

A proposal to drill “Geiseltal” – a near complete terrestrial section of the Eocene in Central Europe

Stefanie Kaboth-Bahr¹, André Bahr², Christian Zeeden³

¹ Department of Earth Sciences, FU Berlin, Germany; ² Institute of Earth Sciences, Heidelberg University, Germany; ³ Leibniz Institute for Applied Geophysics, Hannover, Germany



The Geiseltal is known worldwide for its perfectly preserved vertebrate fossils from the last greenhouse/hothouse phase of the earth's history, the Eocene. The lignite deposited here represents a hitherto unexploited climate archive, with which we can gain unique insights into climate fluctuations, as we may see them in the next 100-200 years due to human-induced climate change.

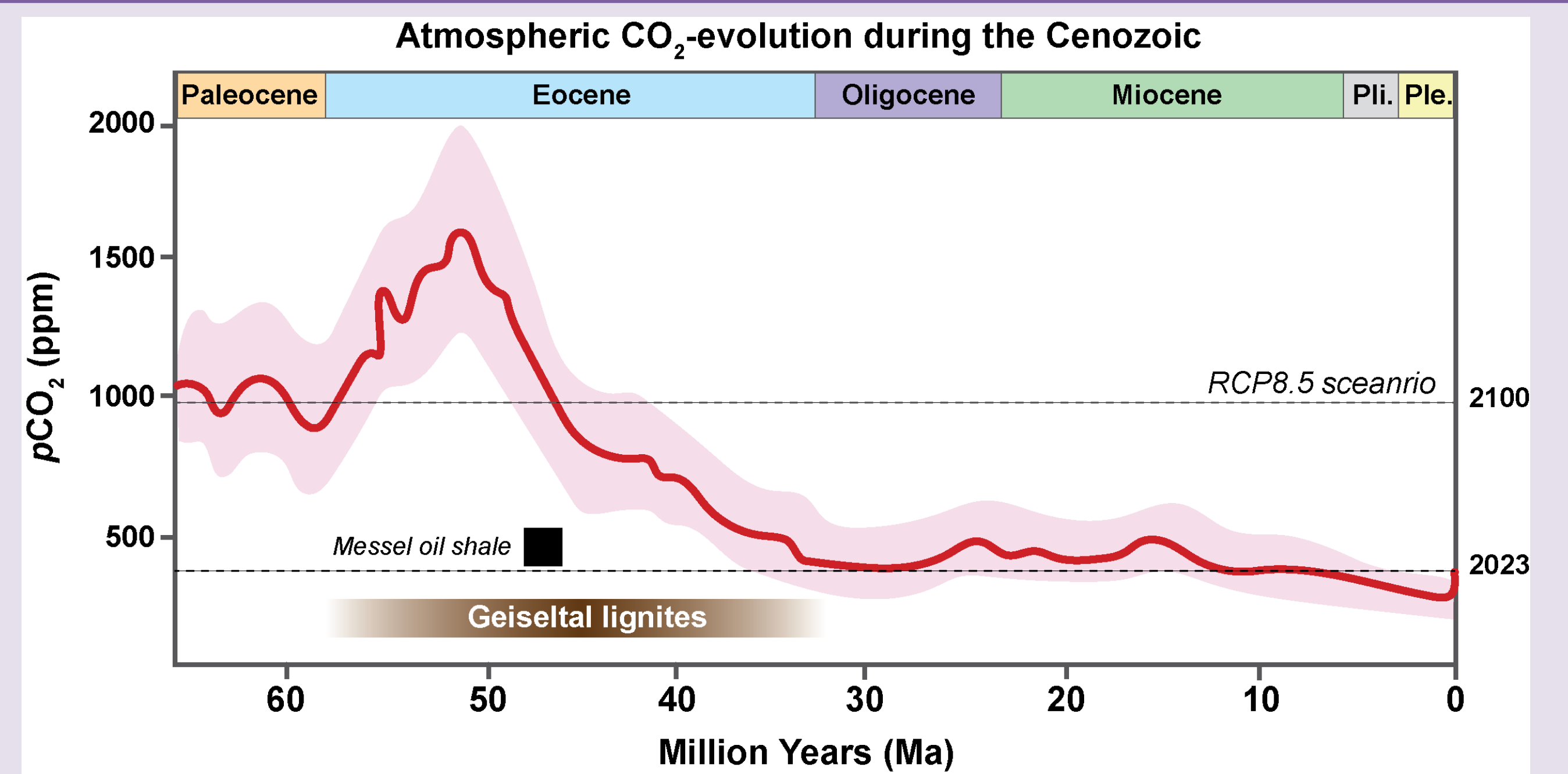


Figure 1: Modelled evolution of atmospheric carbon dioxide concentrations (pCO₂) during the Cenozoic (modified after Hansen et al., 2013); The RCP8.5 pCO₂ level scenario is the highest baseline emissions scenario in which emissions continue to rise throughout the twenty-first century (ICPP, 2022). Modern day pCO₂ level is indicated as well as the time frame covered by the Geiseltal lignites.

Project Motivation

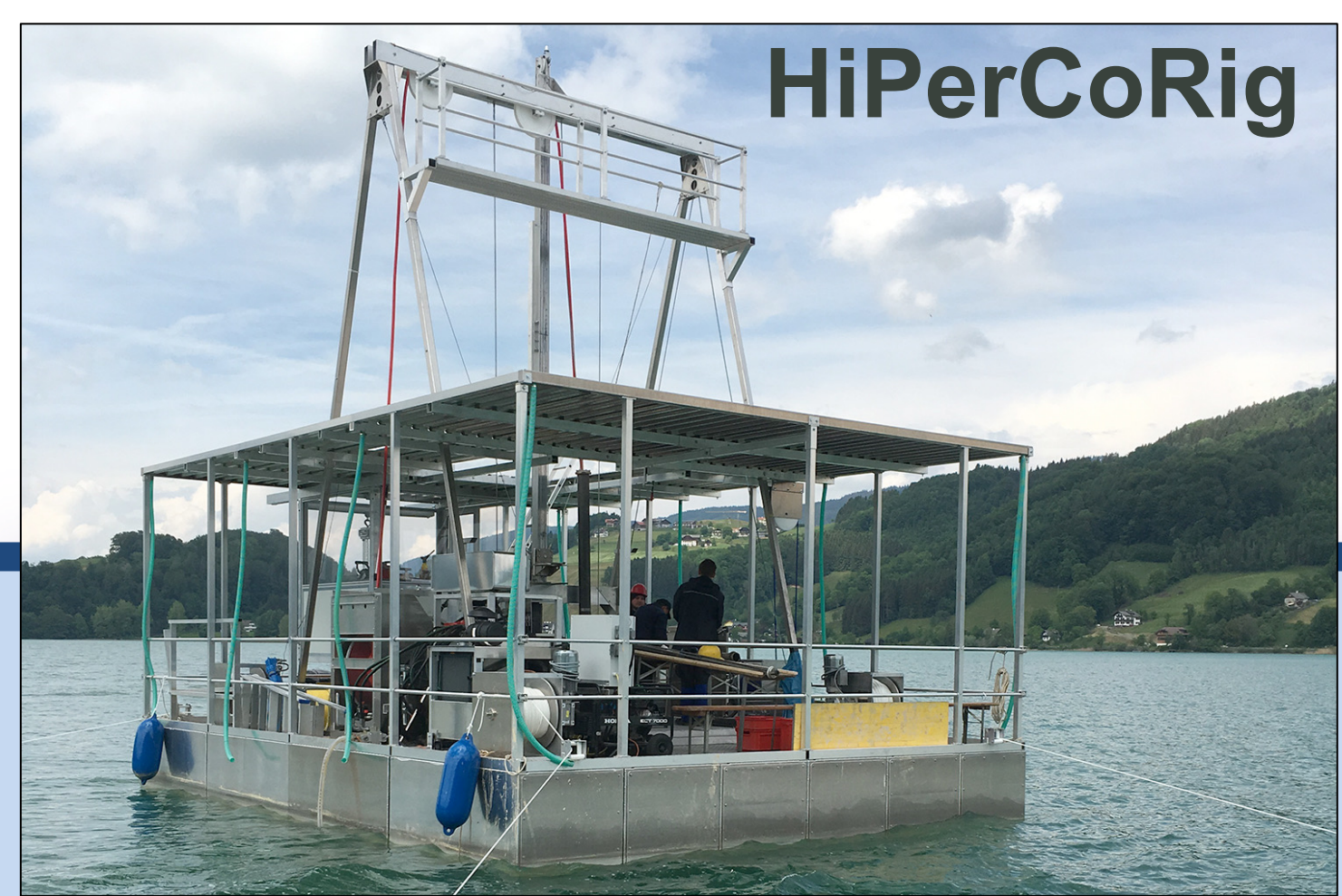


Figure 2 (left): HiPerCoRig is a novel, high-quality soft sediment coring system. Its performance has been demonstrated on perialpine lakes in over 200m water depths. Modified after Harms et al. (2020)

Outline

- i. Two boreholes are planned close to the shore on Lake Geiseltal, under strict consideration of environmental requirements
- ii. Drilling will be operated with HiPerCoRig, a drilling rig developed in Germany for research purposes as a floating drilling platform
- iii. Estimated core recovery of >100 m, allowing to construct a quasi-continuous profile through all major lignite seams
- iv. The chemical composition of sediments, plant fossils etc. will provide insights into past climate fluctuations

Aims

- ✓ Improved stratigraphy via magnetostratigraphy and astronomical tuning
- ✓ high-resolution paleo-environmental covering most of the Eocene



Flyer to go

Project Value

- ✓ Increase of the supraregional publicity of Geiseltal through media attention in the course of the drilling project
- ✓ Expansion of the tourism infrastructure (e.g. visitor center)
- ✓ Innovative concept for the (re)use of lignite for climate research

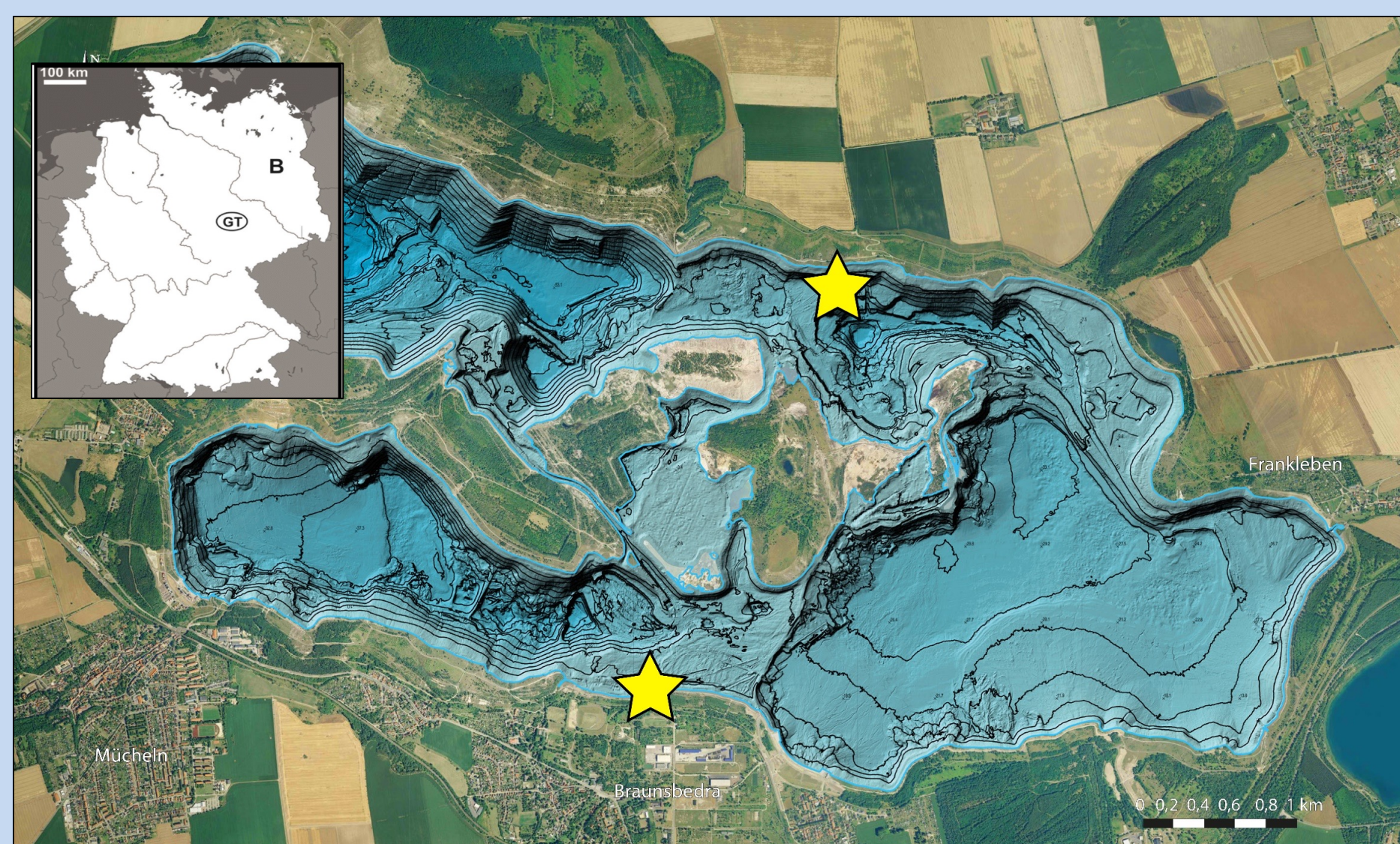


Figure 3: (above): Bathymetry map of the modern Geiseltal lake (Germany); Proposed Coring Positions are indicated by yellow stars.

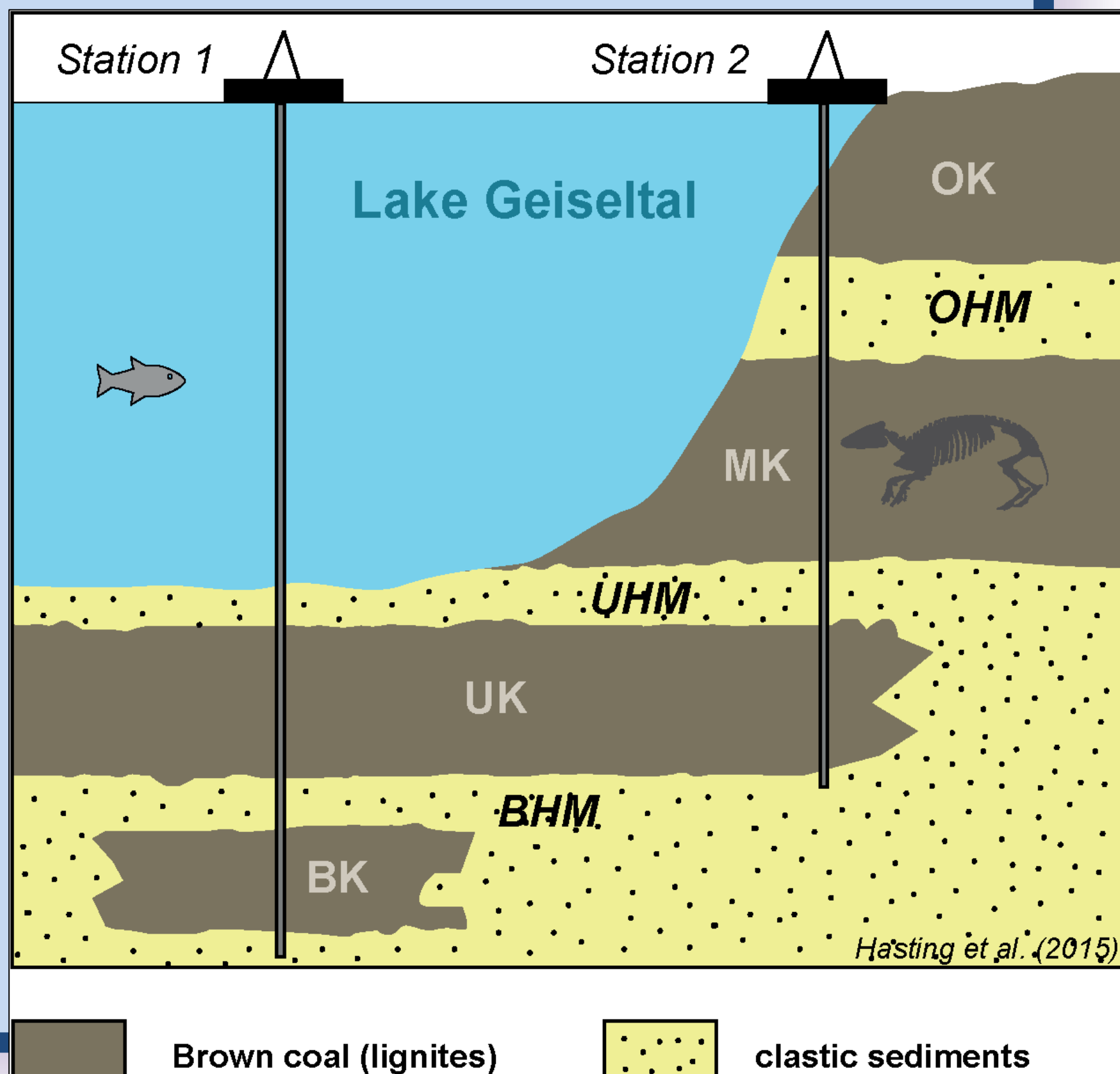


Figure 4: (right): Idealized Geiseltal depositional regime (modified after Hastings et al., 2015); OK = Oberkohle; OHM = Oberes Hauptmittel; MK = Mittelkohle; UHM = Unteres Hauptmittel; UK = Unterkohle; BHM = Basis Hauptmittel; BK = Basiskohle