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SDR (Seaward Dipping Reflectors) mapping in the Amerasia Basin

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Study area includes Alpha-Mendeleev Rise and contiguous deep-water basins – Toll, Mendeleev, Nautilus and Stefansson Basins near the eastern slope and Podvodnikov and Makarov Basins near the western slope. The western boundary is Lomonosov Ridge; the eastern boundary is Chukchi Plateau and part of the Canada Basin. There are Chukchi and East Siberian Seas on the continental shelf.

Within the study area, we studied and interpreted seismic 2D profiles from the Russian Arktika-2011, Arktika-2012, Arktika -2014, and Arktika-2020 expeditions. We also worked with open Canadian seismic data (Shimeld et al., 2021) and published data (e.g., Ilhan, Coakley, 2018). A unified seismostratigraphic correlation was carried out for the entire region.

Many half-grabens locate on the edges of deep-sea basins. Bright-amplitude reflectors with wedge-shaped architecture fill half-grabens. These reflectors are similar to SDR and they represent by interbedding of basaltic lavas and sedimentary rocks. They are typical for the synrift complex within the study area. The top of the synrift complex (or top of SDRs like units) is a bright boundary with age ~100 Ma. Sometimes the top of the synrift complex contains conical edifices with a chaotic internal structure. Their height is 400-800 m. This is possible underwater volcanoes. The base of the synrift complex (or base of SDRs like units) is unclear and corresponds to the top of the acoustic basement. This age is near 125 Ma. We assume that SDRs like units and volcanos were formed during the HALIP epoch (~125-80 Ma).

We found a regularity in the distribution of half-graben and SDRs like units. They are all located at the edges of the basins near the slopes of the uplifts. Two axes can be distinguished as the centers where SDRs like units and half-grabens converge. The western axis goes through Podvodnikov Basin and corresponds with the central uplift of the Podvodnikov basin. Reflectors dip from the western slope of the Mendeleev Rise from one side and from the Lomonosov Ridge from another. They converge near the central uplift. The eastern axis goes through Toll, Mendeleev, Nautilus and Stefansson Basins. In Toll and Mendeleev Basins reflectors and half-grabens dip from east slope of Mendeleev Rise from one side and from Chukchi Plateau from another. The Stefansson Basin looks similar to the Podvodnikov Basin. The central uplift is located in the center of the Stefansson Basin. Reflectors and half-grabens dip from Alpha Rise from one side and from Sever Spur from another. We have compiled a map of the distribution of SDR's like units, volcanoes and half-grabens based on the map of the acoustic basement.

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