

Continuous seismic reflection profiling buoys - a future direction for marine geophysical exploration of the Arctic Ocean

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Project summary

Experience from the last decade of icebreaker expeditions into the central Arctic Ocean demonstrate that about a quarter of the deep polar basin will remain inaccessible to modern multi-channel seismic exploration by towed arrays even when the survey vessel is assisted by a nuclear icebreaker. We propose to develop and use automatic buoys to acquire seismic reflection data particularly over high priority, but relatively inaccessible scientific targets such as the Alpha Ridge and also as a cost effective way to augment the seismic data base in areas targeted by proposals for future scientific drilling. An automatic seismic system powered by solar panels and batteries deployed on drifting sea ice, will collect a single channel seismic record with 0.5- 1 km sub-bottom penetration every 50 meter along the drift path. Data will be compressed and transmitted to shore in real time via the Iridium phone system. Uptime is limited by power and is expected to be at least 6 possibly 8 months of the year. Primary targets for buoy deployments are northern part of Yermak Plateau in support of IODP proposal # 645, area of erosion by deep draft ice on the shallowest part of Lomonosov Ridge, and a newly discovered asteroid impact site on the southern flank of Alpha Ridge. This proposal is part of IPY project # 77 Plate Tectonics and Polar Gateways in Earth's History (PLATES and GATES).