

Biochronology and geochronology of Late Neogene Central Arctic deep-sea cores

YVONNE HERMAN AND HELMUT KEUPP



Herman, Y. & Keupp, H. 1987: Biochronology and geochronology of Late Neogene Central Arctic deep-sea cores. *Polar Research* 5 n.s., 307–308.

Yvonne Herman, Department of Geology, Washington State University, Pullman, Washington 99164-2812, USA; Helmut Keupp, Freie Universität Berlin, Institut für Paläontologie, Schwendenerstrasse 8, D-1000 Berlin 33, FRG.

Microfaunal and foraminiferal oxygen isotope data from the Chukchi Plateau, the Alpha-Mendeleev Rise and the Lomonosov Ridge deep-sea cores (Table 1) representing the last 4.5–5 million years, yield evidence of significant paleoceanographic and paleoclimatic changes. Uranium series isotopes and magnetic stratigraphy provide the time frame for these Late Neogene sequences (Herman & Osmond 1984). The similarity in faunal and floral patterns as well as in lithology allows correlation of cores over widely separated regions. Several datum levels were recognized. They include the *Globigerina egelida* acme zone between ~1.8 and ~1.6 Ma, the *Globigerina quinqueloba* acme zone 0.7 Ma and ~0.34–~0.24 Ma, the *Stetsonia horvathi* acme zone between ~1.66 and ~1 Ma and the *Orthothonella* acme zone between ~1.66 and ~0.73 Ma (Fig. 1).

Table 1. Locations, depths and lengths of cores

Core	Latitude	Longitude	Depth (m)	Length (cm)
T3-67-4	79°22.7'N	174°46'W	1,760	272
T3-67-5	79°31.5'N	174°10'W	2,057	414
T3-67-9	79°37.9'N	172°07'W	2,237	356
T3-67-11	79°34.9'N	172°30'W	2,810	250
T3-67-12	80°21.9'N	173°33'W	2,867	374
T3-66-S-5	75°45.4'N	156°47'W	1,177	121
T3-66-S-6	75°45.7'N	156°50'W	1,167	119
T3-66-S-7	75°44.3'N	157°38'W	834	15
T3-66-S-8	75°41.4'N	158°W	864	108
21-5	82°18.4'N	142°23.3'E	1,578	14
21-6	82°58.8'N	140°34.7'E	2,085	36
21-11	84°40.8'N	145°02.6'E	840	65
21-13	84°51.0'N	145°40.4'E	2,848	83

Continuous sedimentary record permits a tentative reconstruction of ice free/ice covered sequences. Absolute age determinations (ibid.) indicate that ice free periods in the Arctic were coeval with mid-latitude glacial temperature minima, such as faunal-isotope stages 12, 8 and 6 (Herman et al. in press). Oxygen isotope values of benthonic and planktonic foraminifera suggest that during these intervals the pycnocline was greatly reduced. Consequently, sea-ice disappeared at least seasonally (Herman et al. in press). Some of the foraminifera-rich layers were deposited during these periods (e.g. sediments in faunal-isotope stages 12, 8 and 6). These intervals are followed by deglacial events, well documented by faunal-isotope stages 7 and 5 when glacial meltwater and icebergs flooded the Arctic, establishing strong vertical stratification (Herman et al. in press).

$\delta^{13}\text{C}$ show a complex trend, from low values in some of the foraminifera-poor, transition and foraminifera-rich zones, to carbon 13 enrichment by nearly 1‰ in foraminifera-rich as well as in foraminifera-poor zones.

References

- Herman, Y. & Osmond, J. K. 1984: Late Neogene Arctic paleoceanography: micropaleontology and chronology. Pp. 241–250 in Berger, A., Imbrie, J., Hays, J., Kukla, G. & Saltzman, B. (eds.): *Milankovitch and Climate*. Reidel Publ.
- Herman, Y., Osmond, J. K. & Somayajulu, B. L. K. in press: Late Neogene Arctic paleoceanography: micropaleontology, stable isotopes and chronology. In Herman, Y. (ed.): *The Arctic Seas: Climatology, Oceanography, Biology and Geology*. Van Nostrand Reinhold Co. Inc., Stroudsburg, Penn.

T3-67-5

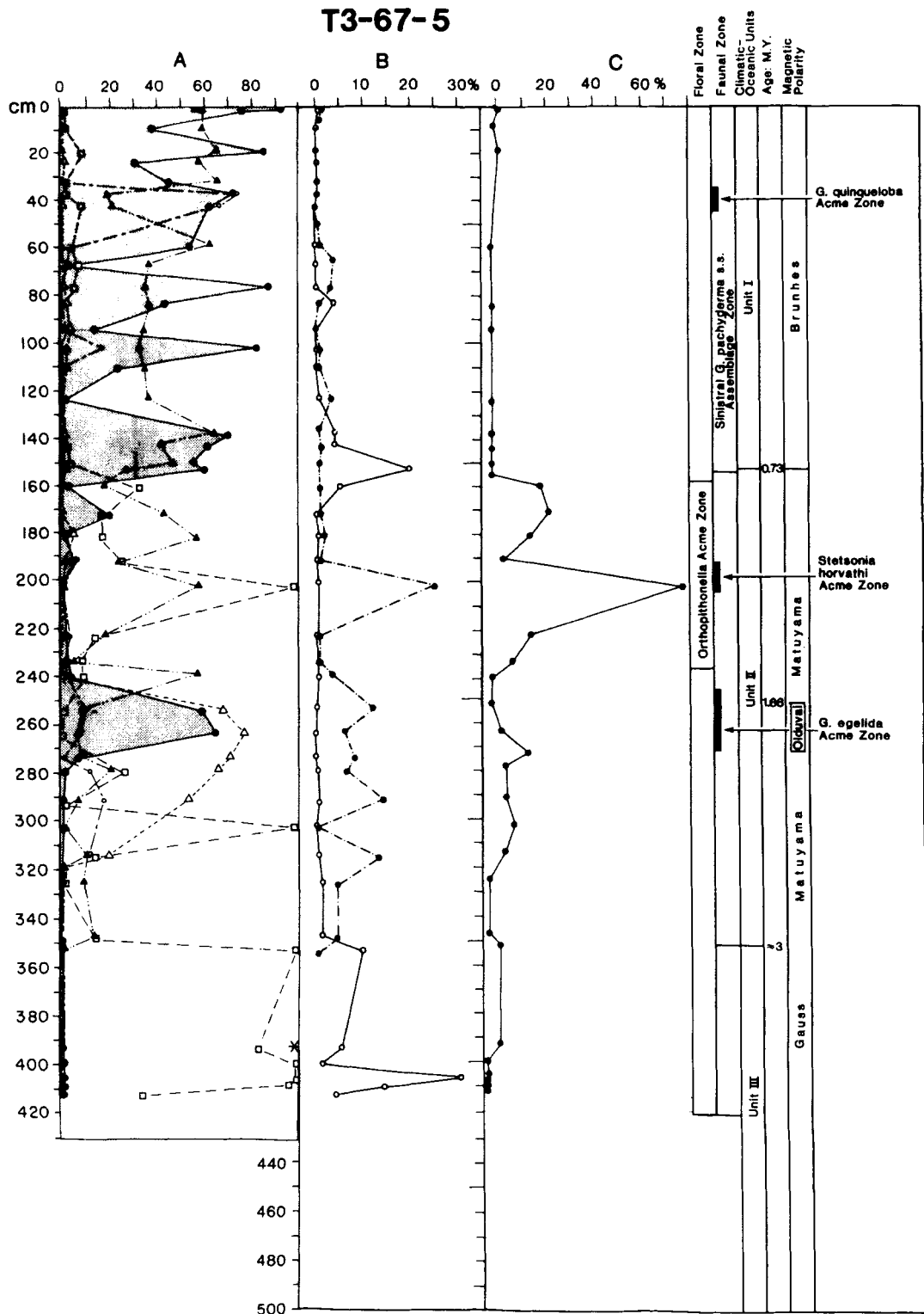


Fig. 1. Core T3-67.5. A: ● 1. Planktonic foraminifera in the coarse fraction ($>63 \mu\text{m}$); percentage. ○ 2. *Globigerina quinqueloba* of the total planktonic foraminiferal fauna; △ 3. *Globigerina egelida*, of the total planktonic foraminiferal fauna; ▲ 4. Juvenile planktonic foraminifera of the total planktonic foraminiferal fauna; □ 5. Benthonic foraminifera, of the total foraminiferal fauna; * 6. Low latitude planktonic foraminifera. B: ○ 1. Mn-Fe rich aggregates. ● 2. Planktonic foraminiferal test fragments; percentage. C: 1. *Orthopithonella* abundance in the coarse fraction ($>63 \mu\text{m}$).