

PLEISTOCENE STRATIGRAPHY, ICE SHEET HISTORY AND ENVIRONMENTAL DEVELOPMENT IN THE SOUTHERN KARA SEA AREA, ARCTIC RUSSIA.

Hanna Lokrantz

Göteborg University, Earth Sciences Centre, Box 460, SE-405 30, Göteborg, Sweden

ABSTRACT

This thesis presents the results from stratigraphic and structural investigations at two coastal key sites with respect to the glacial history of the southern Kara Sea area, arctic Russia: the Marresale coastal cliffs on Yamal Peninsula and Cape Shpindler cliff sections on Yugorsky Peninsula. The focus of the field investigations, which were carried out in the summers of 1997, 1998 and 1999, was to clarify the glacial stratigraphy of the Quaternary deposits for reconstructing their environmental history. Interpretations of depositional environments and stratigraphic relations give new perspectives on the Pleistocene glacial and environmental history of the southern Kara Sea region.

At Marresale, the Kara diamicton and associated glaciotectionic disturbances of underlying prodeltaic, marine and fluviodeltaic sediments reflect a regional glaciation with glacier movements from the S-SW. The diamicton is overlain by eolian and fluvial sand sheets, radiocarbon and luminescence dated to between ca. 45-1 ka BP (kiloyears Before Present), with no signs of proximity or coverage of a Late Weichselian ice sheet. The Cape Shpindler stratigraphy reveals a sequence of regressive marine to fluvial sediments and a complex of till and relict glacier ice that is associated with an ice sheet moving inland from an ice divide in the Kara Sea. Luminescence datings on overlying fluvial sediments yield ages of >120-200 ka. After deposition of the fluvial sediments, Cape Shpindler was again subjected to glacial overriding, this time from the mainland towards the Kara Sea. At the very top occur postglacial terrestrial sediments dated 12.8-0.8 ka.

It is concluded that Marresale was overrun by ice from the S-SW before 40 ka, but was not covered by an ice sheet during the Late Weichselian, suggesting that potential ice volumes of the Late Weichselian Kara Sea ice sheet are considerably reduced, compared to some recent reconstructions. There were two events of glacial overriding at Cape Shpindler. An ice sheet centred in the Kara Sea bordered the Cape Shpindler sections, possibly during Marine Oxygen Isotope Stage 8 (ca. 300-250 ka BP). Relict glacier ice associated with this event is still present today and has thus survived several interglacial-interstadial events. The younger ice advance moved northwards from an ice-divide inland, tentatively centered over the Pai-Hoi upland of Ygorski Peninsula. It is suggested that the younger glacial event at Cape Shpindler and the Kara diamicton at Marresale correlate to the last regional glaciation 80-60 ka BP. The Marresale and Cape Shpindler record question a concentric Early-Middle Weichselian Ice Sheet with a single dome and major ice-divide centred over Novaya Zemlya or the Kara Sea. The glacial fingerprinting suggests that local ice domes, centered on the mainland ridges and highlands may have grown and interacted with a larger Barents-Kara Sea ice sheet during the Early-Middle Weichselian.

Keywords: Arctic Russia, Kara Sea, Pleistocene, stratigraphy, chronology, glaciotectionism, relict glacier ice.