



Environmental risks involved with a new coastal defence approach

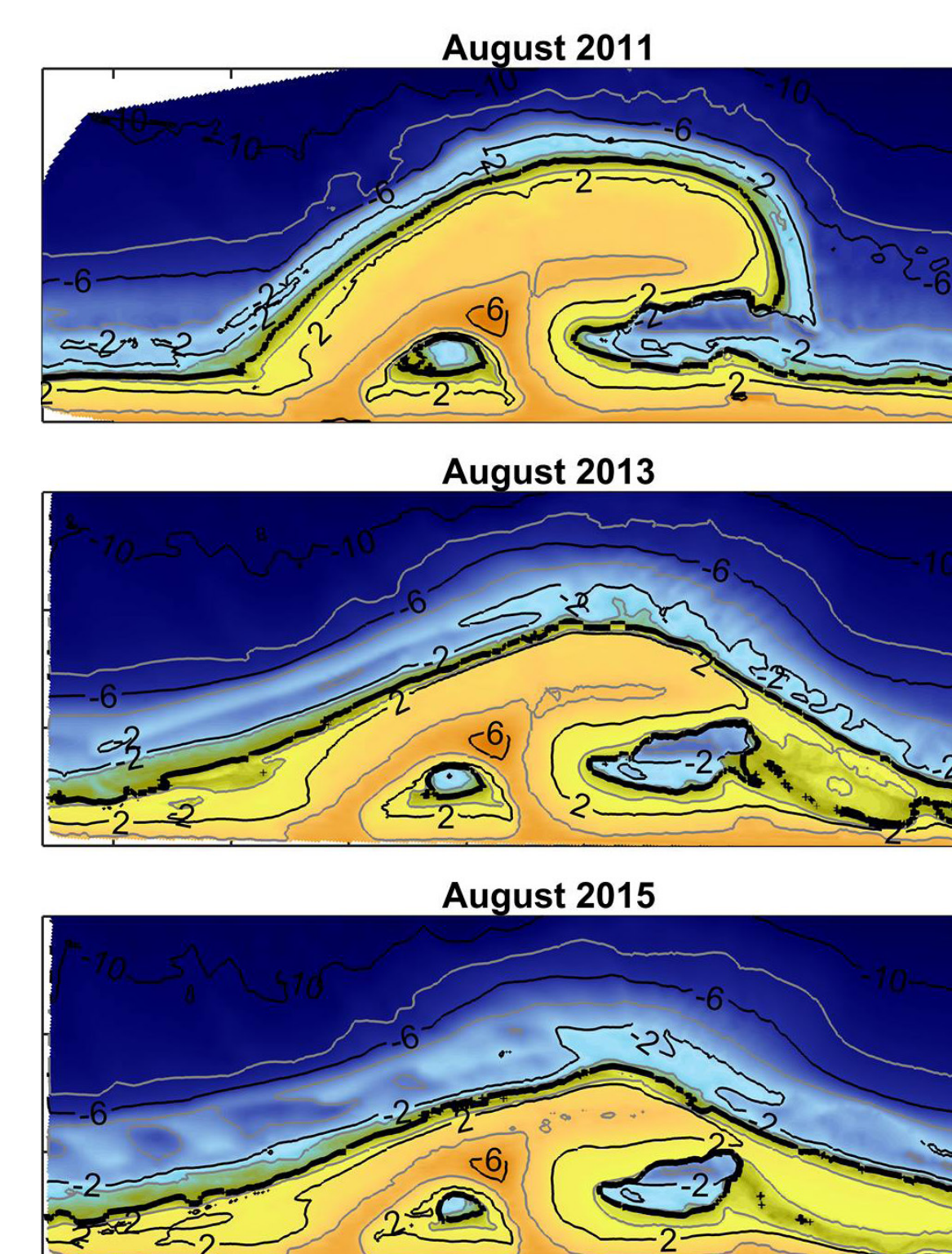
The Sand Engine

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To protect the Dutch hinterland from flooding sand is applied on the coastline since 1990. Because of a rising sea level the coast will become more vulnerable in the future and therefore the Netherlands is in need of a new coastal defence method. The innovative approach of the Sand Engine gears towards sustainability in which coastal defence goes along with ecology and recreation: **Building with Nature!**

The Sand Engine is a **21.5** million m³ shore nourishment at the Delfland coast (Netherlands) and created in **2011**.



The Sand Engine is expected to be fully incorporated in the beach and dunes within **20-30** years by the action of wind, waves and currents.

Project NatureCoast

12 PhD students from different disciplines (including natural and social sciences) collaborate: **multidisciplinary**.



3 post-docs integrate results and communicate with companies and governments: truly **transdisciplinary**

COMPANIES



GOVERNMENT



RESEARCH



Geochemically, the Sand Engine is different from traditional coastal defence methods

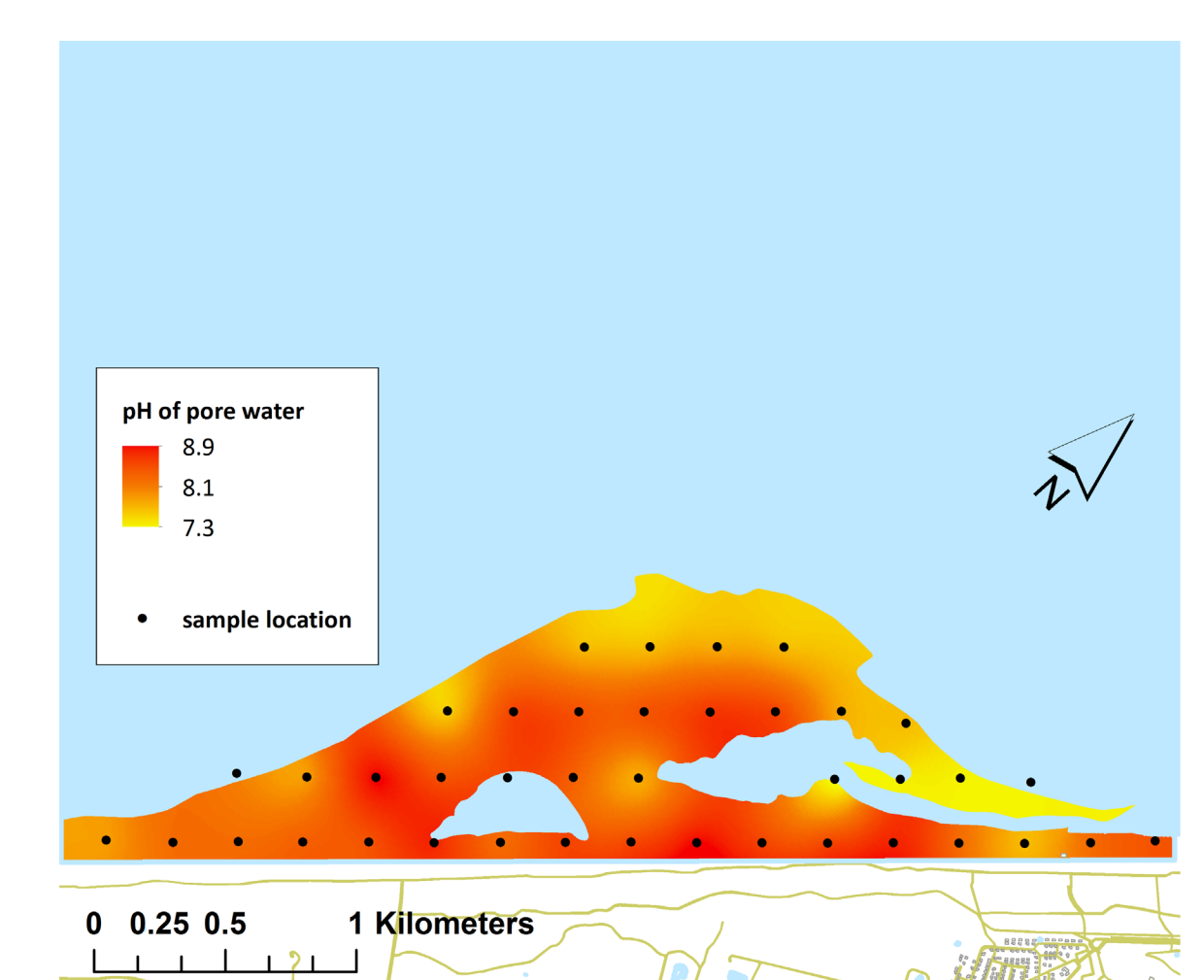
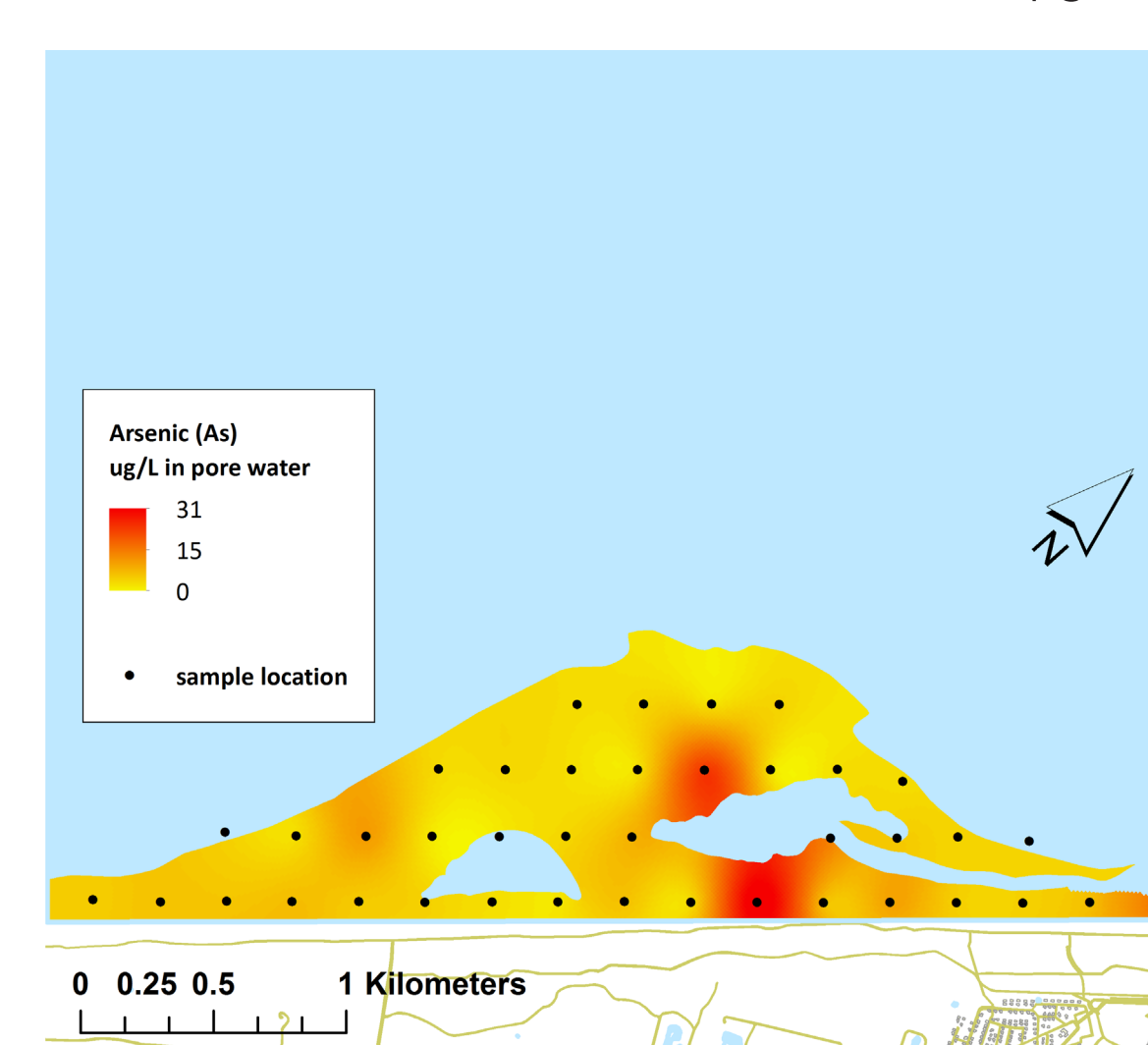
1. The Sand Engine contains twice as much sand as the total volume supplied annually along the entire Dutch coast. This implies intense local oxidation and freshening processes.

2. Its design generates sedimentation of organic matter, which negatively feeds back to the development of the Sand Engine (height, sand harvesting).

3. The chemical processes that occur at the Sand Engine influence the availability of nutrients. This may affect vegetation when the sand gets transported to the dune area.

Arsenic shows overall low concentrations in pore water except at the inner part of the hook where sedimentation occurs.

(Maximum Permissible Concentration = 31 µg/L)



pH of pore water is around 7.5 along the coastline and increases to 8.9 where the unsaturated zone is > 1m thick and freshening occurs.

