

## Pleistocene gravels on the Belgian offshore investigated for composition and provenance, towards a reassessment of the transport models

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### Abstract

Two sampling campaigns of the stony substrate in the Belgian offshore were conducted in the framework of IWT-SBO project SeArch with the oceanographic research vessel BELGICA in April and November 2014, with the objective of finding sites with potential archaeological remains and determining composition and provenance of gravel. The location of target areas was based on preliminary scanning for stony substrates. Priority was given to areas in between sand banks or in channels, where the Quaternary is known to be thin and Pleistocene paleochannels could be expected underneath the Holocene Southern Bight Formation. A bottom trawler, designed to catch coarse elements - from 6 to 40 cm - from the sea bottom was remade after the original model of Gilson (1900). Seven sites were sampled, producing different quantities of gravel material. Two sampling sites in the Hinder Banks area provided the majority of (encrusted and perforated) gravel samples, derived from thick exposed gravel beds. A sampling site in between the Goote and Akkaert Banks, consisted of in-situ “Paniselian” marly sandstone from the Gentbrugge Formation and some gravel as well.

Nearly 3000 (2995) stones were counted and grouped according to grain size and petrographic class on board of the research vessel. Of these 68% consisted of flint, 17% of (meta)sedimentary and (meta)igneous rocks, 13% of Paniselian sandstones (considered in-situ) and 2% other (from recent-anthropogenic to Cretaceous limestones). More than 1000 (1076) measured above 10 cm, in which the proportion of flint dropped to 50%, for 26% of (meta)sedimentary and (meta)igneous rocks, 22% of in-situ Paniselian (ripped of exposed sandstone layers, hence coming up in platy blocks) and 2% other. Samples of the different rock types are registered in the geo-collection of RBINS and provided thin sections for petrographic analysis. Of particular relevance is the frequent occurrence of Jurassic sandy limestones including Portlandian sandstones, Cretaceous silicified chalks, Paleozoic sandstones and arkoses, metamorphic psammites to pelites, orthogneiss and a suite of igneous rocks. Petrographic mixing and morphology point to a periglacial fluvial transport process of northwestern, British provenance, stratigraphically included in the California Glaciogenic Group, Well Ground Formation (MIS 3). Cretaceous to (mainly) Jurassic rocks suggest the NE English coastal zones as source area, the (meta)sedimentary rocks suggest the Scottish Midland Valley, the orthometamorphic and igneous rocks the Scottish Highlands, as none of the diagnostic Baltic igneous rocks are present. These preliminary results are not in line with recent ideas about sediment fluxes in the North Sea Basin, but confirm earlier petrographic investigations both on land and offshore in Belgium and the UK.