Broechem Bed (Lillo Formation)

Unit name: Broechem Bed

Hierarchical unit name: Lillo Formation

Type: Bed

For the time being, given its limited thickness and the limited understanding on its occurrence, a bed status is preferred. Possibly, in the future, an upgrade of its rank to member status may be necessary.

Code: LiBr

Author(s):

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Alternative names: Broechem Unit or Unit 3 (Wesselingh et al. (2020)

Status: Formal

Date: 01/05/2022

How to refer: Vandenberghe, N., Goolaerts, S. & Wesselingh, F., 2023. The Broechem Bed, 01/09/2023. National Commission for Stratigraphy Belgium. http://ncs.naturalsciences.be/lithostratigraphy/Broechem-Bed

Characterizing description

The sediment composition is a fine quartz sand unlike the other glauconite rich Neogene units in the area. Due to the near absence of observed glauconite, the bed is attributed to the Lillo Formation, for which it now forms the oldest known deposit. Lag characteristics are present such as some coarse-grained quartz admixture, worn glauconite pellets, fish teeth and shell fragments, and some flint and phosphoritic sandstone pebbles. In addition, individual sandstone nodules themselves eroded from the Broechem Bed were observed as basal load of overlying stratigraphic units, such as the Luchtbal Member (Wesselingh et al., 2020).

Type section, type locality, type borehole, or type geophysical borehole

At present the observations of the Broechem Bed are still very limited. In the present LIS, the type Broechem Bed refers to the Broechem Unit or Unit 3 as described by Wesselingh et al. (2020). The etymology refers to temporary outcrops related to the construction of a water basin between Broechem and Oelegem, from which a lot of 'Broechem nodules' were collected, and of which accounts on the fauna found within and its age were published by Marquet (1980) and van Baekel et al. (2003). At Antwerp International Airport (AIA), this fauna is found in brown-reddish spherical sandstone nodules of up to circa 15 cm long, partially as moulds and include often paired large bivalves including Cyrtodaria angusta, Arctica islandica, Acanthocardia aff. aculeata, Cardiidae indet., Callista chione and Pygocardia rustica forma tumida.

Description upper boundary

The upper boundary is truncated, and an unknown amount of sediment was eroded, evidenced by observations of reworked nodules at the base of overlying Pliocene beds. However, limited observations, and post-depositional deformation by cryoturbation of the entire Pliocene sequence at the reference section (AIA), the fine details of the contact remain difficult to interpret.

Description lower boundary

The lower boundary is interpreted to be erosive and incisive, although that post-depositional deformation related to cryoturbation post-dating the entire Pliocene sequence at the reference section made it difficult to interpret the lower boundary in all of its details.

Thickness

A few dm only.

Occurrence

The Broechem Bed has been observed in the southeast of the Antwerp area.

Regional correlations

The Broechem Bed is characterised by faunal assemblages that are very similar as those occurring at the base of the Oosterhout Formation at Langenboom (The Netherlands) that have a Zanclean age. Comparisons have been made with the Coralline Crag (England). The Broechem Bed must postdate the first arrival of Pacific fauna immigrants at circa 4.7–4.8 Ma (Wesselingh et al., 2020).

Age

Zanclean, early Pliocene.

Dataset

Data in the LIS are part of the 'NCS_Neogene 2020_Wesselingh et al., 2020' dataset, a subset of the DOV-Neogene data collection, including links to the GSB-collection data sheets.

References

Marquet, R., 1980. De stratigrafie van Neogene afzettingen in een bouwput voor een water-reservoir te Broechem (prov. Antwerpen, Belgie). Mededelingen Werkgroep voor Tertiaire en Kwartaire Geologie 17, 57–64.

van Bakel, B.W.M., Jagt, J.W.M. & Fraaije, R.H.B., 2003. A new Pliocene cancrid crab from Oelegem, province of Antwerpen (NW Belgium). Cainozoic Research, 2, 79–85.

Wesselingh, F. P., Busschers, F. S. & Goolaerts, S., 2020. Observations on the Pliocene sediments exposed at Antwerp International Airport (northern Belgium) constrain the stratigraphic position of the Broechem fauna. Geologica Belgica 23 (3-4), 315-321. https://doi.org/10.20341/gb.2020.026

Annexes

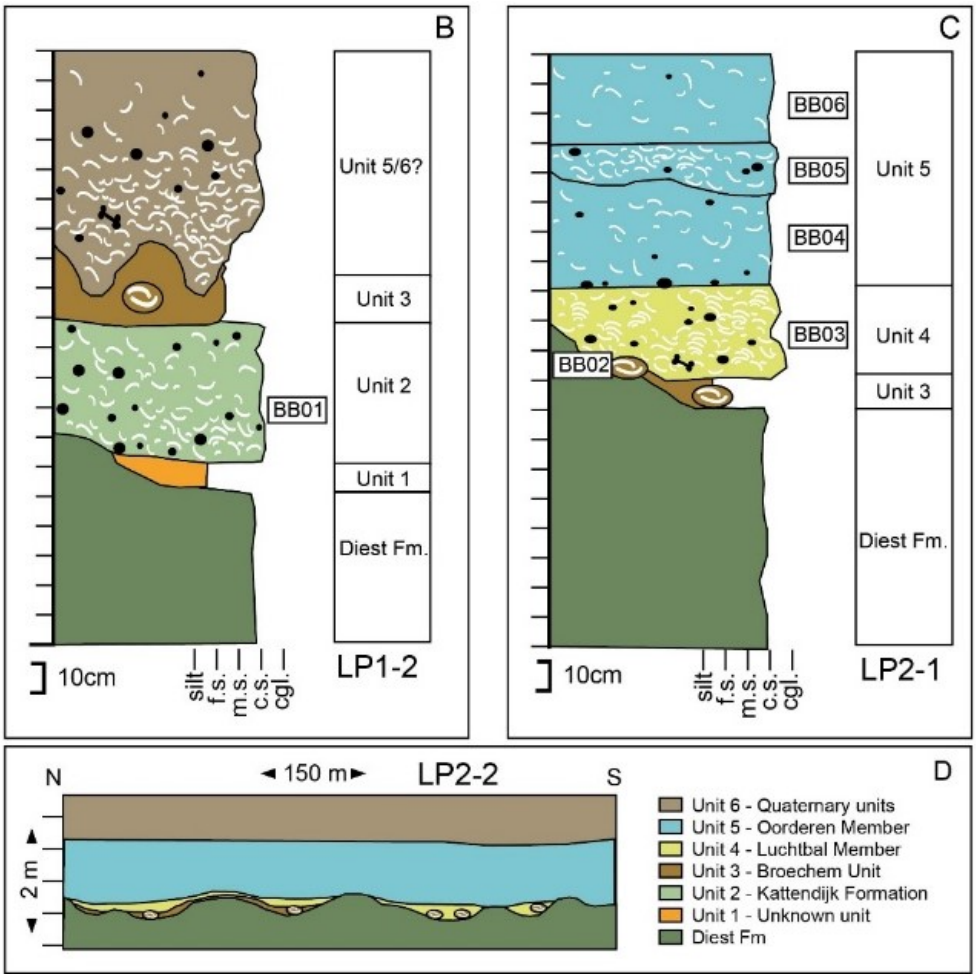

Figure 0-1: Observations at the Antwerp International Airport outcrop. (a) General view on observation point LP1-1. Pliocene fossiliferous sediments (PSU) being strongly deformed by cryoturbation occur on top of upper Miocene Diest Formation (DFm) and below Quaternary deposits (LQF). (b) Schematized succession at observation point LP1-2. (c) Schematized succession at observation point LP2-1. (d) Schematized layer structure at observation point LP2-2. F.s. – fine sand, m.s – medium sand, c.s. – coarse sand, cgl. – gravel (Figure 2 from Wesselingh et al., 2020)

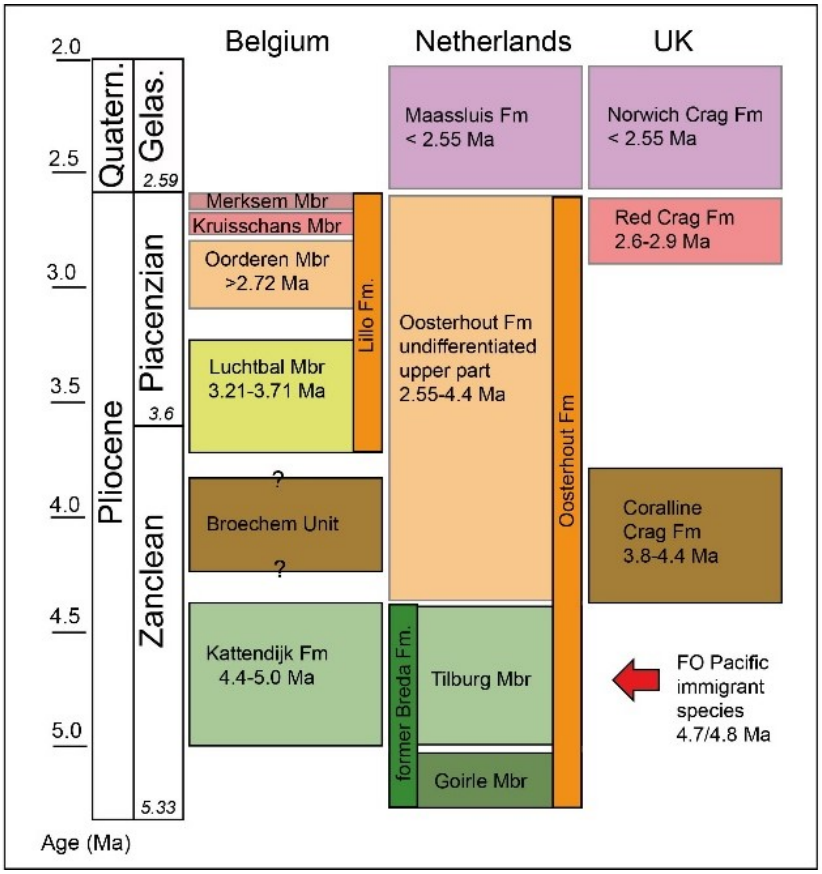

Figure 0-2: Stratigraphic framework of Pliocene units in the southern North Sea Basin and the position of the Broechem unit (adapted from Vervoenen et al., 2014 and Munsterman et al., 2020). Abbreviations: FO: first occurrence; Quartern.: Quaternary; Gelas.: Gelasian; Fm: Formation, Mbr: Member. (Figure 4 from Wesselingh et al., 2020)