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The tectonic evolution of the New Siberian Islands

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The New Siberian Islands are located on the wide arctic shelf between the Laptev Sea in the west and the East-Siberian Sea in the east and represent the westernmost part of the Chuchotka-Alaska Terrane. Geologically, they are bounded by the Laptev Sea Rift in the west, the passive continental margin towards the Arctic Ocean in the north and the South Anyui Suture Zone in the south. Two scenarios are discussed: (1) the New Siberian Islands were situated at the North American margin before the start of the break-up of Laurasia in Jurassic times, and (2) the New Siberian Islands are part of the Siberian platform since at least Palaeozoic times.

Compared with the structural evolution of Severnaya Semlya, Franz Joseph Land and Svalbard, the sedimentary succession of the New Siberian Islands is only very little affected by tectonicdeformation. There is no evidence for the Caledonian and Ellesmerian orogeny on the New Siberian Islands. Although there are some Late Ordovician volcanics exposed on the DeLong Islands, the stratigraphic succession continues without important breaks from Cambrian to Middle Carboniferous, a time span which includes both orogenies. Furthermore, the Paleozoic evolution of the sedimentary basin on the New Siberian Islands has more affinities to the Siberian platform than to Severnaya Semlya, Franz Joseph Land and Svalbard.

The only observed deformation on the New Siberian Islands is related to the plate tectonic re-organisation of the recent Arctic during the break-up of the Arctic Ocean in probably Early Tertiary times. The deformation on the Anyui Islands is characterized by mostly gentle, open synclines and anticlines with NW-SE trending axis. The deformation increases westwards towards the Laptev Sea, and is dominated by tight folding, thrusting and partly cleavage-development at the west coast of Kotel′ny Island and on Bel′kovski Island. The fold-vergencies and the cross-cutting relationships of bedding and cleavage indicate NE-directed transports. On Novaya Sibir' Island and on the DeLong Islands, there is no evidence for NE-SW shortening, only minor tilting of the sedimentary units was observed.

Structural investigations that were carried out during the CASE 13 expedition in September 2011 indicate that the folding on the western New Siberian Islands is probably related to the onset of the development of the Laptev Sea Rift during the Palaeocene. It is characterized by a dextral tectonic regime before anomaly 24 (55 Ma ago) and before the start of the sea-floor spreading in the Eurasian Basin. The evolution of the New Siberian Islands is very different compared to Severnaya Semlya, Franz Joseph Land, Svalbard and North Greenland/Ellesmere Island but quite similar to the south Taimyr Peninsula and Khatanga/Anabar areas. Based on this the New Siberian Islands have never been close to Severnaya Semlya, Franz Joseph Land, Svalbard and North Greenland/Ellesmere Island since Palaeozoic times, but they were relatively close to the Siberian margin. At least this means that the westernmost part of the Chuchotka-Alaska Terrane was never situated adjacent to Svalbard and North Greenland/Ellesmere Island.