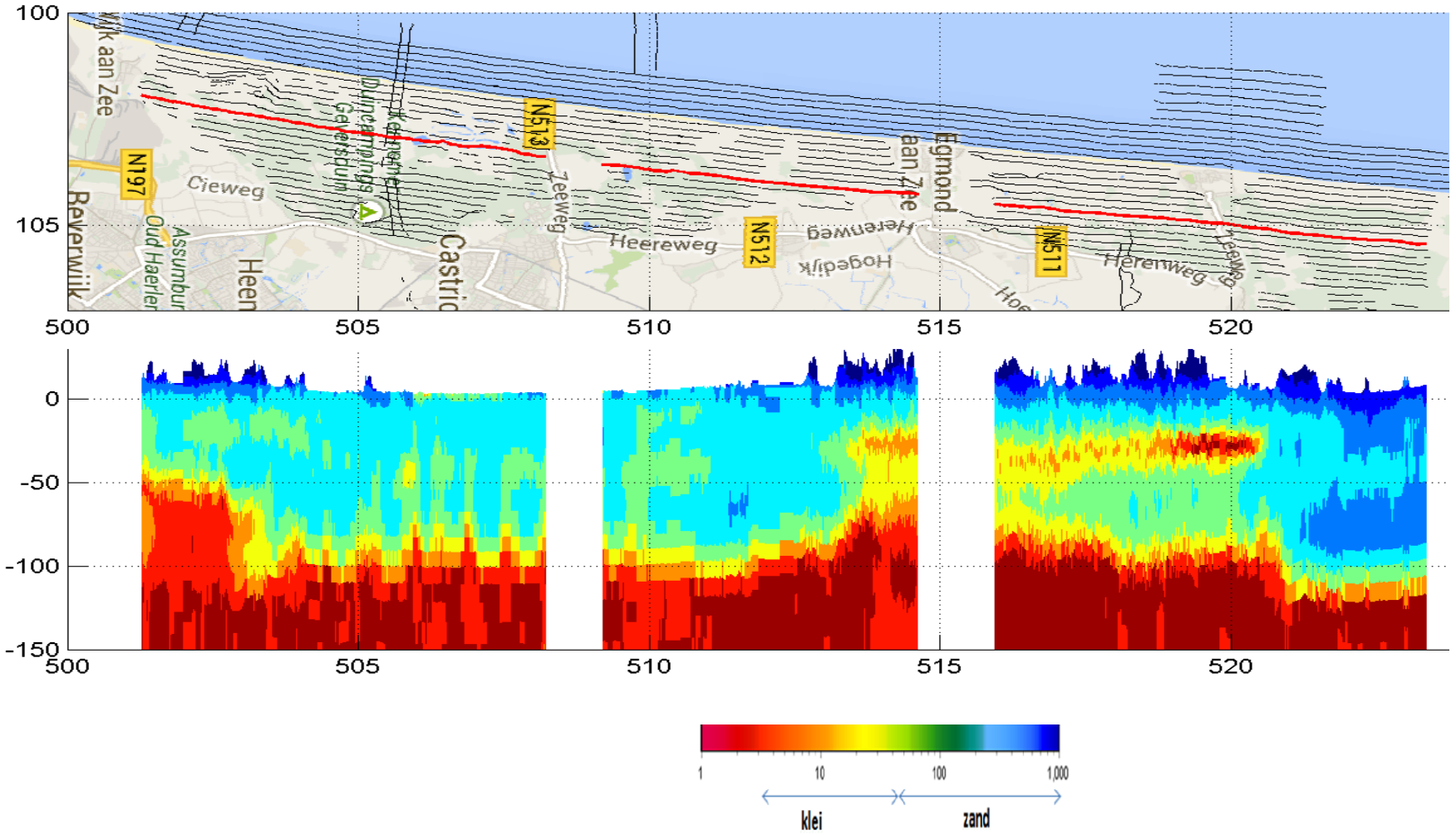
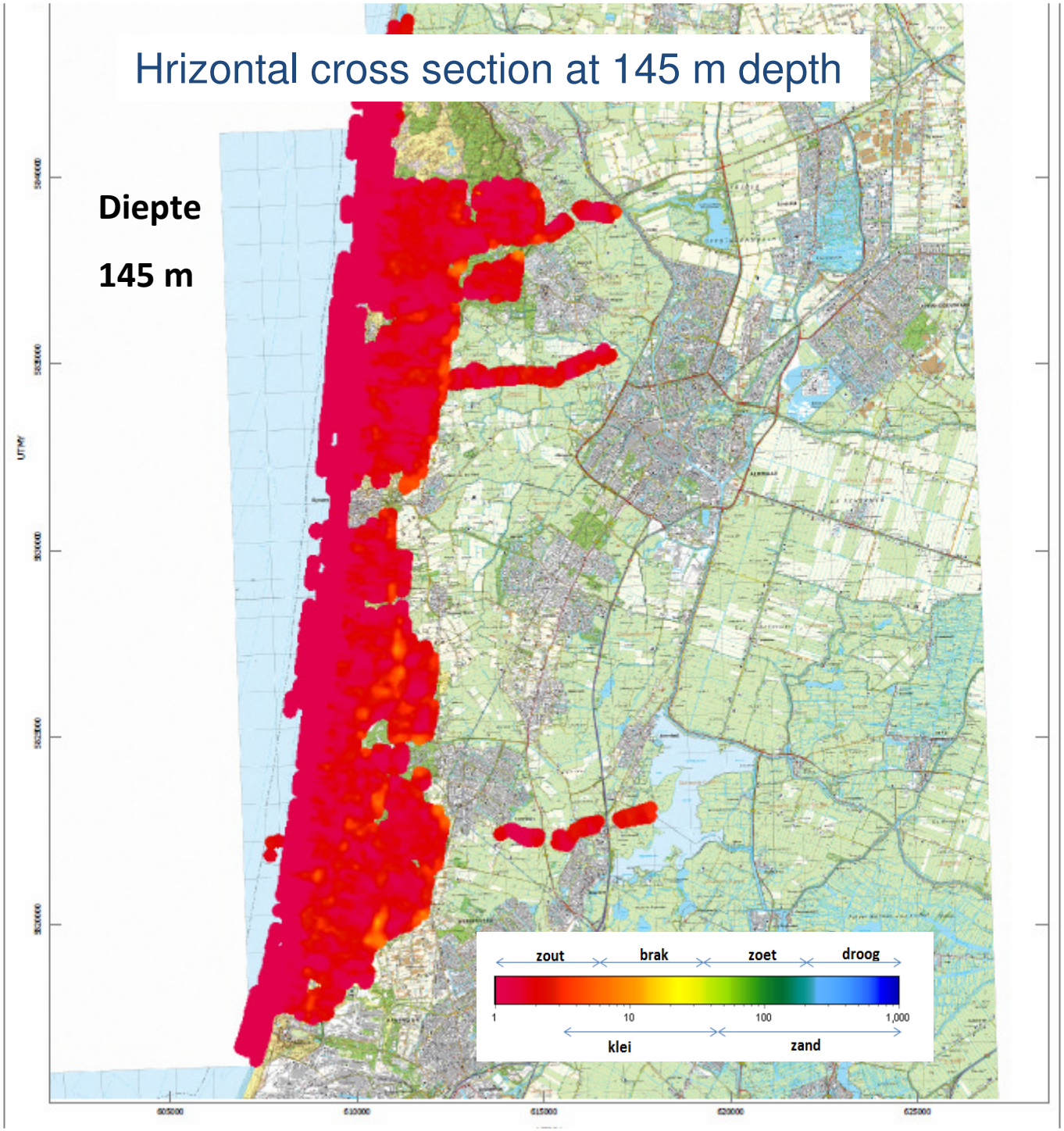
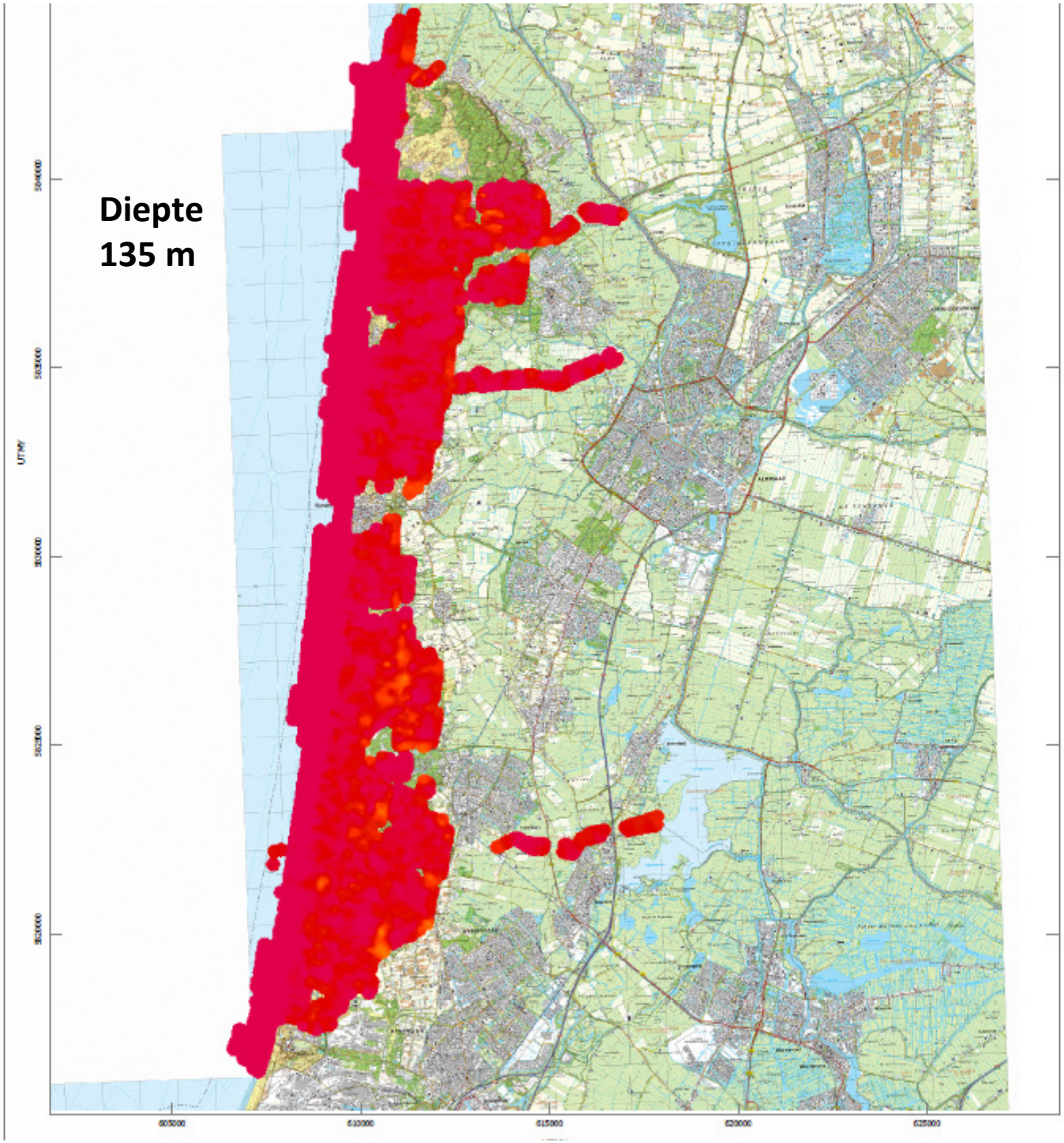
In cross section



Hrizontal cross section at 145 m depth

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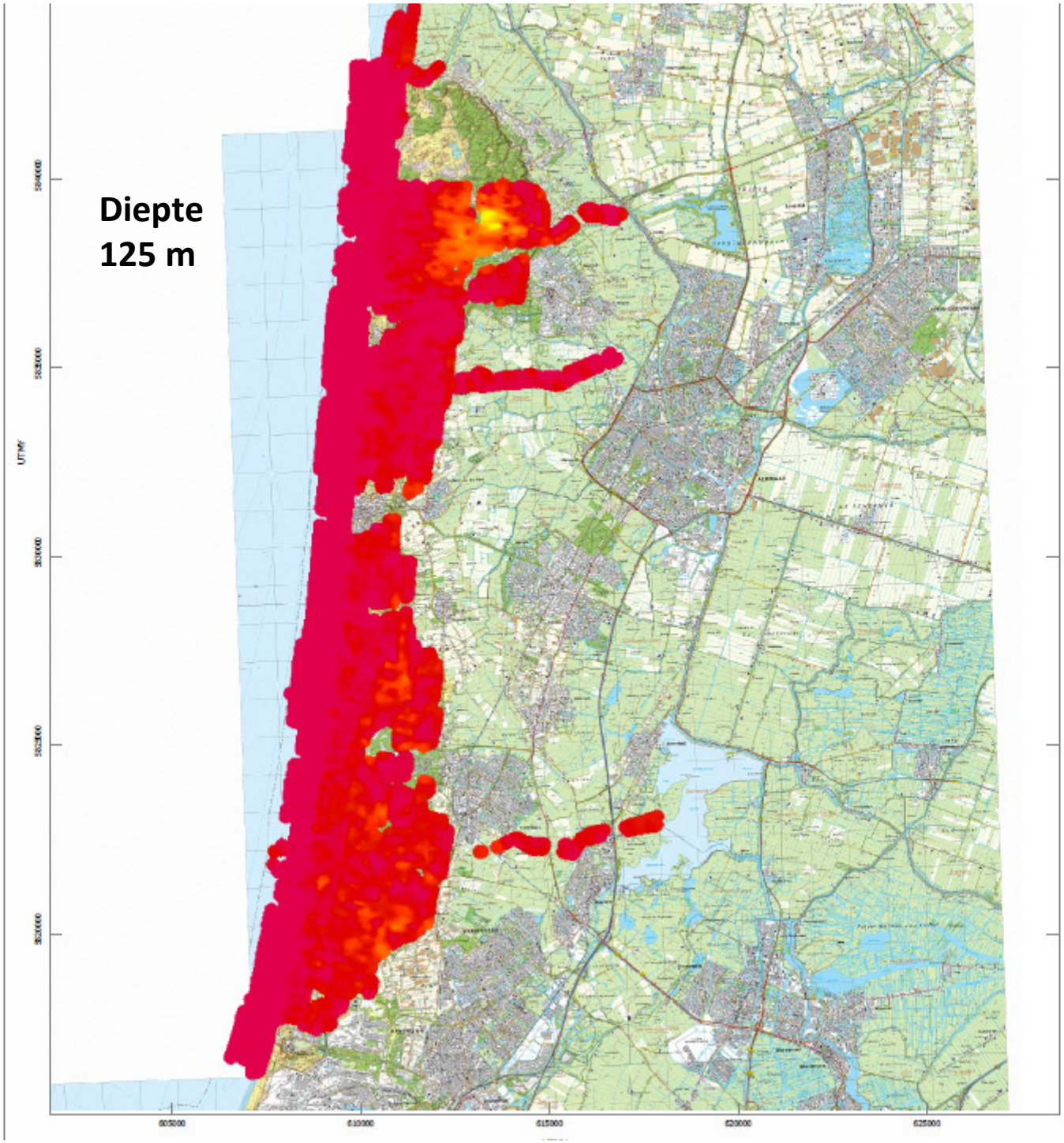
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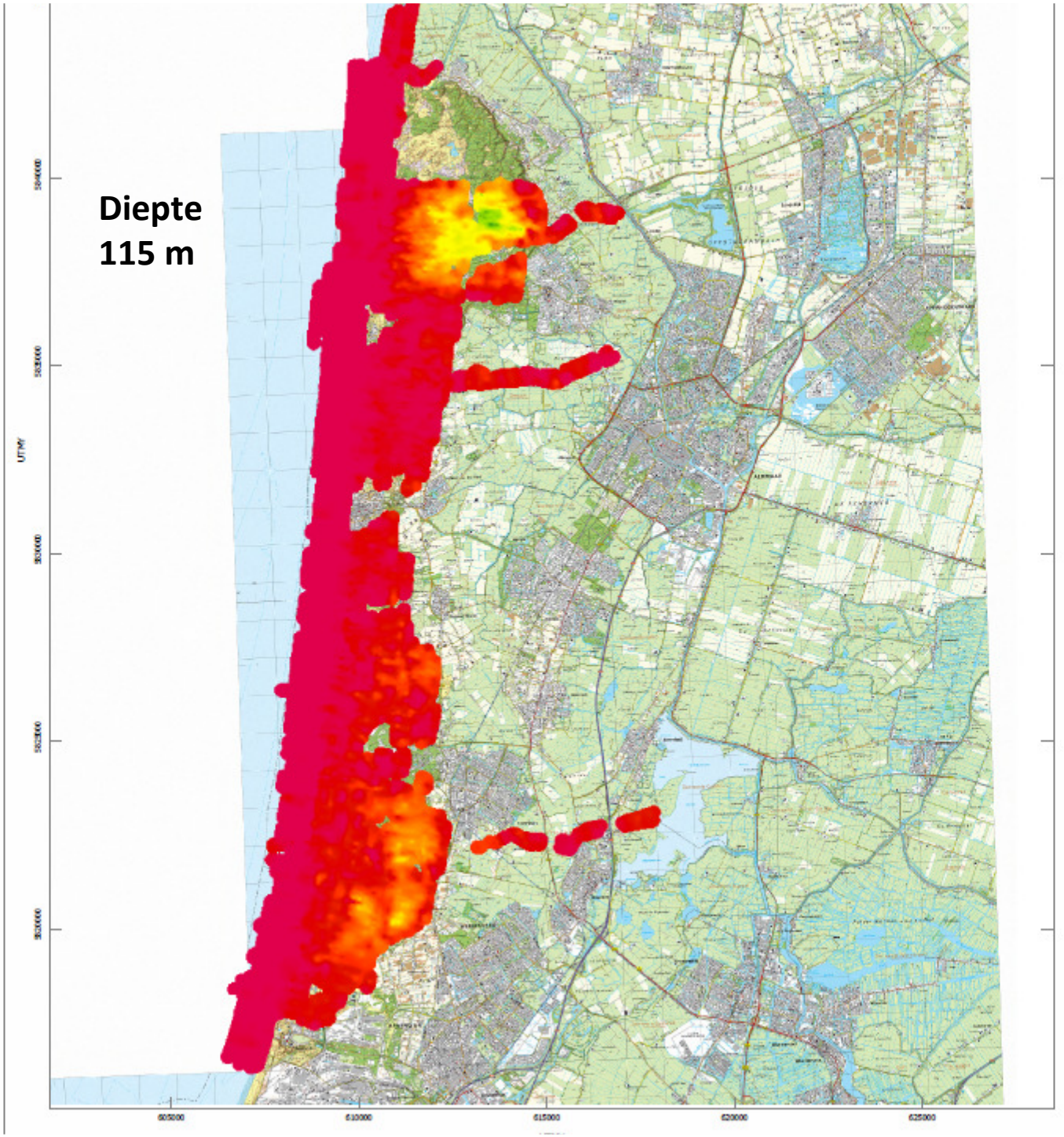
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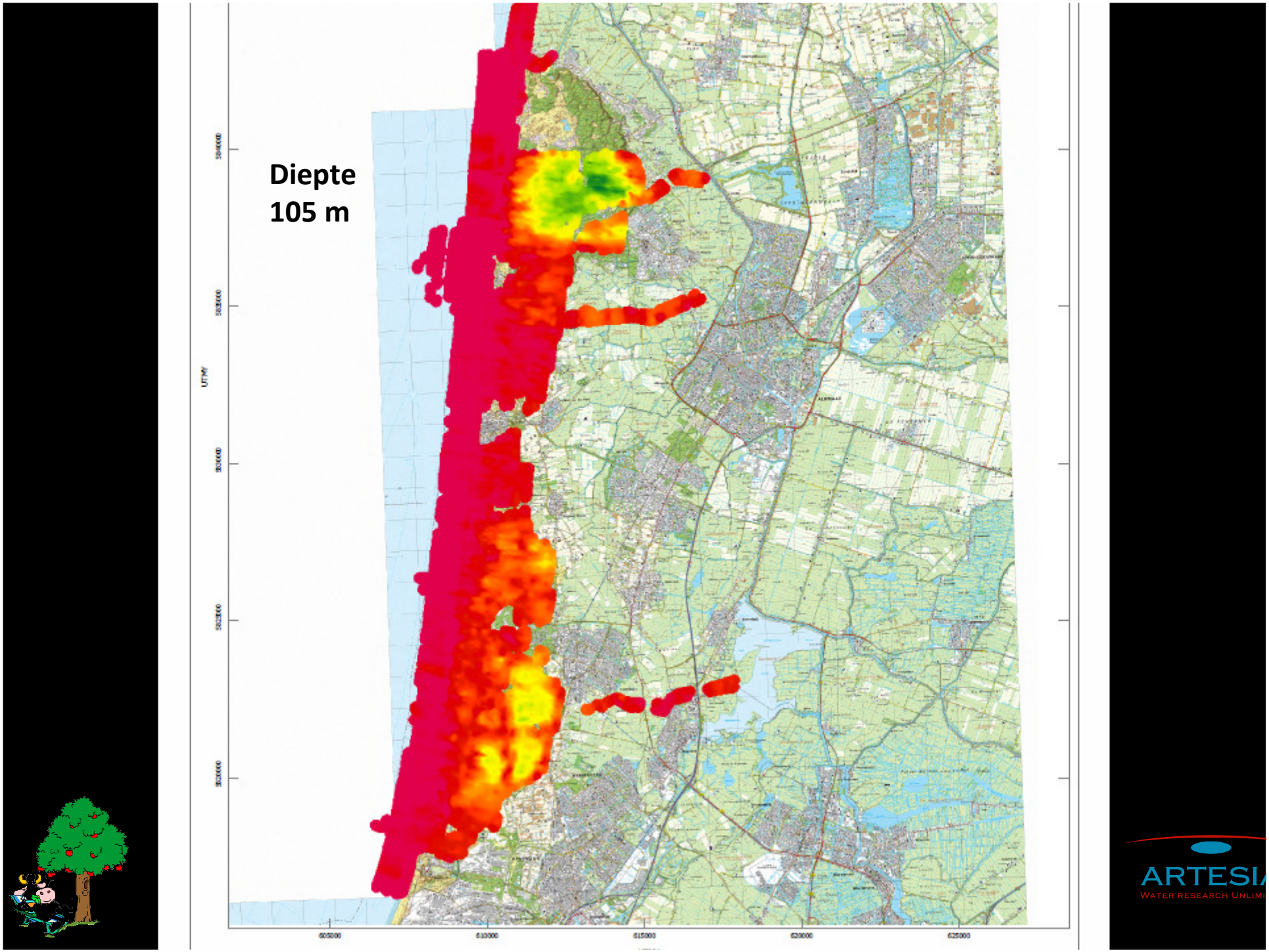
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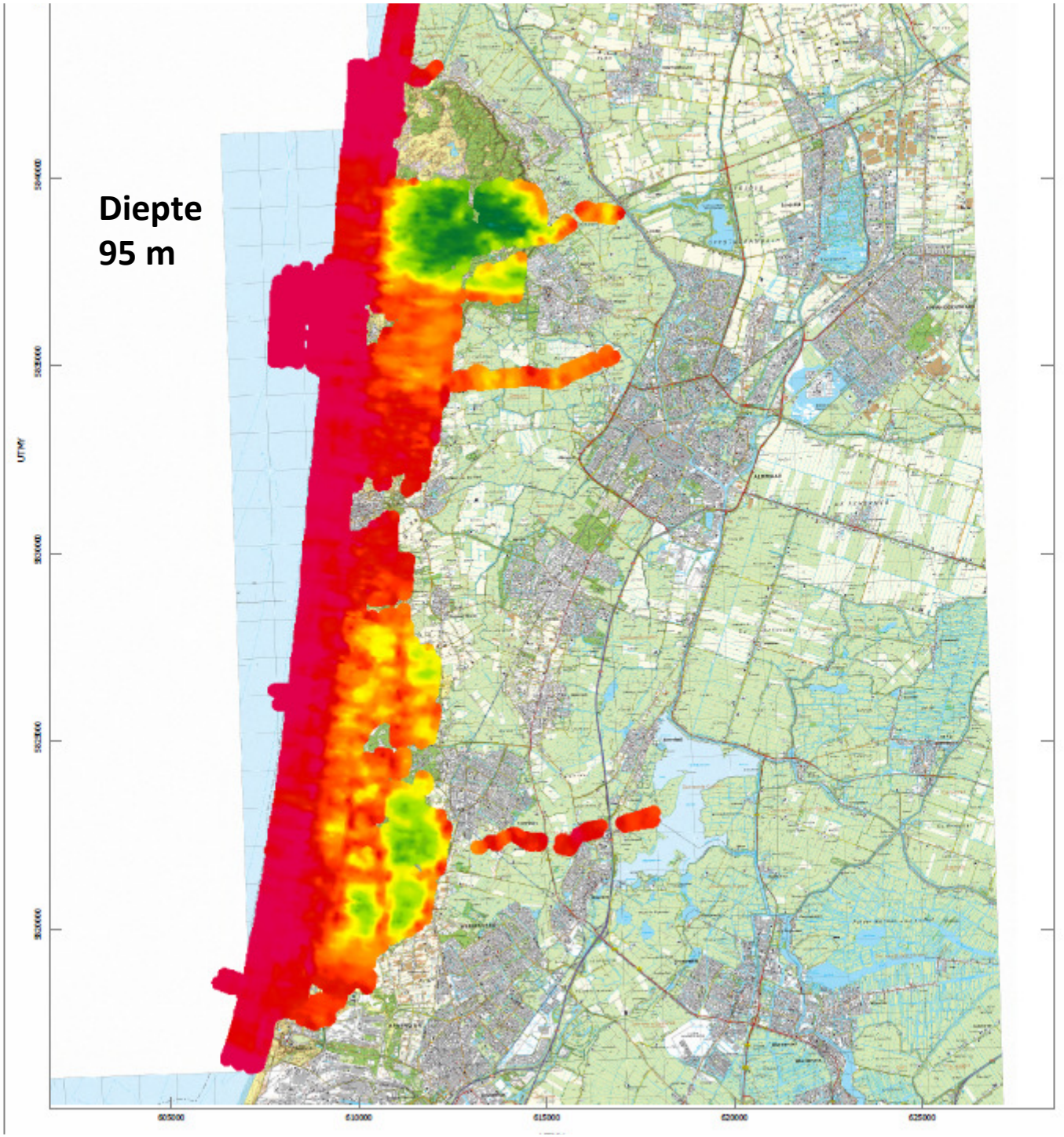

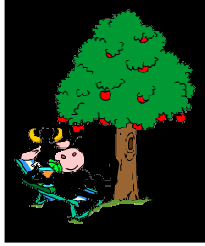

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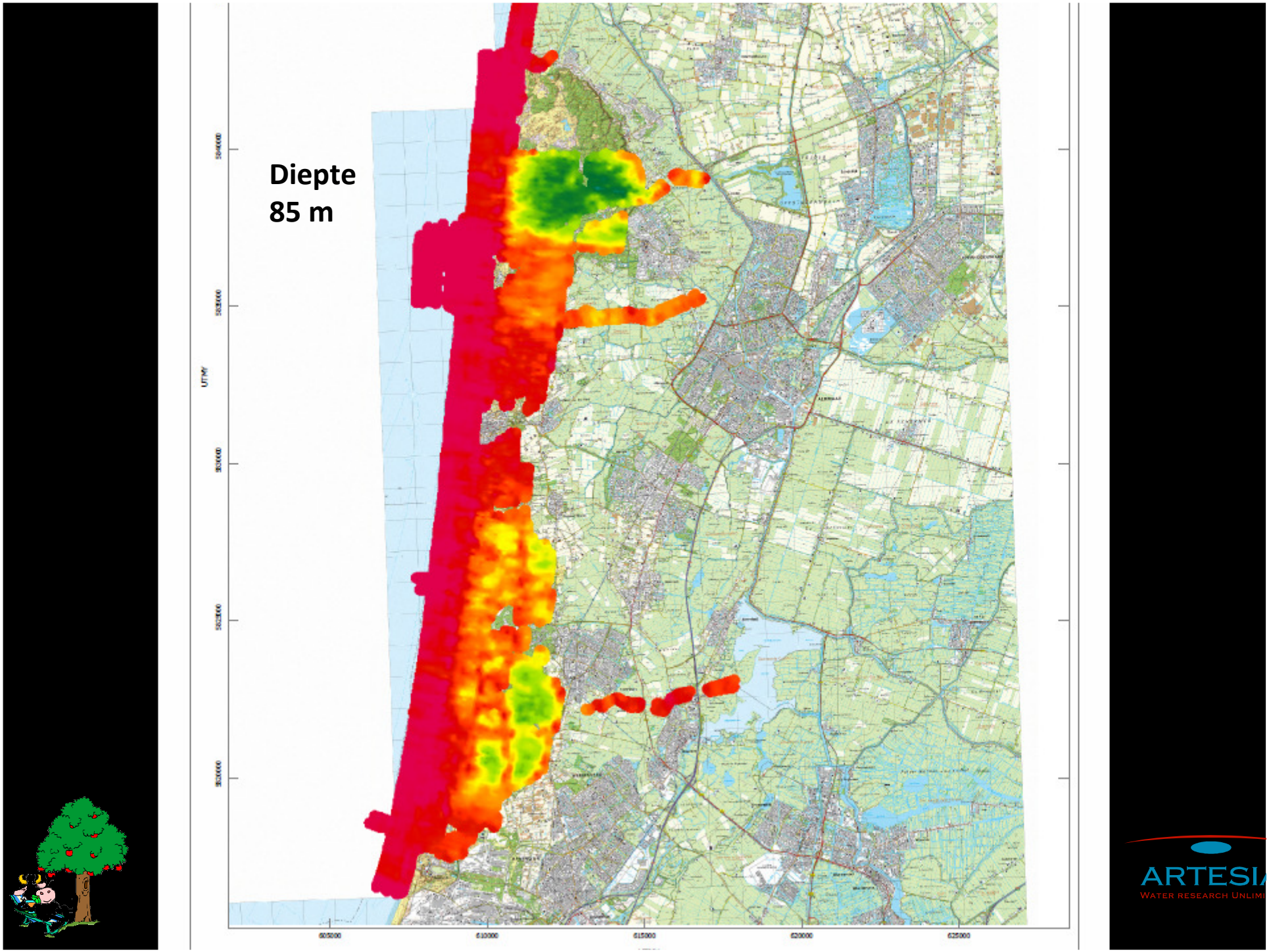
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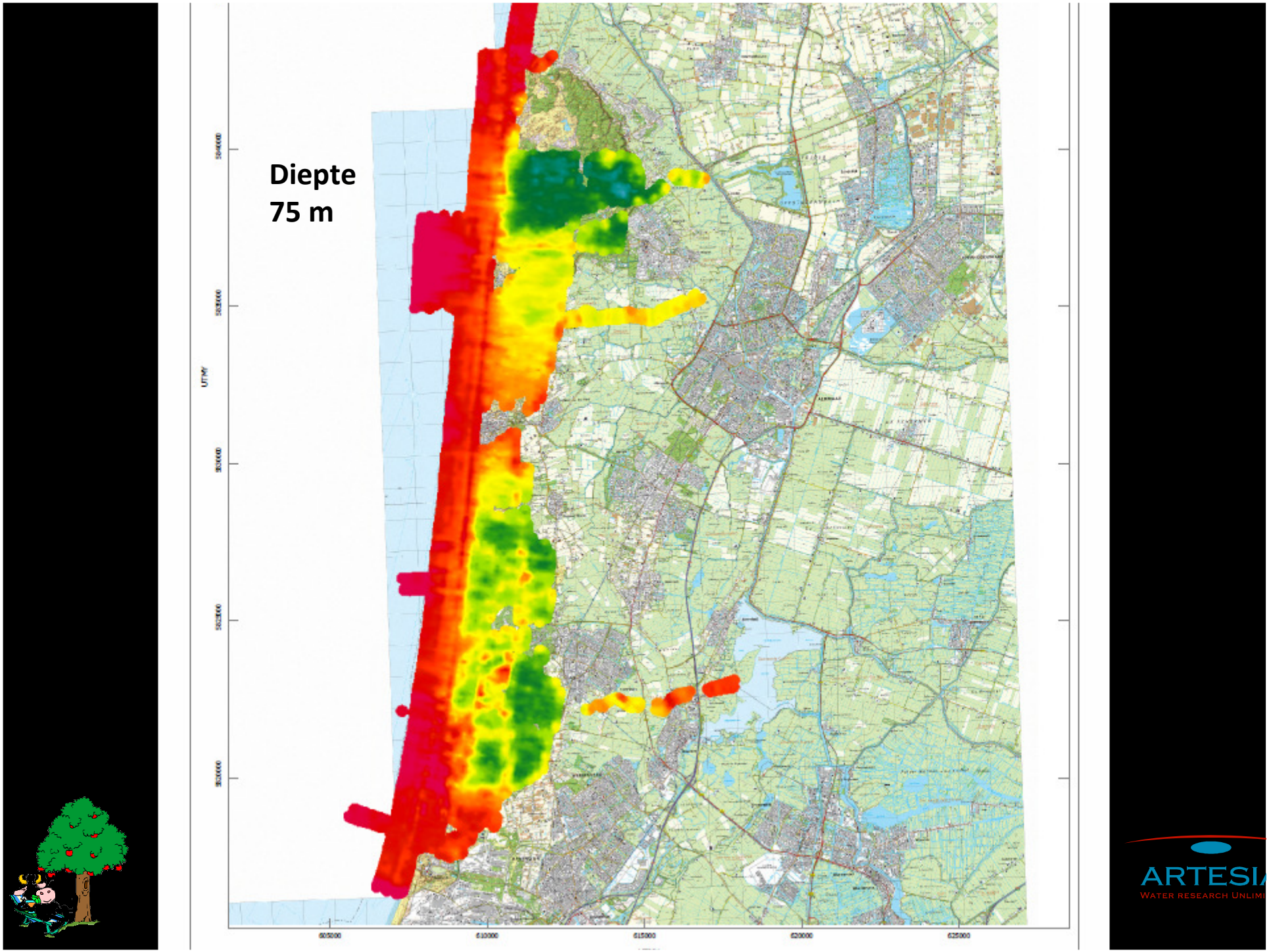
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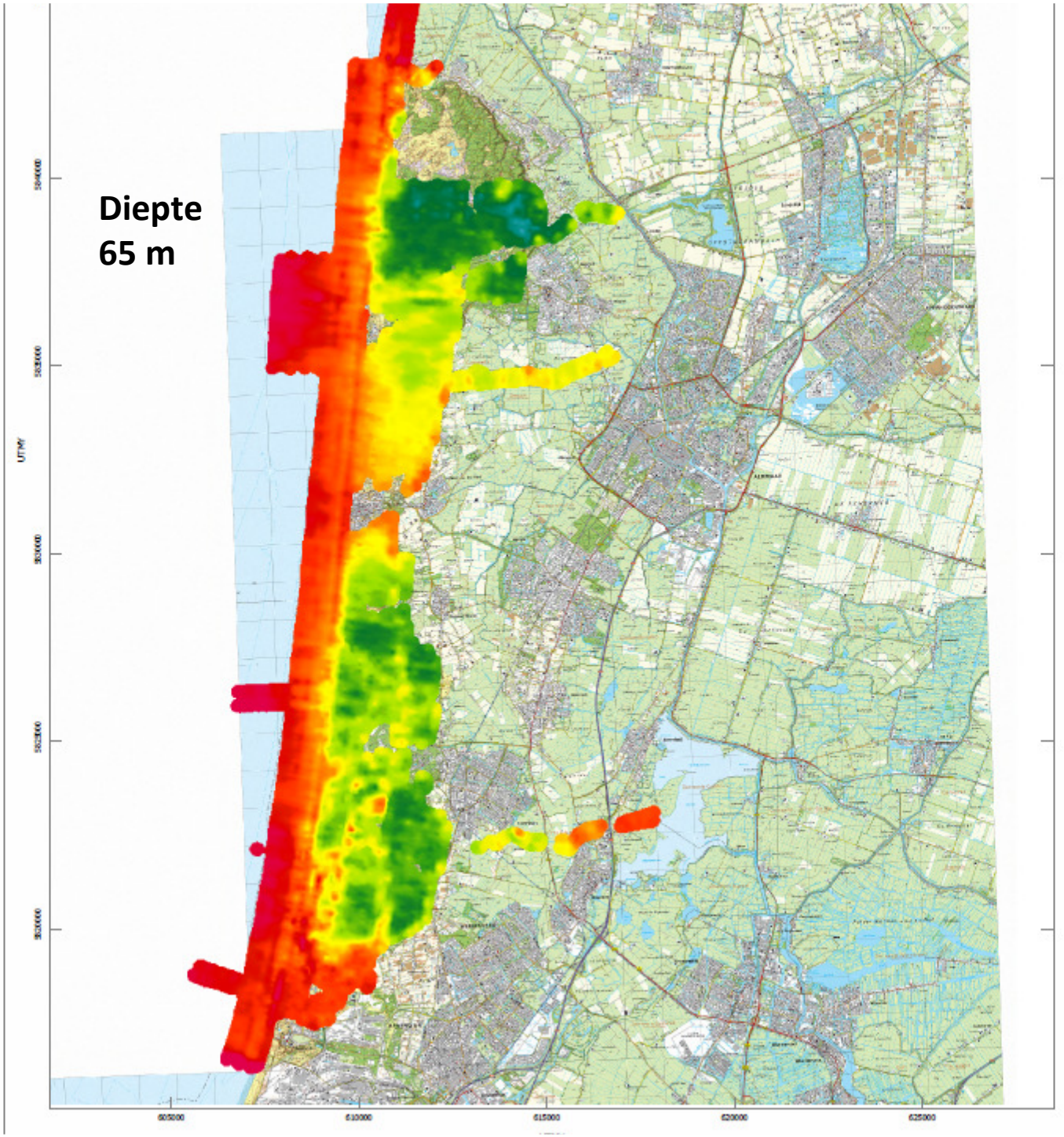
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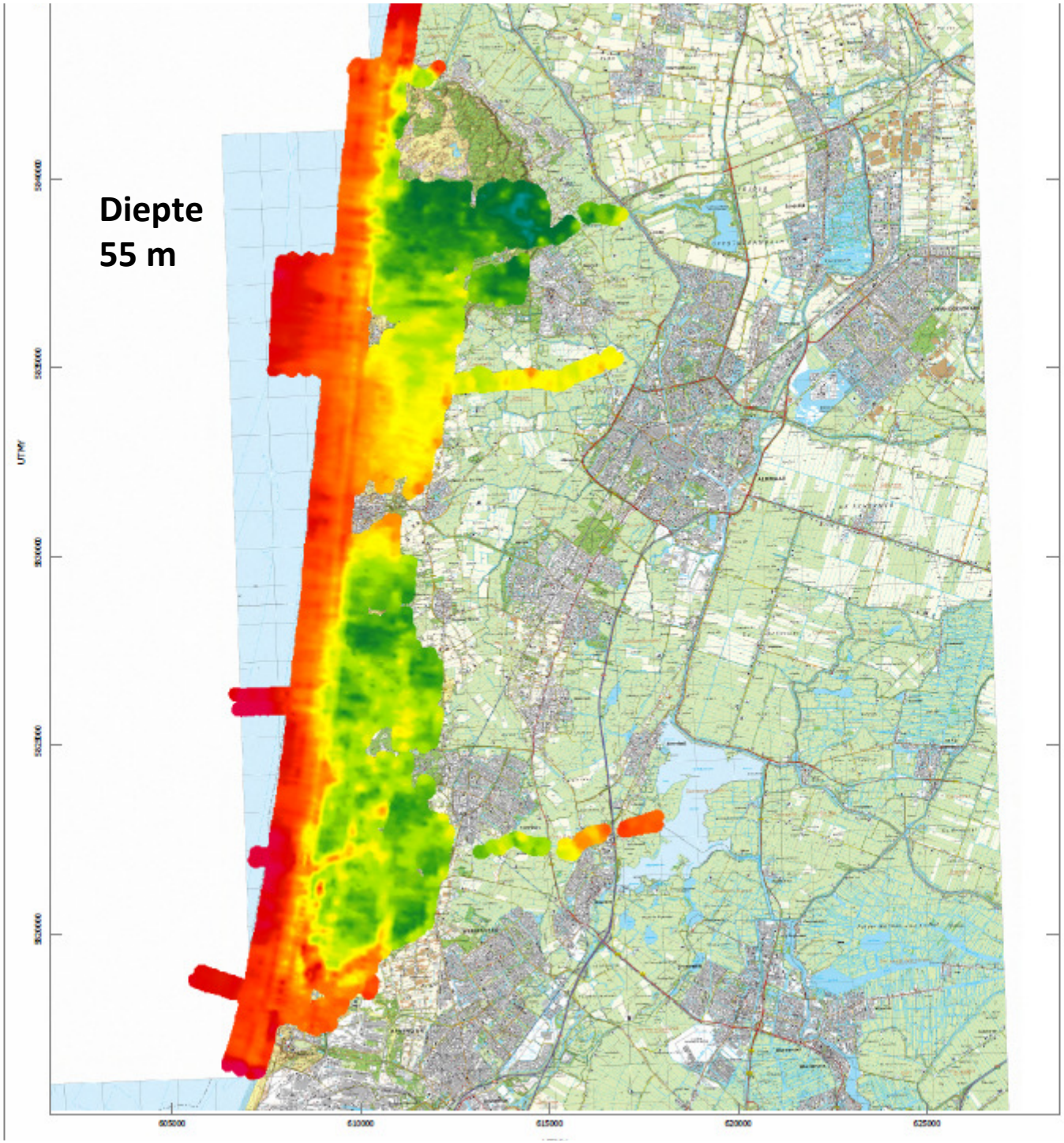
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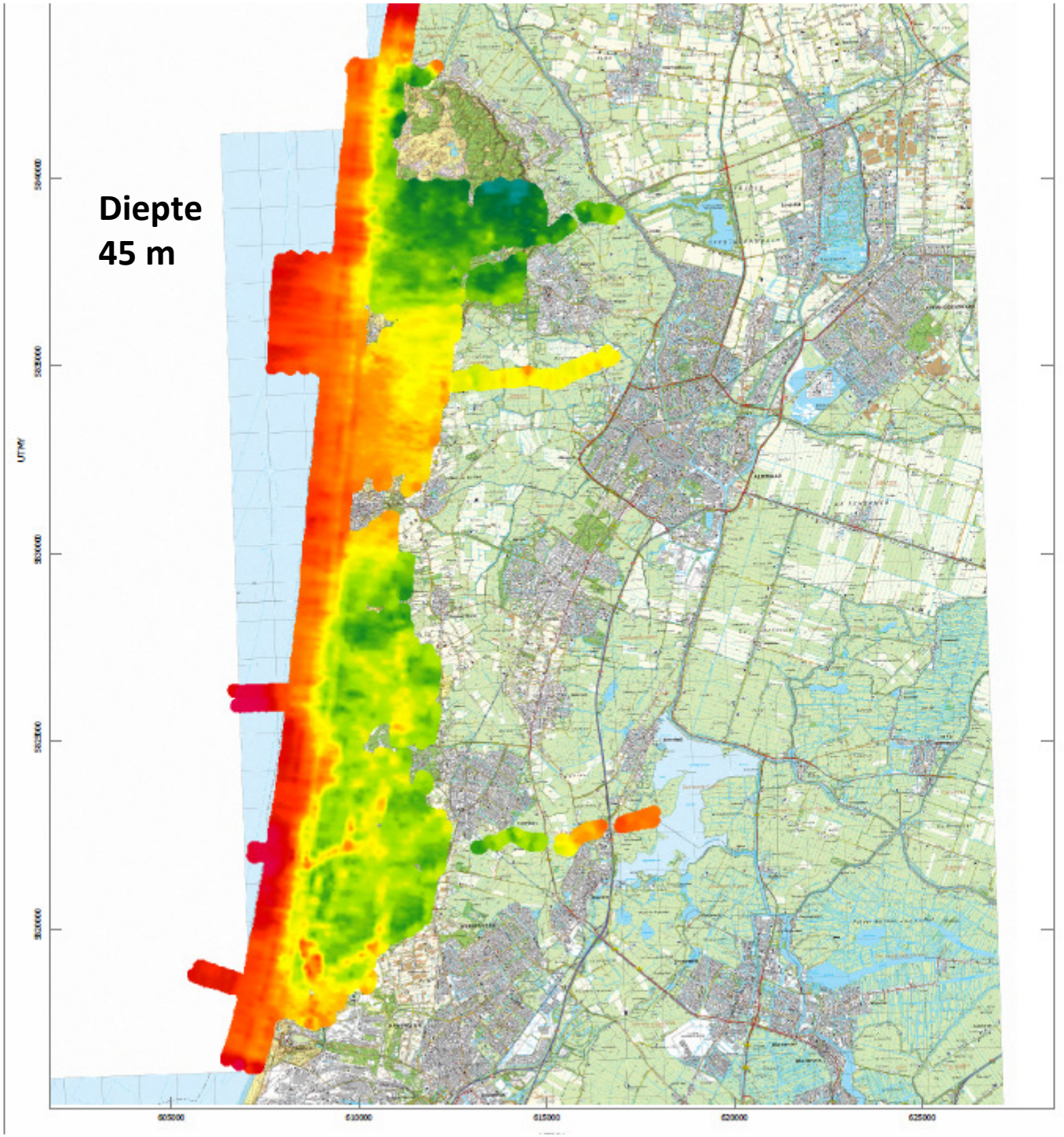
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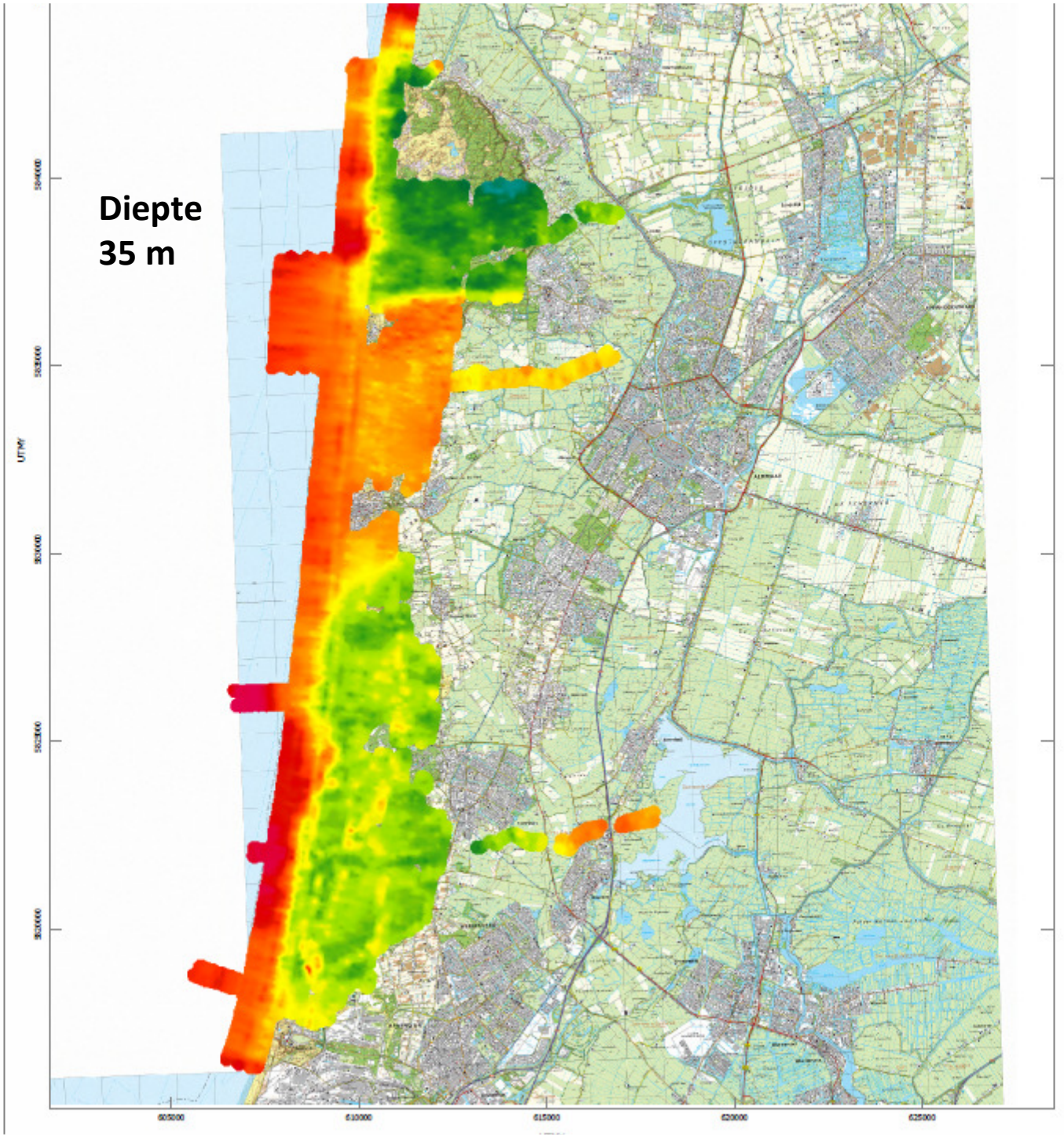

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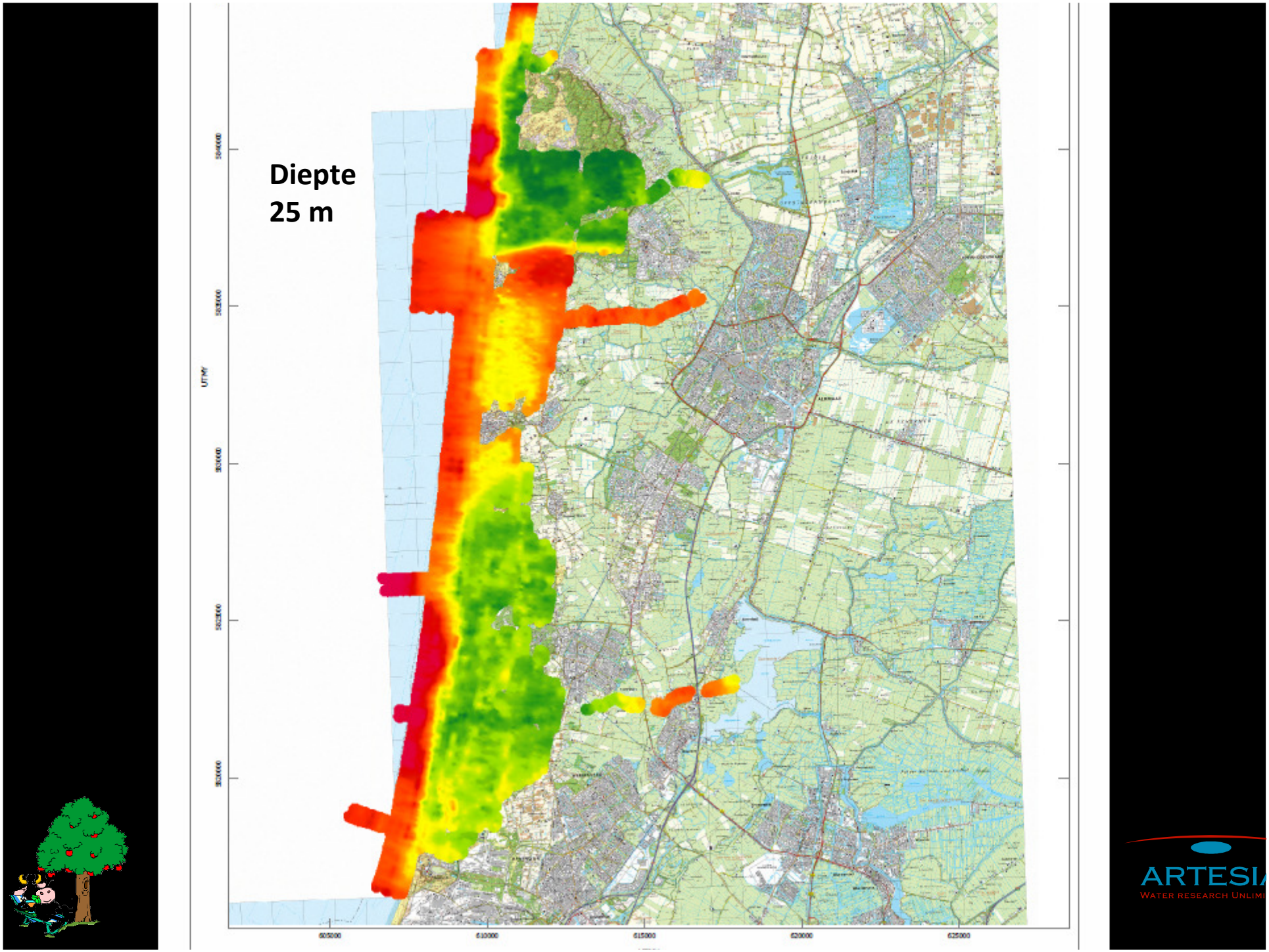
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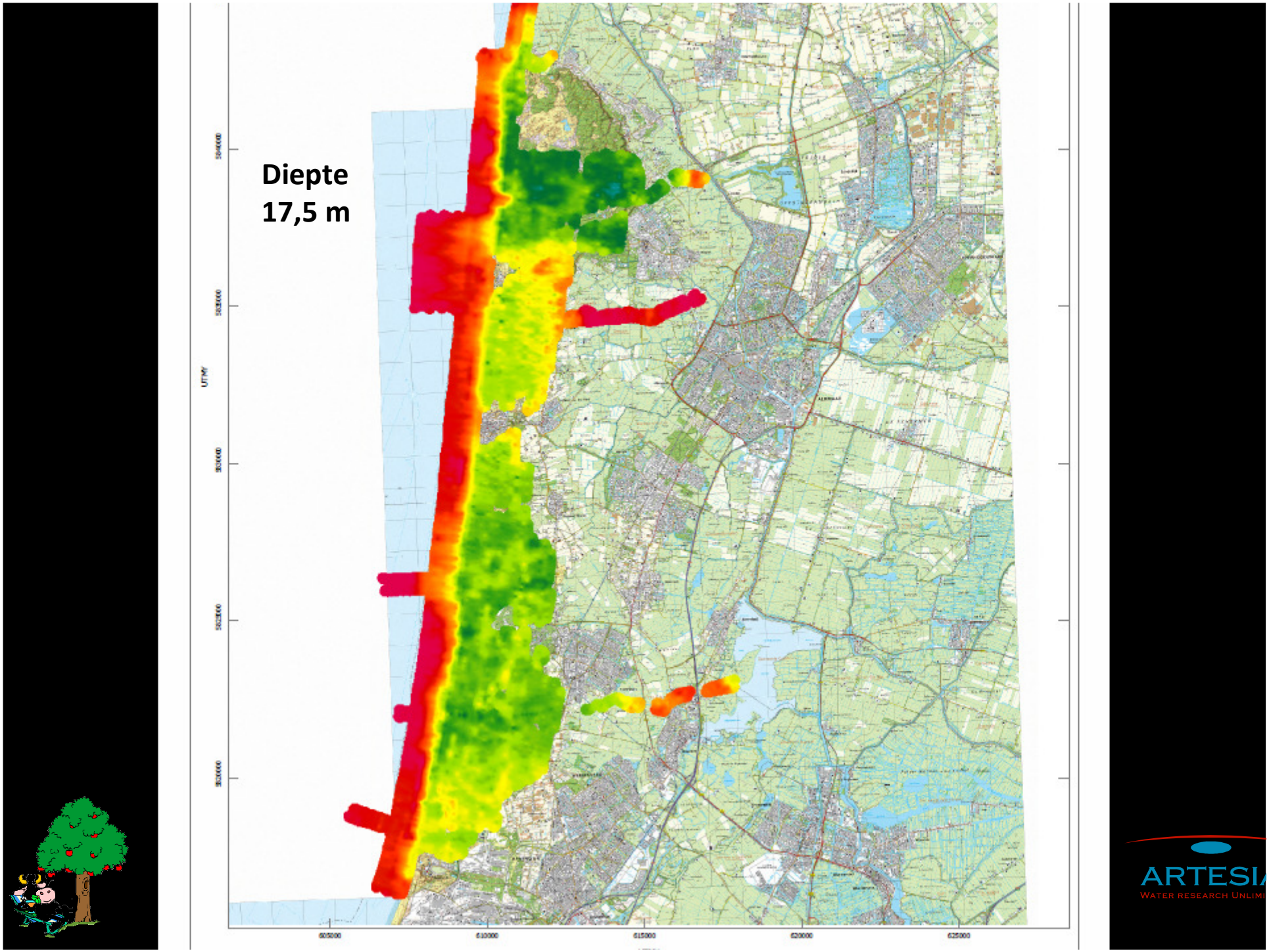
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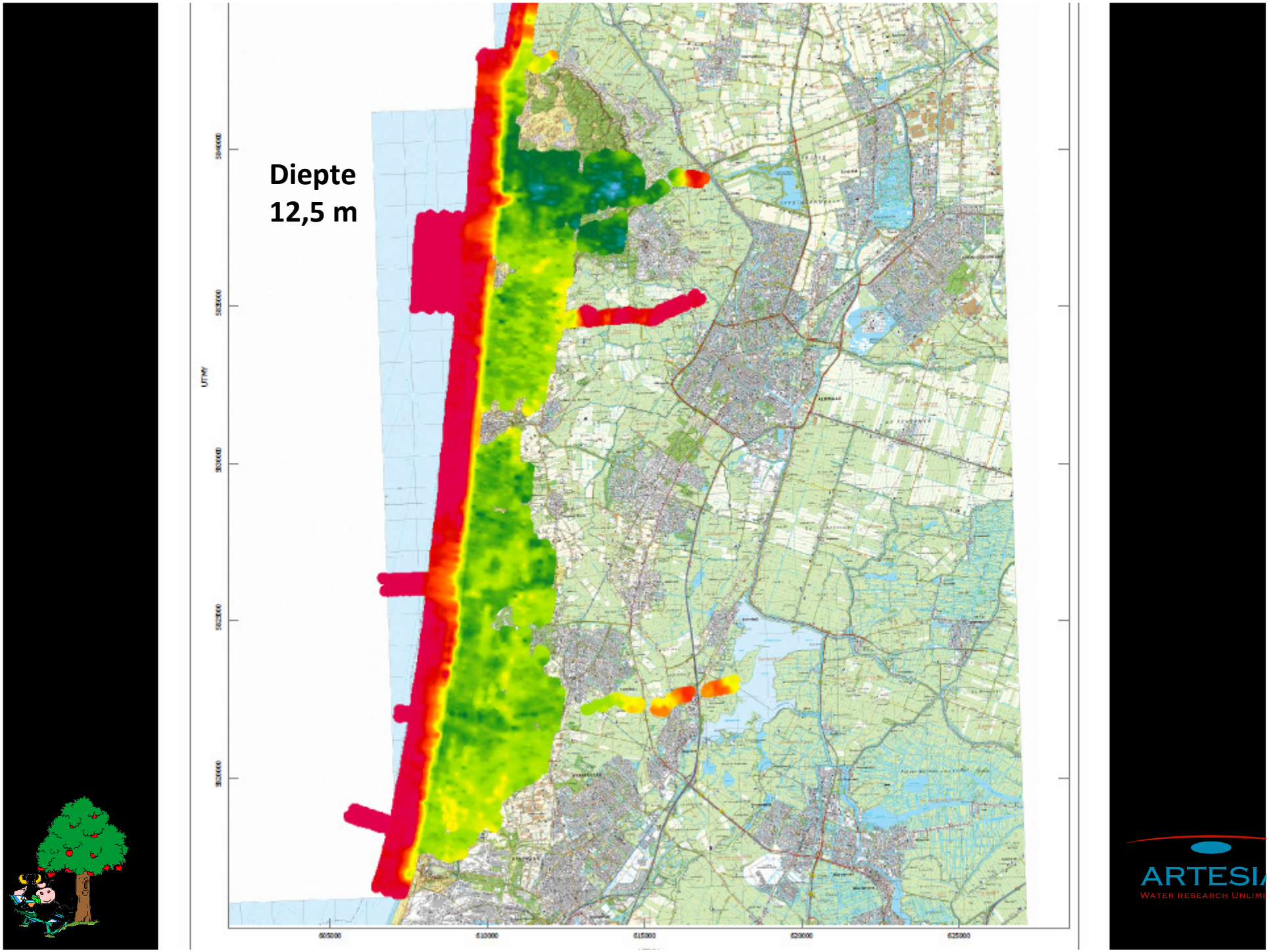
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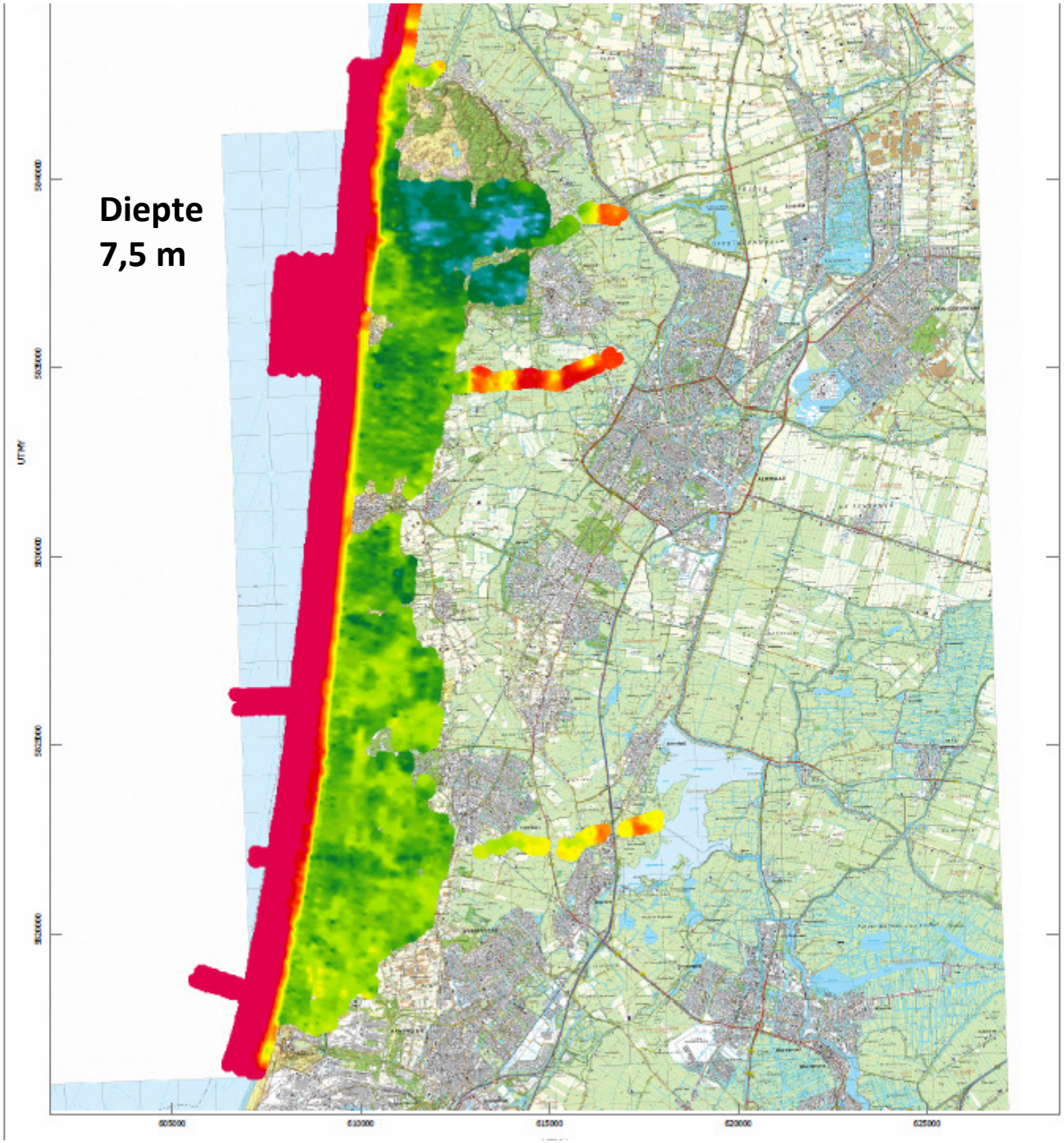

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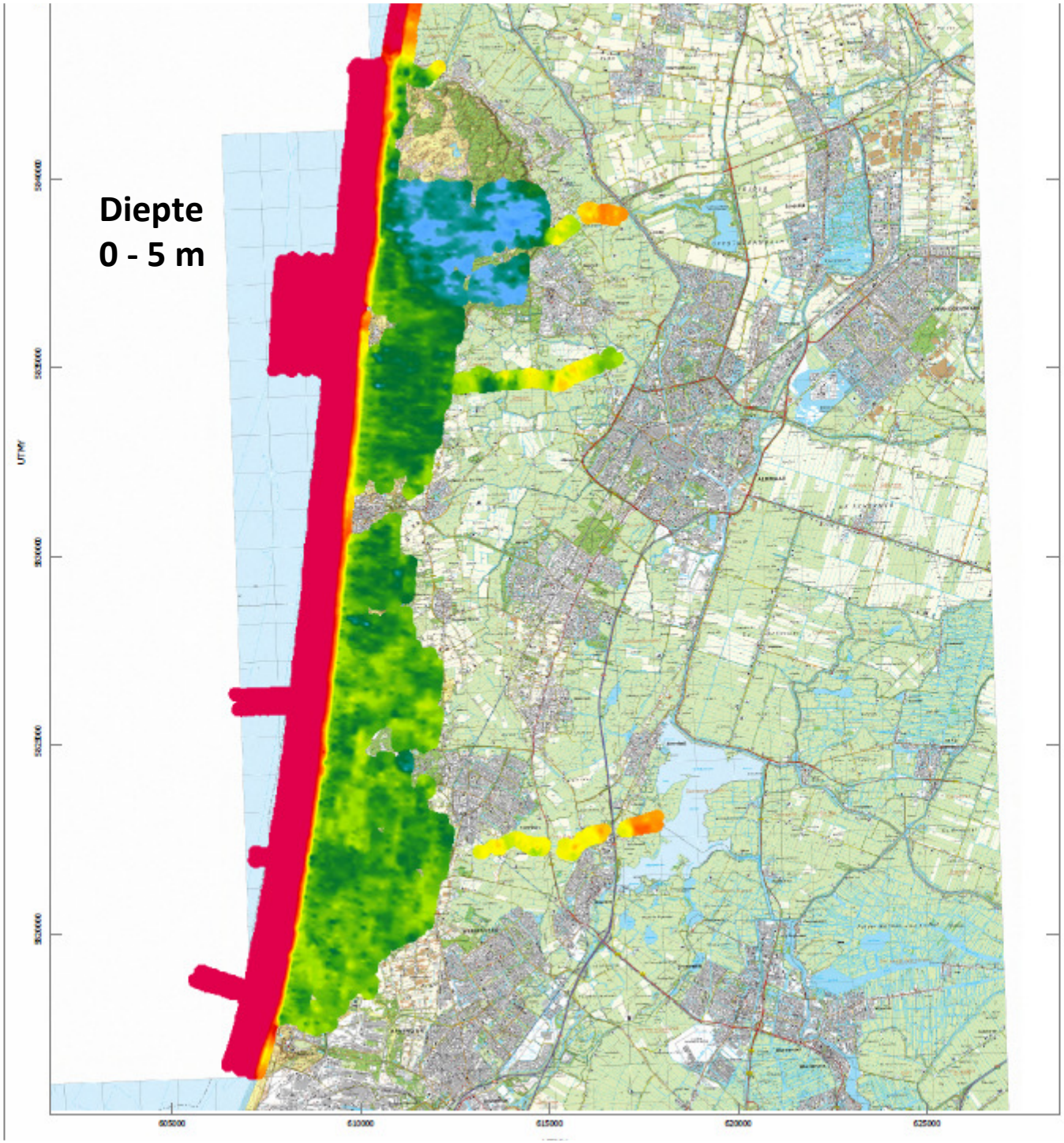

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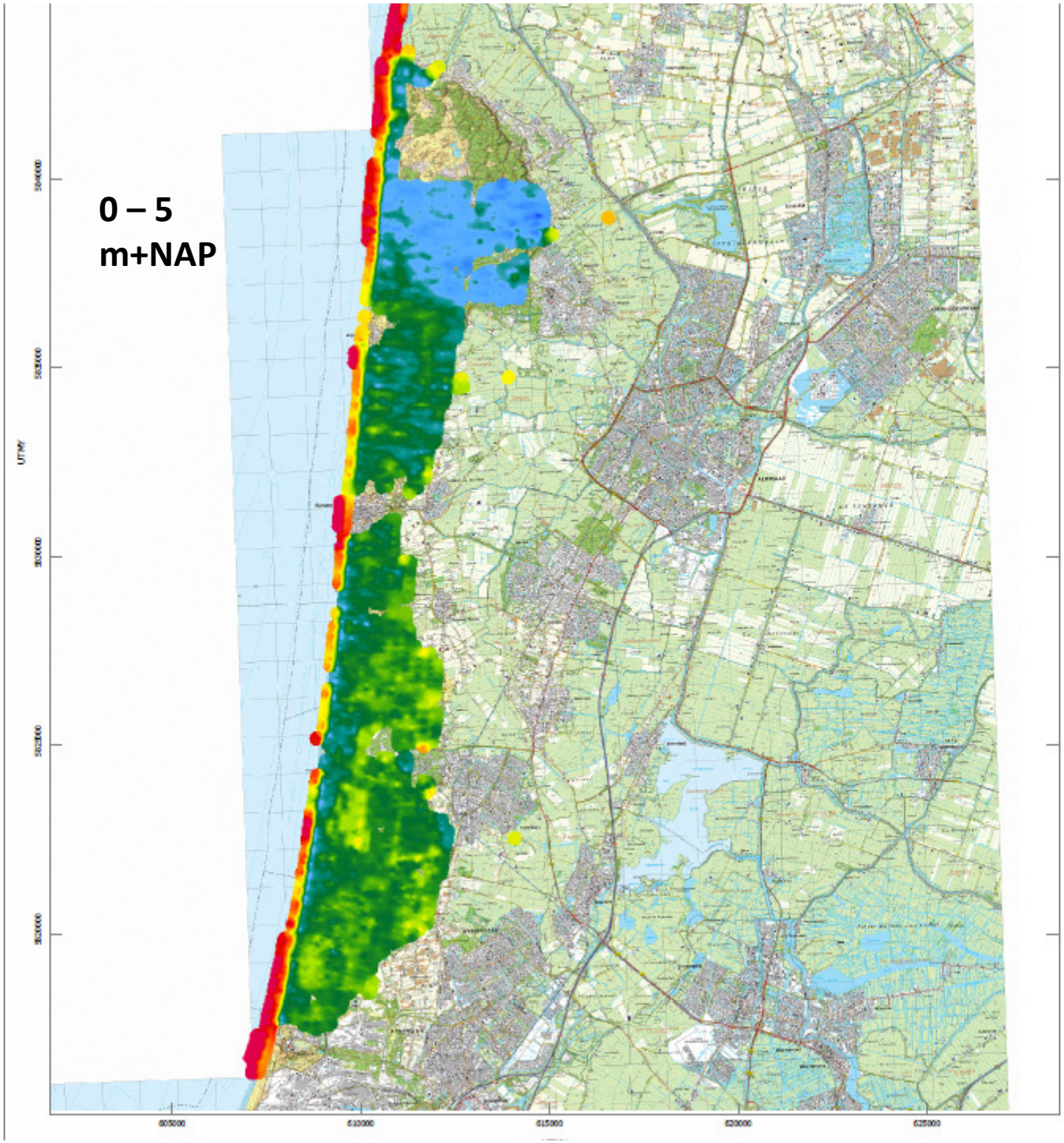

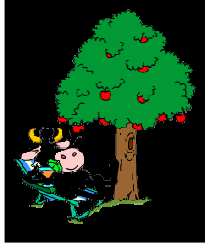

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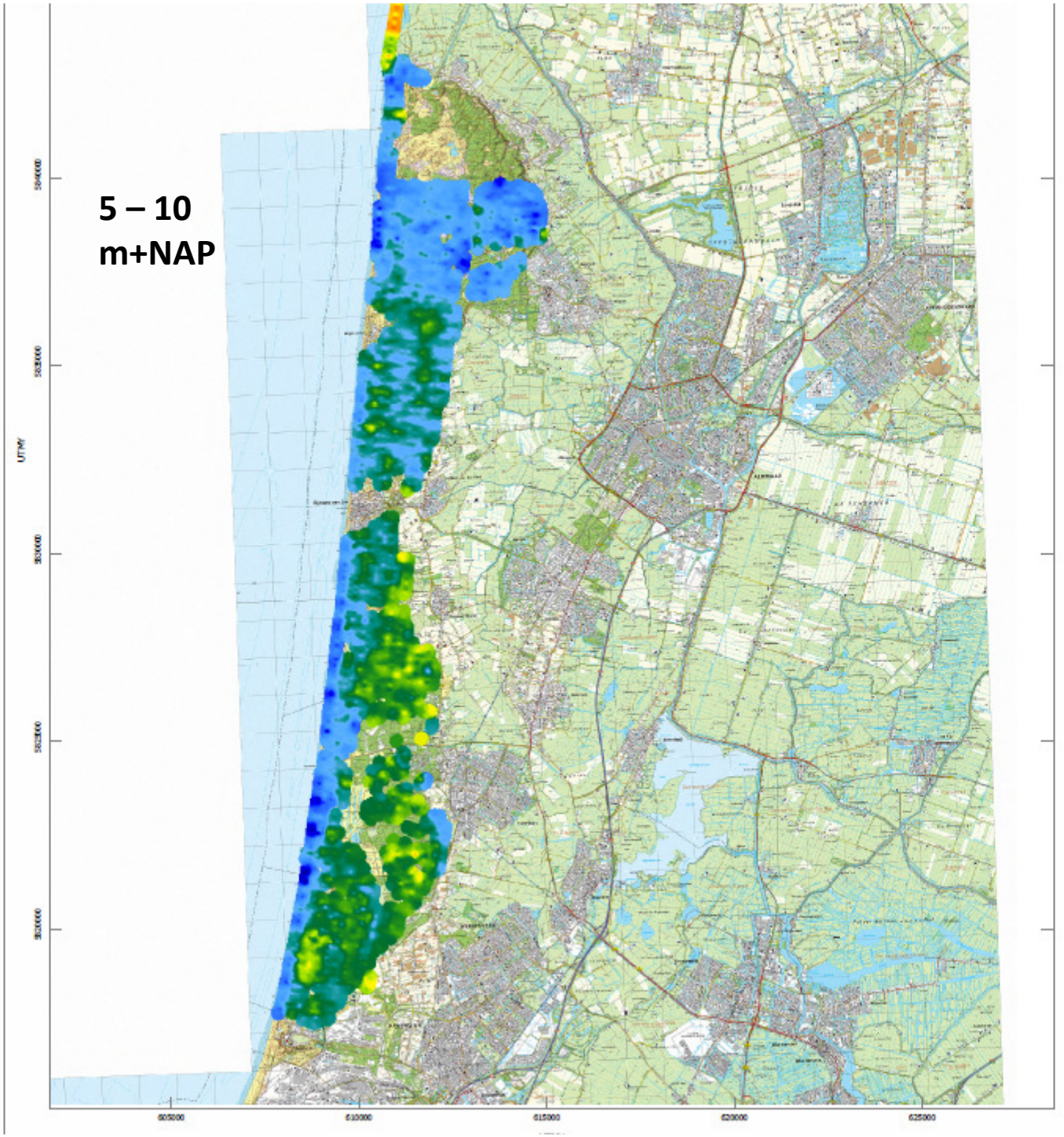

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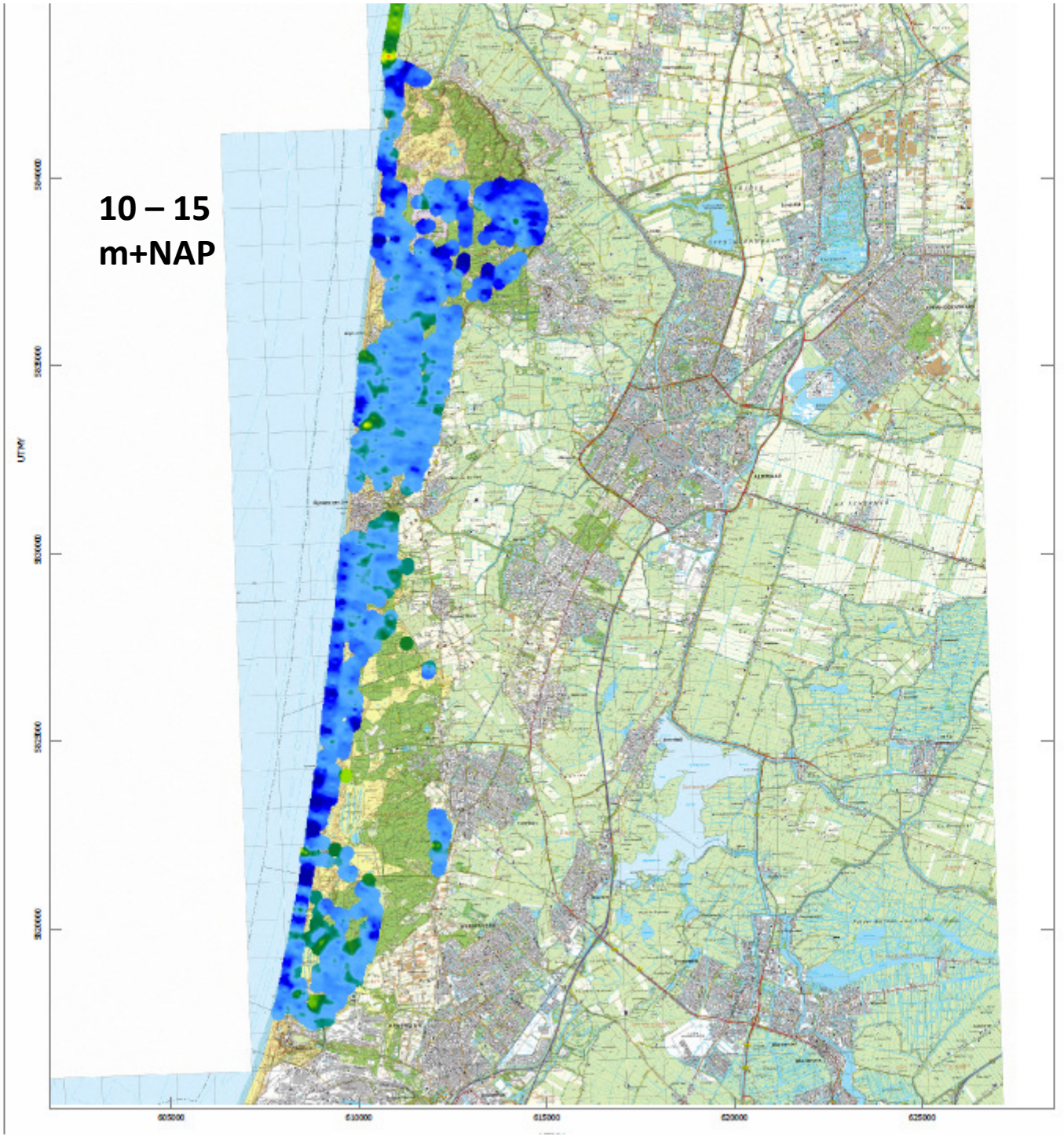

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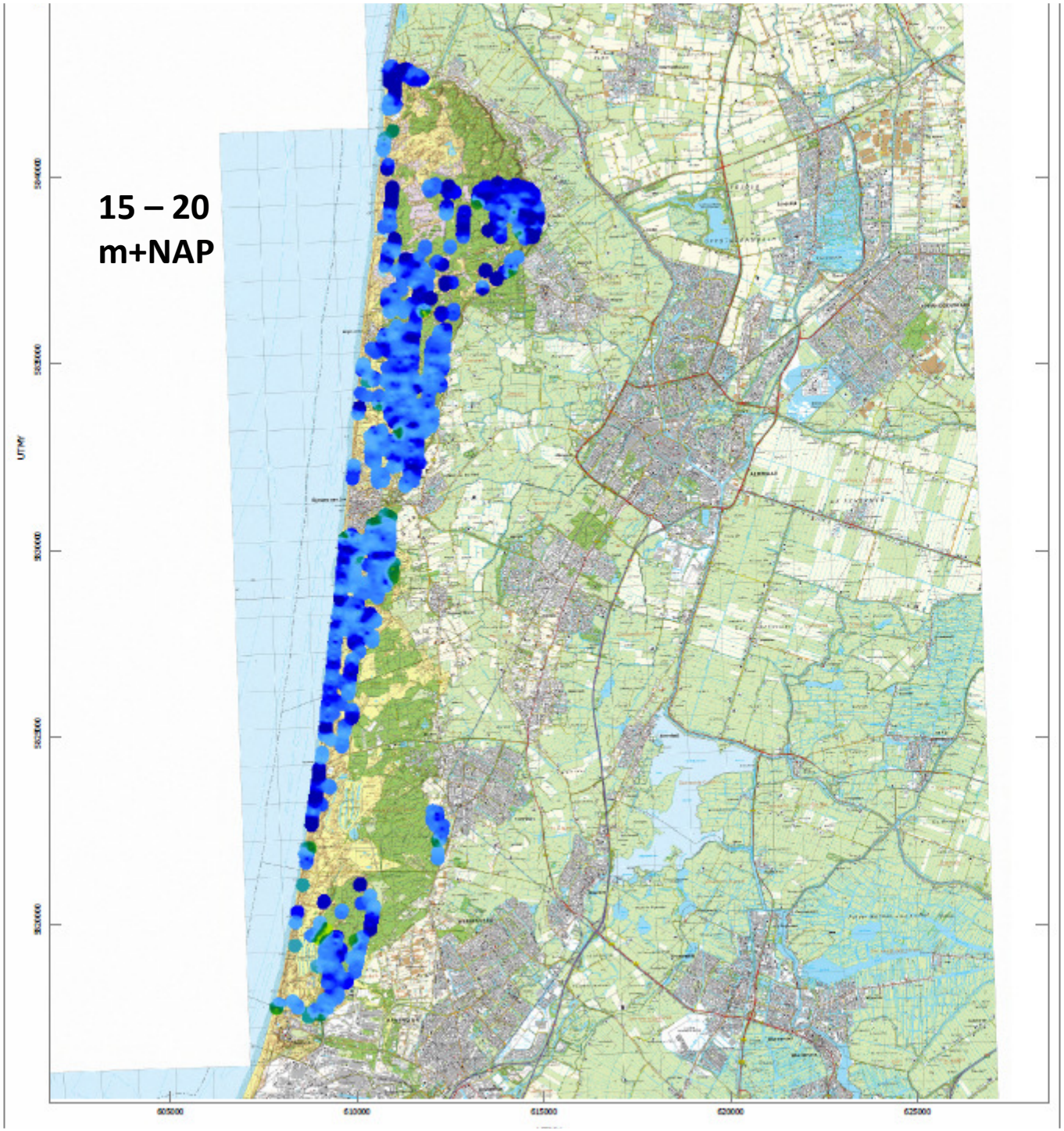

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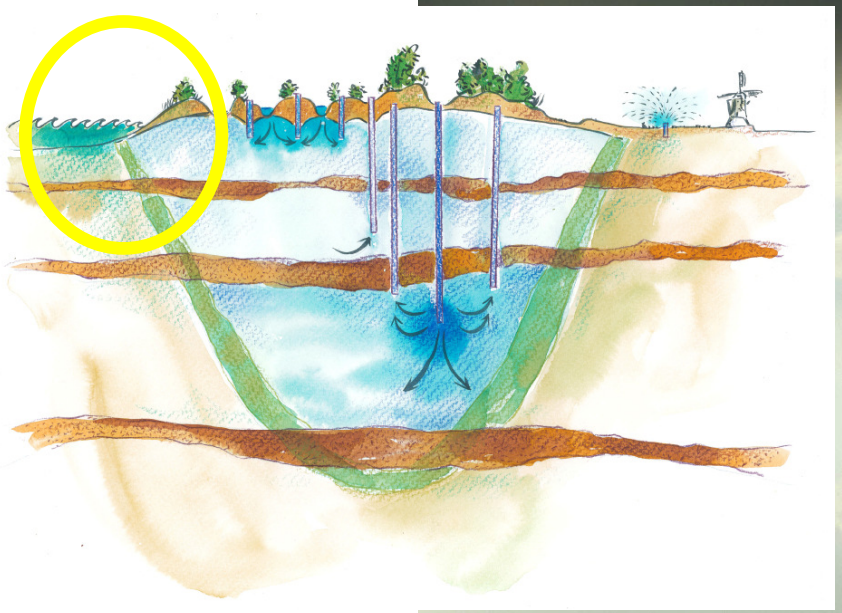
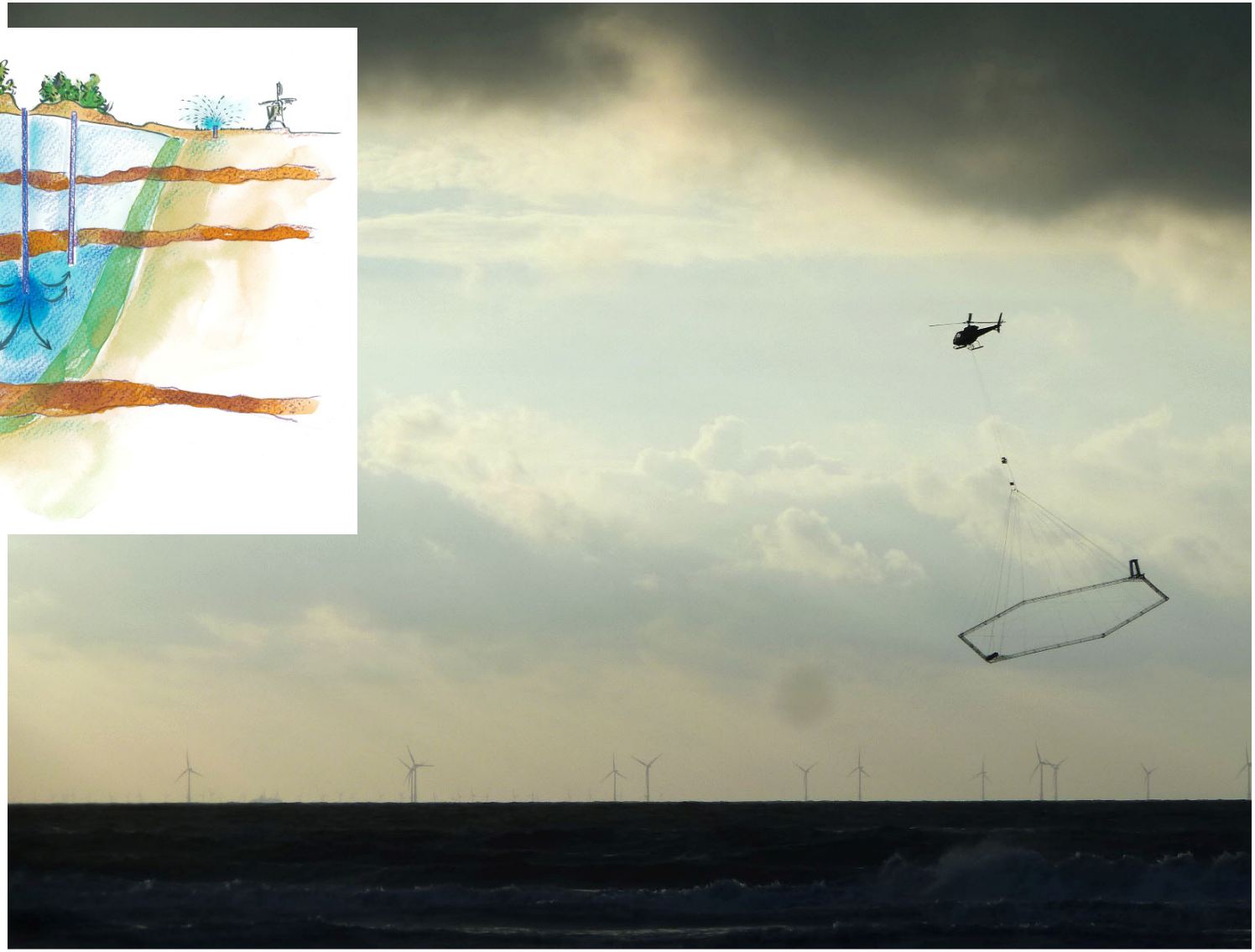
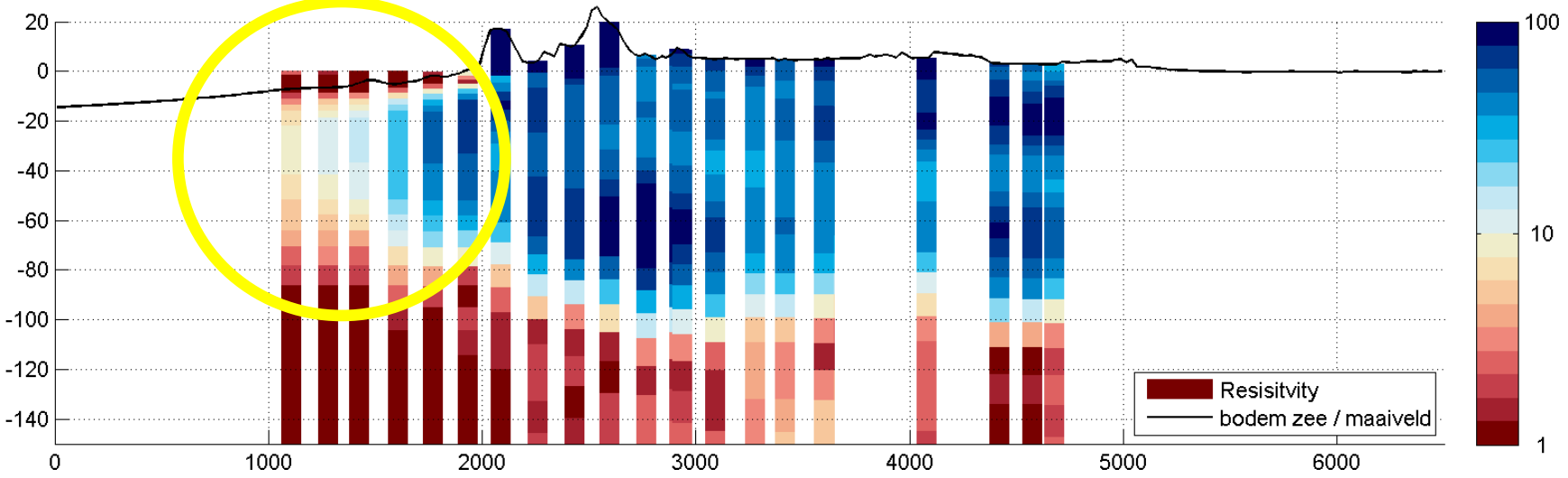
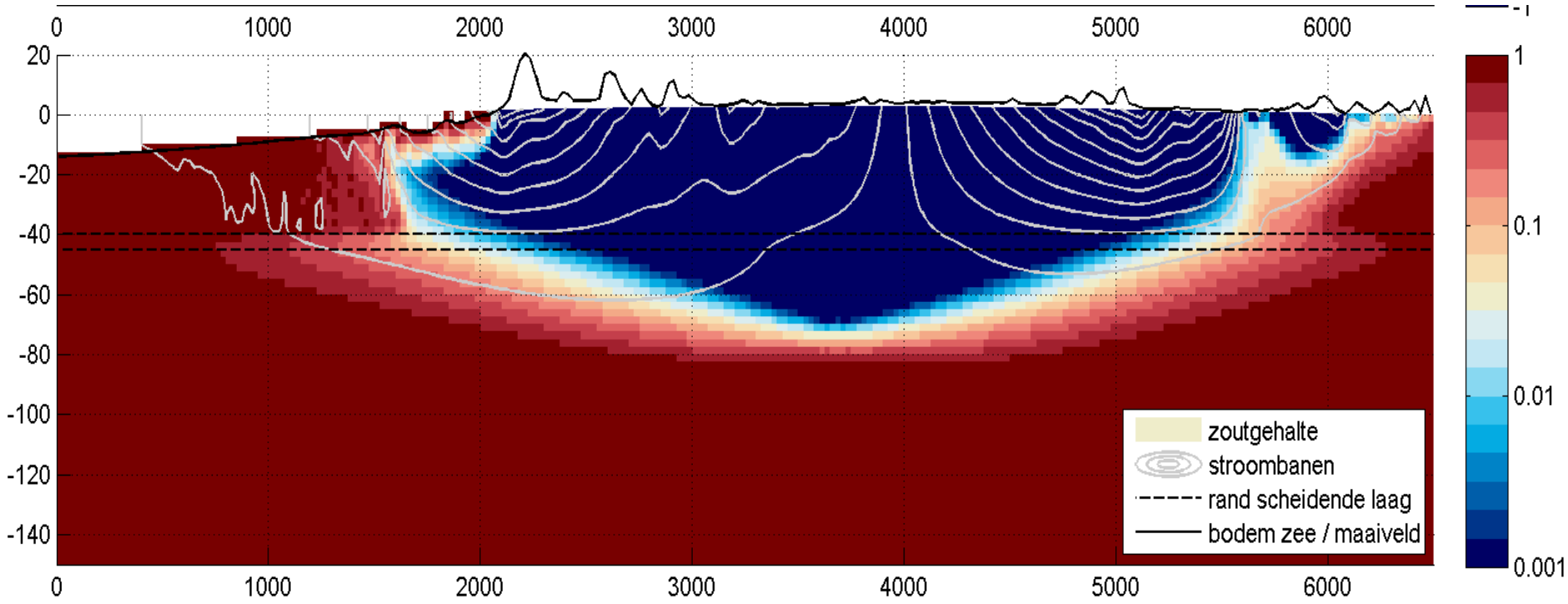
groundwater even under the sea





Fresh groundwater under the sea



Modelling fresh groundwater outflow under the sea