Figure S1. Biochemical parameters along main headwall (profile 1 and 2). Depth in meters from top headwall. Upper row: total organic carbon (TOC) content, carbon to nitrogen ratio (C/N), concentration of short *n*-alkanes (C<20), long *n*-alkanes, and other alkanes (branched and cyclic alkanes). Bottom row: *n*-alkane proxy average chain length (ACL), concentration of short *n*-fatty acids (*n*-FAs) (C<20), and long *n*-FAs, ratio of *iso* and *anteiso*-branched FA C_{15} and C_{17} vs. mid and long chain *n*-FAs (IA index) and higher-plant fatty-acid (HPFA) index. Stratigraphical units: 1. Lower Ice Complex, 2. Lower Sand Unit, 3. Woody Layer, 4. Upper Ice Complex and 5. Holocene Cover. Grey dots: selected samples for NSO separation. Ice wedge indicated in blue rectangle.

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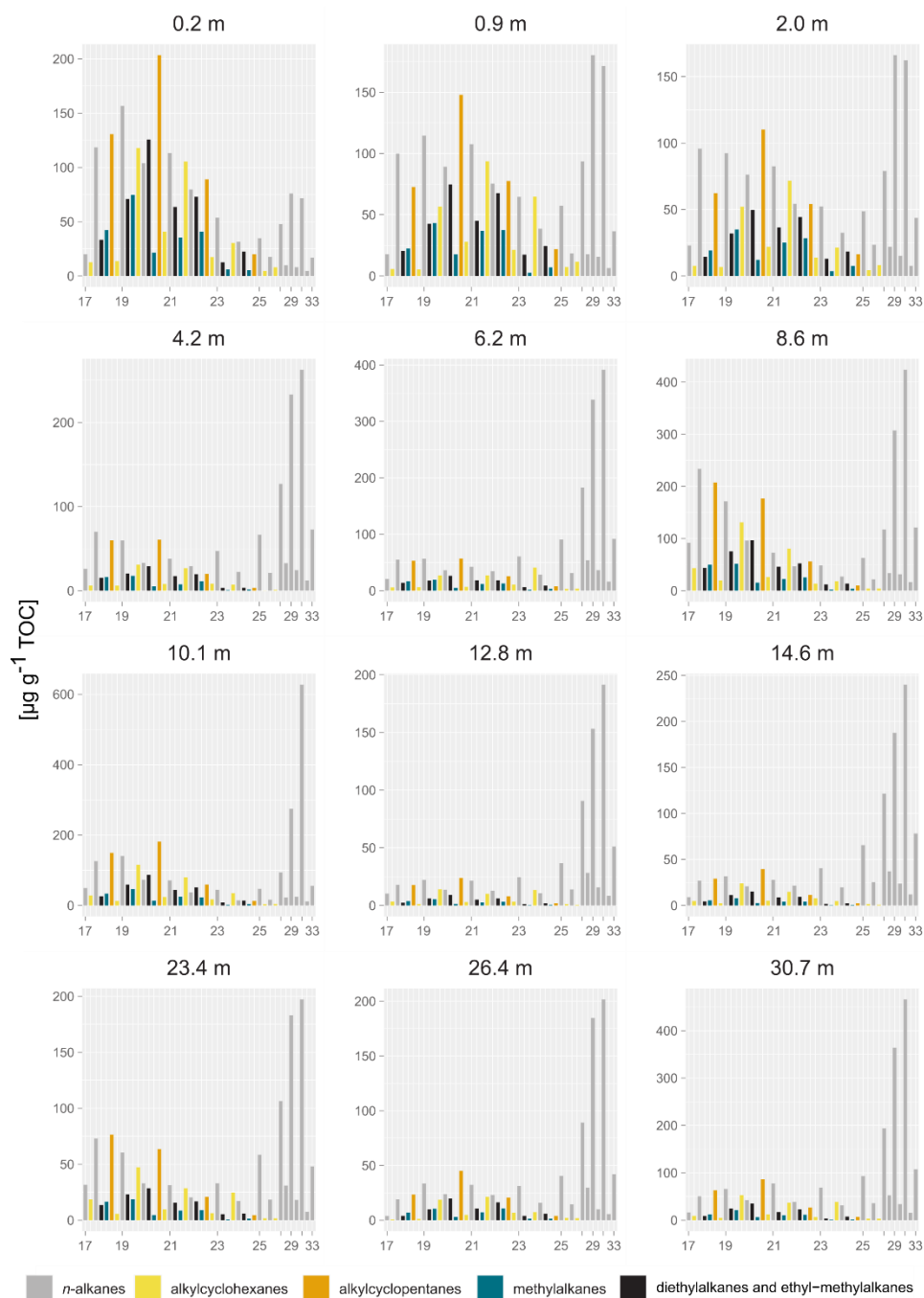
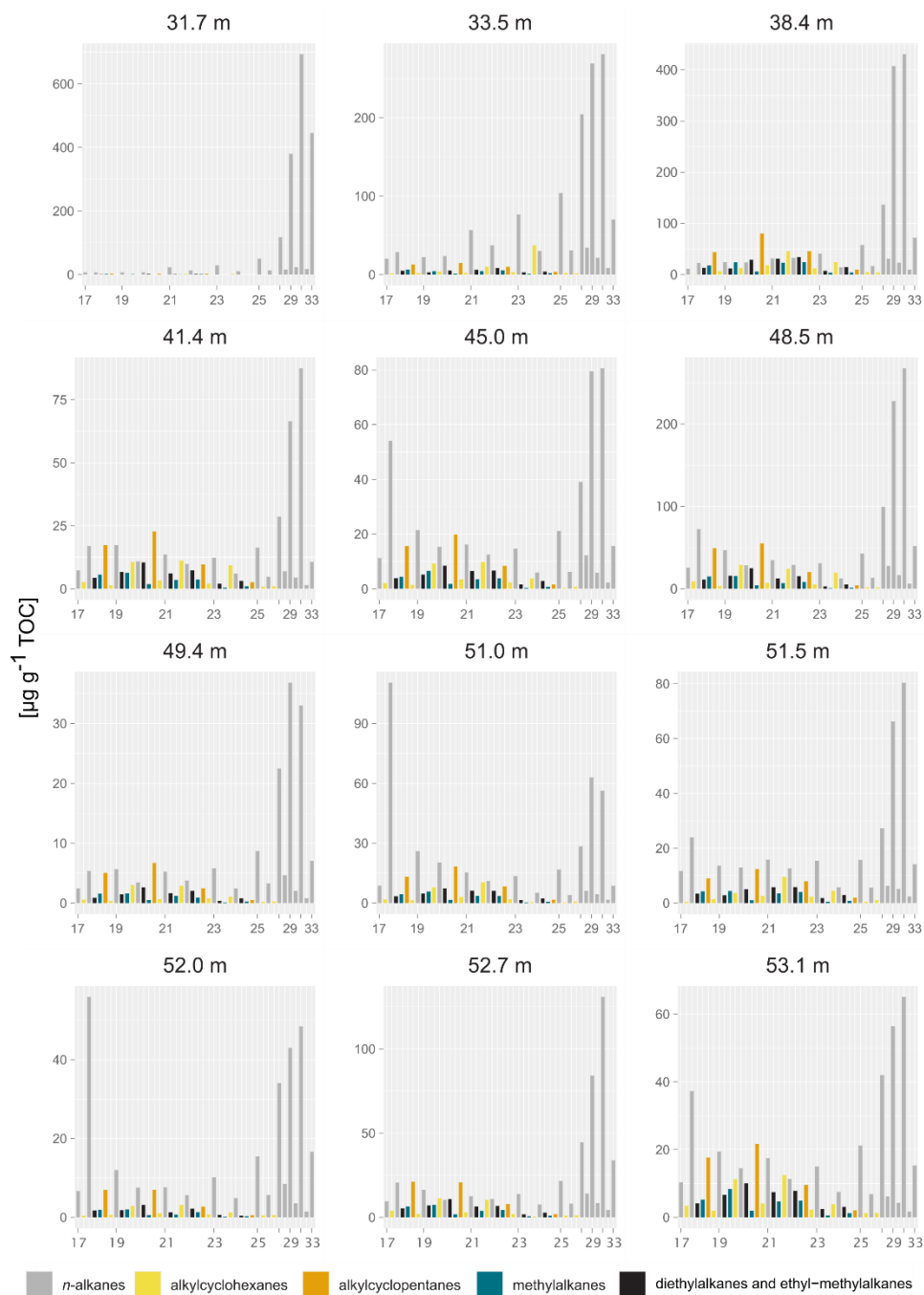


Figure S2. Alkane distribution of sediment samples of main headwall (profile 1 and 2). Depth in meters from top headwall indicated above graphs, corresponding to stratigraphical units (see Figure S1): 1. 53.1-52.0 m, 2. 51.5-33.5 m, 3. 31.7 m, 4. 30.7-4.2 m and 5. 2.0-0.2 m. Odd *n*-alkanes indicated with ticks on x-axis. Concentrations on y-axis expressed in µg g^{-1} TOC.

15 **Figure S2 (continuation). Alkane distribution of sediment samples of main headwall (profile 1 and 2). Depth in meters from top headwall indicated above graphs, corresponding to stratigraphical units (see Figure S1): 1. 53.1-52.0 m, 2. 51.5-33.5 m, 3. 31.7 m, 4. 30.7-4.2 m and 5. 2.0-0.2 m. Odd *n*-alkanes indicated with ticks on x-axis. Concentrations on y-axis expressed in µg g⁻¹ TOC.**

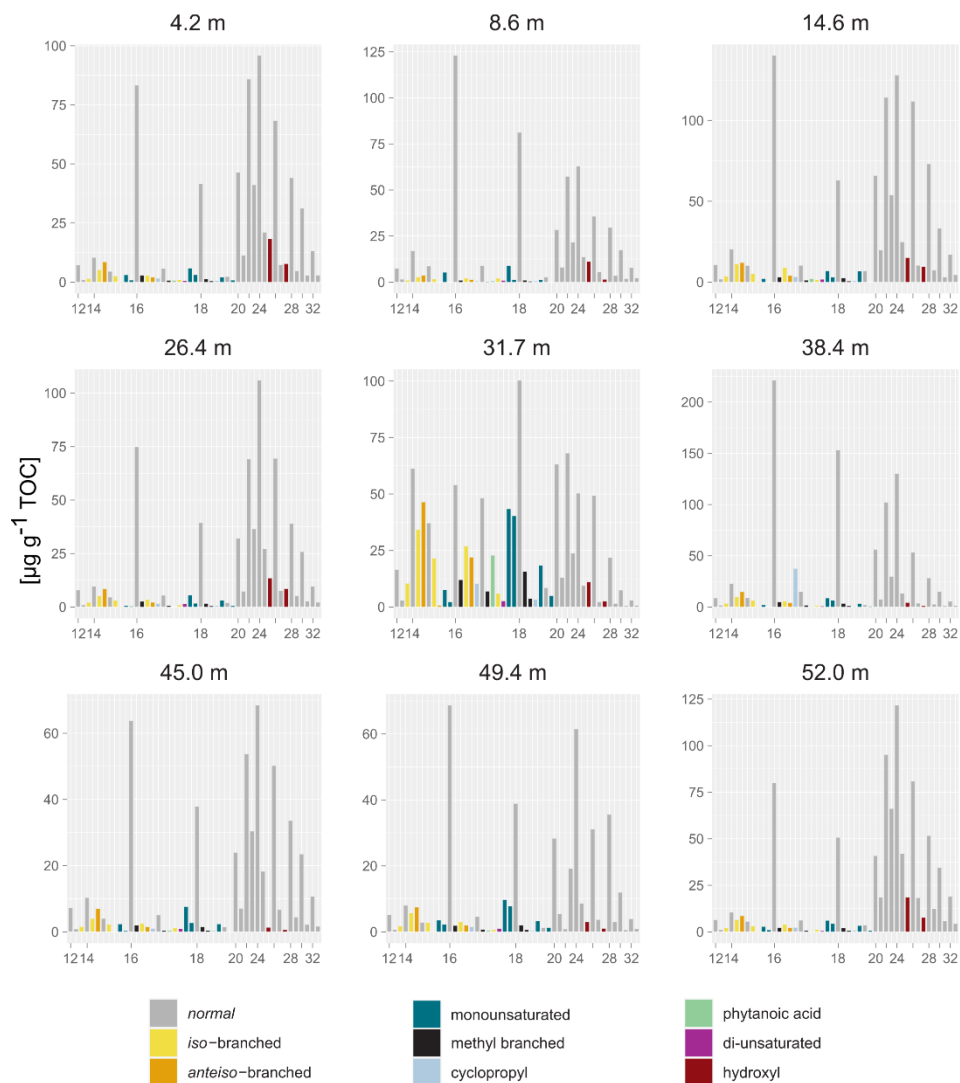



Figure S3. Fatty acid distribution of selected sediment samples of main headwall (profile 1 and 2). Depth in meters from top headwall indicated above graphs, corresponding to stratigraphical units (see Figure S1): 1. 52.0 m, 2. 49.4-38.4 m, 3. 31.7 m and 4. 26.4-4.2. Odd *n*-alkanes indicated with ticks on x-axis. Even *n*-fatty acids indicated with ticks on x-axis. Concentrations on y-axis expressed in µg g^{-1} TOC.

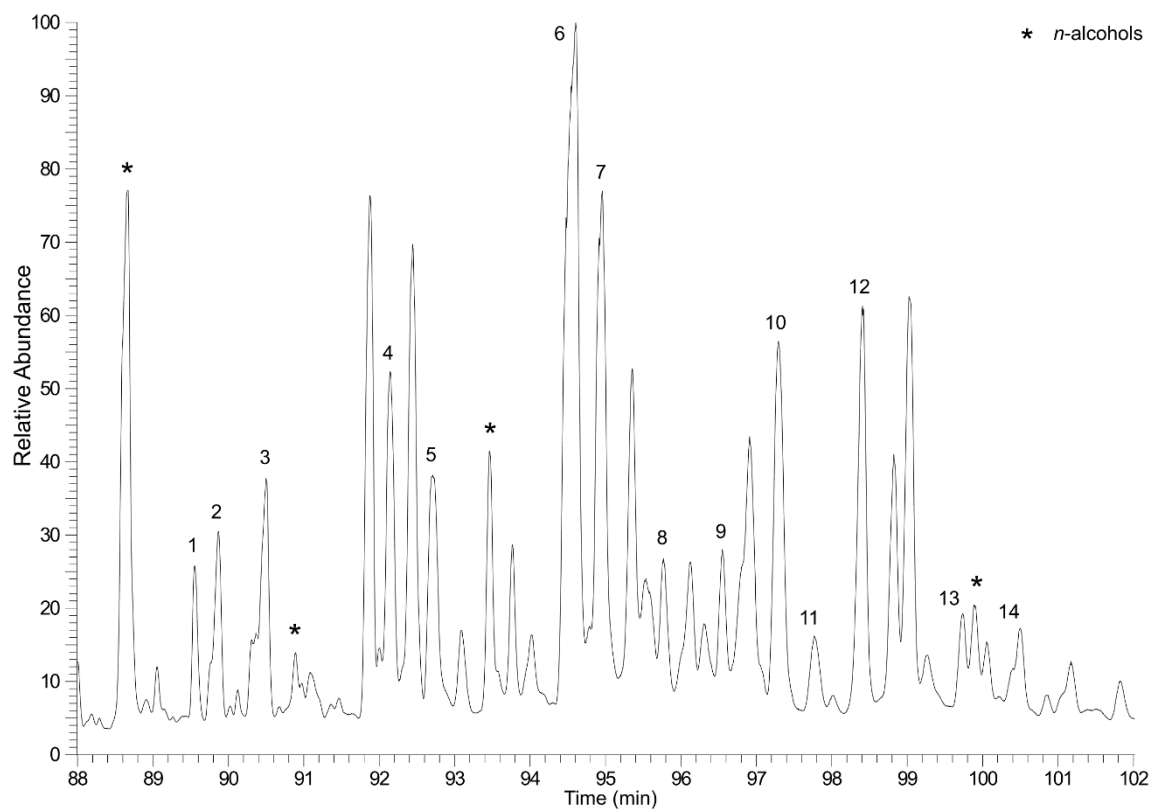



Figure S4. Total ion current of the sterols and triterpenoids found in the sediments at 31.7 m bs (profile 1). * indicates *n*-alcohols (C$_{28}$-C$_{30}$ and C$_{32}$). Numbered peaks are identified in Table 1.

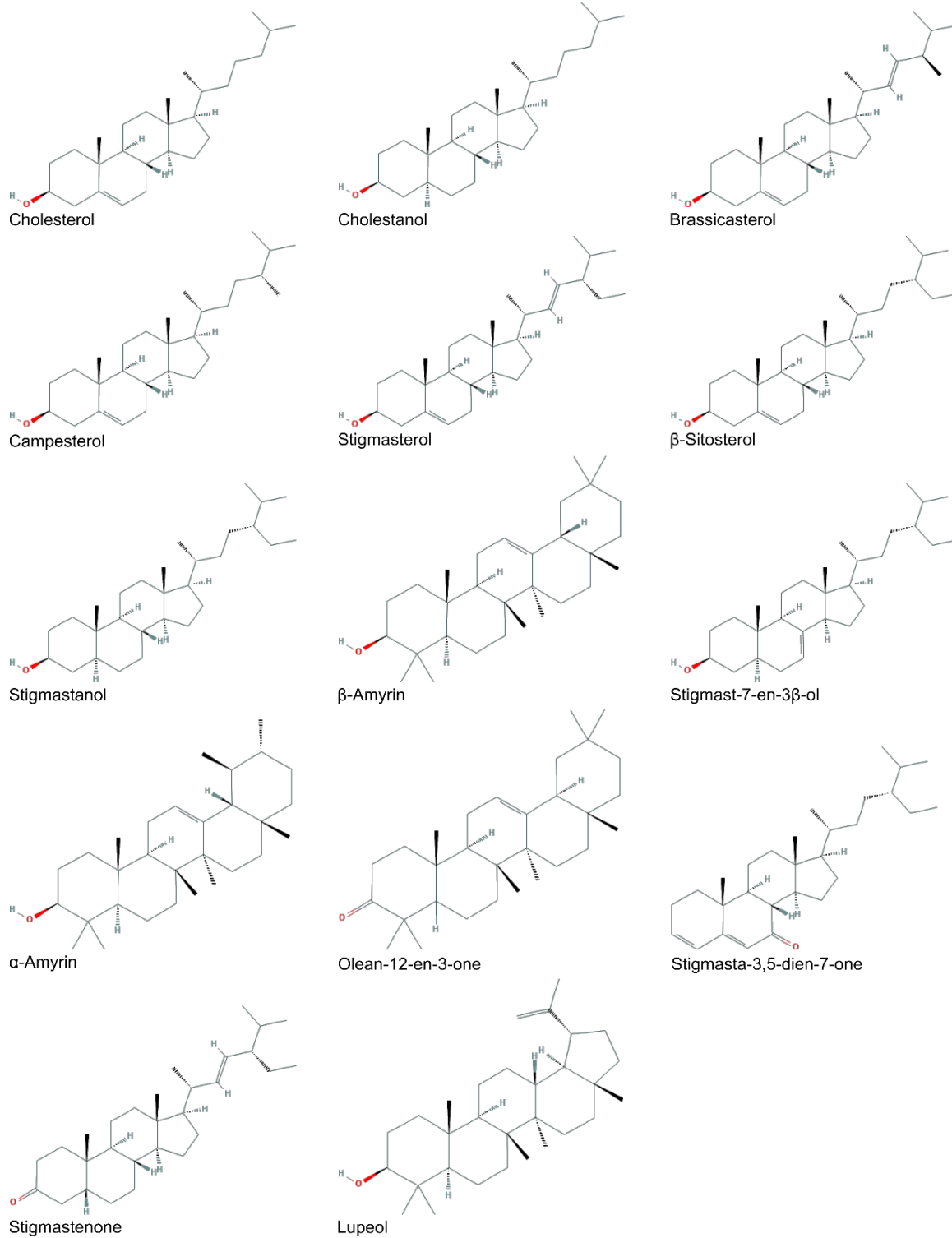



Figure S5. Chemical structures of sterols and triterpenoids found in the sediments at 31.7 m bs (profile 1).