National Aeronautics and Space Administration

Johnson Space Center

Cold Stowage

NASA's vision for humans pursuing deep space flight involves the collection of science in low earth orbit aboard the International Space Station (ISS). As a service to the science community, Johnson Space Center (JSC) has developed hardware and processes to preserve collected science on the ISS and transfer it safely back to the Principle Investigators. This hardware includes an array of freezers, refrigerators, and incubators.

The Cold Stowage team is part of the International Space Station (ISS) program. JSC manages the operation, support and integration tasks provided by Jacobs Technology and the University of Alabama Birmingham (UAB). Cold Stowage provides controlled environments to meet temperature requirements during ascent, on-orbit operations and return, in relation to International Space Station Payload Science.

Cold Stowage Hardware

Passive Hardware

- Double Coldbag

  Double Coldbags (DCBs) have highly insulated walls and are designed to carry payload science at controlled temperatures by utilizing Phase Change Material (PCM) to maintain specific temperatures for a prolonged period of time. The DCB is rectangular and fits in a single mid-deck locker. It is commonly used for transport.

- Mini Coldbag

  Mini Coldbags (MCBs) are similar to DCBs but are significantly smaller. This coldbag has been optimized for return on a Soyuz vehicle. The MCB can also be used within a Glovebox as a means to immediately begin cooling samples after collection.

- Ice Bricks

  Ice Bricks are designed to provide cooling or incubation to scientific specimens requiring specific temperature ranges during transport. They are designed to work with other insulated transporters (e.g., DCB, MCB) to maintain specific temperatures between -32°C and +37°C. Ice Bricks are reconditioned using active hardware (MELFI, Glacier, Polar, MERLIN).

Cold Stowage Hardware

Active Hardware

- MELFI

  The Minus Eighty-degree Laboratory Freezer for the International Space Station (MELFI) is a refrigerator/freezer used to preserve science samples on the ISS. MELFI has four insulated dewars which can be set independently to +2°C, -35°, or -95°C.

- MERLIN

  MERLIN is a single middeck locker-sized incubator/fridge/freezer. The primary functions of MERLIN are to provide temperature-specific environments for samples. MERLIN is designed to support experiments requiring temperatures between +4°C and +40°C for launch/return, and -20°C to +48°C on ISS.

- Rapid Freeze

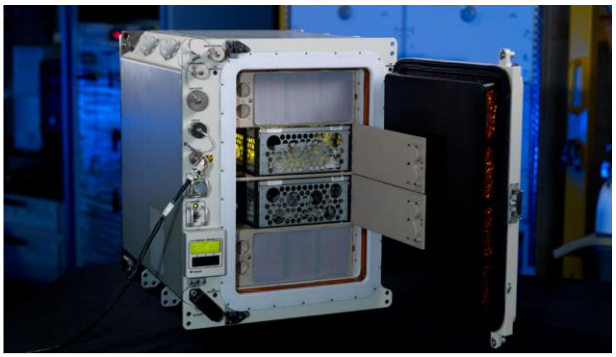
  The Glovebox Freezer and Cryo Chiller provide the capability to rapidly freeze science samples at rates approaching those of Liquid Nitrogen on the ground. Samples are frozen via a conduction interface at -185°C. The Glovebox Freezer is designed to be used inside the Microgravity Sciences Glovebox (MSG) and Life Sciences Glovebox (LSG). The Cryo Chiller is a single middeck locker-sized freezer that supports experiments at -160°C for on-orbit rapid freeze operations.

- GLACIER

  The Glacier is a double middeck locker-sized cryogenic freezer. The primary function of Glacier is to provide cryogenic preservation of science samples aboard the ISS and thermal control in visiting vehicles. Glacier is designed to support experiments that require temperatures between -95°C and +4°C for launch/return and -160°C to +4°C on ISS.

- POLAR

  Polar is a single middeck locker-sized cryogenic freezer. The primary function of Polar is to provide cryogenic preservation of science samples aboard the ISS and thermal control in visiting vehicles. Polar is designed to support experiments that require temperatures between -95°C and +10°C.



Active Hardware Continued

- Iceberg

  Iceberg is a double middeck locker-sized cryogenic freezer. The primary function of Iceberg is to provide cryogenic preservation of science samples aboard the ISS. Iceberg provides the largest ratio of internal cold volume to external footprint of all the Cold Stowage assets. Iceberg is designed to support experiments that require temperatures between -95°C and +4°C.

Cold Stowage Lab

The Cold Stowage Lab is located at JSC. Hold tests, fit checks, and thermal tests can be performed by request within the lab.

Equipment in the lab allows the Cold Stowage team to test articles at temperatures ranging between -196°C to +200°C. Cold Stowage also utilizes a lab at Kennedy Space Center (KSC).

The lab at KSC is used for active hardware processing, passive hardware conditioning, and payload turnover in support of visiting vehicle missions.

Requesting Cold Stowage

Payload Developers (PD's) use an ISS Program tool, OZ (Payload Office) Requirements Baseline and Integration Tool (ORBIT), to request Cold Stowage support by filling out a Cold Stowage Form. ORBIT can be accessed at the following website: https://orbit.iss.nasa.gov

CONTACT US

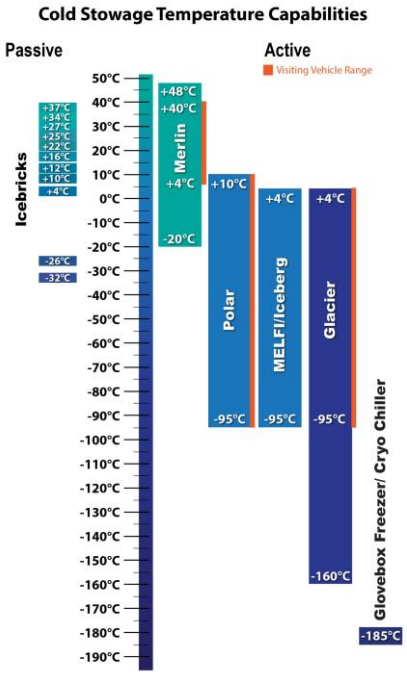
The Cold Stowage team is dynamic and provides integration and support to PDs through launch, on-orbit operations, and landing. In most cases, Cold Stowage assistance doesn't end until the science has been safely handed over to the PD.

Please contact us and find out how Cold Stowage can help make your experiment even cooler.

For more information on Cold Stowage, including existing Cold Stowage forms, a current Cold Stowage plan, and to request Cold Stowage testing, visit the following website:

https://home.iss.nasa.gov/oc/cold-stowage-integration/

E-Mail: jsc-coldstowage@mail.nasa.gov



For the benefit of all

For more information:
https://www.nasa.gov/centers/johnson/partnerships/JSC-Partnership-Gateway

Point of contact:
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