



## **Holocene palaeoDEMs for lowland coastal and delta plain landscape reconstructions**

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Geological mapping of Holocene deposits of coastal plains, such as that of The Netherlands can reach high resolution (dense population, diverse applied usage) and good time control (<sup>14</sup>C dating, archaeology). The next step is then to create time sliced reconstructions for stages in the Holocene, peeling of the subrecent and exposing past relief situation. This includes winding back the history of sea-level rise and delta progradation etc. etc. So far, this has mainly been done as 2D series of landscape maps, or as sea-level curve age-depth plots.

In the last decade, academic and applied projects at Utrecht University, TNO Geological Survey of The Netherlands and Deltares have developed palaeoDEMs for the Dutch low lands, that are a third main way of showing coastal plain evolution. Importantly, we produce two types of palaeoDEMs: (1) geological surface mapping using deposit contacts from borehole descriptions (and scripted 3D processing techniques – e.g. Van der Meulen et al. 2013) and (2) palaeogroundwater surfaces, using sea-level and inland water-level index-points (and 3D kriging interpolations – e.g. Koster et al. 2016). The applications for the combined palaeoDEMs range from relative sea-level rise mapping and assessment of variation in rate of GIA across the coastal plain, to quantification of soft soil deformation, to analysis of pre-embankment extreme flood levels.

Koster, K., Staffeu, J., & Cohen, K.M. (2016). Generic 3D interpolation of Holocene base-level rise and provision of accommodation space, developed for the Netherlands coastal plain and infilled palaeovalleys. *Basin Research*. DOI 10.1111/bre.12202

Van der Meulen, M.J., Doornenbal, J.C., Gunnink, J.L., Staffeu, J., Schokker, J., Vernes, R.W., Van Geer, F.C., Van Gessel, S.F., Van Heteren, S., Van Leeuwen, R.J.W. & Bakker, M.A.J. (2013). 3D geology in a 2D country: perspectives for geological surveying in the Netherlands. *Netherlands Journal of Geosciences*, 92, 217-241. DOI 10.1017/S0016774600000184