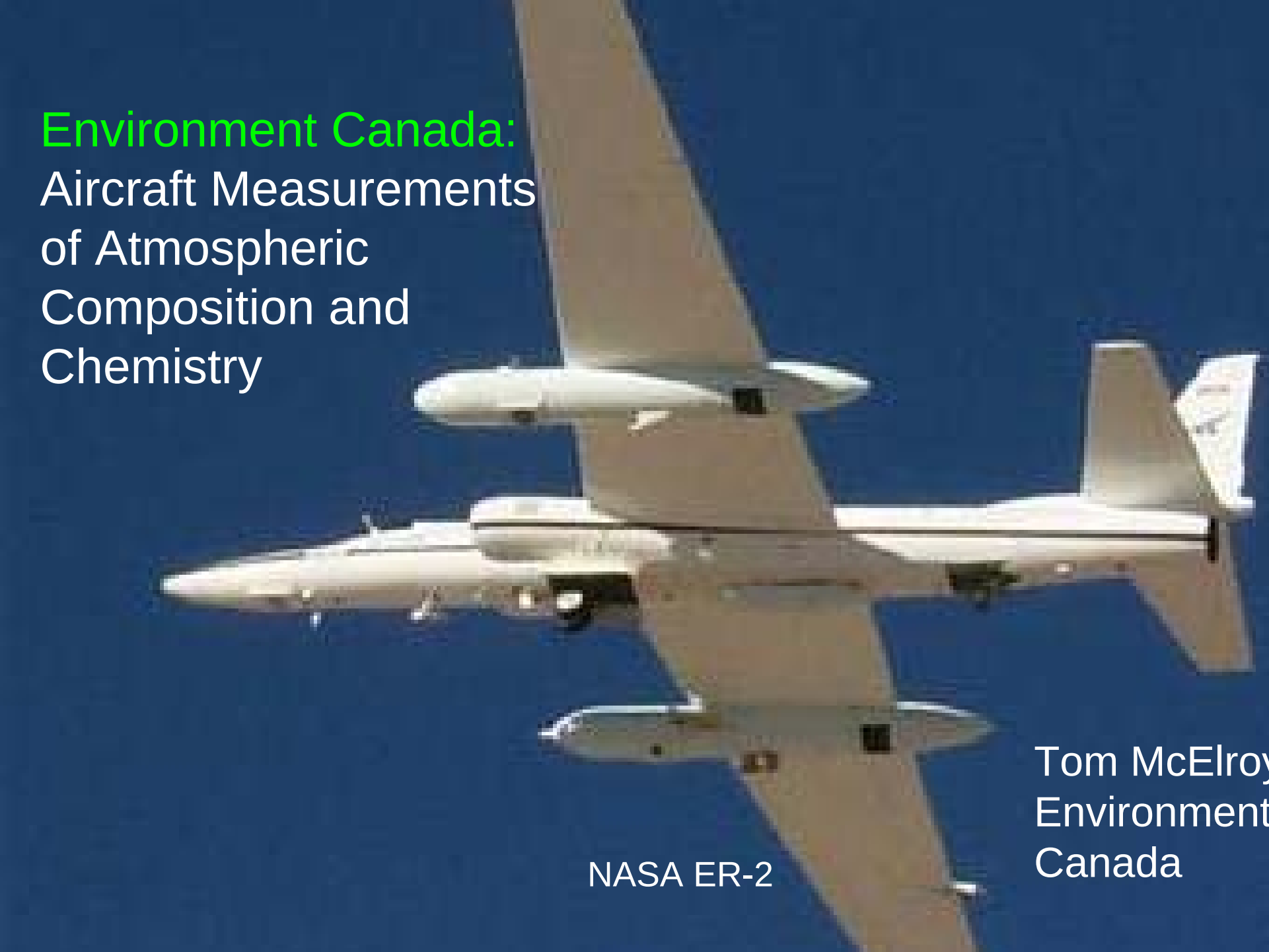
Environment Canada: Aircraft Measurements of Atmospheric Composition and Chemistry



NASA ER-2

Tom McElroy
Environment
Canada

Transport Canada

JetStar aircraft used to make NO_2 profile Measurements published in *Nature*, November, 1973

Photo: Canadian Aviation Museum

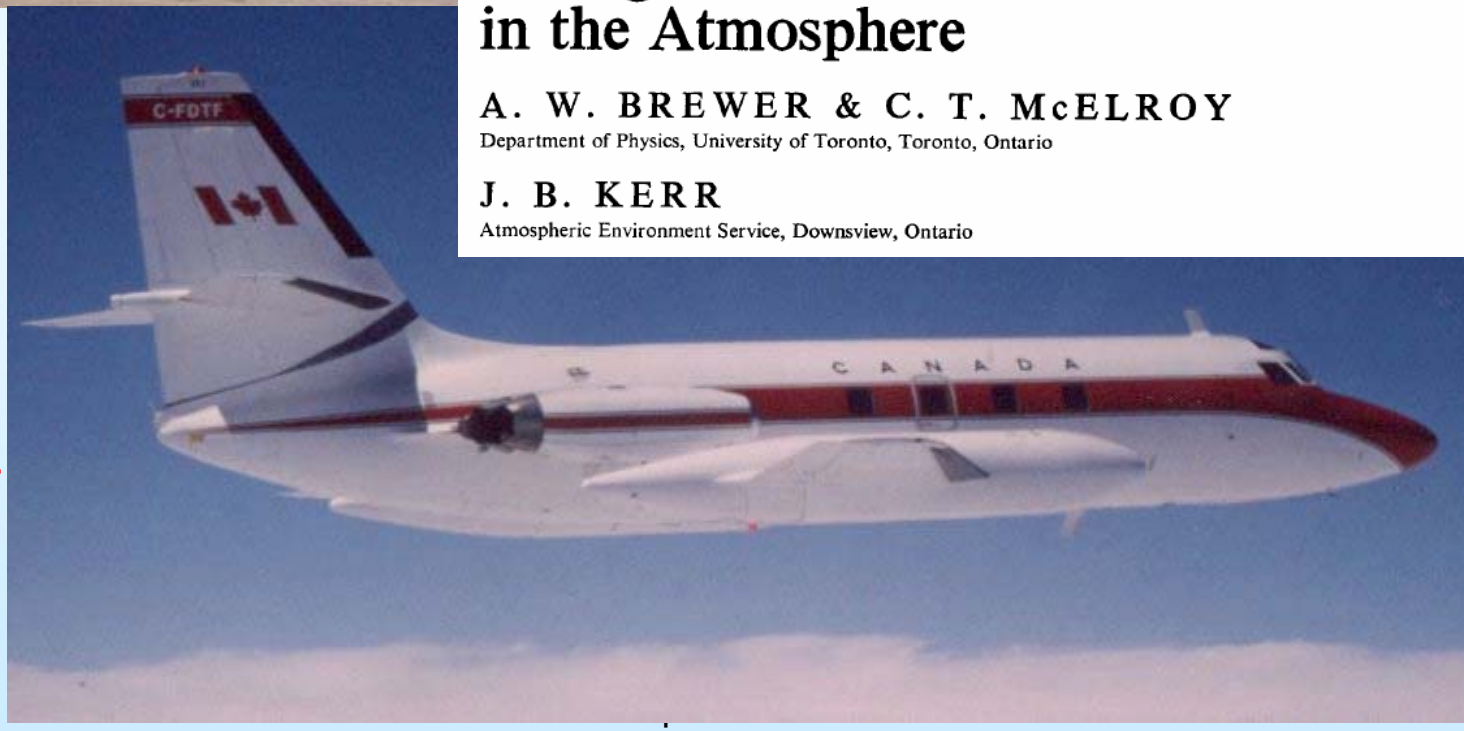
(Reprinted from Nature, Vol. 246, No. 5429, pp. 129–133, November 16, 1973)

Nitrogen Dioxide Concentrations in the Atmosphere

A. W. BREWER & C. T. McELROY
Department of Physics, University of Toronto, Toronto, Ontario

J. B. KERR
Atmospheric Environment Service, Downsview, Ontario

The NO_2 measurements were made with a version of the ozone spectrophotometer



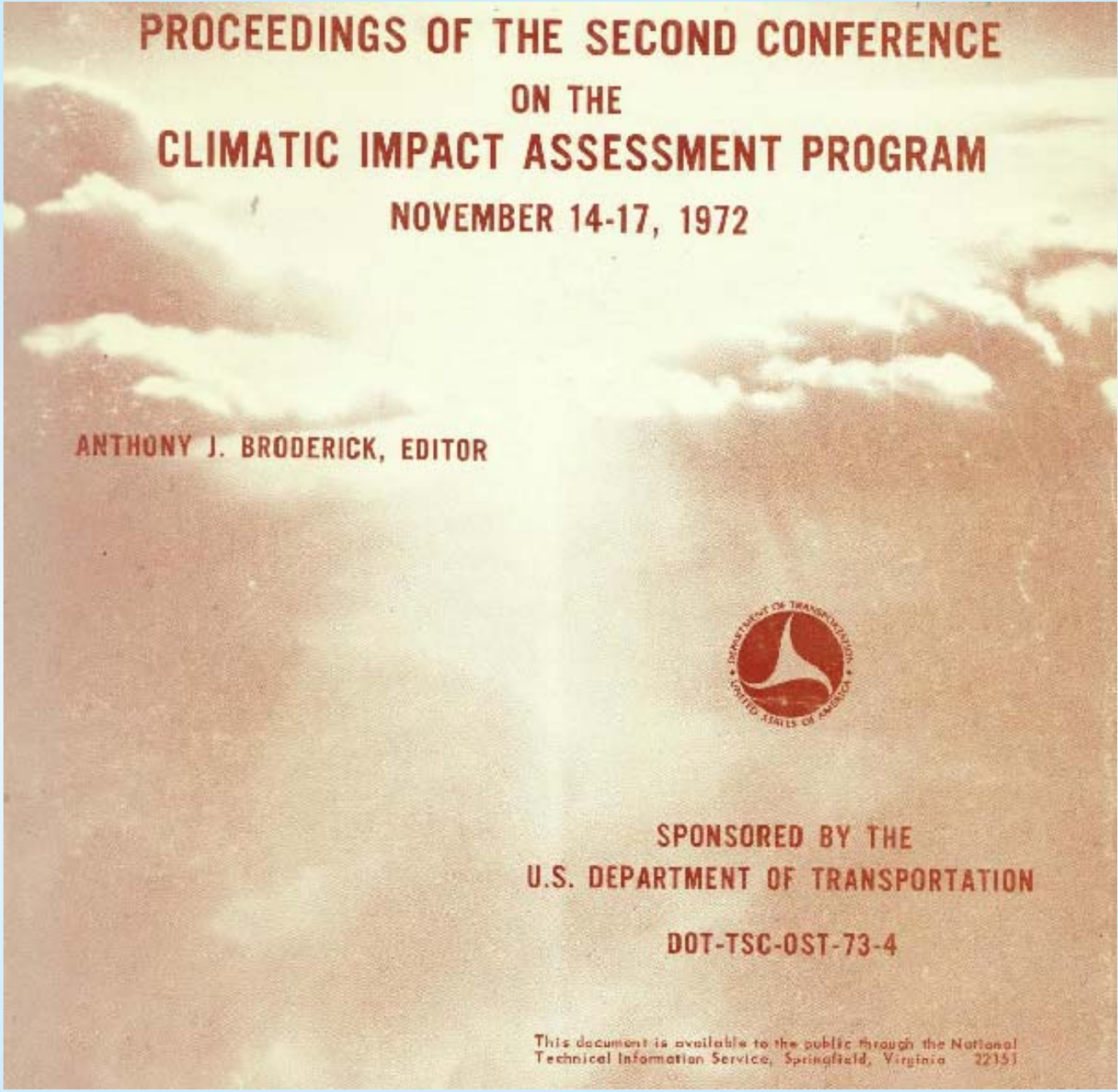
14-16 April, 2010

Atlantic Canada Aviation Museum

CIAP

Jim Kerr presented ground-based and JetStar NO_2 Data in 1972

McElroy et al. presented balloon results in 1974

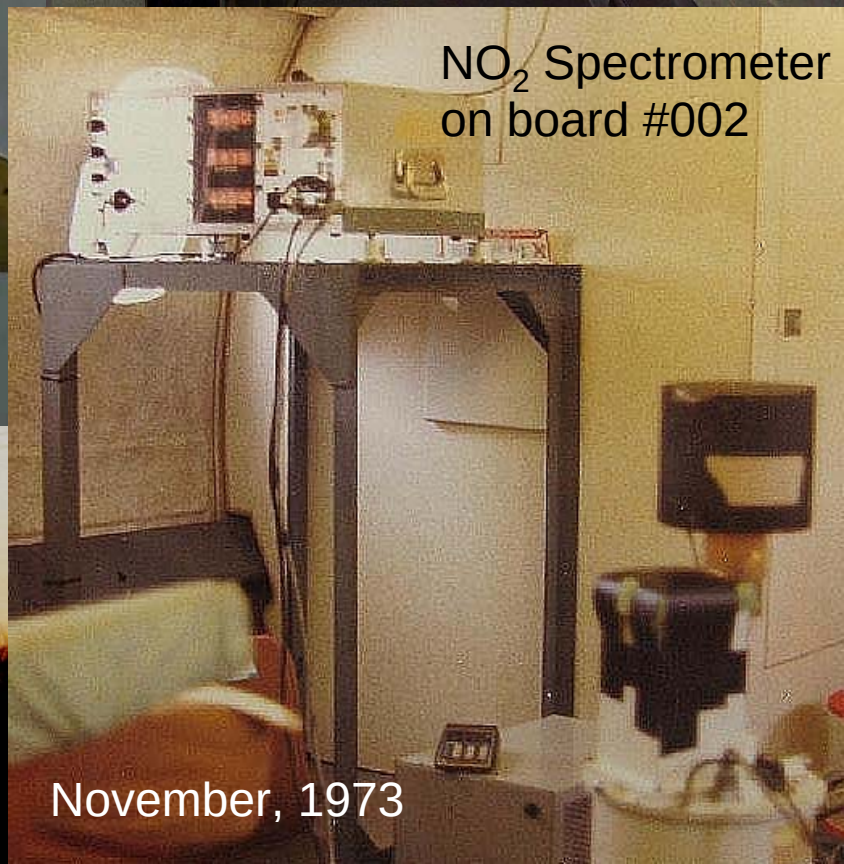


Concorde Measurements

Hampson (H_2O)
Crutzen (NO, NO_2)
Raised concerns of environmentalists.

BAC & Aerospatiale made flight time available for measurements relevant to determining the risk of supersonic flight to the ozone layer
The British Met. Office managed the flight time of Concorde #002
(N.B.: This is NOT #002)

Interior of #002 c.a. 1973
At that time, Concorde was still an experimental aircraft; ~70% certified.
www.concordesst.com/002/002detail.html



NO_2 Spectrometer on board #002

November, 1973

Landing near Fairford, England at sunset.

WB-57F

A Brewer Spectrophotometer flew on board the Project Airstream WB-57F in 1982 to measure volcanic SO_2

Column Ozone c.a. 1983

Two brewers were flown on the
NASA Convair CV-990 ‘Galileo’ Aircraft
by Jim Kerr and Bill Clarke.
One instrument measured sunlight and the other the upwelling radiance from below.

Ray Olafson installed and operated
a Brewer on the NCAR Electra to make
measurements during a research trip
To South America.

Training Flight

The first Canadian Astronaut, Marc Garneau, shown training with the AES SunPhotometer that he operated on board Challenger during Shuttle flight STS-41G in 1984. The training was done aboard a Gulfstream G2 aircraft making maximum rate descents from maximum altitude.

[McElroy was in the back modifying the software…]

SPEAM-1

Marc Garneau operates the AES SunPhotometer on board the Orbiter Challenger

Note the use of Sunglasses and a special UV filter on the side-hatch window to provide protection from the intense solar Ultraviolet in space.

1984: Marc Garneau. Photo courtesy of NASA.

We attempted to put a Brewer on the Montreal-Moscow IL-62 in 1992


A NASA WB-57F
Accent Flights
September 1999
FOD Critical Zone

Environment Canada SunPhotoSpectrometer Pod

SOLVE Payload

HOx / H20 - Anderson - Harvard
ClONO2 - Anderson - Harvard
WAS - ATLAS - NCAR
MASP - Baumgardner - NCAR
MMS - Bui - ARC
ACATS - Elkins - NOAA
NO / NOy - Fahey - NOAA
Argus - Jost - ARC
MTP - Mahoney - JPL

H20 - May - JPL
CPFM - McElroy - AES (Canada)
O3 - Richard - NOAA
ALIAS - Webster - JPL
CIMS - Wennberg - Cal Tech.
FCAS / NMASS - Wilson - Denver
Impactor - Wilson - Denver U
CO2 - Wofsy - Harvard


809
NASA
DRYDEN
FLIGHT RESEARCH CENTER

NRC Twin Otter flights in the Canadian Arctic.
SunPhotoSpectrometer measurements of BrO.

ironment
ada
Environnement
Canada


POLAR
Bremerhaven
March, 2009

Sea Survival Training

Longyearbyen, Svalbard

Summary – use of aircraft

- *In situ* chemical sampling & particle measurement
- Remote sounding of the atmosphere
- Cloud physics, icing studies
- Remote sensing of the surface
- Instrument test and development
- Validation of space-based remote sounding measurements
- Astronaut training


The End…