The Maintenance and Development of a Specialised Cold Curation Facility for Pristine Astromaterials.

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The Subzero Facility for Curation of Astromaterials at the University of Alberta consists of a purified Ar glove box enclosed within a freezer chamber; enabling handling of samples at or below -10 °C in an inert atmosphere [1]. Originally designed for the manipulation and characterization of the Tagish Lake meteorite, an ungrouped carbonaceous chondrite with a high organic content that has been kept at sub-zero temperatures since it's fall onto a frozen lake in 2000 [1-6], the facility also represents a test bed for the development of sample handling facilities ready for sample return from targets containing organic compounds, ices, or other volatile components. The facility differs significantly from similar facilities elsewhere, and from previous cold curation test-beds [7-8] due to the enclosure of the glove box within the low-temperature environmental chamber. Keeping samples in a cold, as well as inert, environment has the benefit of reducing terrestrial contamination from known volatiles released from laboratory building and handling materials, slowing the rates of oxidation, hydrolysis and that of bacterial and fungal growth [1,9], therefore preserving the integrity of the sample material for longer periods of time.

We can provide several recommendations based on insights obtained from the commissioning and initial use of the facility that are relevant to planning and implementation of curation methods for future sample return missions, collection of freshly fallen meteorites, curation of volatile bearing meteorites and other astromaterials.

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