

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.

EC5 Spacesuit Knowledge Capture POCs:

Cinda Chullen, Manager

cinda.chullen-1@nasa.gov

(281) 483-8384

Vladenka Oliva, Technical Editor (Jacobs)

vladenka.r.oliva@nasa.gov

(281) 461-5681

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,

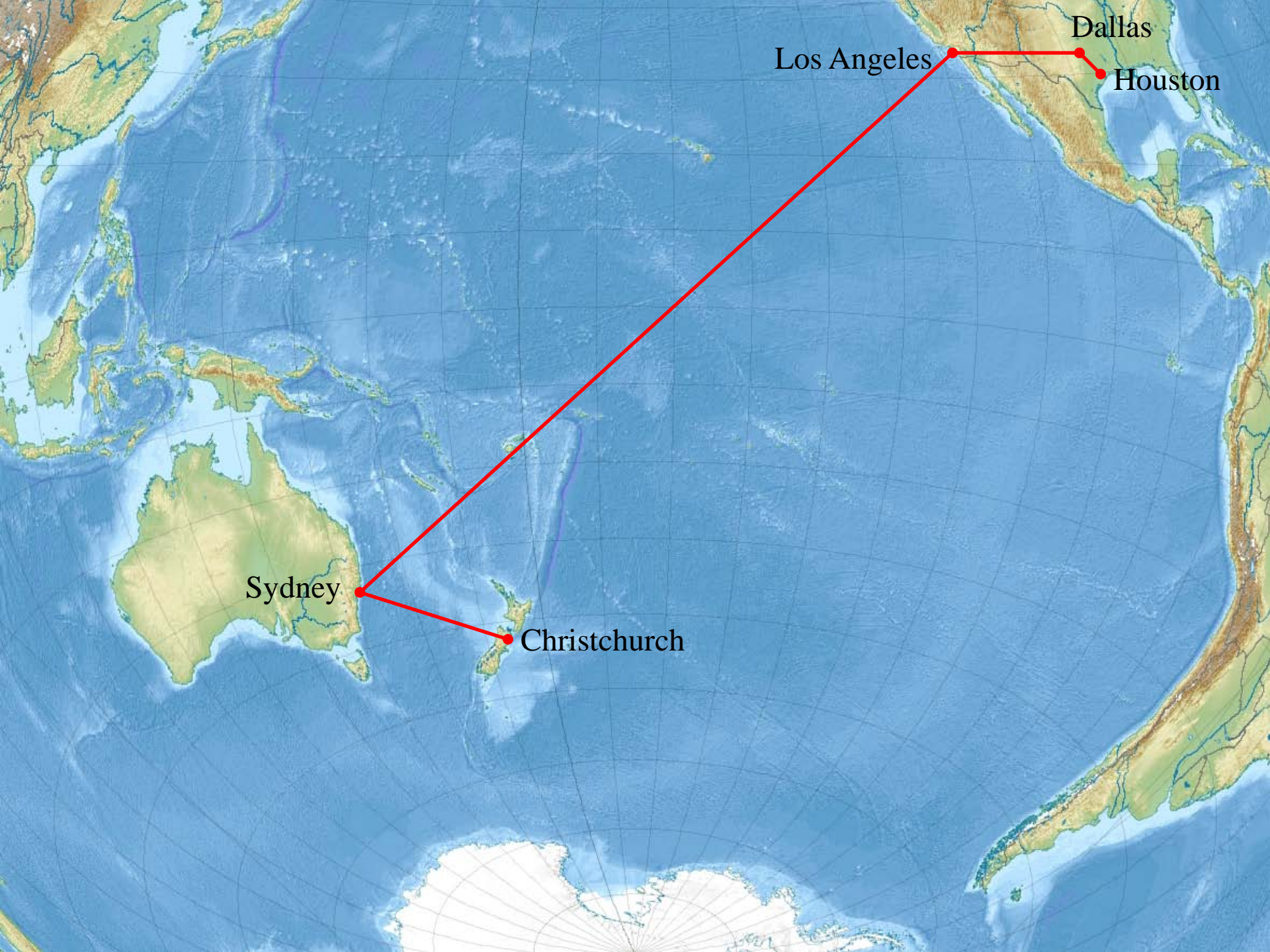
Plus long work days

And challenges with eating, drinking,

And going to the bathroom.







Sydney

Christchurch

Los Angeles

Dallas

Houston





Christchurch

McMurdo Station





U.S. AIR FORCE

8195

AW





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



SOC
A Planned Preventative
Maintenance Inspection
was carried out on this
installation.





242239

CAUTION
WINDSHIELD EXTERIOR

5000 LB. CAP
COL-110 CL2 ZEMCKENHOF







U.S. AIR FORCE

8195
827 SW
4407 AB



AMC

McHOLD

8195





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

OPERATOR
ACCESS
ONLY

FUEL TANK
JTB

OPERATOR
ACCESS
ONLY

FOR
OTHER
SEC.



3

TL00160













007

ALL SET BY
CONTRACTOR







Please
Open Door
and
Place Food
Trash Bin

LIGHT METAL


FABRIC

FOOD WASTE

SKUA

BATTERIES
ALL HOUSEHOLD BATTERIES
- ALKALINE
- CARBON ZINC
- LEAD-ACID
- NICKEL CADMIUM
- NICKEL METAL HYDRIDE
- RECHARGEABLE
- ZINC AIR
NO
WET-CELL
LEAD-ACID
OR
VEHICLE BATTERIES

AEROSOLS
ALL PERSONAL CARE & HAIR
PRODUCTS
- AIR FRESHENERS
- DEODORANTS
- HAIRSPRAY
- SHAMPOO
- SHOWER GEL
- SPRAY PAINT
- SPRAY LIMECAWTS
NO
ALUMINUM BEVERAGE CANS
OR AEROSOL CONTAINERS
TOOTH PASTE CONTAINERS

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 dumpster?

It would be SO appreciated. Thanks.

EMPTY
ALUMINUM
BEVERAGE
CANS ONLY

PAPEL TOWELS

MIXED PAPER

GLASS

PLASTIC

NO
BROKEN GLASS
- SEPALED BOX
- NON-RECYCLEABLES

NON-RECYCLABLES
ALL MIXED MEDIA ITEMS SUCH AS
- AIR FILTERS
- FLOOR SWICHEL WAFERS
- BROKEN GLASS
- FULL UNDRYERS
- SHOE BOTTLE CAPS
- HAND WIPERS
NO
NON-CONTAMINATED ITEMS
BAGS OR UNSORTED TRASH

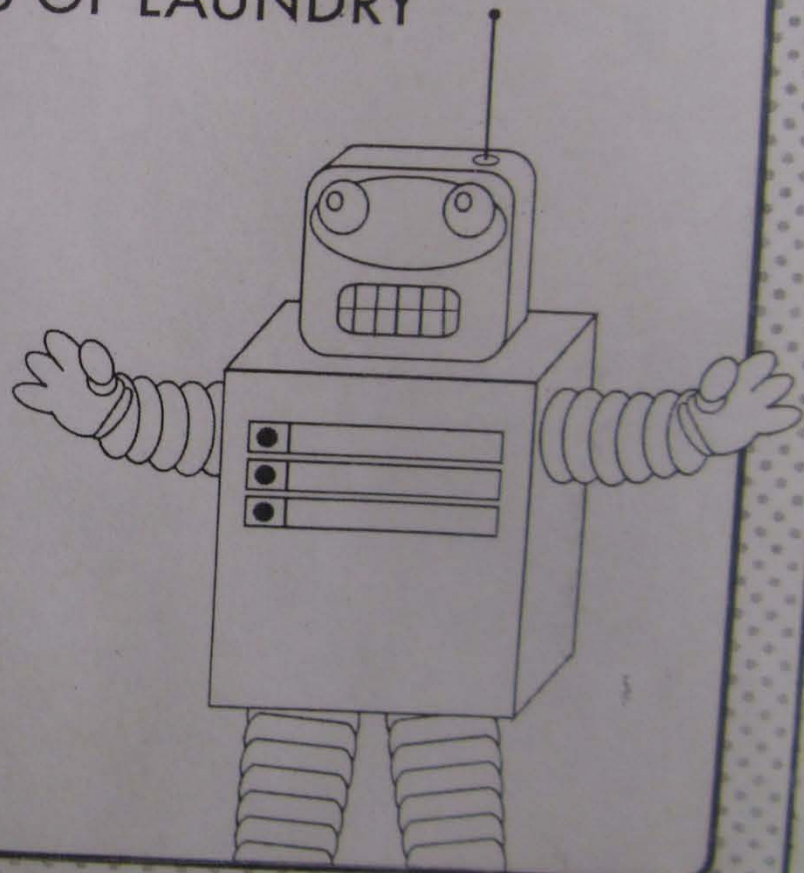
ROBOT SAYS:

USE HOT WATER SPARINGLY!

FOR SHOWERS & HOT CYCLES OF LAUNDRY

SADLY, THIS BUILDING HAS MORE HUMANIDS 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

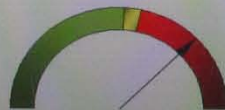
Last wk avg. \$ 6441/ Day

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: 12/12/12

MALE TO FEMALE RATIO



DID YOU KNOW?

Peanuts are one of the ingredients in Dynamite!

MO

Gallagh
CLOS

COP

Always

GEAR

Go

CRAFT

Respect

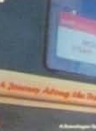
LIBR

633

Like Us On
facebook



Monday, Wed



PLEASE
Do not steal signs
from the REC BOARD

RECREATION



MONDAY
Gallagher's Southern
CLOSED Closed

COFFEE HOUSE
Always open, BARTISTAS at
6:30-9:30am & 6:30-10pm

GEAR ISSUE OPEN
6:30-7:30pm

CRAFT ROOM OPEN
Reserved for leather writing

LIBRARY OPEN
6:00pm-10:00pm

Like Us On Facebook



Yoga
Monday, Wednesday, Friday 6:30-7:45

OPEN BASKETBALL
MONDAYS
7:30-8:30
Big Gym



TUESDAY
Gallagher's Southern
7:00-11:00 pm

COFFEE HOUSE
Always open, BARTISTAS at
6:30am-9:30am & 6:30pm-10pm

GEAR ISSUE OPEN
6:30-7:30pm

CRAFT ROOM OPEN
7-9pm

LIBRARY OPEN
6p-10p



WEDNESDAY
Gallagher's Southern
7:00-11:00 pm

COFFEE HOUSE
Always open, BARTISTAS at
6:30am-9:30am & 6:30pm-10pm

GEAR ISSUE OPEN
6:30-7:30pm

CRAFT ROOM OPEN
7pm-9pm - 6-8pm

LIBRARY OPEN
6:30am-10am & 6:30pm-10pm

TED Talks
A weekly series of talks by local authors and speakers.



OPEN SOCCER
Every Wednesday
7:00-8:30PM
Big Gym



THURSDAY
Gallagher's Southern
7:00-11:00 pm

COFFEE HOUSE
Always open, BARTISTAS at
6:30am-9:30am & 6:30pm-10pm

GEAR ISSUE OPEN
6:30-7:30pm

CRAFT ROOM OPEN
7pm-9pm

LIBRARY OPEN
12:30am-2am & 6:30pm-10pm

Hardcore: 30min of Abs & Core
Tuesdays & Thursdays 6:45-8:15pm



FRIDAY
Gallagher's Southern
7:00-11:00 pm

COFFEE HOUSE
Always open, BARTISTAS at
6:30am-9:30am & 6:30pm-10pm

GEAR ISSUE OPEN
6:30-7:30pm

CRAFT ROOM OPEN
7pm-9pm

LIBRARY OPEN
6:30am-10am & 6:30pm-10pm



SATURDAY
Gallagher's Southern
6:00-11:00 pm

COFFEE HOUSE
Always open, BARTISTAS at
6:30am-9:30am & 6:30pm-10pm

GEAR ISSUE OPEN
6:30-7:30pm

CRAFT ROOM OPEN
7pm-9pm

LIBRARY OPEN
6:30am-10am & 6:30pm-10pm



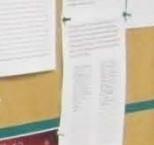
SUNDAY
Gallagher's Southern
6:00-11:00 pm

COFFEE HOUSE
Always open, BARTISTAS at
6:30am-9:30am & 6:30pm-10pm

GEAR ISSUE OPEN
6:30-7:30pm

CRAFT ROOM OPEN
7pm-9pm

LIBRARY OPEN
6:30am-10am & 6:30pm-10pm



Rec Opportunities

Building others for a better world. One person at a time.

Helping you reach your goals.

Providing faith-based support.

... (various smaller posters and notices) ...





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











FRY'S
PURE
CONCENTRATED
COCOA
12. L.B. TINS. No. 227

SCOTT'S ANTARCTIC

BOVRIL

FRY'S
PURE
CONCENTRATED
COCOA

SUGAR

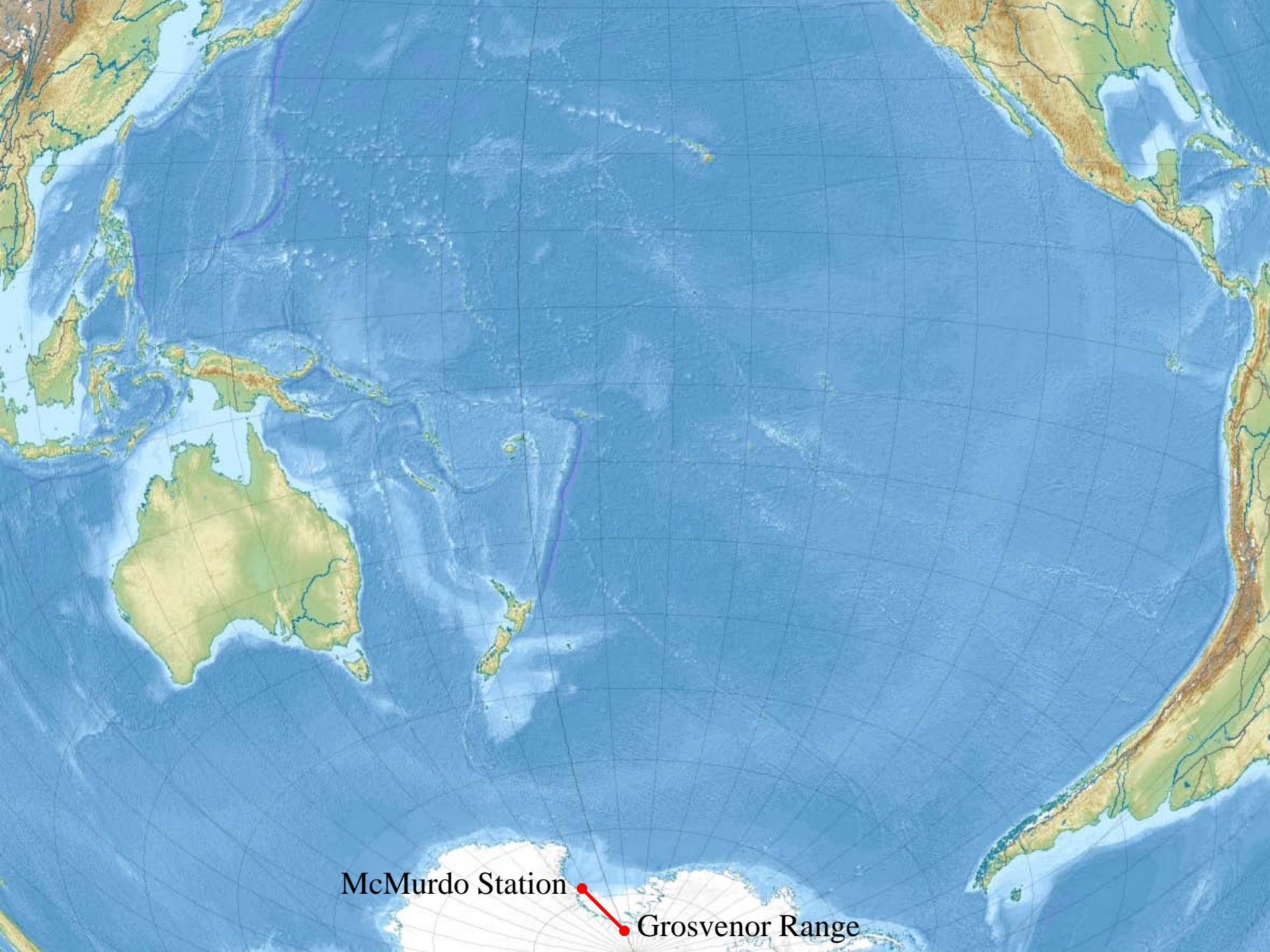
SPECIAL
SLIP
SUGAR



EXPLORE THE HISTORY OF THE WORLD

CHINA

1942



McMurdo Station

Grosvenor Range



LC-130 "Hercules" aircraft

280 kt TAS

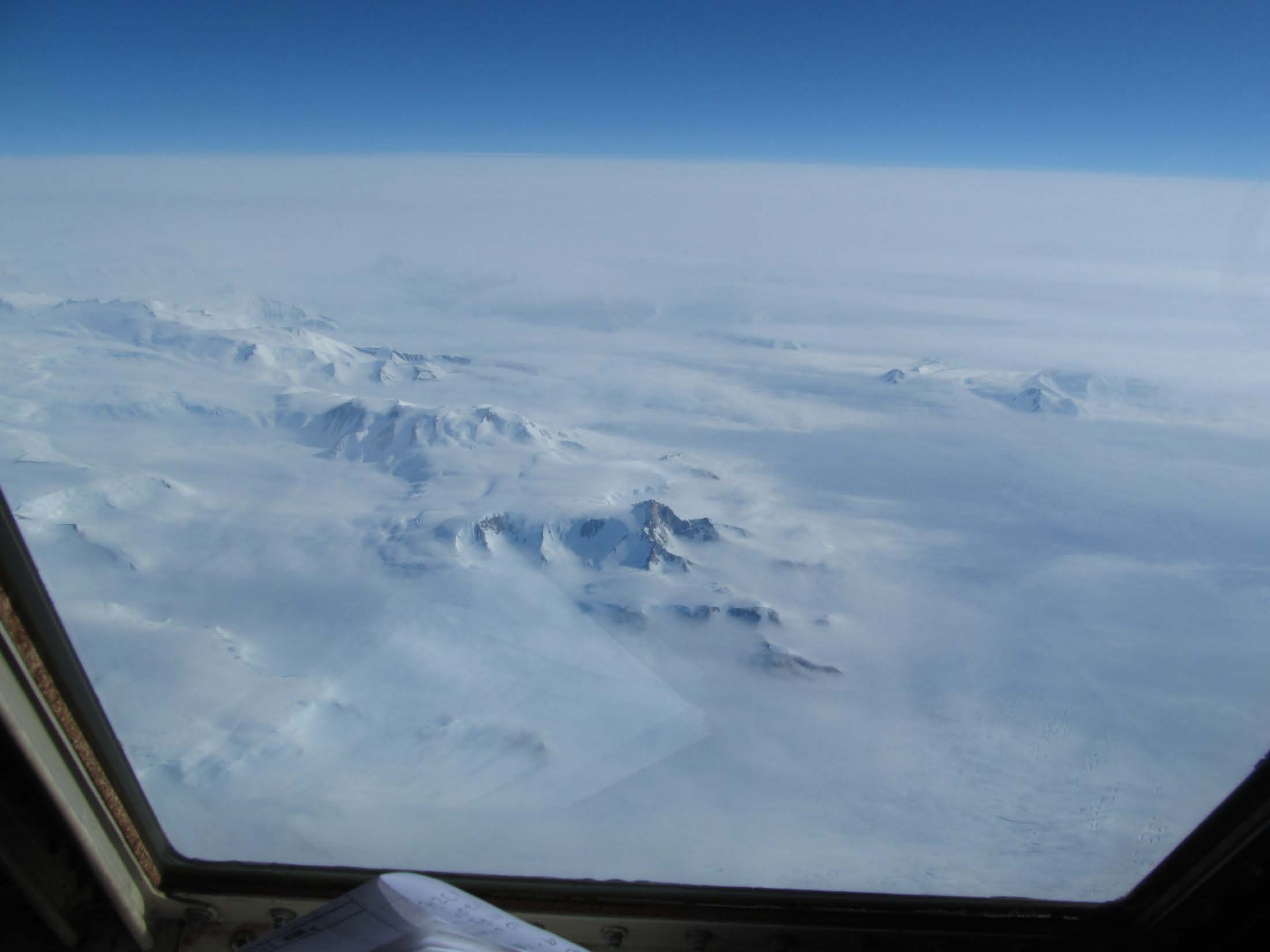
Load for our first flight (750 km from McMurdo):

5,500 kg

35 cubic meters

Two Hercules flights for 8 people for 6 weeks











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.

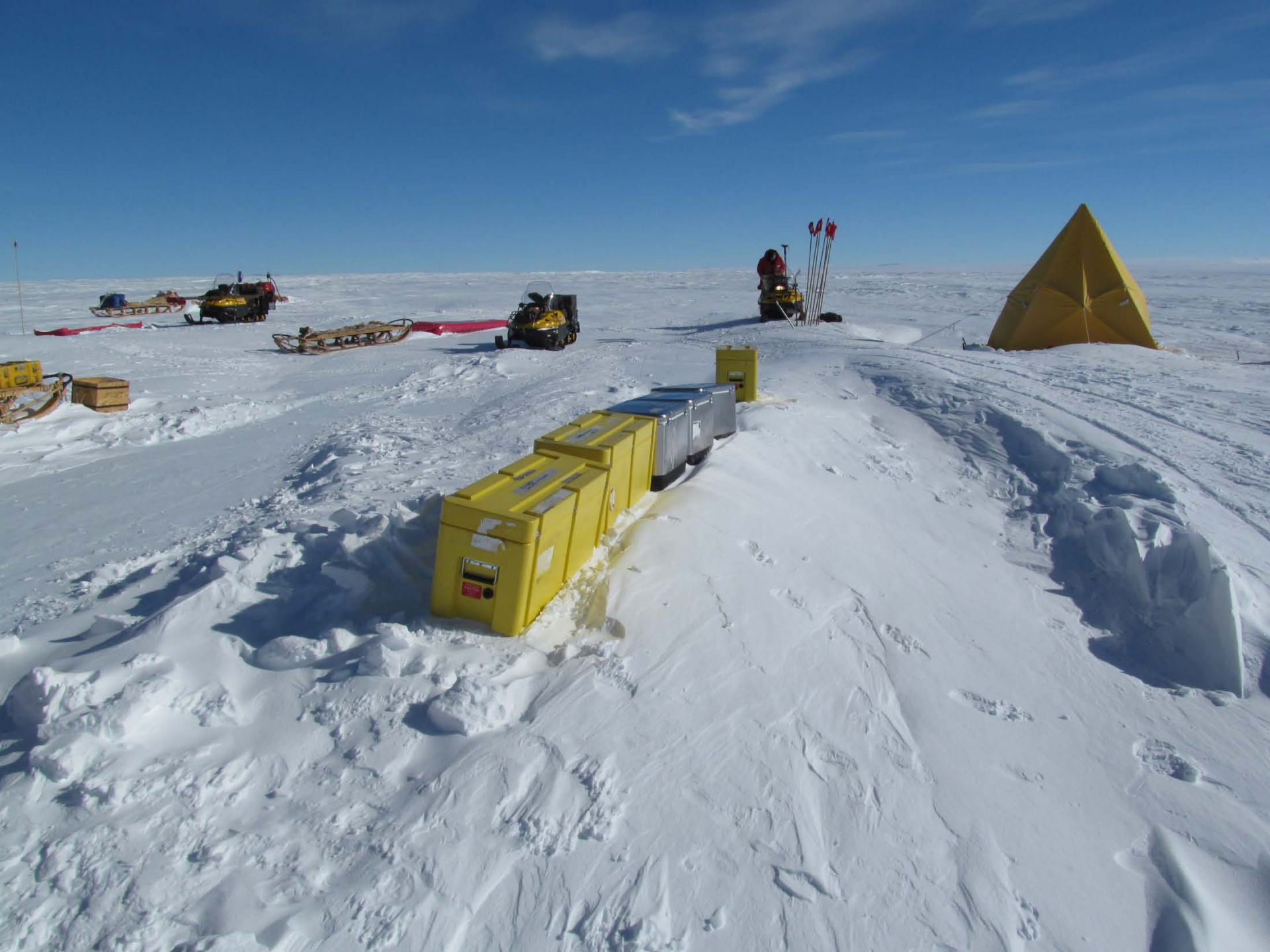


Coleman 2-burner white gas camp stove

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

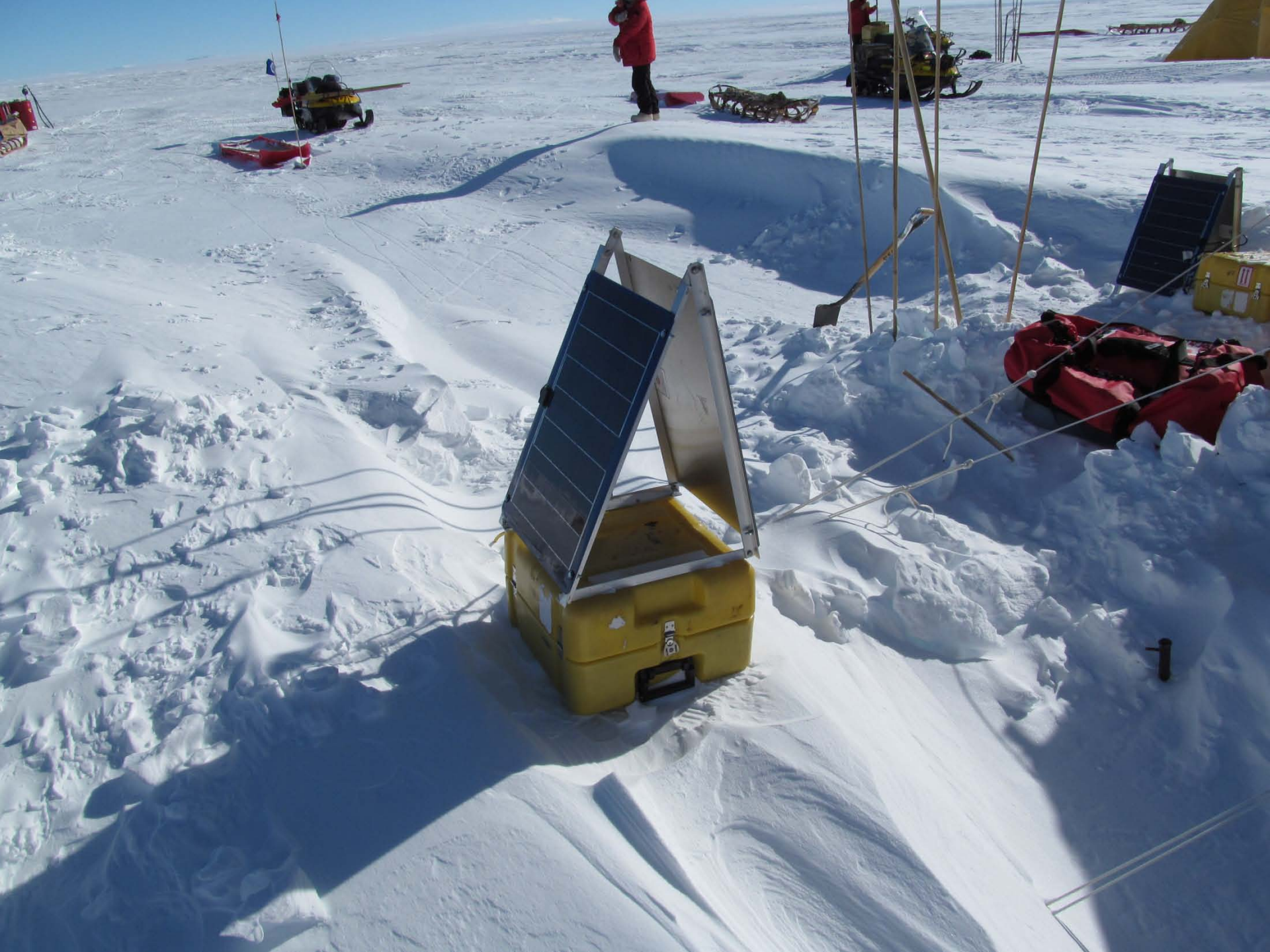
0.5 cubic meters



Water for two people

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





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 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"



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)





Harvey /
G-058-M

BFC 06-01















DR. STEVE





"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.



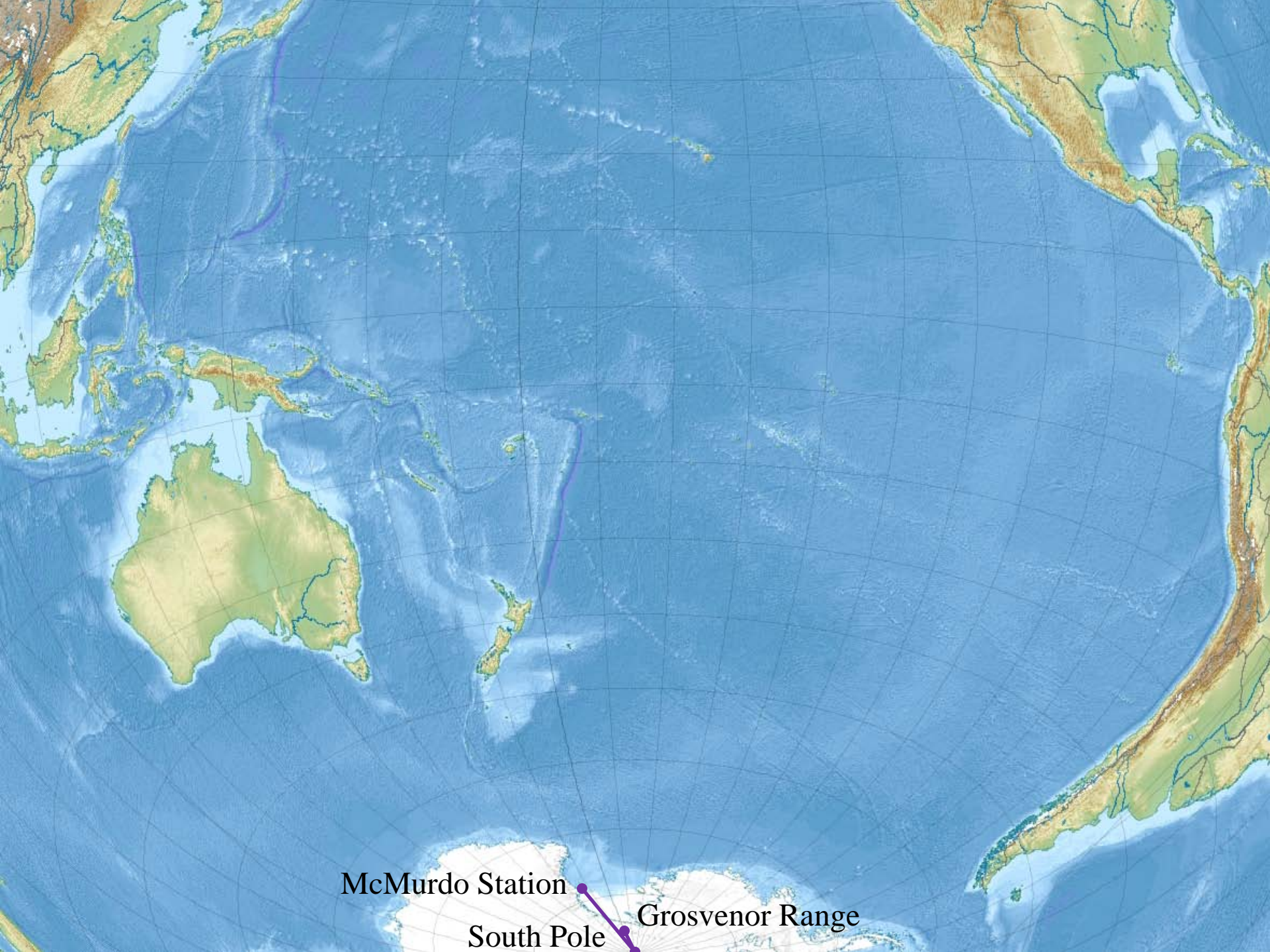












McMurdo Station

South Pole

Grosvenor Range

The United States Antarctic Program
welcomes you to

Amundsen-Scott South Pole Station



90°00' South

established 1957













FOOD WASTE





MOUNTAIN
HARD
WEAR

DR STANLEY OVE





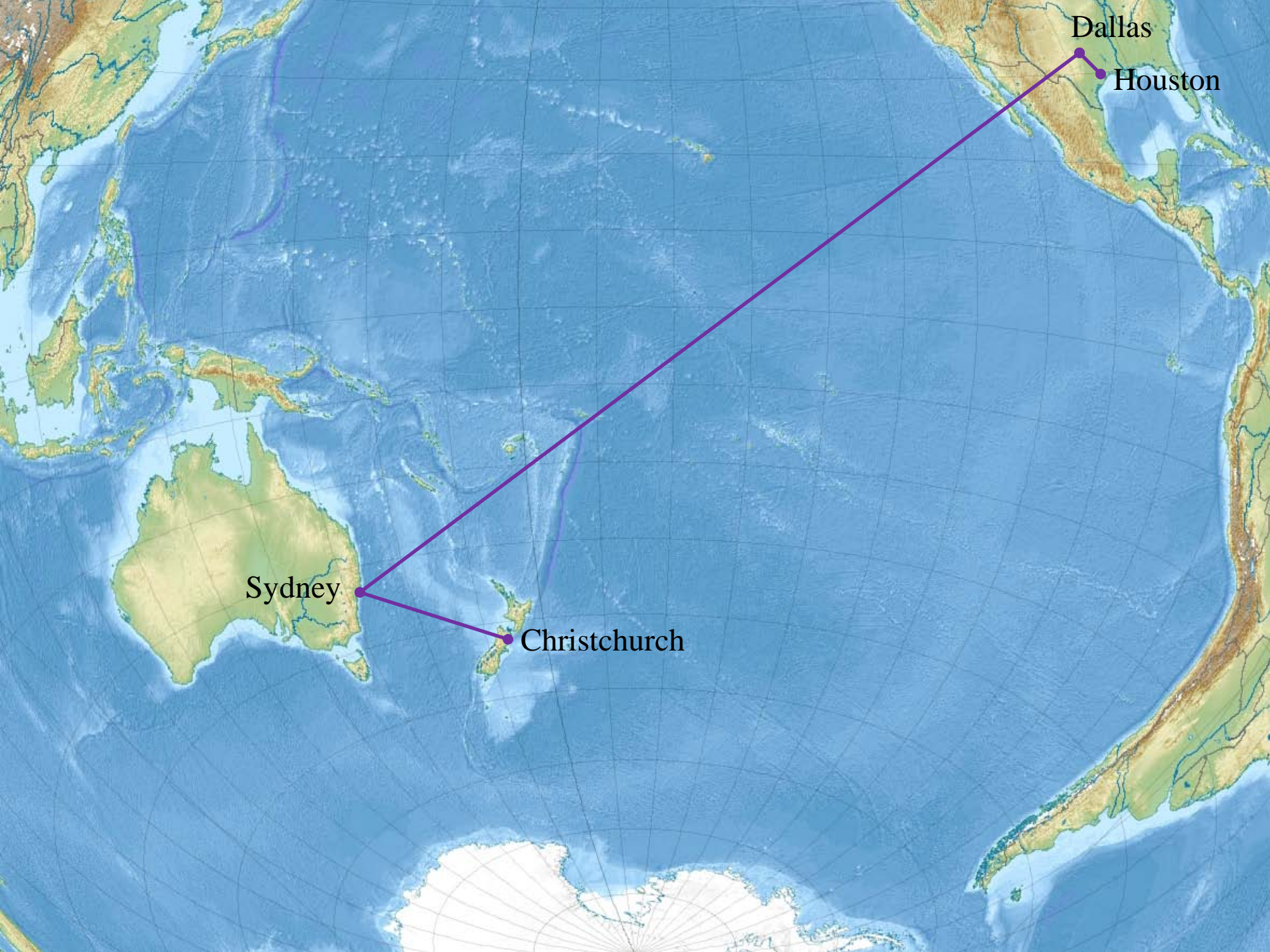
Christchurch

McMurdo Station









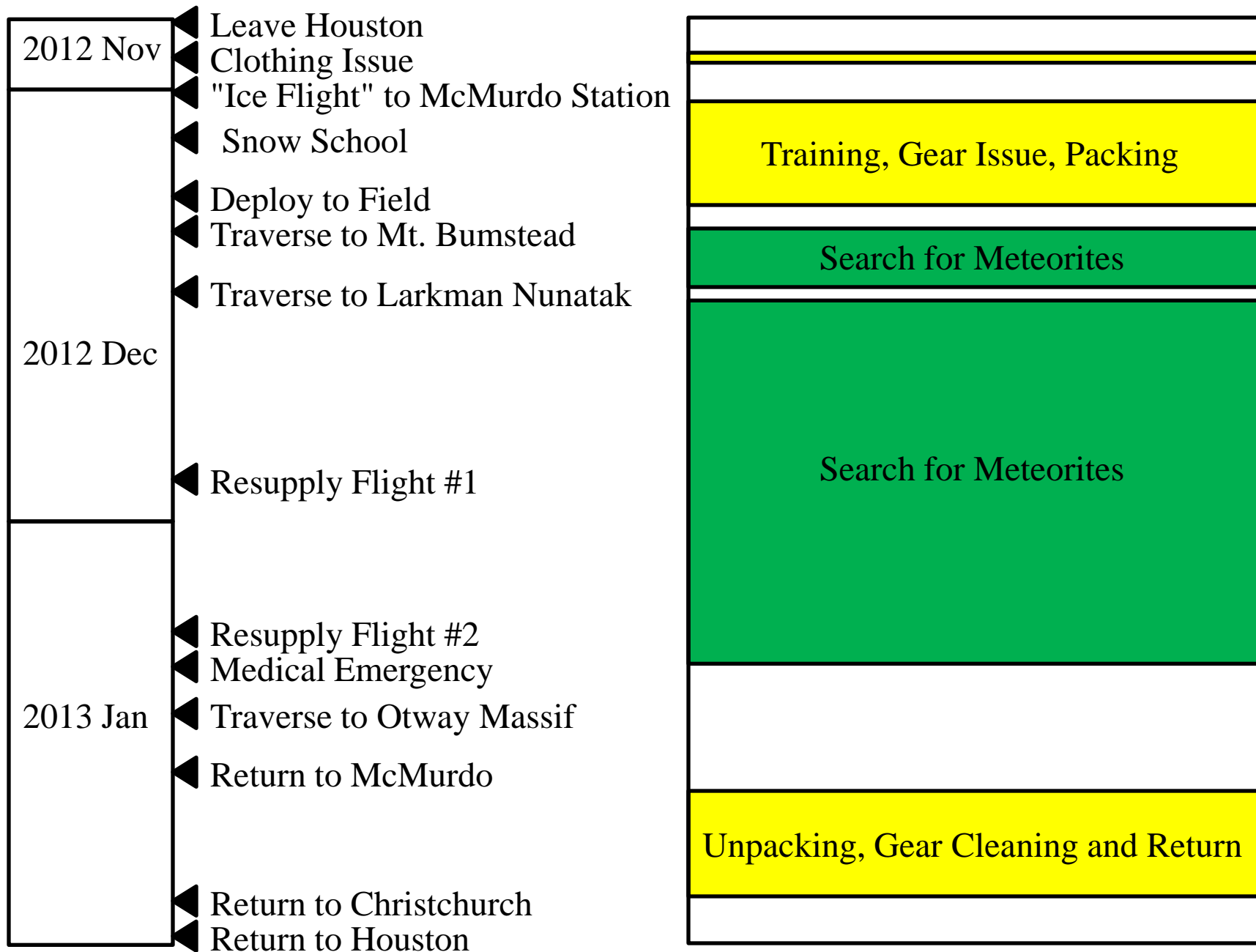
Sydney

Christchurch

Dallas

Houston

Timeline



The End



Sydney

Christchurch

McMurdo Station

Grosvenor Range

Los Angeles

Dallas

Houston



Dallas

Houston

Sydney

Christchurch

McMurdo Station

South Pole

Grosvenor Range