

Cryolithology and palaeoecology of NE Siberian Ice Complex (Bol'shoy Lyakhovsky Island, New Siberian Archipelago)

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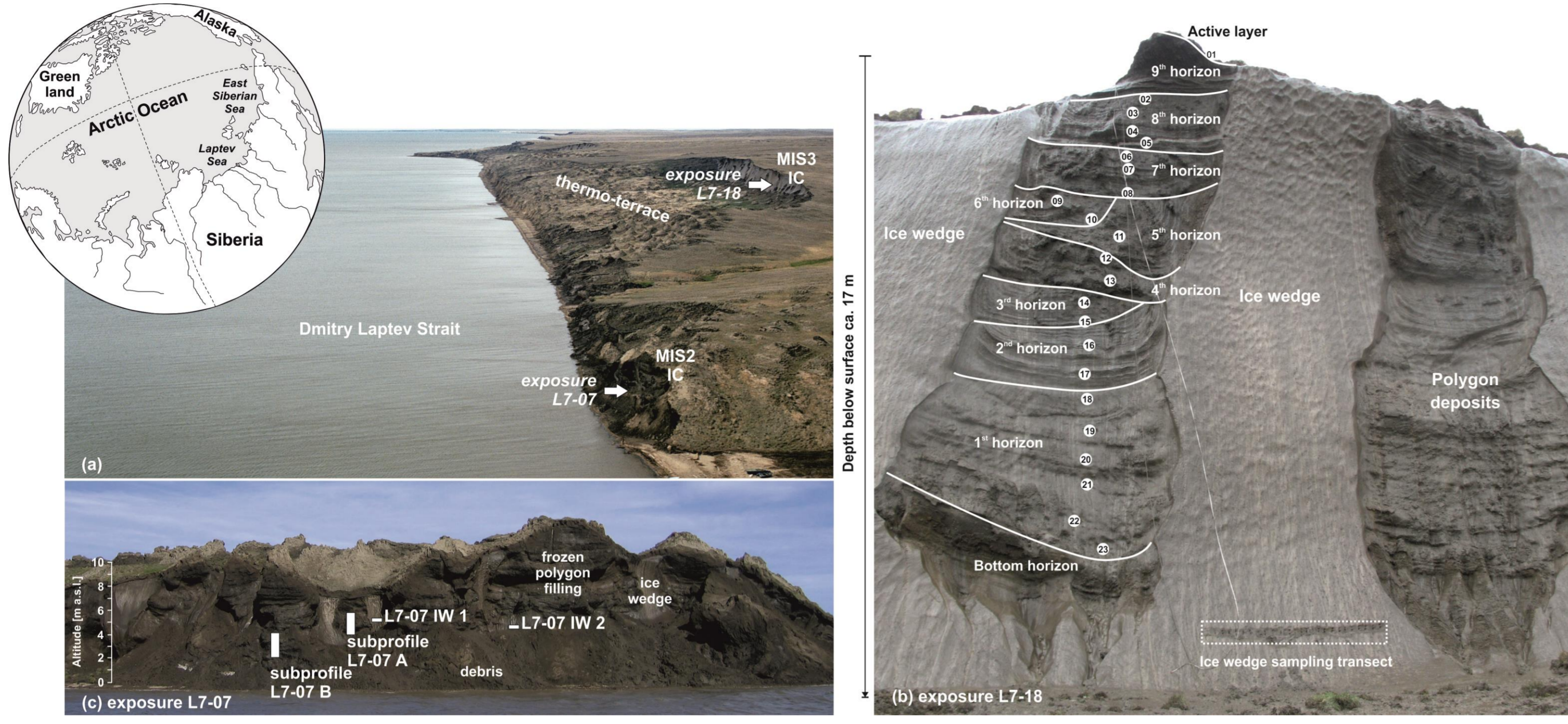


Figure 1 (a) Study area at the southern coast of Bol'shoy Lyakhovsky Island with detailed photographs of (b) the studied L7-18 exposure of Molotkov Interstadial (MIS3) Ice Complex and (c) the studied L7-07 exposure of Sartan Stadial (MIS2) Ice Complex.

II. ICE COMPLEX OF MIS3 and MIS2 AGE

According to the Quaternary stratigraphy scheme of the Dmitry Laptev Strait coasts presented by Tumskey (2012), the Sartan Ice Complex (MIS2) belongs to the Yanskaya Suite and fills erosional structures such as valleys within the underlying older Ice Complex deposits of the Oyogorskaya Suite (MIS4 and MIS3) that formed during the Zyryan stadial and Molotkov interstadial periods.

A 15 m long sequence of Molotkov Ice Complex accumulated between >49 and 29 ka BP (Figure 1b, L7-18, Wetterich et al., 2014), and a 4.5 m long sequence (Figure 1c, L7-07; Wetterich et al., 2011) reflects Ice Complex formation between 26 and 22 ka BP during the Sartan Stadial.

III. RESULTS

Sediment data

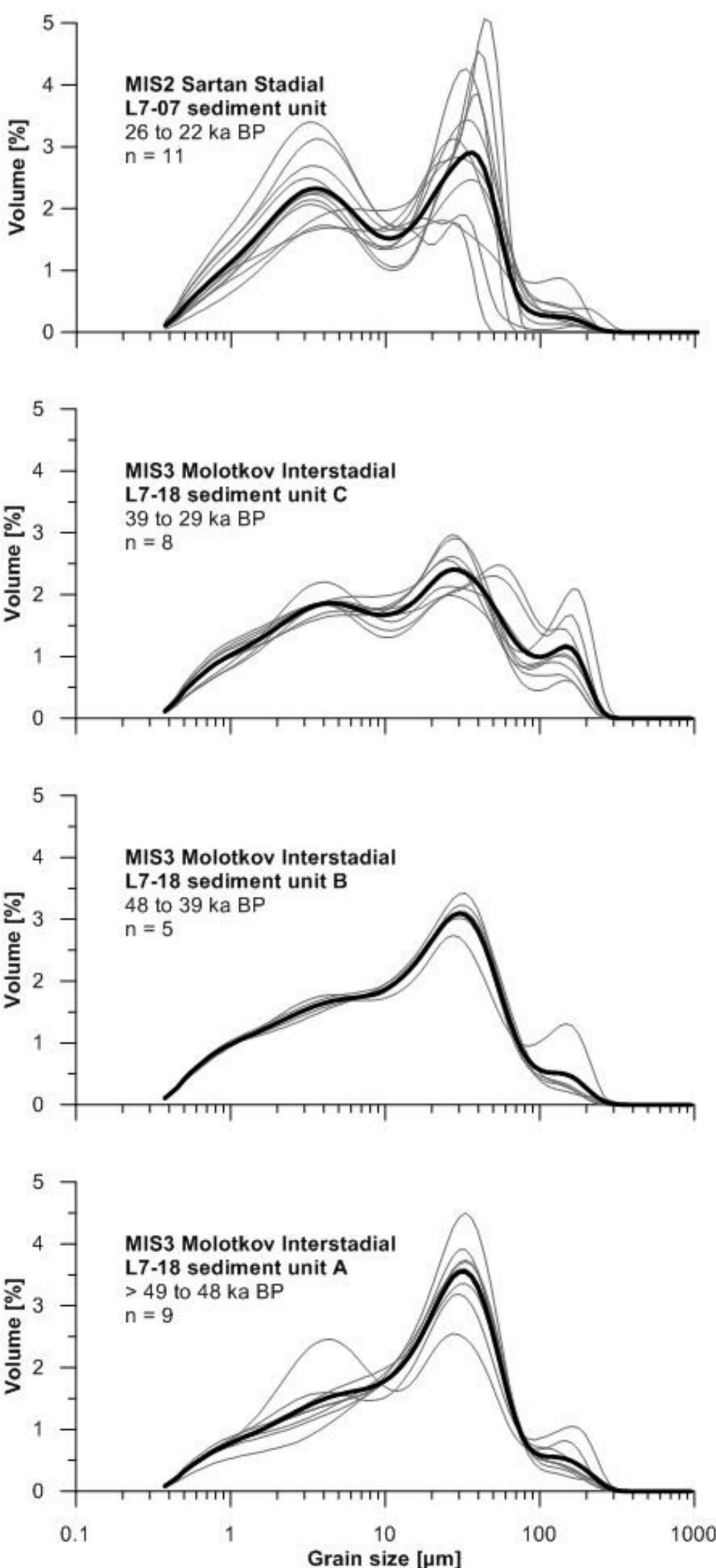


Figure 3 Typical grain size distributions of Molotkov (MIS3) and Sartan (MIS2) Ice Complex deposits on Bol'shoy Lyakhovsky Island. Bold curves delineate the mean values.

Pollen data of tundra-steppe vegetation

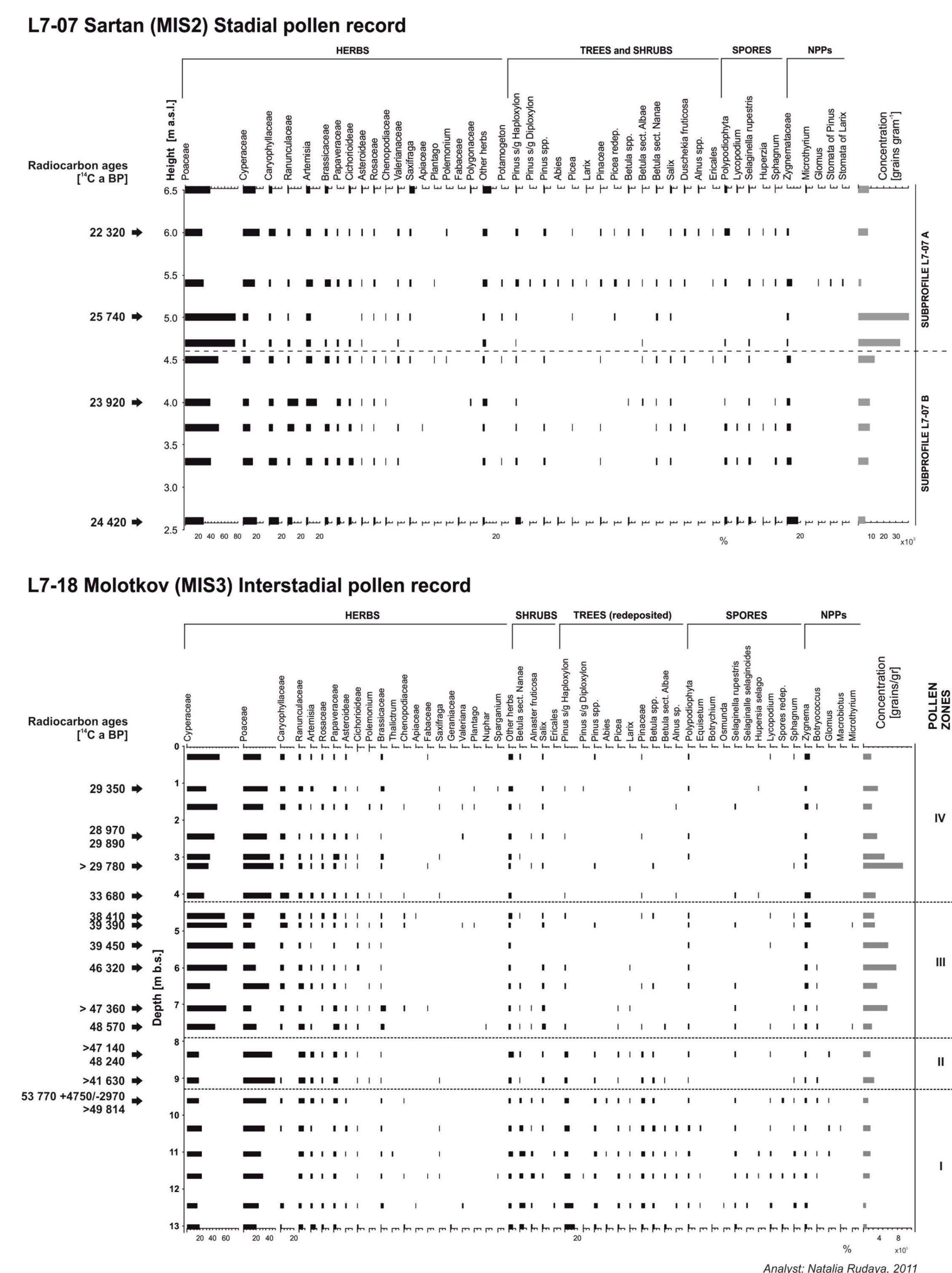


Figure 4 Pollen diagram of Molotkov (MIS3) and in Sartan (MIS2) Ice Complex deposits on Bol'shoy Lyakhovsky Island.

I. BACKGROUND

Cryolithological and paleontological proxy data from East Siberian Arctic permafrost preserve records of late Quaternary climate and environmental conditions in West Beringia and their variability which results from interglacial-glacial and interstadial-stadial dynamics.

A key site for late Pleistocene Ice Complex is situated at the southern coast of Bol'shoy Lyakhovsky Island (Figure 1a) where coastal outcrops expose frozen sediments, ground ice, and fossil remains dating from the mid-Pleistocene (Andreev et al., 2004).

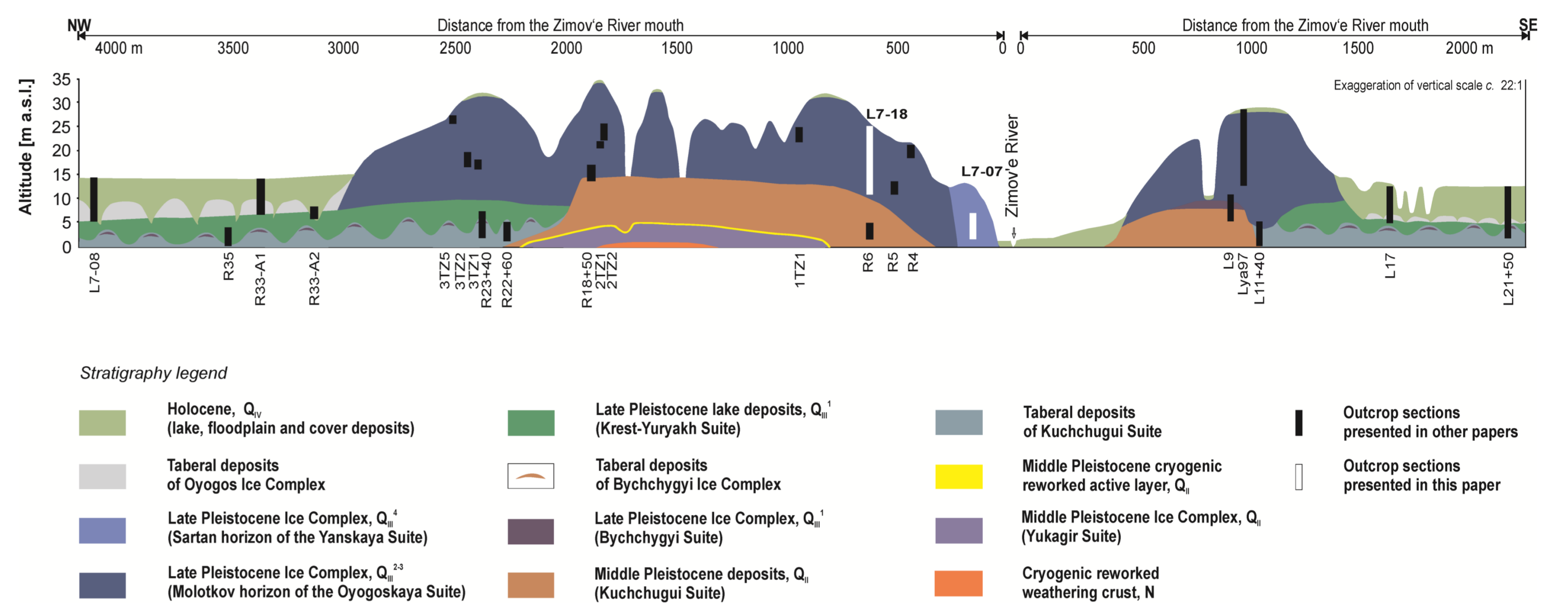


Figure 2 Stratigraphic scheme of the exposed coastal section at the Zimov'e River mouth on the southern coast of Bol'shoy Lyakhovsky Island modified after Andreev et al. (2004, 2009) and updated according to Tumskey (2012). Studied profiles from previous work (Andreev et al., 2004, 2009; Ilyashuk et al., 2006; Wetterich et al., 2009, 2011) are shown by black vertical bars. The position of the L7-18 Molotkov (MIS3) interstadial profile and the L7-07 Sartan (MIS2) stadial profile are shown by a white vertical bars.

Ice wedge stable water isotope data

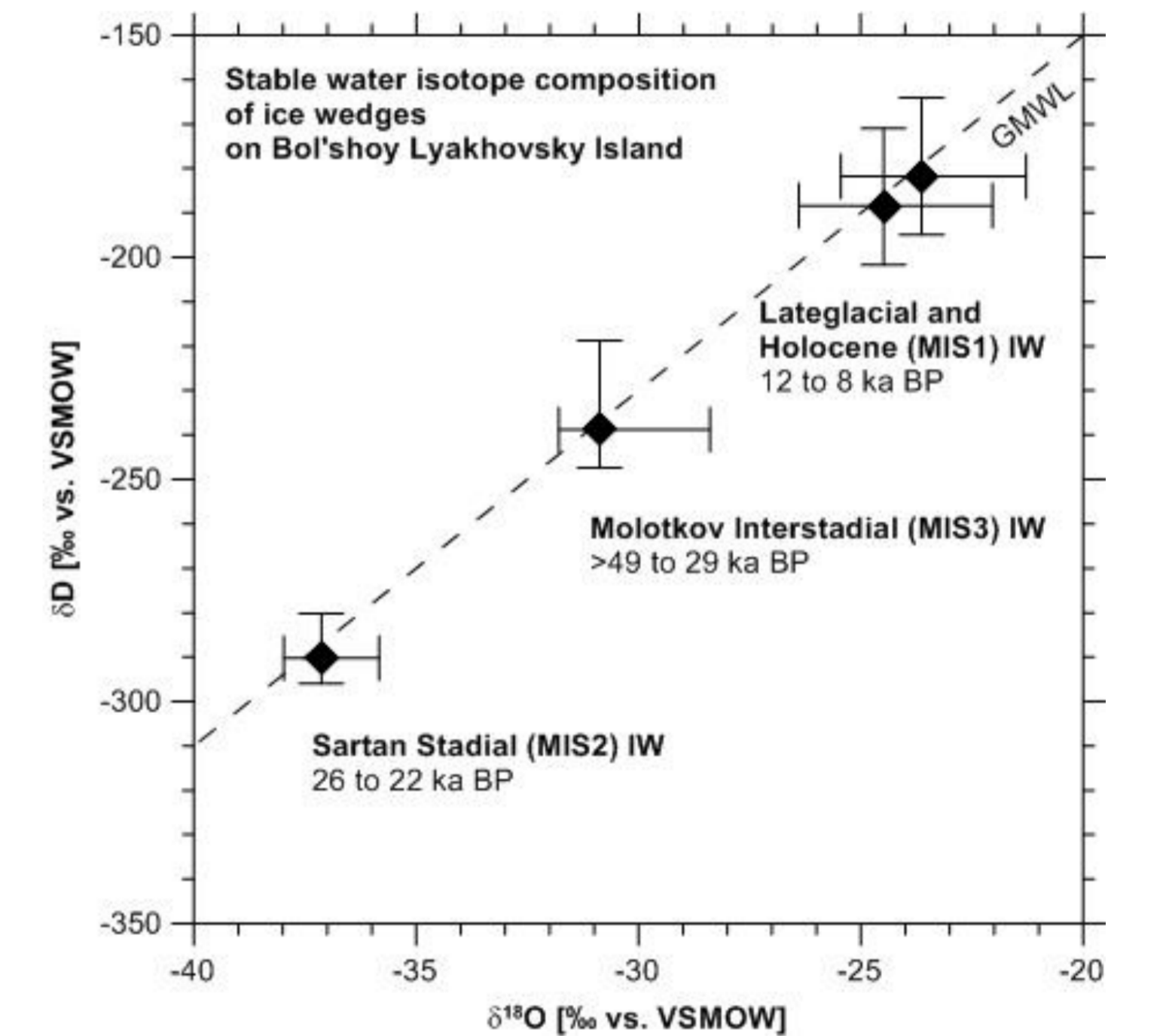


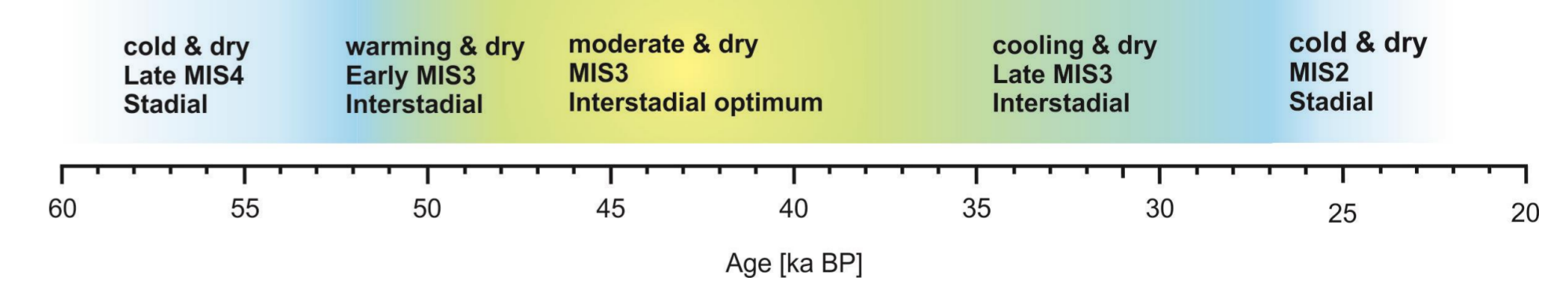
Figure 5 Stable water-isotope composition of ice wedges from the Sartan Ice Complex L7-07 exposure, compared to previously studied older and younger ice wedges from Bol'shoy Lyakhovsky Island (Meyer et al., 2002; Wetterich et al., 2009).

IV. CONCLUSIONS

Continuous Ice Complex formation during MIS3 -> changing deposition regime during MIS2

Interstadial-stadial climate variability reflected by pollen data of tundra-steppe vegetation

Continuous Ice Complex formation on Bol'shoy Lyakhovsky Island (New Siberian Archipelago) Summer conditions as revealed by pollen data



Coldest winter temperatures during MIS2 are revealed by stable water isotopes of ice wedge ice

References

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