

# The Flower Girls of Salina

Ian MacPherson

National Research Council of Canada (retired)



# The Flower Girls of Salina



## Two Disclaimers

*1) Piers Sellers came up with this title*

*2) Everything I know about  
'The Flower Girls of Salina'  
is in the next slide*

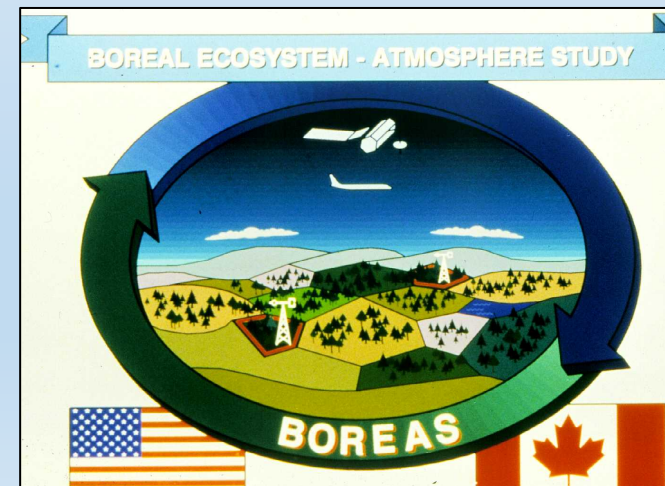
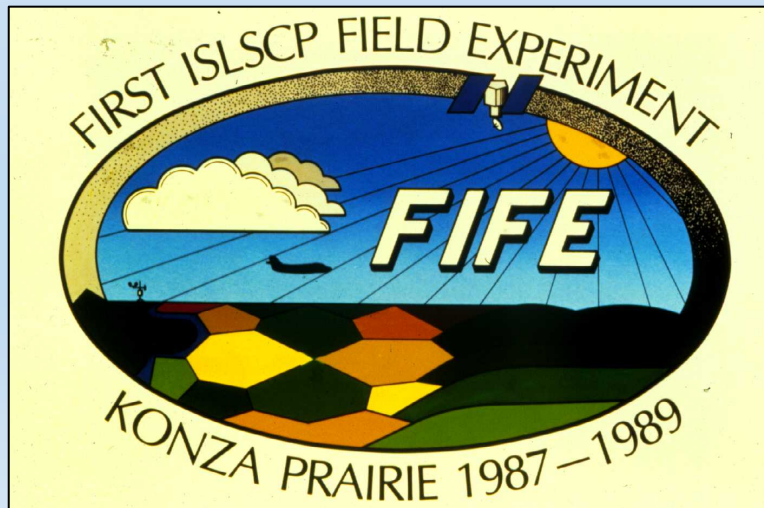


Thank you



*Well, maybe I should say a few words about the  
experience of operating the Twin Otter Flux  
Aircraft in FIFE and BOREAS*

# NRC Twin Otter in FIFE (1987 and 1989) and BOREAS (1994 and 1996)





## Twin Otter Team --- FIFE 1987



Ray

Peter

John

Chuck

Ben

Ian

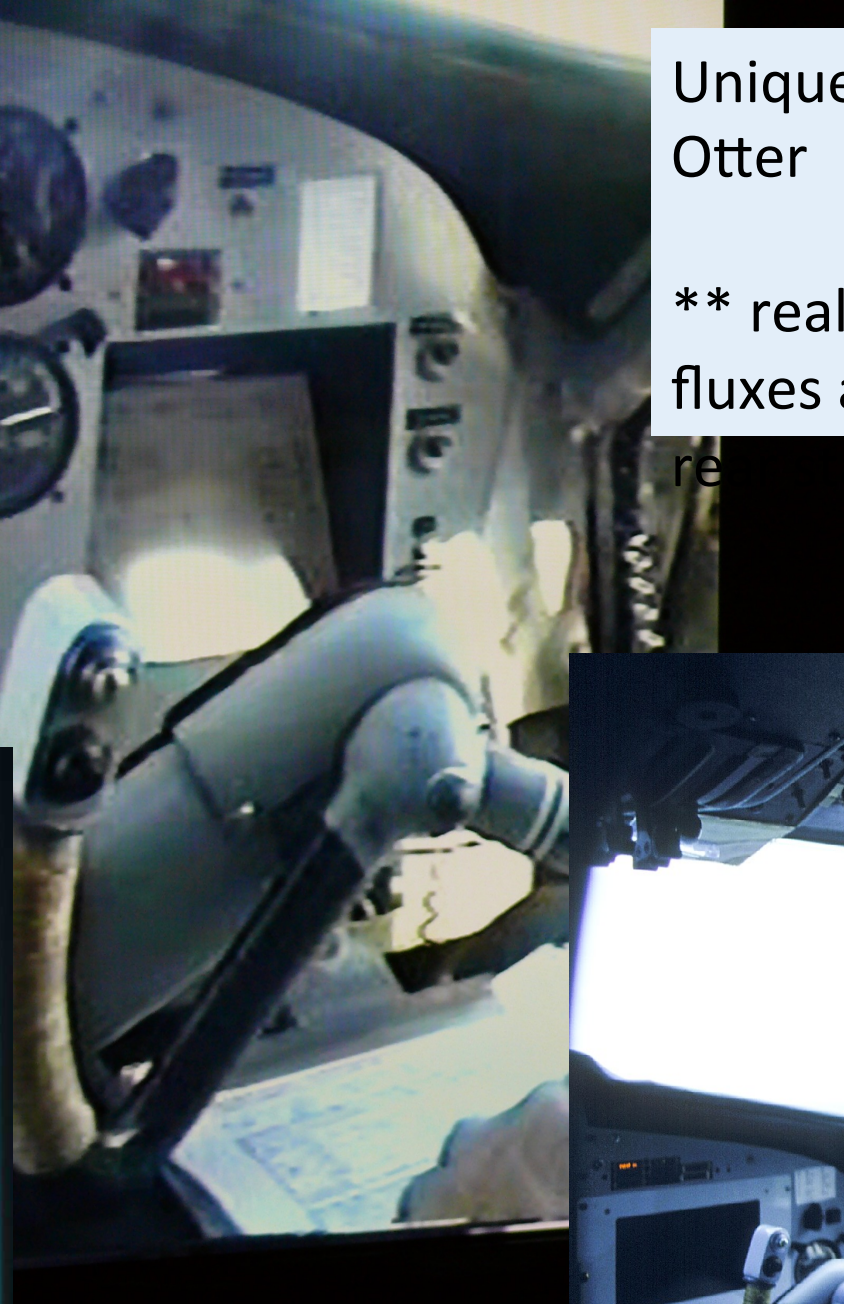
## *Canadian Agencies on Twin Otter Flux Projects*

- National Research Council of Canada - *Ian MacPherson*
- Agriculture Canada  
-- *Ray Desjardins*
- McGill University  
-- *Peter Schuepp*

## Unique feature on the Twin Otter

\*\* real time computation of the fluxes and display in cockpit and real time.

```
Time: 203341 Slip: 27.23 Event on: 202001
Elapsed: 420.0
Pointer 9 / 0.0
Mean Wind 267 / 7.0 278 / 9.8
Net Rad 261 278 Event: Off
Wep Nose -0.34 0.28 Column: Off
PT Unheat 293.4 0.12 H -7 Licor: Off
Left 293.2 0.11 -8 Button: Off
Right 293.4 0.13 X -9 Switch: On
H2O Esri 105.9 0.07 Le -3 Photo: Off
Lcr n 5.0 0.06 1 Xmit: Off
Lcr c 0.3 0.01 0 Dat: Wrt
Dewpt 6.6 0.19 2
CO2 Esri 10588. 6.55 Wc -0.10
Lcr n 573.2050.442 -0.31 Lalt: 2940
Lcr c -180.5 2.26 -0.09 Ralt: 2214
L ppm -119.0 866.2 mb Laser: 1028
Loz3 34.8 1.02 Oz -0.09 Hdg M: 0
```



# Grid Pattern Flown by Twin Otter Flux Aircraft Over SSA (FT-GS)

The grid is 16 x 16 km

The aircraft takes about 2 hrs to cover the grid twice





Aspen site



Old Black Spruce

Intercomparisons with Towers on hundreds of passes

Intercomparisons with  
other Aircraft



NCAR KingAir



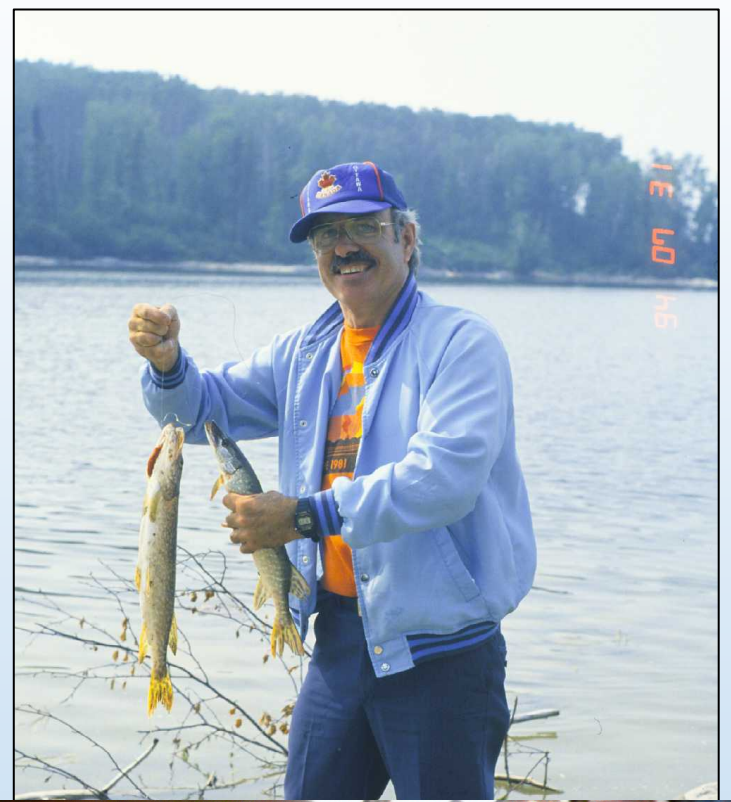
University of Wyoming KingAir



Piers coming to check up on us



Tim Crawford's  
Long-EZ



Good times



BOREAS dawn flight



10 34 28

BOREAS Agricultural Run



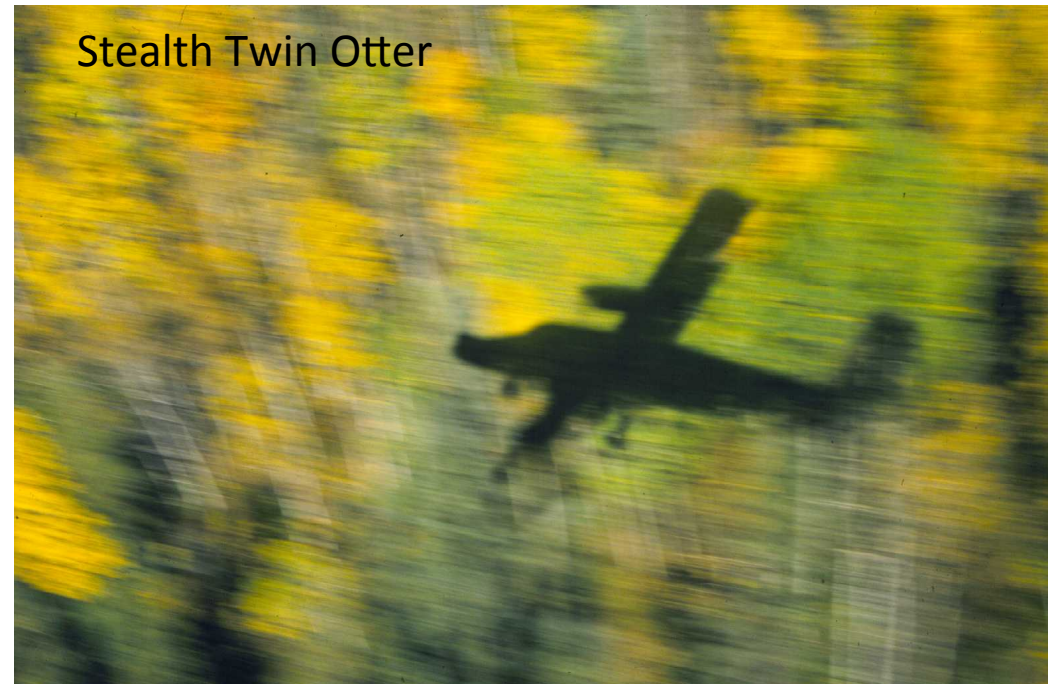
Konza Prairie



06 25 87

Beautiful  
Scenes

Stealth Twin Otter



**Eyeball-to-eyeball with the tree  
flies Aiken John - so low that he  
is wont to say when crewmen squeal  
"that's how I like to spin the wheel".  
And much desired photo-ops  
are when he shaves the black-spruce tops.  
The camera in Raymond's hand  
spasmodically scans the land  
a flash of Otter, blue and white  
a drunken hurtling out of sight,  
a hint of sky, a blur of tree  
that's what you might or might not see**

Not all without risk



Low Flight

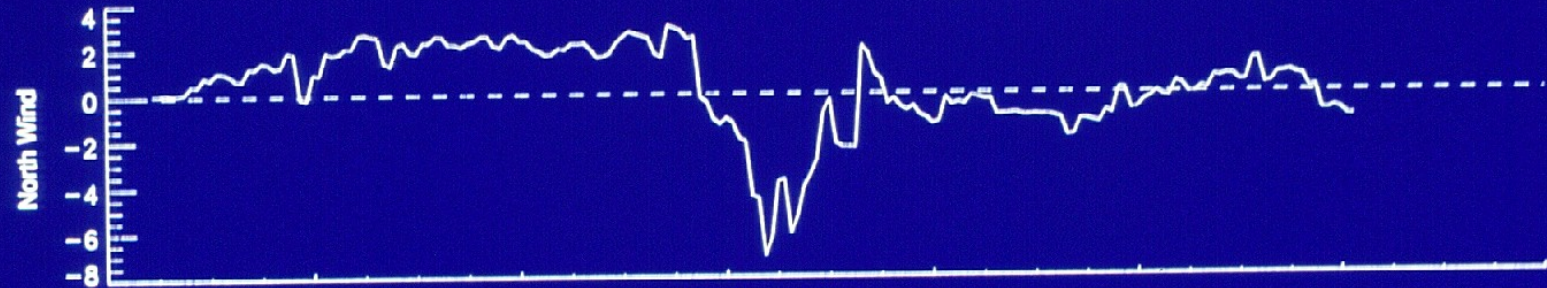


Peter  
Schuepp  
(our poet)

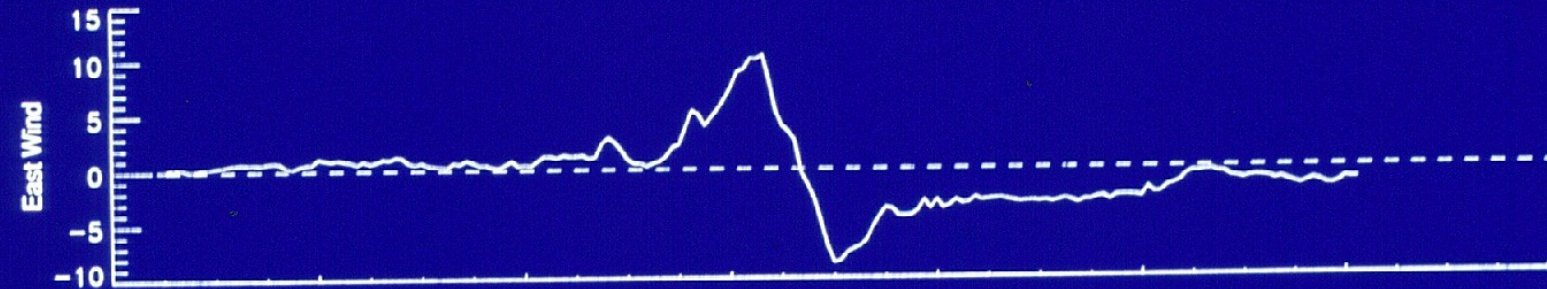


# Largest Gust ever measured by the Twin Otter -- Old Jackpine NSA - 38 m altitude

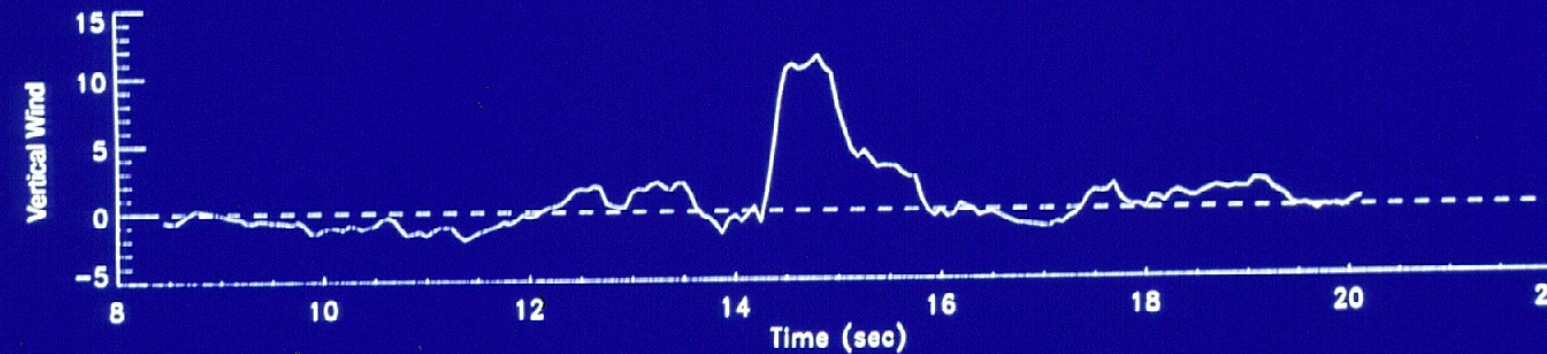
North wind



East wind



Vertical wind



# TWIN OTTER ANALOG TRACES

GUST 2, BOREAS 017 RUN 10

GUST 2, FLT 17 RUN 10

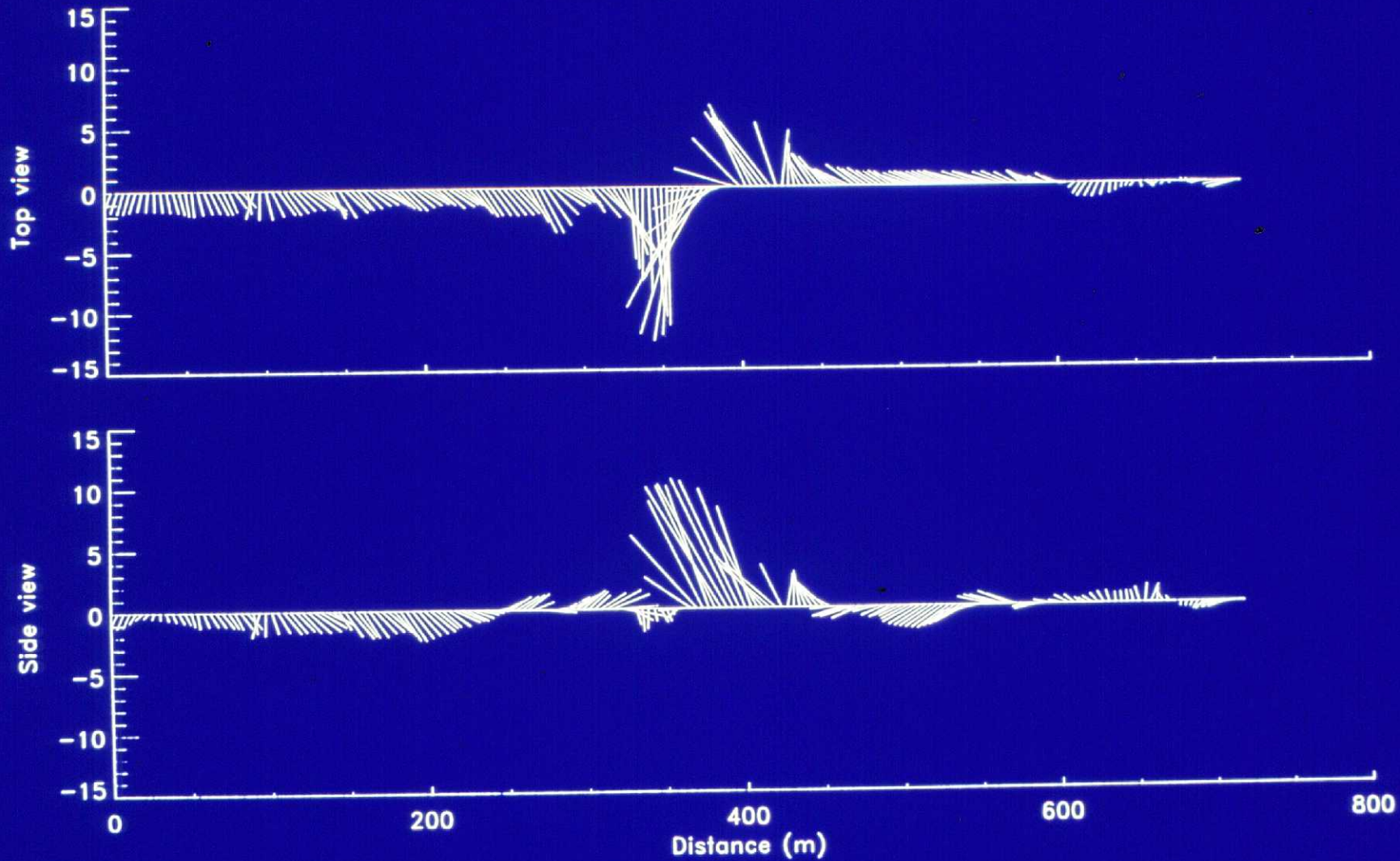
FRL / IAR / NRC

SYS\$SYSDEVICE:[JIM.BOREAS]BIGUST\$GUST.R02;1

Date: 10-JUN-94

Start time: 173444

End time: 173456





Chuck with fire extinguisher

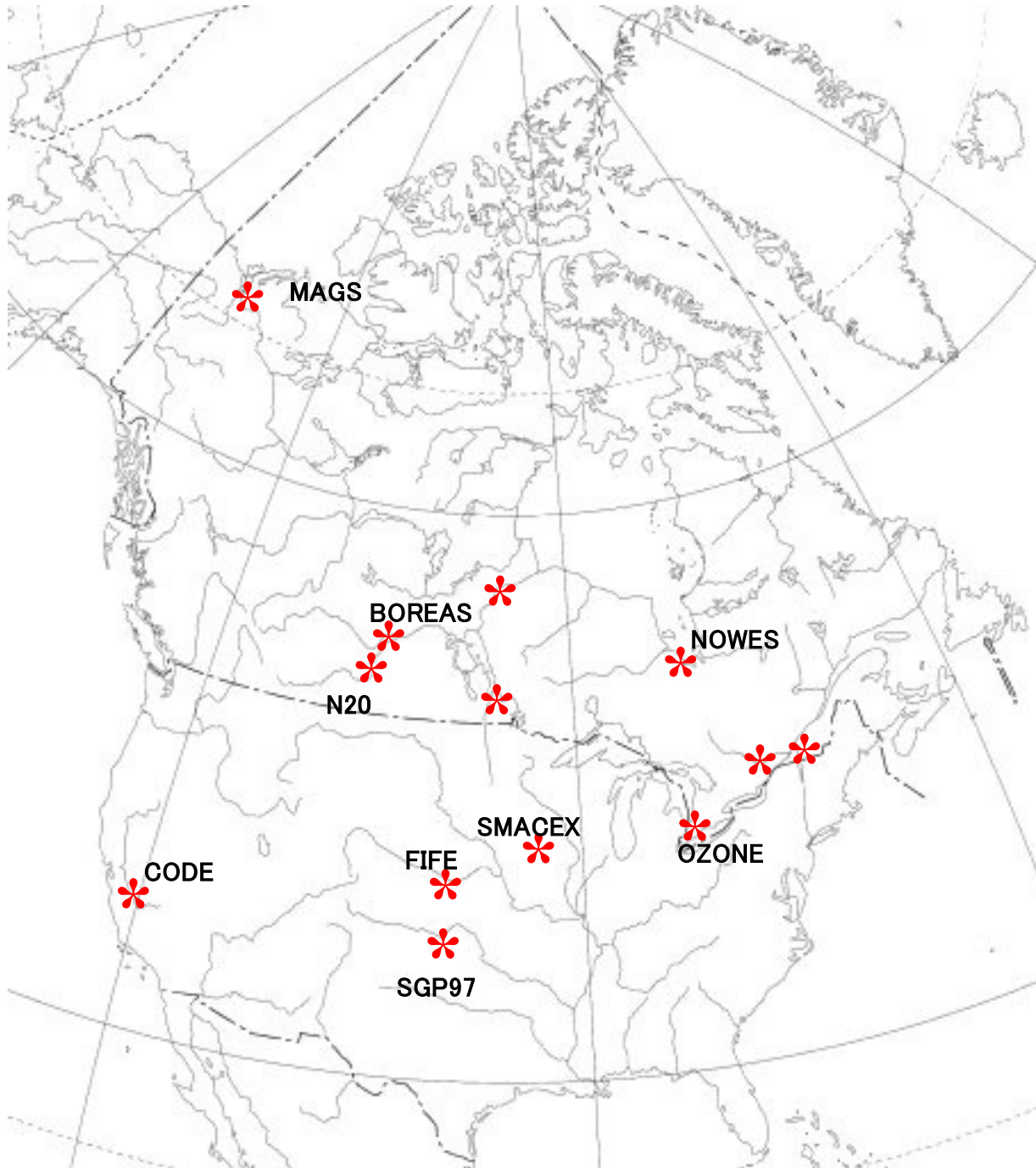
Brake fire on takeoff



Marshmallow  
Roast

# *Twin Otter Flux Projects*

*1981-2003*



## *Twin Otter Flux-Measuring Flights*

- Before FIFE 81- 86 74 flights
- FIFE 87,89 58 flights
- \* BOREAS 94, 96 83 flights
- Post FIFE & BOREAS 91, 96- 03 159 flights

+++ 143 FIFE & BOREAS project flights account for 38% of 374 Flux Flights by the Twin Otter



All this fun and science  
thanks to these two  
Gentlemen

Thank you Piers and Forrest for  
getting us into these projects, and  
for your amazing success in  
getting everyone involved to  
continue to analyze data and  
write papers for 2+ decades (so  
far)

Thank You