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# Engineering challenges of operating year-round portable seismic stations at high-latitude

Bruce Beaudoin (1), Paul Carpenter (1), Jason Hebert (1), Dean Childs (1), Kent Anderson (2), and the PASSCAL Team

(1) IRIS PASSCAL, New Mexico Tech, Socorro, NM, United States (bruce@passcal.nmt.edu), (2) Incorporated Research Institutions for Seismology, Washington, DC, United States

Remote portable seismic stations are, in most cases, constrained by logistics and cost. High latitude operations introduce environmental, technical and logistical challenges that require substantially more engineering work to ensure robust, high quality data return. Since 2006, IRIS PASSCAL has been funded by NSF to develop, deploy, and maintain a pool of polar specific seismic stations. Here, we describe our latest advancements to mitigate the challenges of high-latitude, year-round station operation.

The IRIS PASSCAL program has supported high-latitude deployments since the late 1980s. These early deployments were largely controlled source, summer only experiments. In early 2000 PASSCAL users began proposing year-round deployments of broadband stations in some of the harshest environments on the planet. These early year-round deployments were stand-alone (no telemetry) stations largely designed to operate during summer months and then run as long as possible during the winter with hopes the stations would revive come following summer. In 2006 and in collaboration with UNAVCO, we began developing communications, power systems, and enclosures to extend recording to year-round. Since this initial effort, PASSCAL continued refinement to power systems, enclosure design and manufacturability, and real-time data communications. Several sensor and data logger manufacturers have made advances in cold weather performance and delivered newly designed instruments that have furthered our ability to successfully run portable stations at high-latitude with minimal logistics – reducing size and weight of instruments and infrastructure.

All PASSCAL polar engineering work is openly shared through our website: www.passcal.nmt.edu/content/polar