JSC/EC5 U.S. Spacesuit Knowledge Capture (KC) Series Synopsis

All KC events will be approved for public using NASA Form 1676.

This synopsis provides information about the Knowledge Capture event below.

Topic: Antarctica EVA

Date: May 6, 2013 **Time:** 3:30-5:00 pm **Location:** JSC/B5S/R3102

DAA 1676 Form #: 29248

A PDF of the presentation is also attached to the DAA 1676 and this is a link to all lecture material and video: \\js-ea-fs-01\pd01\EC\Knowledge-Capture\FY13 Knowledge Capture\20130506 Love_Antartica EVA\1676 Review and Public Release

*A copy of the video will be provided to NASA Center for AeroSpace Information (CASI) via the Agency's Large File Transfer (LFT), or by DVD using the USPS when the DAA 1676 review is complete.

Assessment of Export Control Applicability:

This Knowledge Capture event has been reviewed by the EC5 Spacesuit Knowledge Capture Manager in collaboration with the author and is assessed to not contain any technical content that is export controlled. It is requested to be publicly released to the JSC Engineering Academy, as well as to CASI for distribution through NTRS or NA&SD (public or non-public) and with video through DVD request or YouTube viewing with download of any presentation material.

Presenter: Dr. Stan Love

Synopsis: NASA astronaut Stan Love shared his experiences with the Antarctic Search for Meteorites (ANSMET), an annual expedition to the southern continent to collect valuable samples for research in planetary science. ANSMET teams operate from isolated, remote field camps on the polar plateau, where windchill factors often reach -40◦ F. Several astronaut participants have noted ANSMET's similarity to a space mission. Some of the operational concepts, tools, and equipment employed by ANSMET teams may offer valuable insights to designers of future planetary surface exploration hardware.

Biography: Dr. Stan Love is a NASA astronaut at the Johnson Space Center. He served as a crew member and spacewalker on space shuttle flight STS-122 in 2008 and worked as a Capcom for many shuttle and International Space Station missions. He has participated in numerous terrestrial spaceflight analog expeditions, including two Antarctic field seasons with ANSMET. He previously worked as a spacecraft engineer at Jet Propulsion Laboratory and as a postdoctoral researcher in planetary science at Caltech and at the University of Hawaii. He holds a bachelor's degree in physics from Harvey Mudd College, and a master's and doctorate in astronomy from the University of Washington.

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The Antarctic Search for Meteorites: The Future of Space, on Earth Today

EVA Knowledge Capture Outbrief

Stan Love

2013 May 6

A months-long expedition

A months-long expedition
Far from home

A months-long expedition
Far from home
With a lethal outside environment,

A months-long expedition
Far from home
With a lethal outside environment,

Living in cramped quarters

A months-long expedition
Far from home
With a lethal outside environment,

Living in cramped quarters
With a small group of international co-workers

A months-long expedition
Far from home
With a lethal outside environment,

Living in cramped quarters
With a small group of international co-workers
Isolated from the rest of the world

A months-long expedition
Far from home
With a lethal outside environment,

Living in cramped quarters
With a small group of international co-workers
Isolated from the rest of the world
With little contact with friends and family,

A months-long expedition
Far from home
With a lethal outside environment,

Living in cramped quarters
With a small group of international co-workers
Isolated from the rest of the world
With little contact with friends and family,

Plus long work days

A months-long expedition
Far from home
With a lethal outside environment,

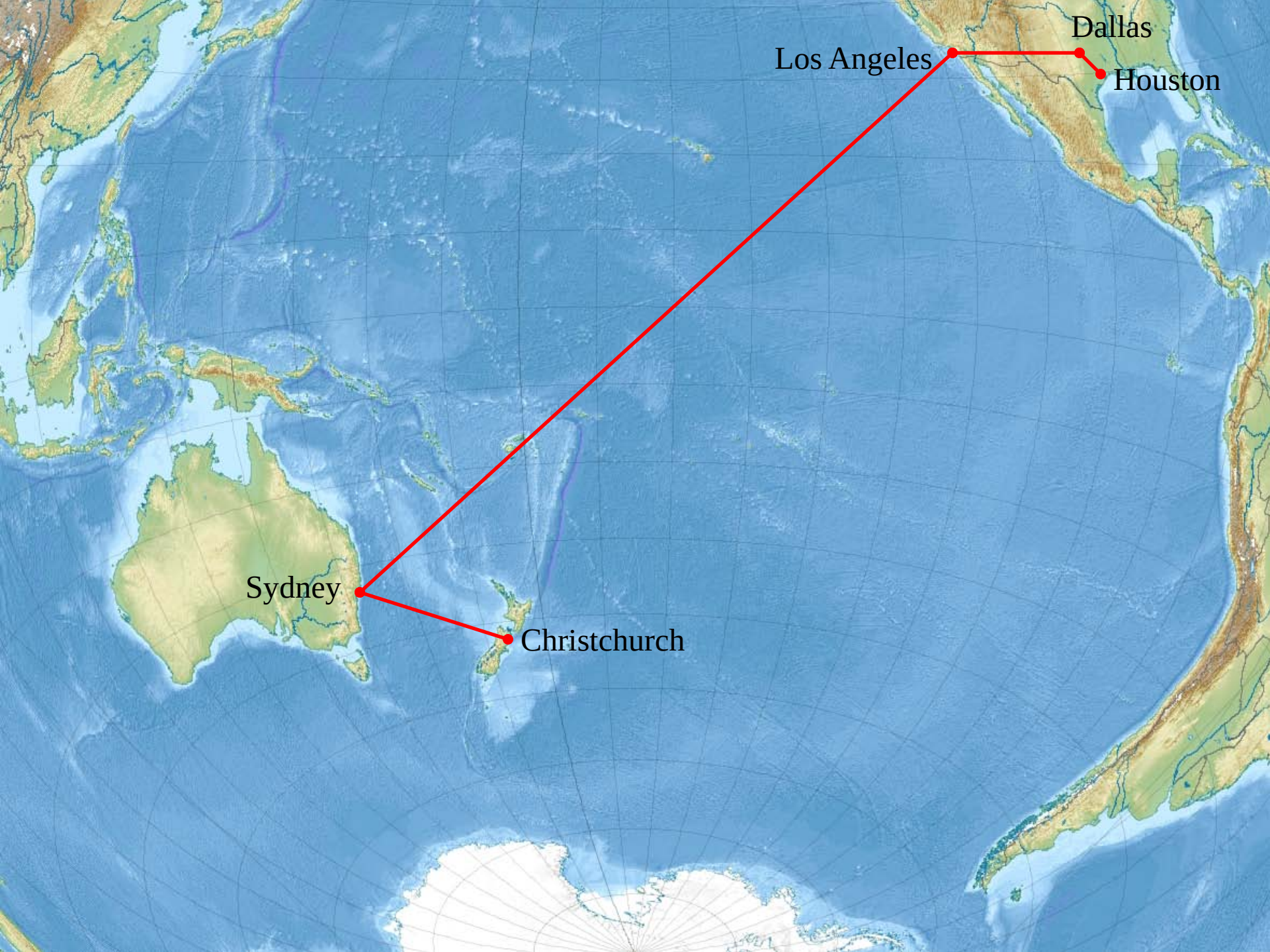
Living in cramped quarters
With a small group of international co-workers
Isolated from the rest of the world
With little contact with friends and family,

Plus long work days
And challenges with eating, drinking,

A months-long expedition
Far from home
With a lethal outside environment,

Living in cramped quarters
With a small group of international co-workers
Isolated from the rest of the world
With little contact with friends and family,

Plus long work days
And challenges with eating, drinking,
And going to the bathroom.


Dallas
Los Angeles
Houston
Sydney
Christchurch

EXIT

Christchurch
McMurdo Station

U.S. AIR FORCE
8195

U.S. AIR FORCE
LIQUID OXYGEN
NO SMOKING WITHIN 50 FEET
KEEP FREE FROM OIL AND GREASE
FOR BREATHING PURPOSES ONLY

242239

U.S. AIR FORCE
8195
AMC
McCHORD
88195

FOREMOST
IVAN THE
TERRA BUS

McMurdo Station

900 people (150-200 in winter)
5:1 ratio of support staff to scientists
3:1 ratio of males to females

14,000 liters of water per day
(desalinated seawater)
1.7 MW average electrical load
(90% diesel, 10% wind)

"IVAN" THE
TERRA BUS
FOREMOST
FUEL DOOR
JP8

3
TL00160

KRESS
CAT
KRESS
402
KRESS

MIXED PAPER
PAPER TOWELS
PLASTIC
GLASS

007

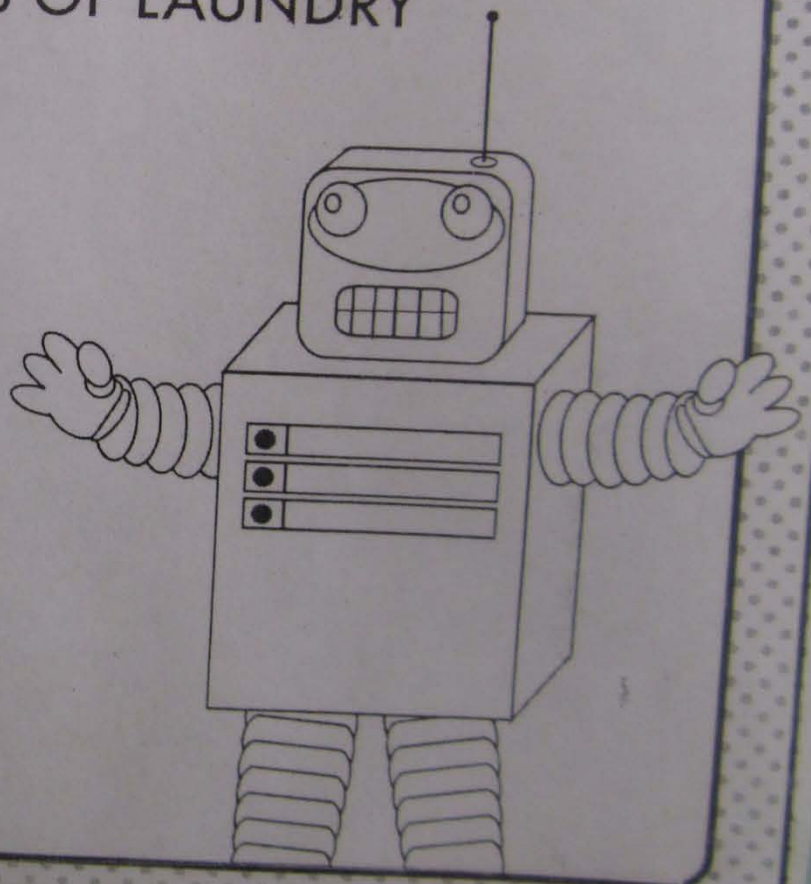
Please
Open Door
and
Place Food
Inside Bin
BATTERIES
AEROSOLS
FABRIC
FOOD WASTE
SKUA
The janitors need your help!
If you have a lot of party trash – or lots of trash for any reason – could you please sort and dispose of your trash in the outside dumpsters?
It would be SO appreciated. Thanks.
PAPER TOWELS
MIXED PAPER
GLASS
PLASTIC
NON-RECYCLABLES

ROBOT SAYS:

USE HOT WATER SPARINGLY!

FOR SHOWERS & HOT CYCLES OF LAUNDRY

SADLY, THIS BUILDING HAS MORE HUMANOIDS THAN HOT WATER. PLEASE USE HOT WATER IN OFF-PEAK HOURS, LIMIT HOW OFTEN YOU USE HOT CYCLES, & KEEP SHOWERS SHORT SO YOUR FRIEND DOES NOT GET STRANDED IN A COLD SHOWER!



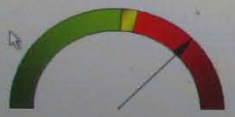
IN THE FUTURE, CONSERVE HOT WATER!

McM Electric Bill

Current $ 6693/ Day

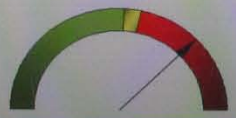
Last wk avg. $ 6441/ Day

Power Usage Last Week
kWh



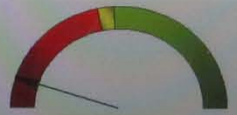
281786 kWh

Water Usage Last Week
Gallons per Person



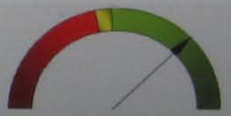
57
Gal/person/Day

Wind Energy Last Week
kWh

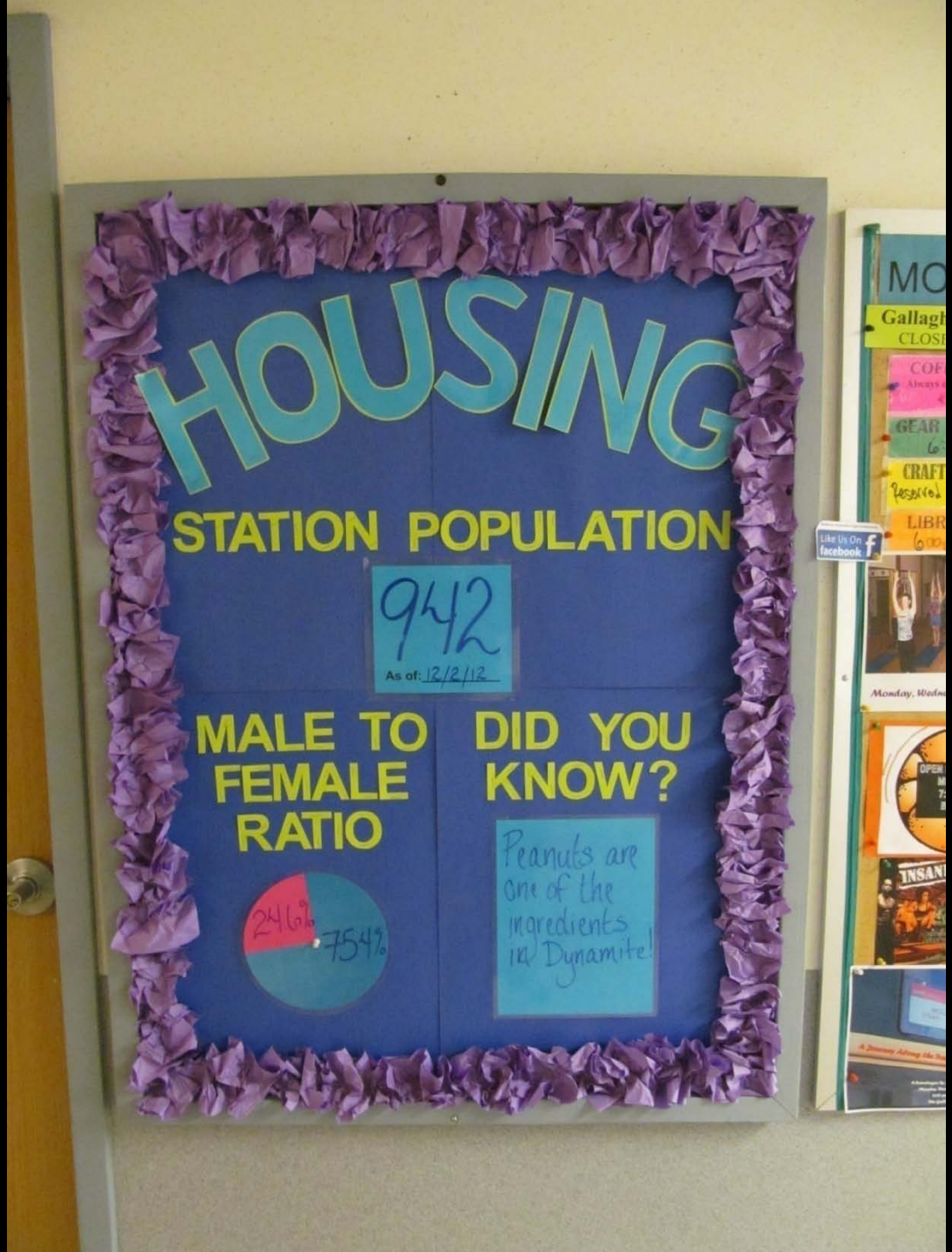


33631 kWh

Heat Recovery Last Week
MBTU



793222 MBTU


HOUSING
STATION POPULATION
942
As of: 12/2/12
MALE TO FEMALE RATIO
24.6%
75.4%
DID YOU KNOW?
Peanuts are one of the ingredients in Dynamite!
Like Us On facebook

RECREATION
PLEASE
Do not steal signs
from the REC B
THE ROOM
The Best Worst Movie Club
Tuesday, Dec. 11th 7:30PM
The Coffee House Theatre
MONDAY
Gallagher's
CLOSED
Southern
Closed
COFFEE HOUSE
Always open, BARISTAS at:
GEAR ISSUE OPEN
6:30-7:30pm
CRAFT ROOM OPEN
Reserved for leather Working
LIBRARY OPEN
6:00pm-10:00pm
Like Us On facebook
Yoga
Monday, Wednesday, Friday 6:30-7:45
OPEN BASKETBALL
MONDAYS
7:30-9:30
Big Gym
INSANITY
TUESDAY
Gallagher's
7:00-11:00 pm.
Southern
7am-11am & 7pm-11pm
COFFEE HOUSE
Always open, BARISTAS at:
GEAR ISSUE OPEN
CRAFT ROOM OPEN
7-9am
LIBRARY OPEN
6p-10p
INSANITY
Hardcore:
30mins of Abs & Core
WEDNESDAY
Gallagher's
7:00-11:00 pm
Southern
7:00pm - 11:00pm
COFFEE HOUSE
Always open, BARISTAS at:
GEAR ISSUE OPEN
630 - 730 pm
CRAFT ROOM OPEN
7:00-9:00 pm - 6-8pm
LIBRARY OPEN
TED Talks
DOWNTOWN BABEY
OPEN SOCCER
Every Wednesday
7:30-9:30PM
Big Gym
Yoga
Monday, Wednesday, Friday 6:30-7:45
Like Us On facebook
THURSDAY
Gallagher's
7:00-11:00 pm
Southern
7am-11am & 7pm-11pm
COFFEE HOUSE
Always open, BARISTAS at:
GEAR ISSUE OPEN
CRAFT ROOM OPEN
7:00-9:00 pm
LIBRARY OPEN
Hardcore:
30mins of Abs & Core
Tuesdays & Thursdays 6:45-7:15pm
INSANITY
Yoga For Beginners
FRIDAY
Gallagher's
7:00-11:00 pm
Southern
7:00pm - 11:00pm
COFFEE HOUSE
Always open, BARISTAS at:
GEAR ISSUE OPEN
CRAFT ROOM OPEN
LIBRARY OPEN
INSANITY
The TWILIGHT ZONE
Yoga
Monday, Wednesday, Friday 6:30-7:45
BALLROOM
SATURDAY
Gallagher's
7:00-11:00 pm.
Southern
COFFEE HOUSE
GEAR ISSUE OPEN
CRAFT ROOM OPEN
LIBRARY OPEN
INSANITY
CRARY
SUNDAY
Gallagher's
6:00-10:00 pm
Southern
COFFEE HOUSE
GEAR ISSUE OPEN
CRAFT ROOM OPEN
LIBRARY OPEN
Rec Opportunities
VOTED BEST BURGER IN TOWN BY SOME GUY WHO LIKES BURGERS
SUNDAY SUNDAY SUNDAY

ANTARCTICA
PM 3A
62 72
NAVAL NUCLEAR POWER UNIT
PM-3A NUCLEAR POWER PLANT
AUTHORIZED AND FUNDED BY THE U.S. CONGRESS AUGUST 1960
DESIGNED AND FABRICATED BY MARTIN COMPANY UNDER CONTRACT TO THE ATOMIC ENERGY COMMISSION
ERECTED BY NAVY SEABEES JANUARY/FEBRUARY 1962
FIRST CRITICALITY 4 MARCH 1962
OPERATED AND MAINTAINED BY OFFICERS, SEABEES AND HOSPITAL CORPSMEN OF THE NAVAL NUCLEAR POWER UNIT, FORT BELVOIR, VIRGINIA
CREWS WERE AUGMENTED WITH ARMY AND AIR FORCE PERSONNEL
THE PLANT WAS SHUT DOWN IN SEPTEMBER 1972
IN MAY 1979, PM-3A DECOMMISSIONING WAS COMPLETE, AND THE SITE RELEASED FOR UNRESTRICTED USE
POWER OUTPUT: 1800 KW(ELECTRIC)
EXPORT STEAM FOR DESALINATION PLANT
72% AVAILABILITY; RECORD POWER RUN 4400 HOURS 1971
ONLY NUCLEAR POWER PLANT TO HAVE OPERATED IN ANTARCTICA
ERECTED IN 2010 BY THE NAVAL NUCLEAR POWER UNIT GROUP

BOVRIL
HUNTER'S
FLAKED OATMEAL
EDINBURGH
FRY'S
PURE
CONCENTRATED
COCOA
No. 227.
12. 1 LB. TINS.
291
SCOTT'S ANTARCTIC

McMurdo Station
Grosvenor Range

CATERPILLAR
CAT

LC-130 "Hercules" aircraft

280 kt TAS

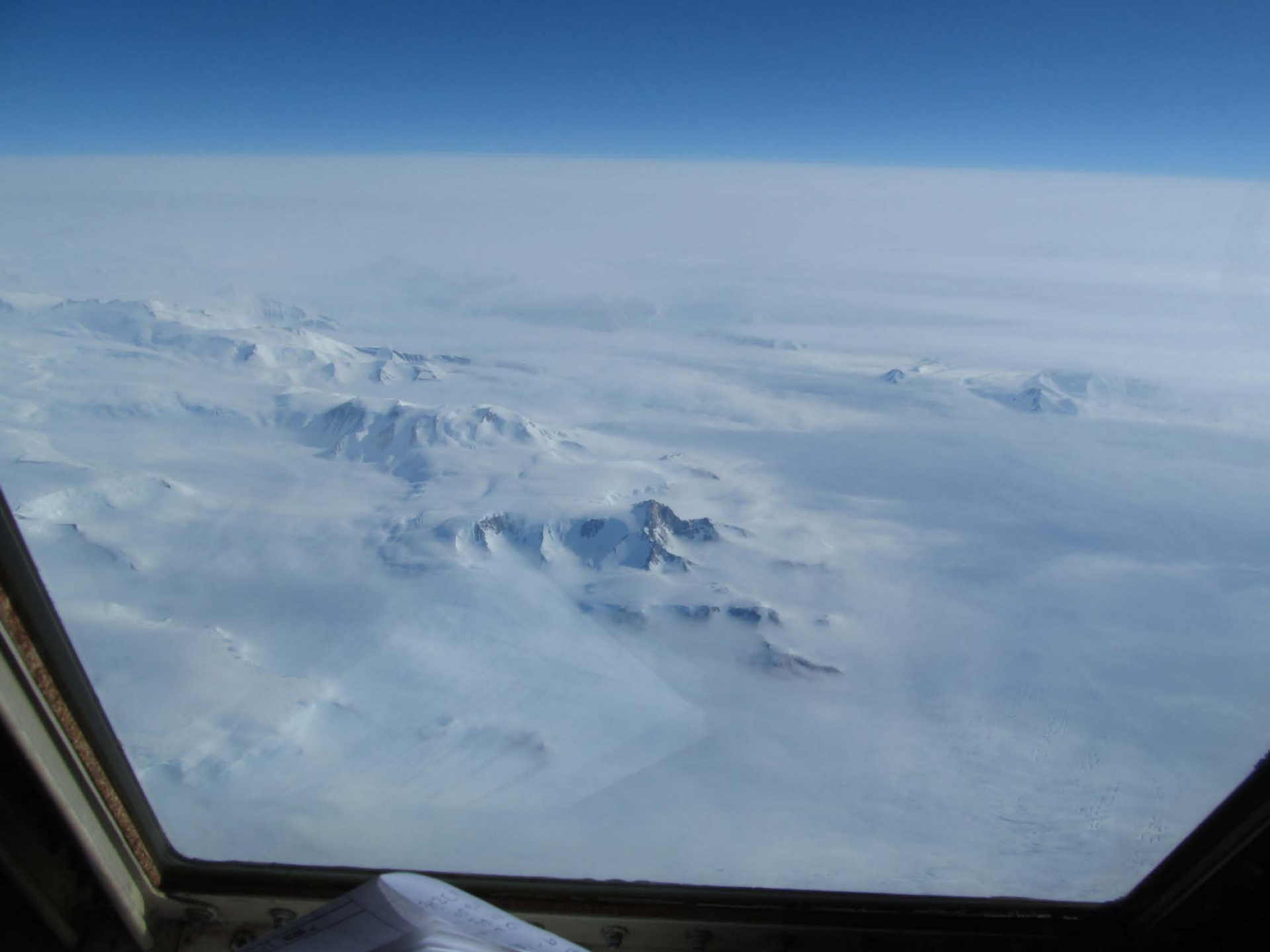
Load for our first flight (750 km from McMurdo):

5,500 kg

35 cubic meters

Two Hercules flights for 8 people for 6 weeks

ski-doo



G-058

Scott Tent

2 people plus stove and some storage
Double wall construction
40 kg weight
Ventilated for stove exhaust
Pyramid shape with four aluminum poles

4.3 cubic meters habitable volume (plus vestibule)
2 people can endure at least 13 consecutive tent days

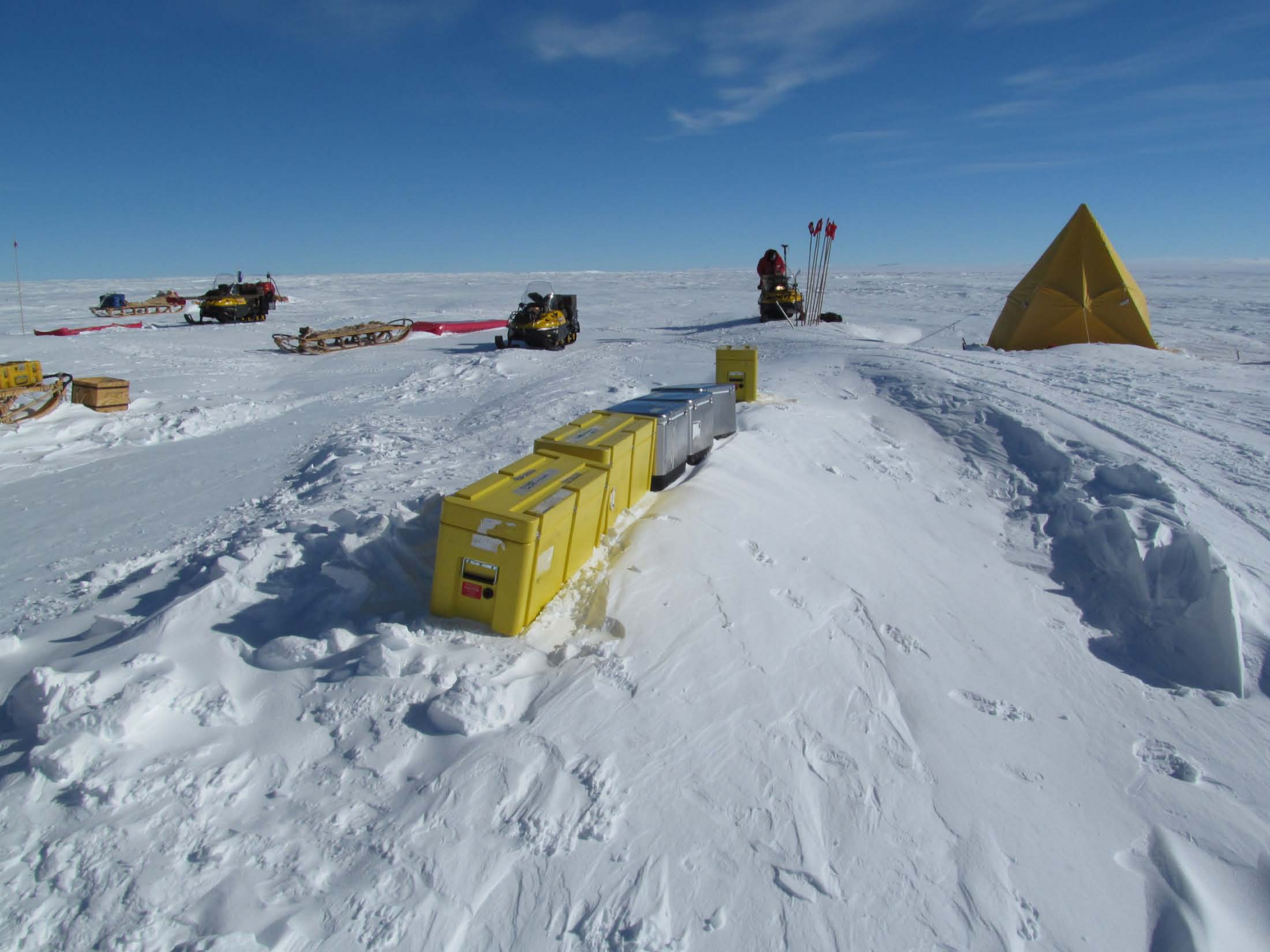
Three additional Scott tents: lavatory; science and team gathering; bath or skidoo repair.

BFC
DANGER
426

Coleman 2-burner white gas camp stove

Converted for propane fuel

Used for heating, cooking, and melting ice for water.
9 kg of propane gives 9 days of use.



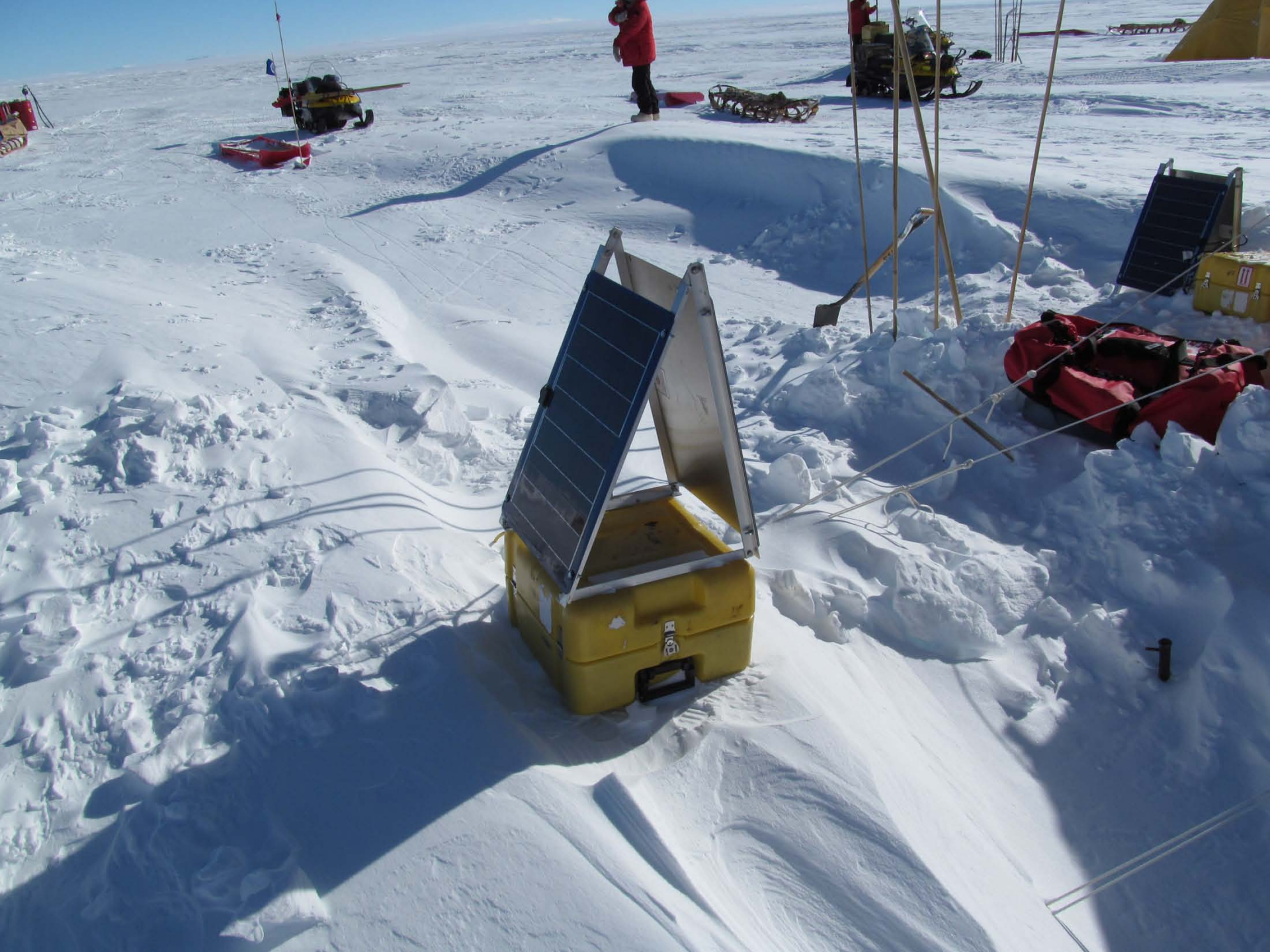
Food for two people for 6 weeks

80 kg
0.5 cubic meters

Water for two people

10-liter bucket full of ice chunks
yields 6 liters of water per day

EXTRA LONG



Solar power unit

Two panels
Two low-temperature auto batteries
Inverter for 110 V 60 Hz power
Power storage and conditioning gear masses 40 kg

35 W max continuous load
5 W average use for power misers

IRIDIUM
OK
MOTOROLA
MOTOROLA
CELL DRIGIN JAPAN
MOTOROLA
CAUTION

Iridium satellite telephone

6 W draw for charging
8 hours for a full charge
2 hours talk time on a charged battery

3 phones for a party of 8
each phone used 5 minutes to 1 hour per day

Daily check-in calls but no "mission control"

ski-doo

Bombardier "Skandic" Ski-Doo

320 kg weight
Pre-mixed two-stroke engine fuel (40:1 fuel:oil)
delivered in 208-liter drums
36-liter fuel tank, 3 km per liter of fuel (6 mpg)
640 km driven during 6-week season
Fuel use for 8 skidoos for 6 weeks:
2300 liters (640 gal., 3800 lb.)

Daily maintenance: 5 minutes for 1 person
Repairs in field: 32 person-hours
(carburetors, broken spring, broken bracket)

NACHO 07-04

Harvey /
G-058-M
BFC
06-01

HARVEY
GPS
17354
Skandic

17354
MARIANNE MADUR

XOMDR2
UP
FRAGILE

"Isopod" insulated sample containers

0.2 & 0.15 cubic meters

15 kg empty

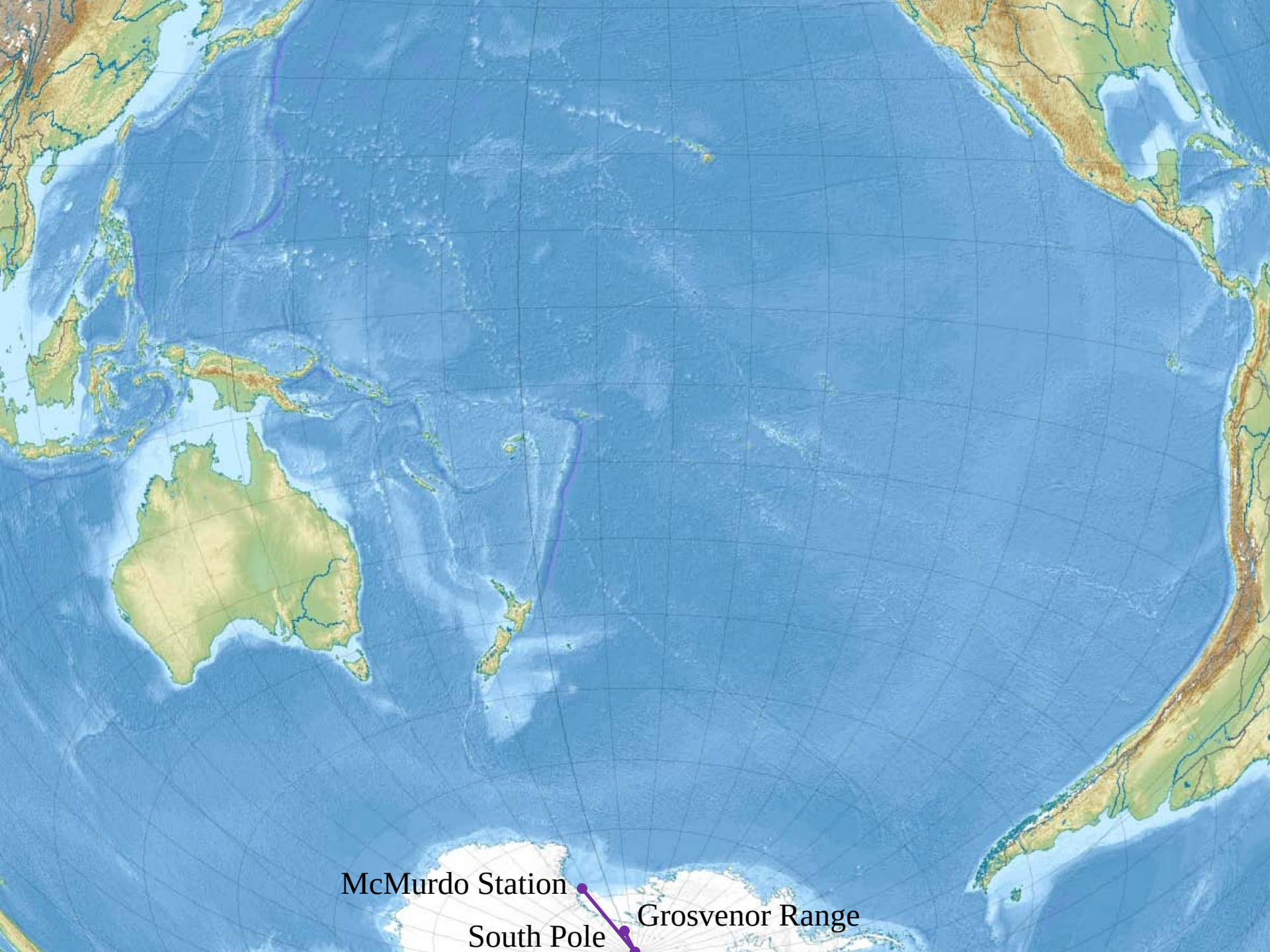
140 kg & 45 kg with samples at end of season

(329 meteorites)

Twin Otter aircraft

1,000 kg load for 400-500 km range.

17353
17356
17357


McMurdo Station
Grosvenor Range
South Pole

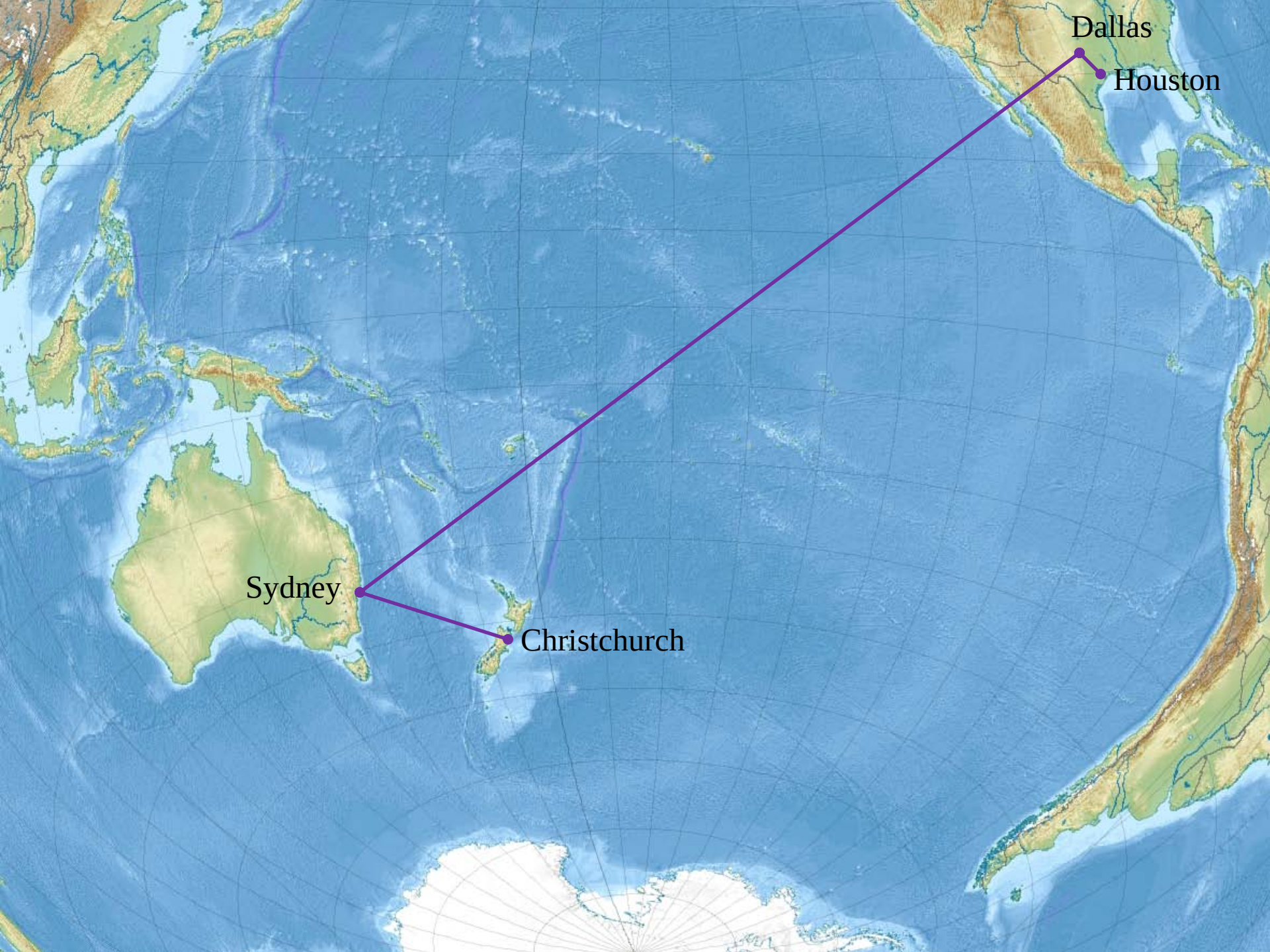
The United States Antarctic Program
welcomes you to
Amundsen-Scott
South Pole Station
UNITED STATES ANTARCTIC PROGRAM
NATIONAL SCIENCE FOUNDATION
90°00′ South
established 1957

FOOD WASTE

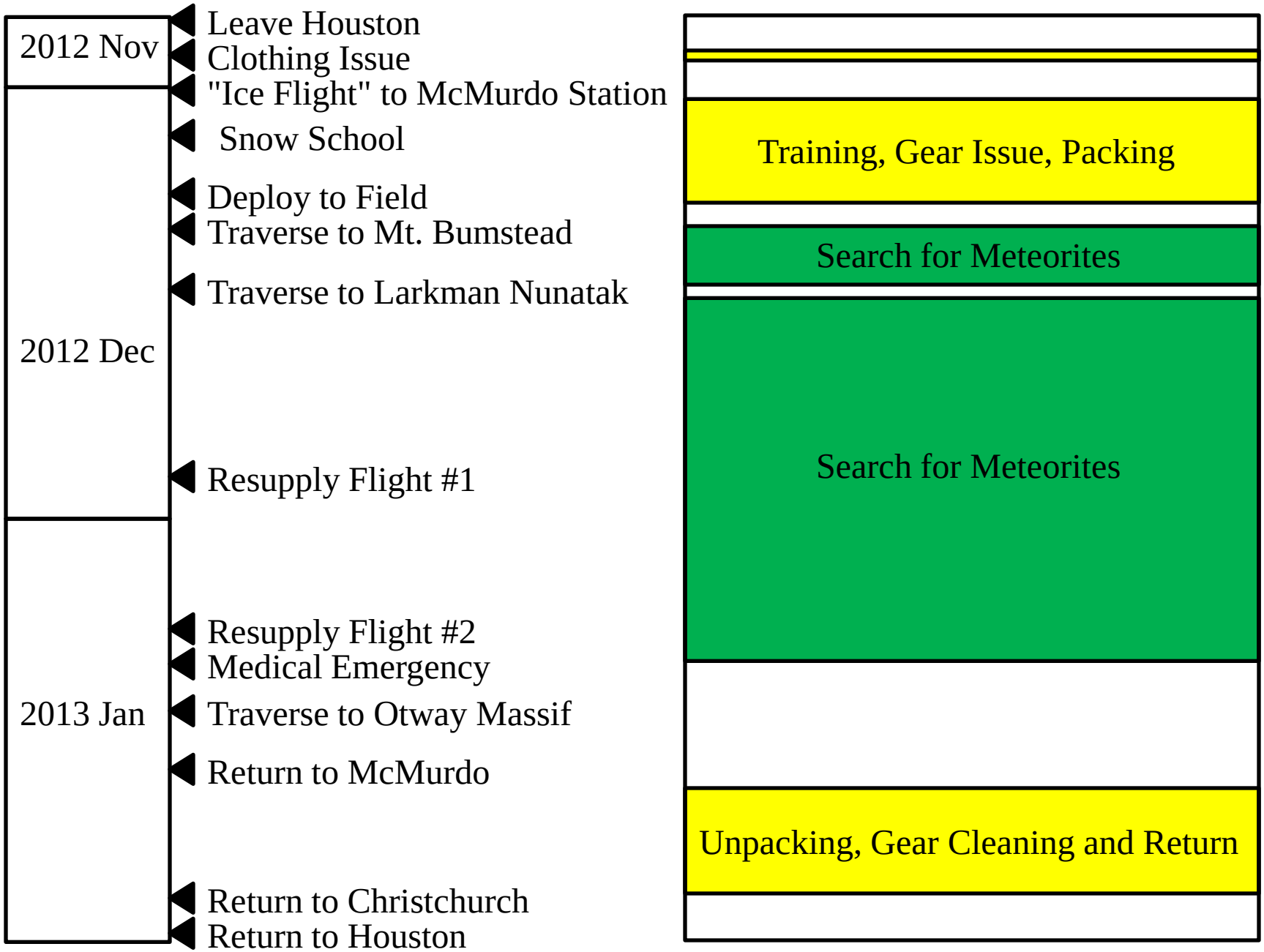
MOUNTAIN
HARD
WEAR
DR STANLEY

Christchurch
McMurdo Station

U.S. AIR FORCE
3301

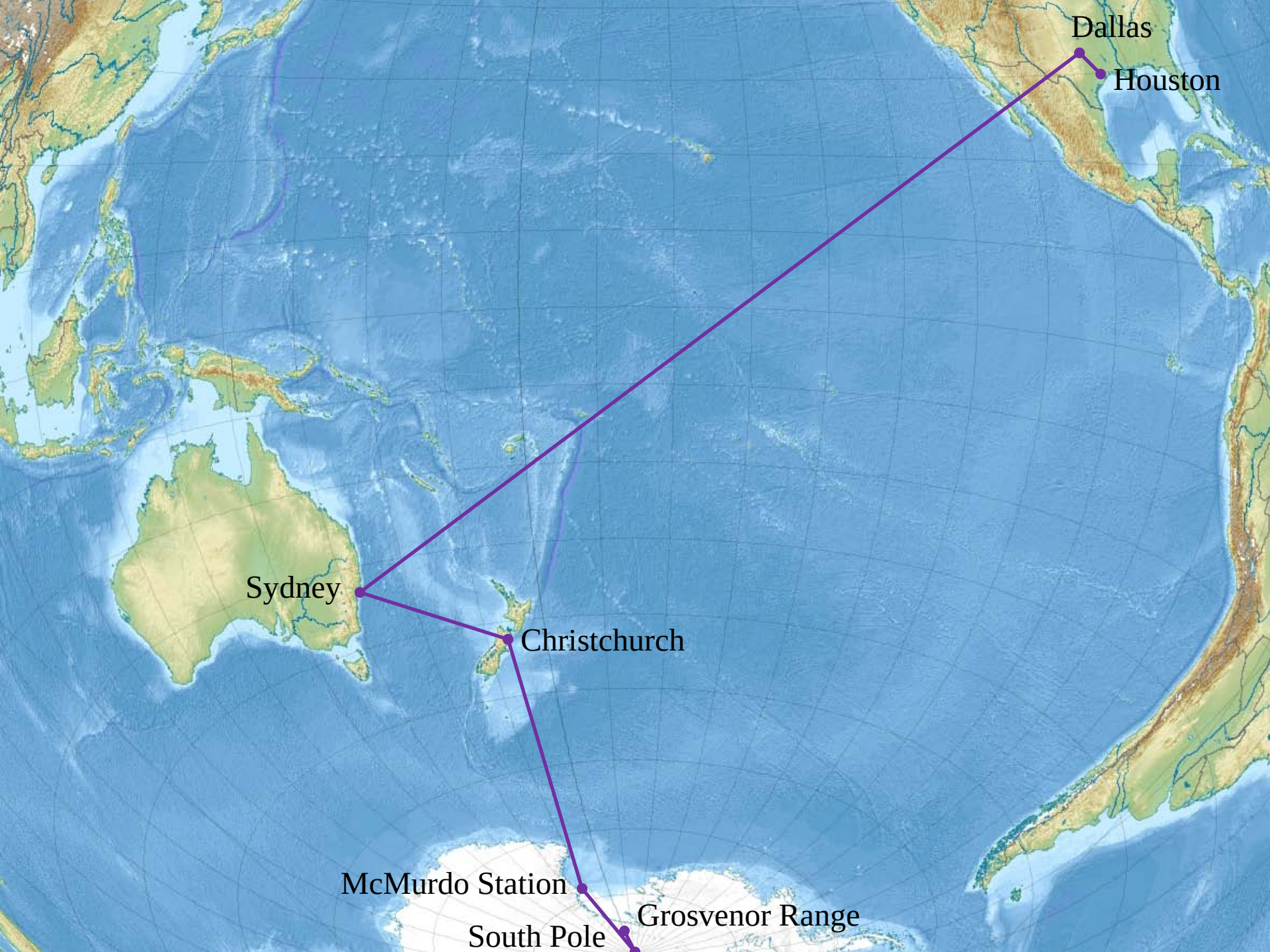

Dallas
Houston
Sydney
Christchurch

Timeline


2012 Nov
2012 Dec
2013 Jan
Leave Houston
Clothing Issue
"Ice Flight" to McMurdo Station
Snow School
Deploy to Field
Traverse to Mt. Bumstead
Traverse to Larkman Nunatak
Resupply Flight #1
Resupply Flight #2
Medical Emergency
Traverse to Otway Massif
Return to McMurdo
Return to Christchurch
Return to Houston
Training, Gear Issue, Packing
Search for Meteorites
Search for Meteorites
Unpacking, Gear Cleaning and Return

The End

Dallas
Los Angeles
Houston
Sydney
Christchurch
McMurdo Station
Grosvenor Range


Dallas
Houston
Sydney
Christchurch
McMurdo Station
Grosvenor Range
South Pole