Can diatoms indicate shore displacement on Lygra?

A core was taken from the profundal sediments of the bog and analyzed to determine when the sea level changed. Diatoms were used to understand the sea-lake transition.

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INTRODUCTION

- Diatoms are microscopic algae: the siliceous cell wall is generally well preserved in sediments (Round, Crawford & Mann, 1990)
- Many species are characteristic of high or low salinity waters: some species persist better at high salinity concentrations, while others at low salinity concentrations (Potapova & Charles, 2003)
- Heavy concentrations of salt ions may restrict some species from flourishing (ibid.)

AIM

To use diatoms assemblies to reconstruct shoreline displacements, identifying genus and their environmental salinity preferences. Then, correlate this information to other data sets in order to date the shoreline displacement.

METHOD

- 1 cm^3 samples were taken and prepared from the area of the core showing clear lithographic change from grey silty layer with shells to dark brown organic layer
- Diatoms were examined under light microscope to identify genus or species, the nomenclature was standardised throughout
- Diatoms were eliminated from analyses that could not be identified or that could not be used as indicators of salinity
- PCA to reveal the associations between species composition of diatoms at different depths using R version 3.3.0, R Core Team (2016)
- Stratigraphic analysis to compare change through depth using C2 program (Staff.ncl.ac.uk, 2014)
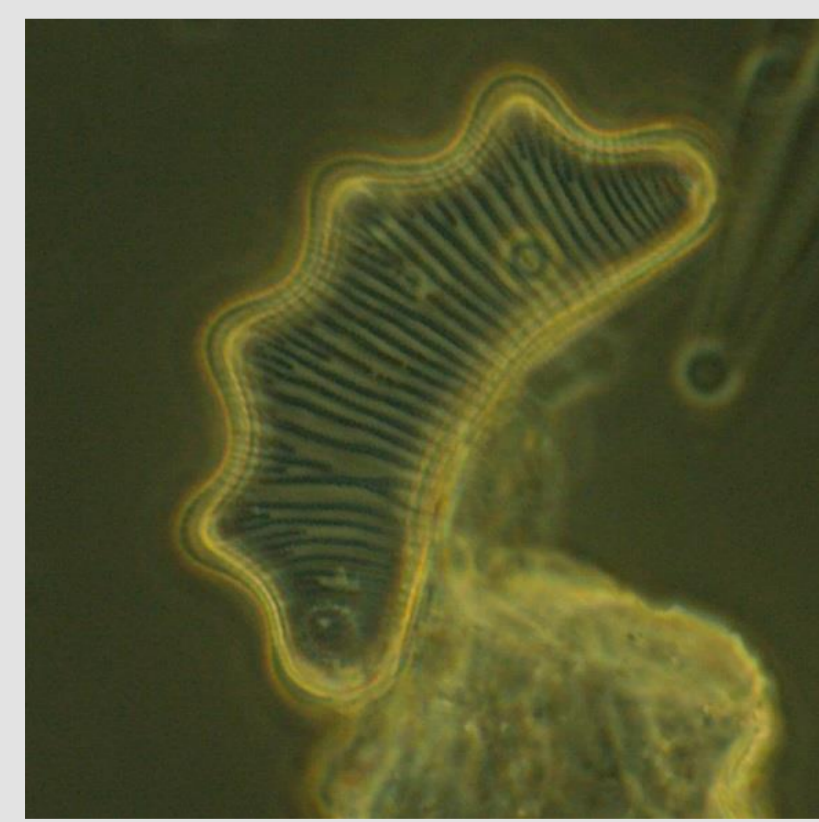
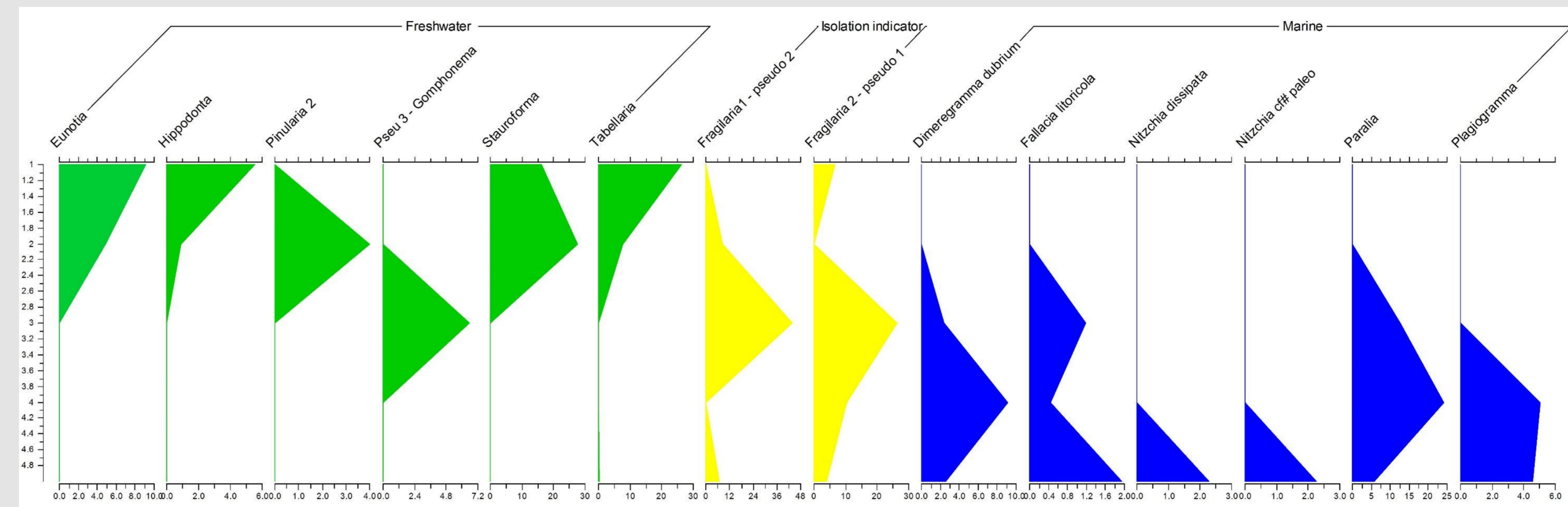*Eunotia* sp.   *Fragilaria* sp.   *Plagiogramma* sp.

Figure 1: Diatom diagram showing how the different genera change through depth. Genera have been grouped by environmental preference.
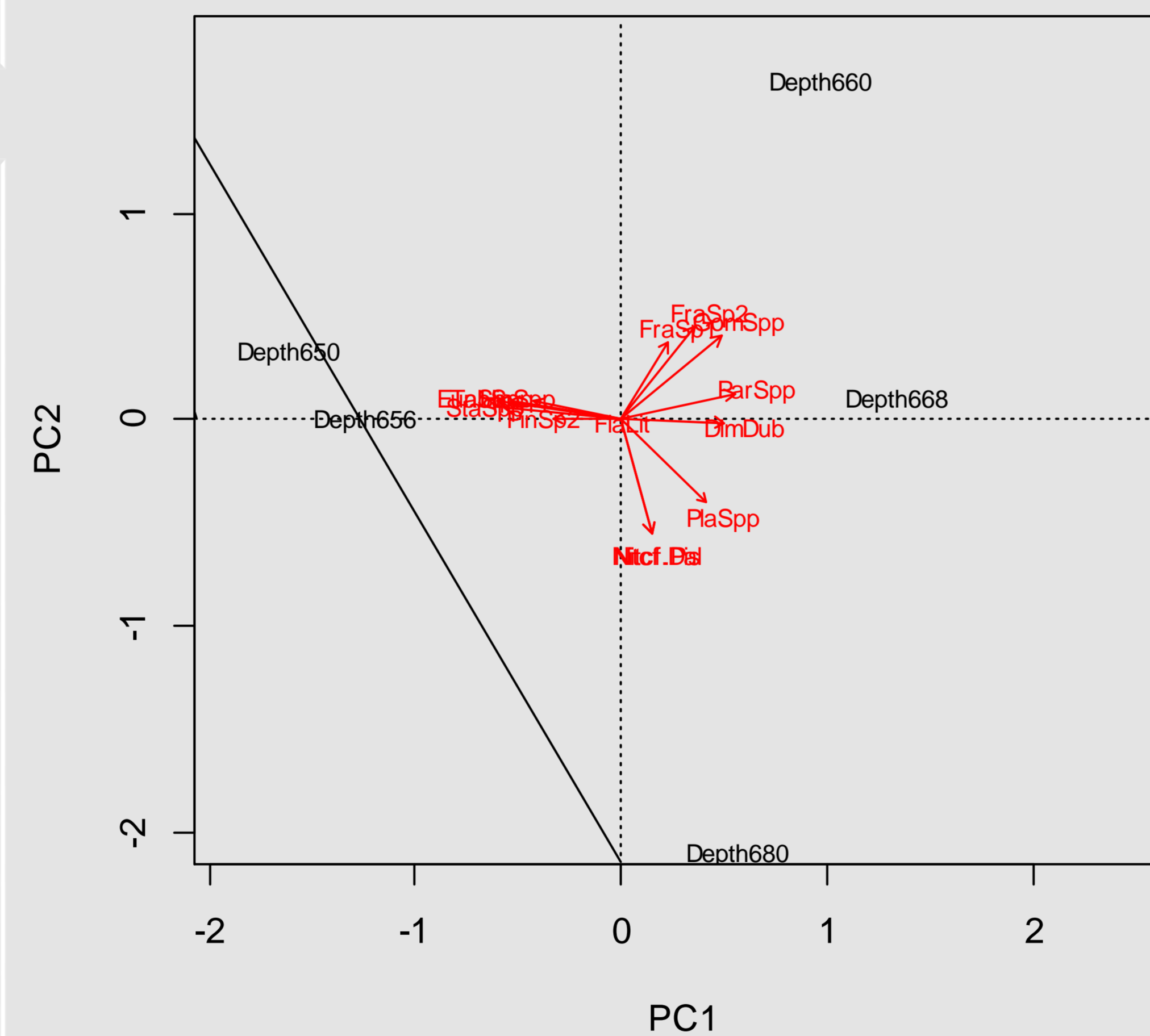

Figure 2: Results of the PCA analysis showing the association between species composition of diatoms species communities and soil depth.

RESULTS

- The 1st and 2nd axis of the PCA explained 46.97%, and 25.27% of the total variation of the dataset respectively. This is 72.24% of the variation explained by 2 ordination axis.
- Depths 650cm & 656cm are associated with freshwater diatoms *Tabellaria* spp., *Stauraforma* spp., *Eunotia* spp., and *Pinularia* sp.
- Depth 660cm is associated with 2 of *Fragilaria* spp.
- Depths 668cm and 680cm are associated with different marine species such as; *Paralia* sp., *Dimeregramma* sp., *Plagiogramma* sp. and *Nitzchia* cf. *paleo*

DISCUSSION

- *Fragilaria* spp. Show predominance in sediments around the isolation from marine to fresh water (Stabell, 1985), indicating that isolation occurred around a depth of 660cm
- The Sotra shore displacement curve is representative of our area of study (Kaland et al., 1984)
- The bog sampled is at an altitude which only shows the early Holocene isolation (ibid.), confirmed by lithographic analysis of the core sample
- We suggest a date of approx. 9.7kya BP for the depth of 660cm, we feel that more time, more samples and analysis with an electron microscope would be needed to confirm this.
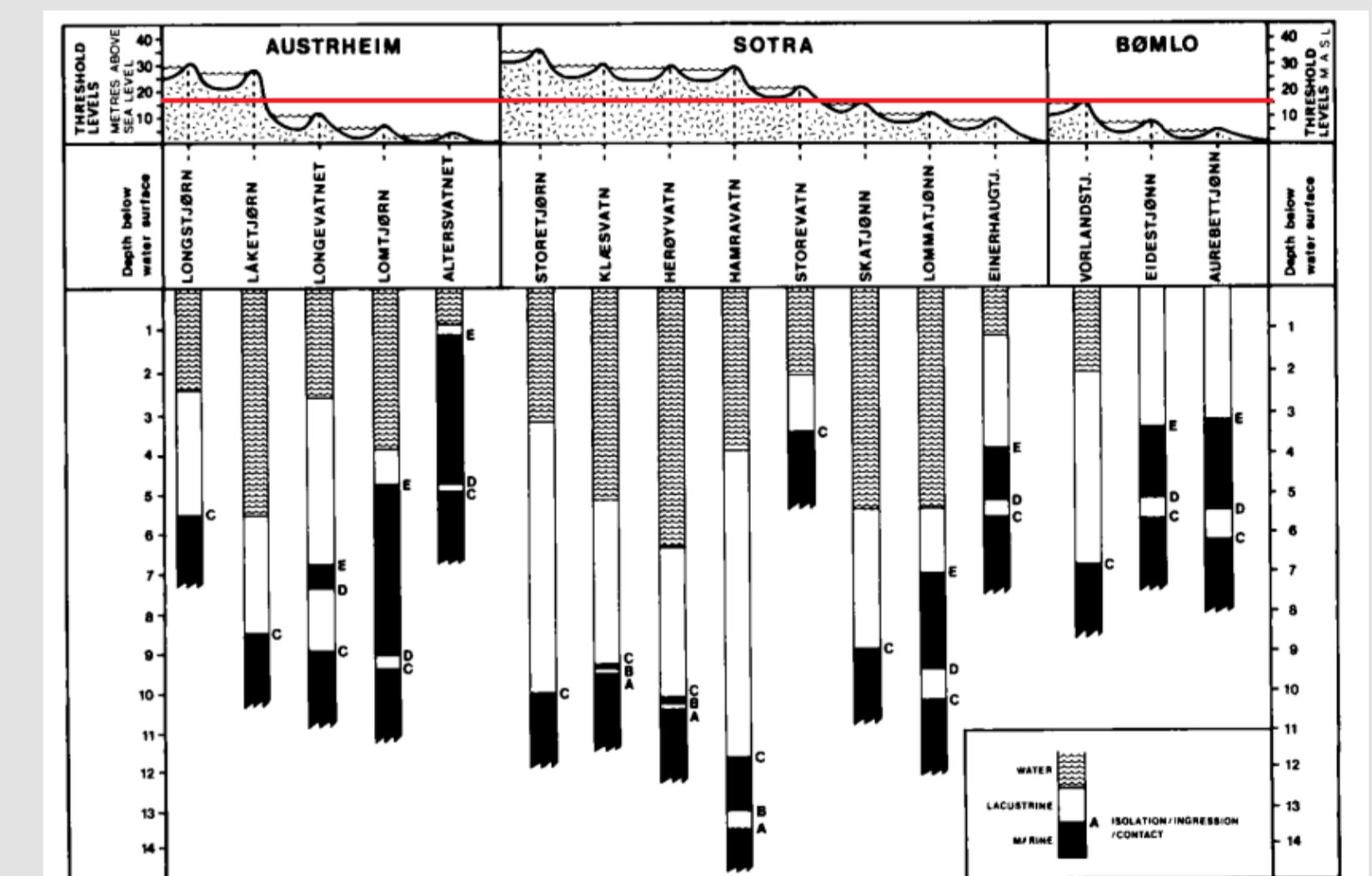

Fig. 3: Generalised stratigraphy of investigated basin (Kaland et al. 1984) with red line denoting altitude of bog sampled in this study
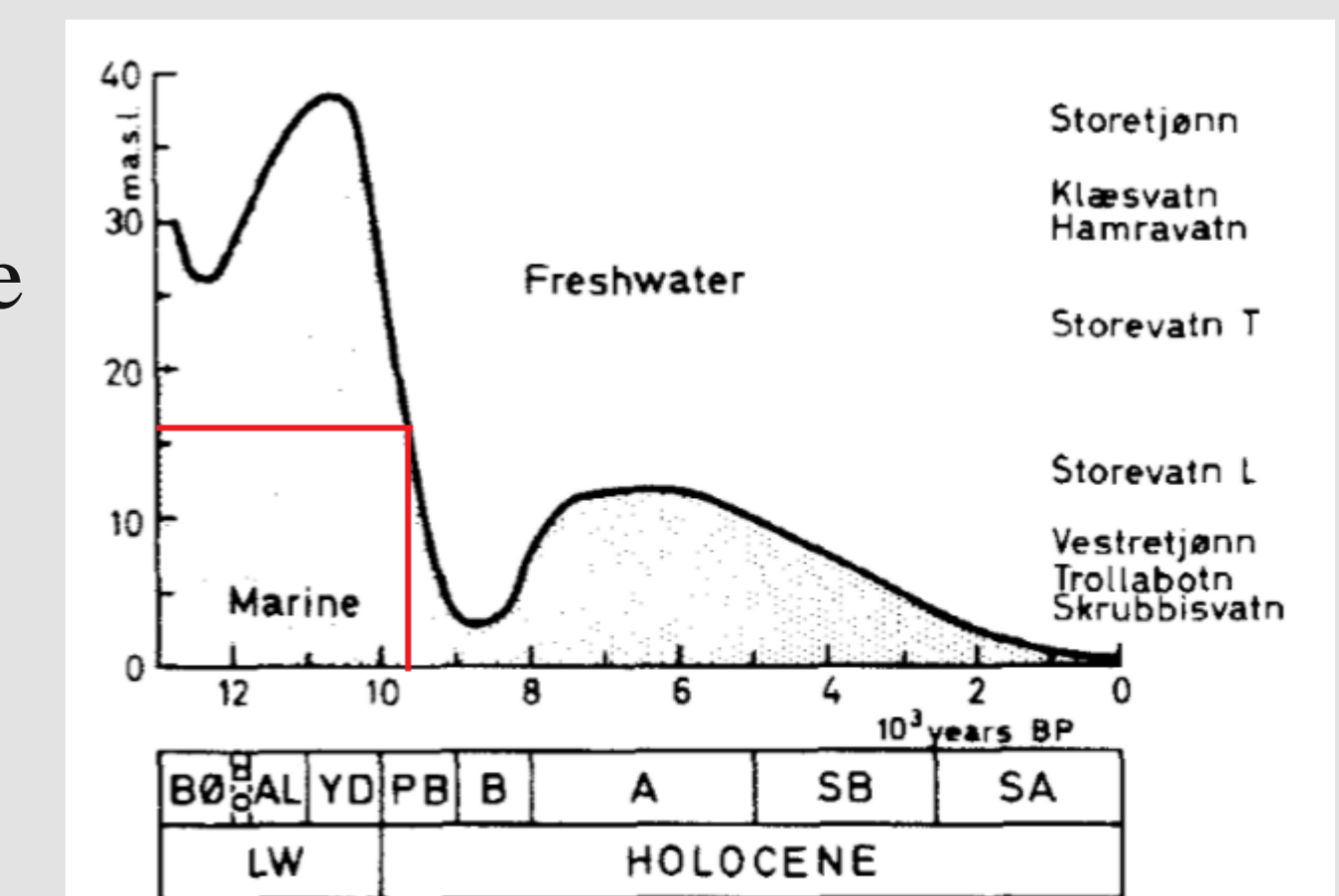

Figure 4: Shore displacement curve from Sotra area (Stabell, 1985) with red line indicating correlation with this study

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