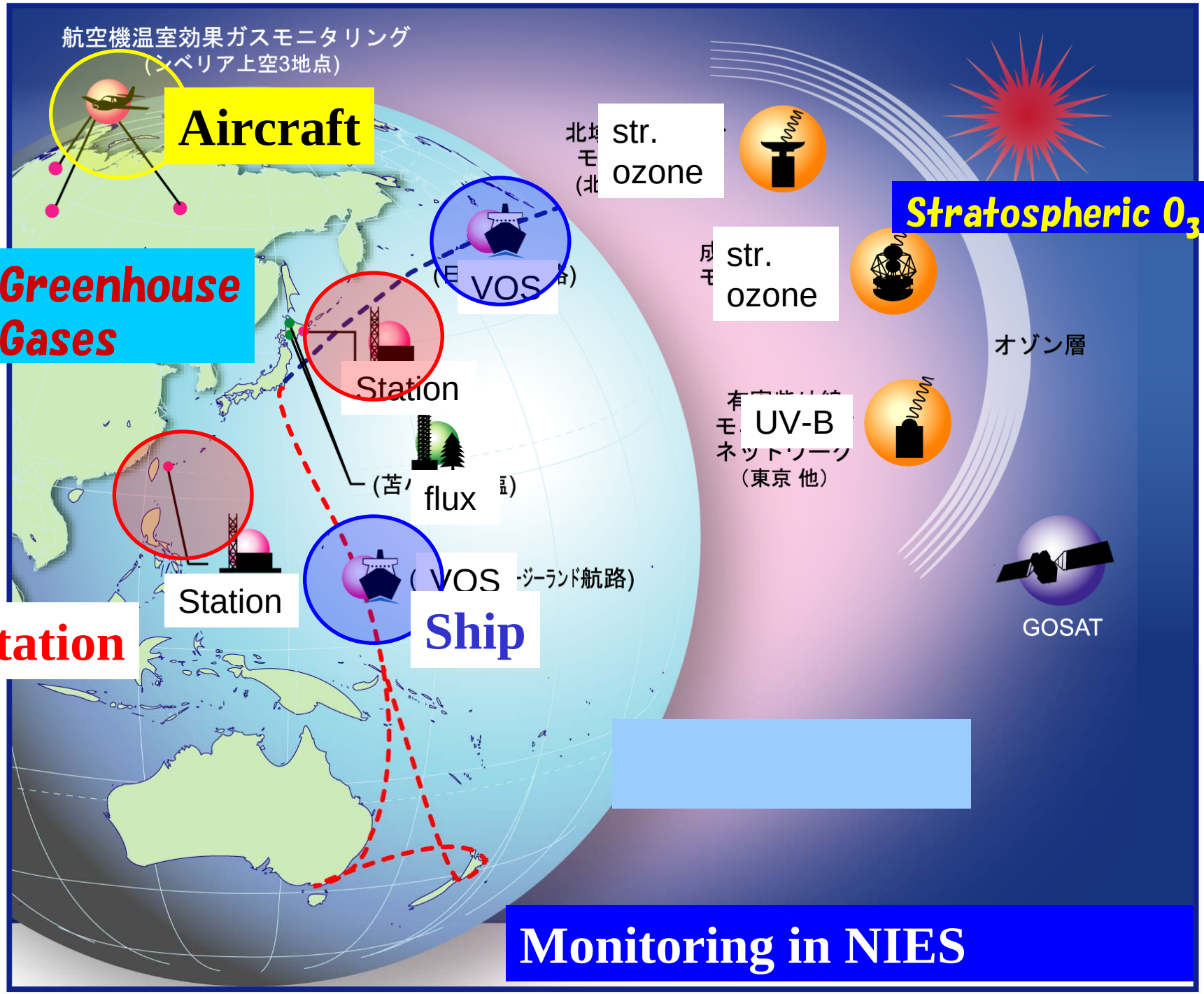
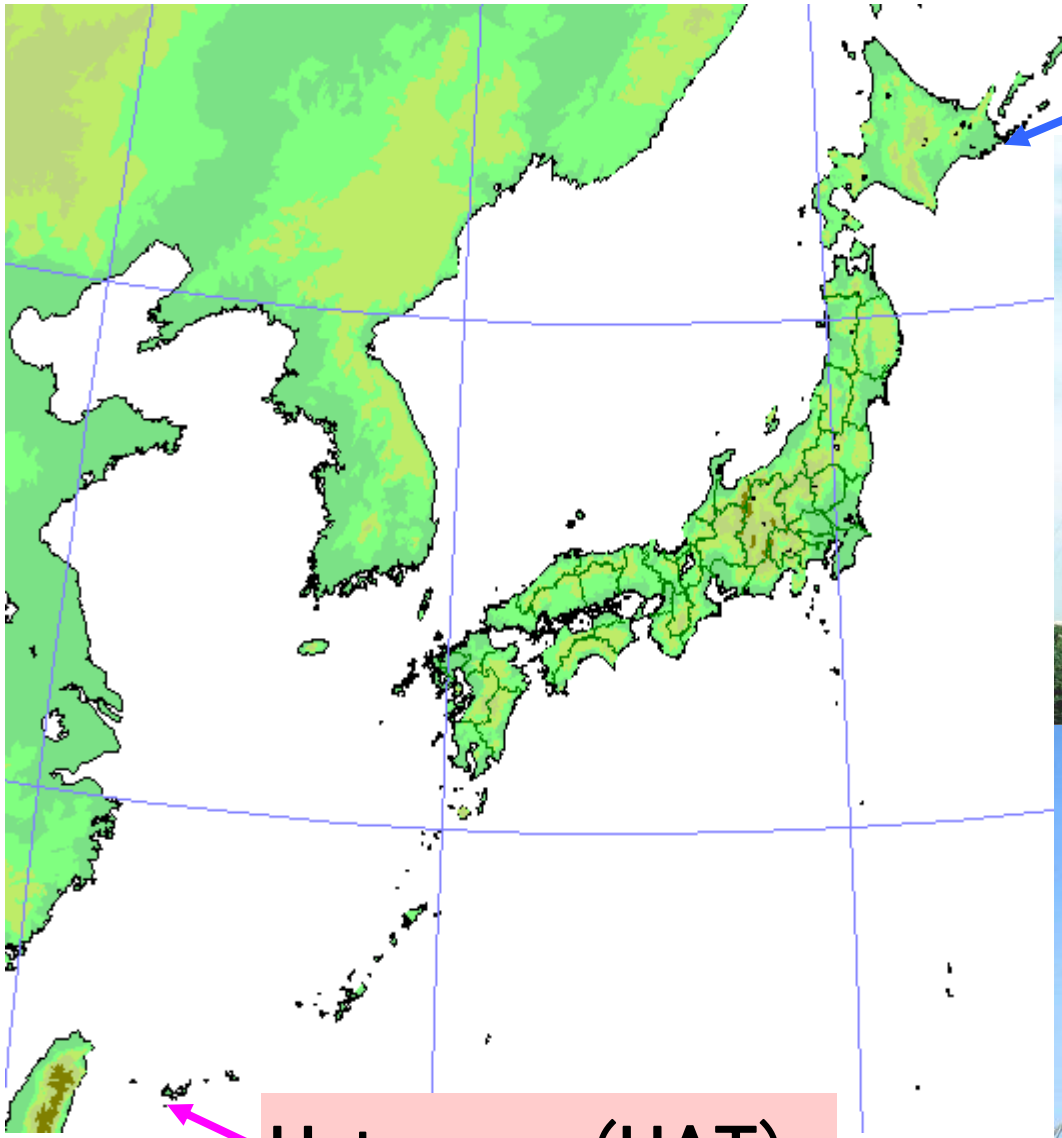
GHG Observation by Various Platform

T. Machida, H. Mukai, Y. Nojiri,
Y. Tohjima, Y, Yokouchi

（CGER／NIES）

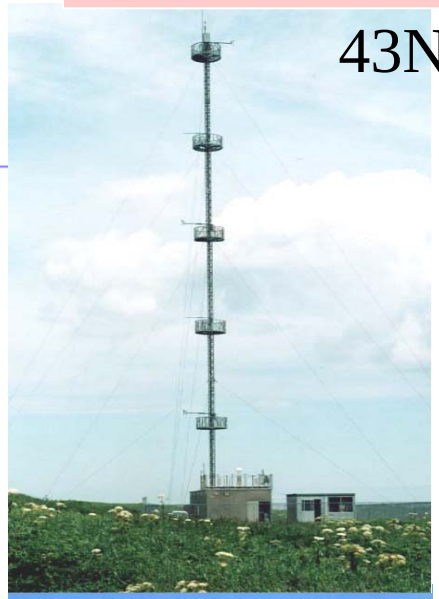

航空機温室効果ガスモニタリング
(シベリア上空3地点)
Aircraft
Greenhouse Gases
Station
Station
Station
flux
VOS
VOS
Ship
str. ozone
str. ozone
Stratospheric O_3
オゾン層
UV-B
(東京 他)
GOSAT
Monitoring in NIES

Ground Station



Cape Ochi-Ishi (COI)

43N, 146E

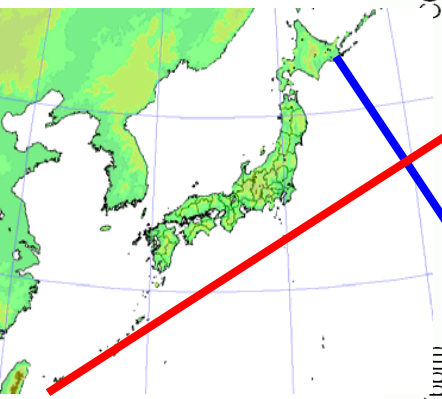


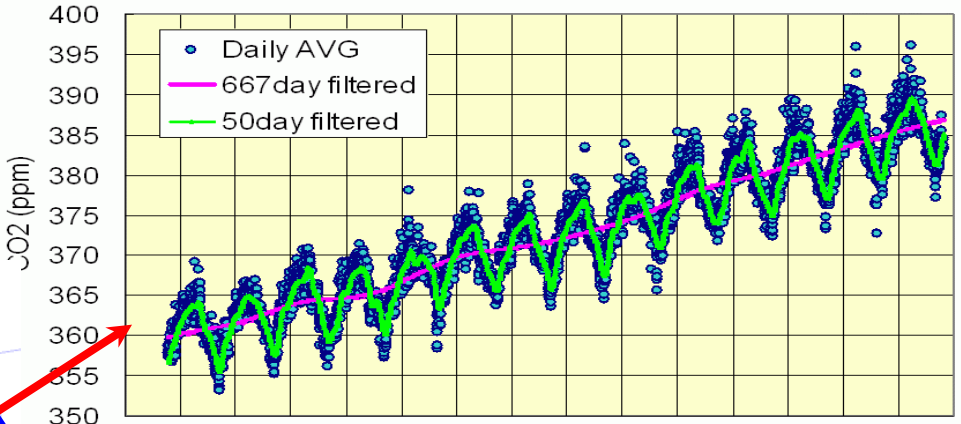
Hateruma (HAT)

24N, 124E

Species	hateruma	Ochi-ishi
CO2	○	○
CH4	○	○
N2O	○	○
O3	○	○
CFCs	○	○
Aerosol	○	○
Black Carbon	○	○
CO	○	○
H2	○	○
NOx	○	○
SO2	○	○
Meteorol.	○	○
O2/N2	○	○
Sampling	○	○

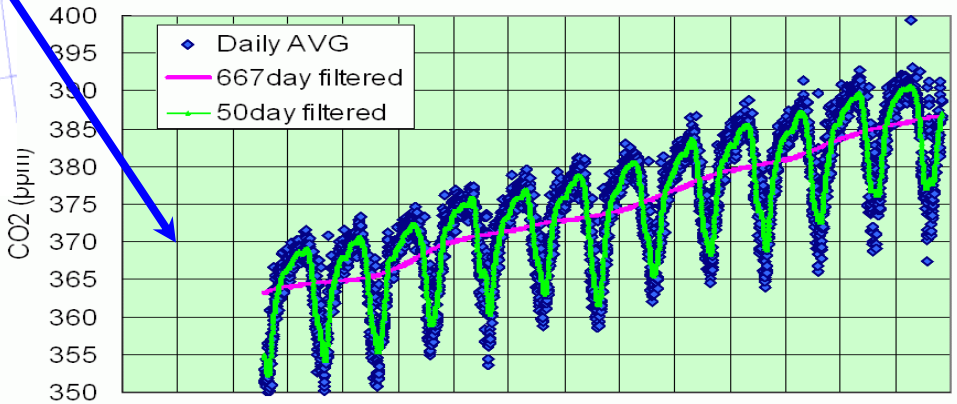
CO_2





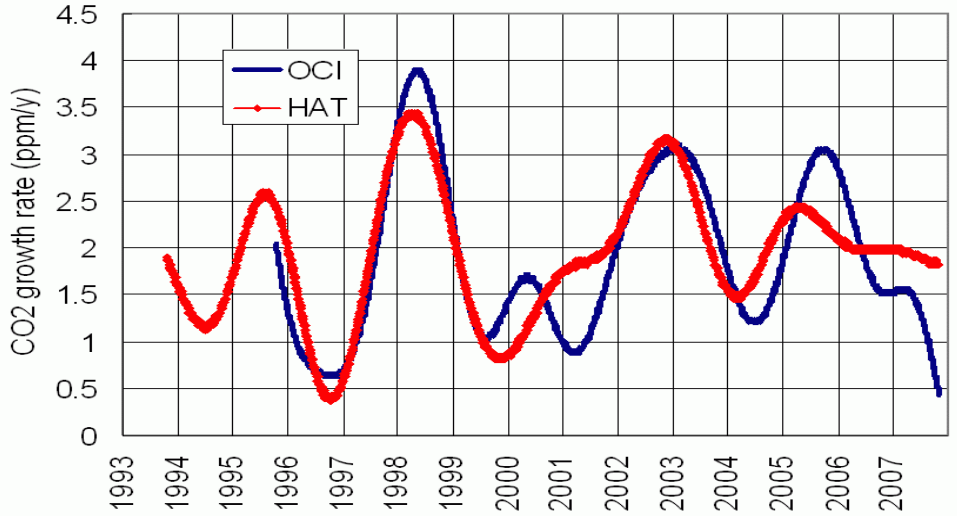
Hateruma

23N



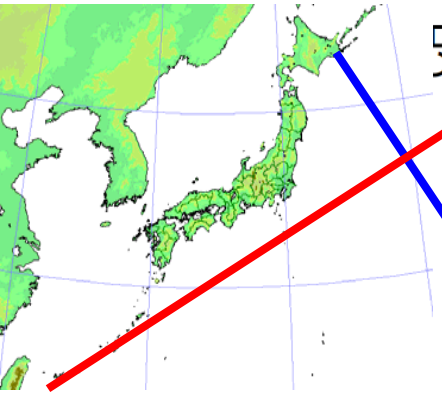
Ochi-Ishi

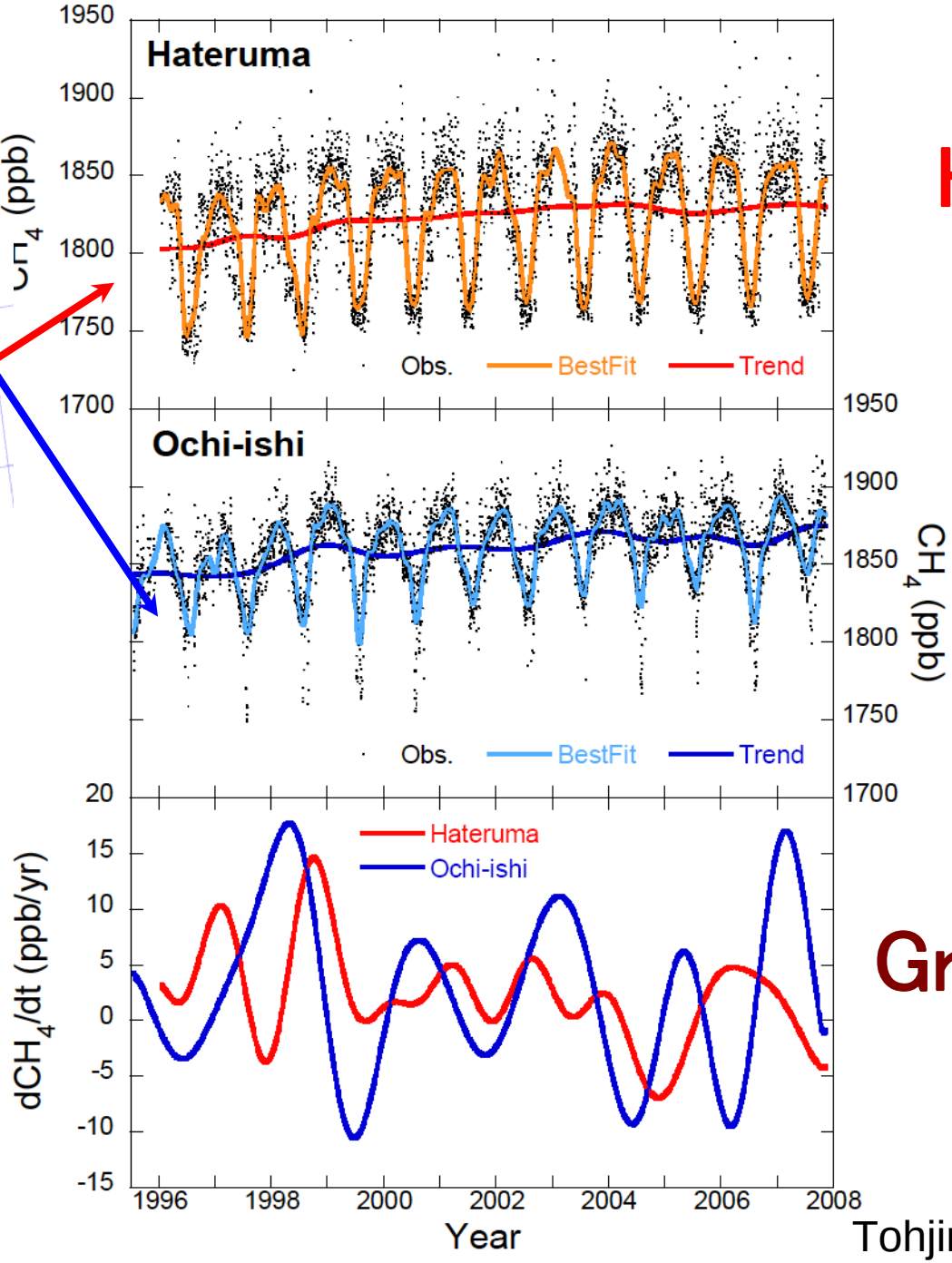
43N



Growth Rate

CH_4





Hateruma

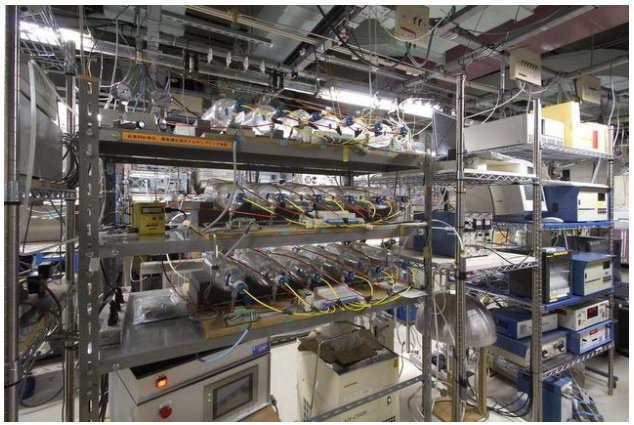
Ochi-Ishi

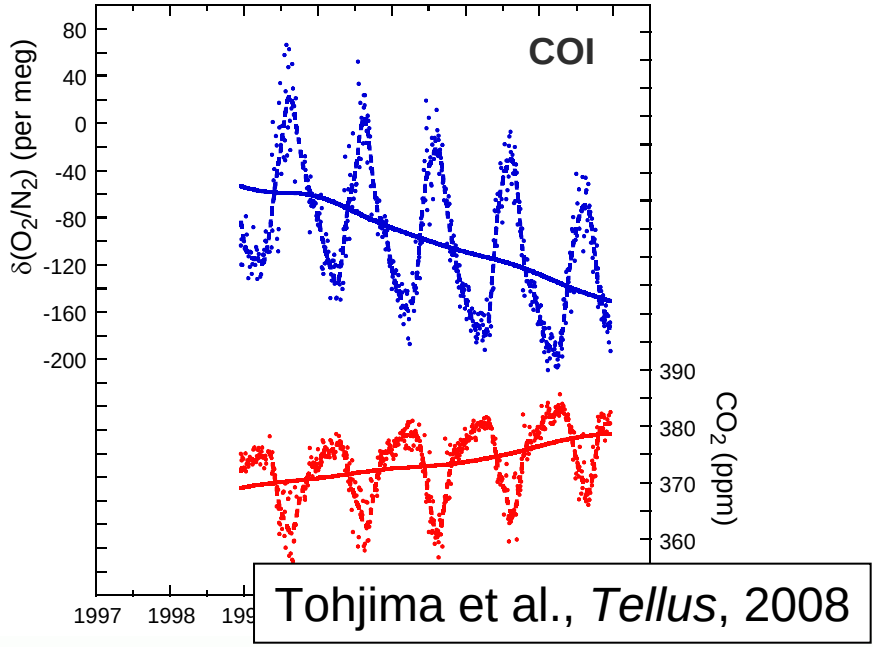
Growth Rate

Tohjima et al., *JGR*, 2003

Other Measurements using Monitoring Stations

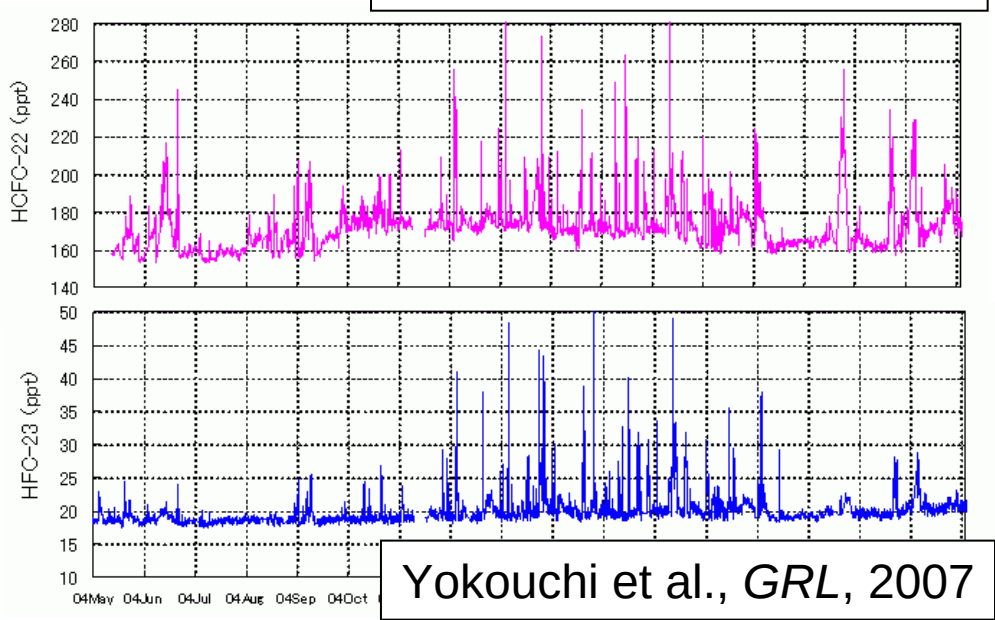
O2/N2 Ratio





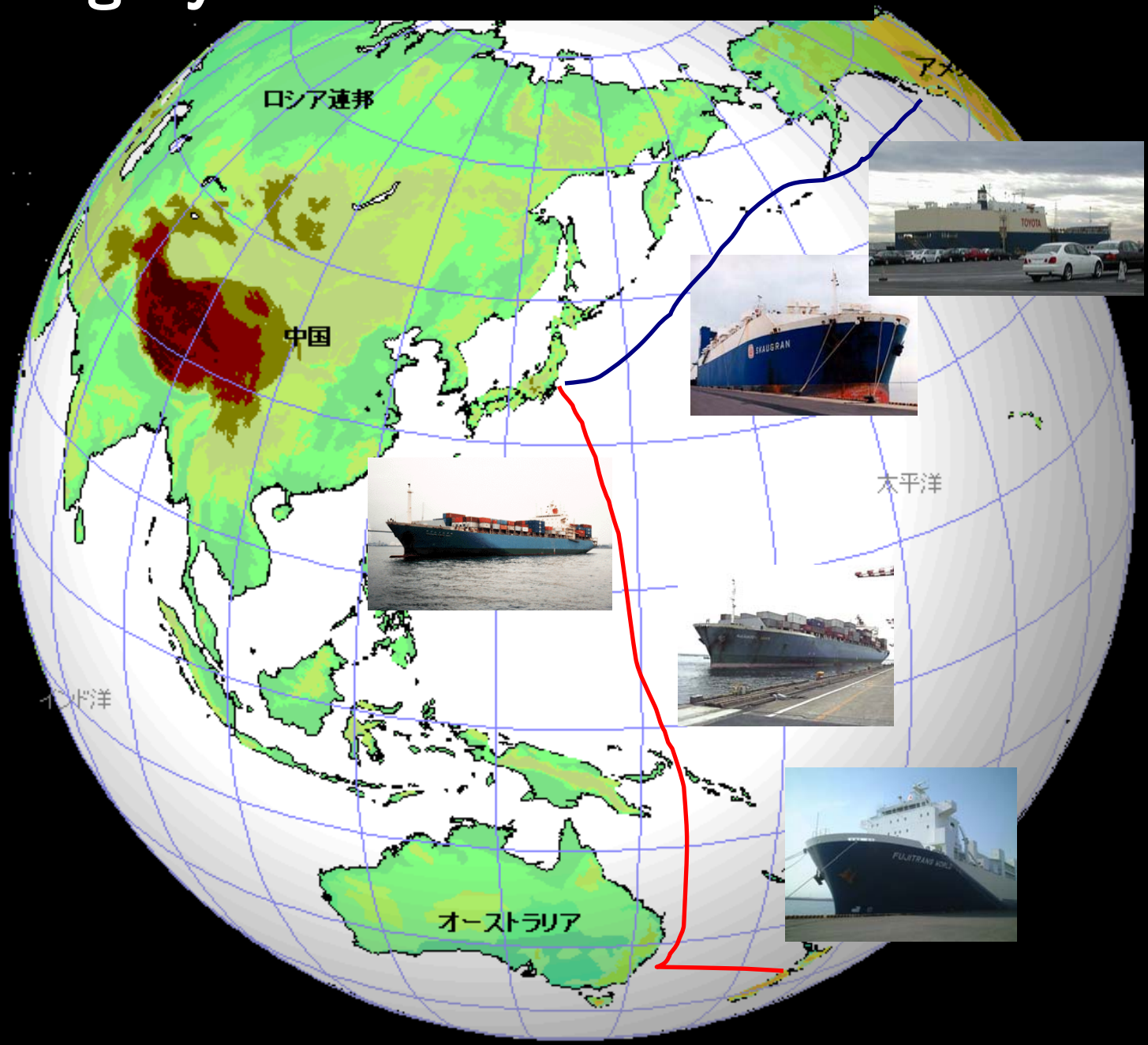
Tohjima et al., *Tellus*, 2008

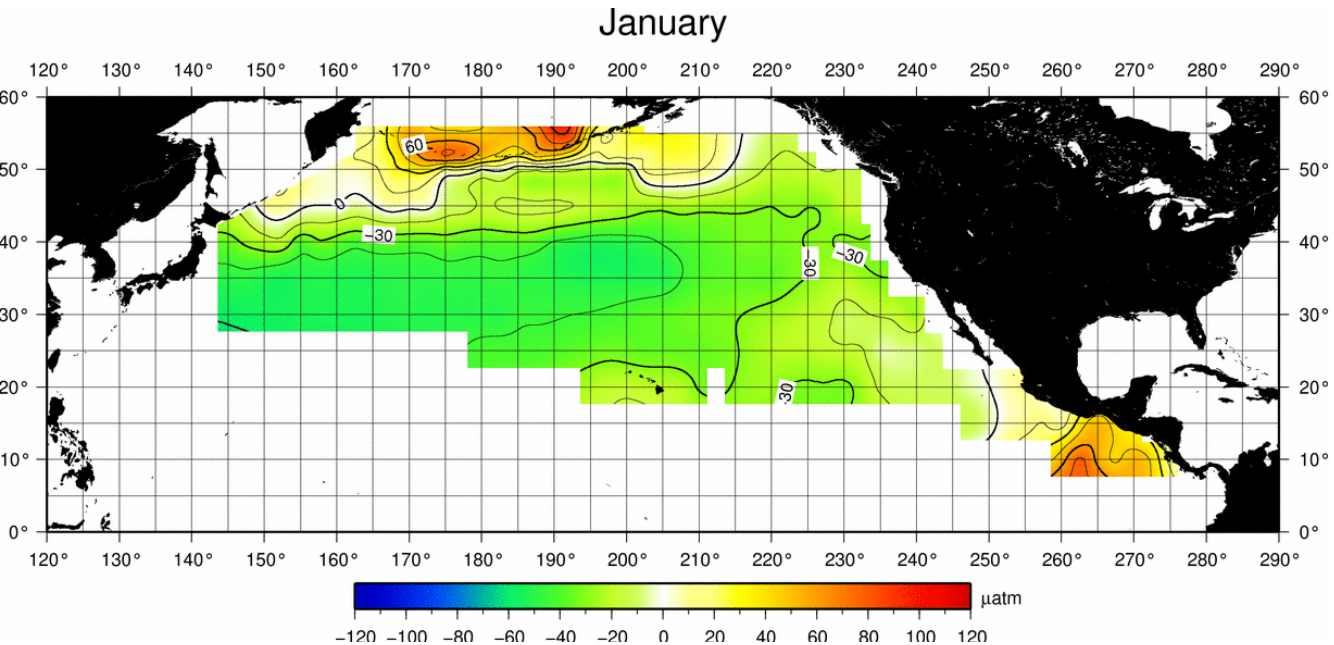
Halocarbon



Yokouchi et al., *GRL*, 2007

Monitoring by VOS

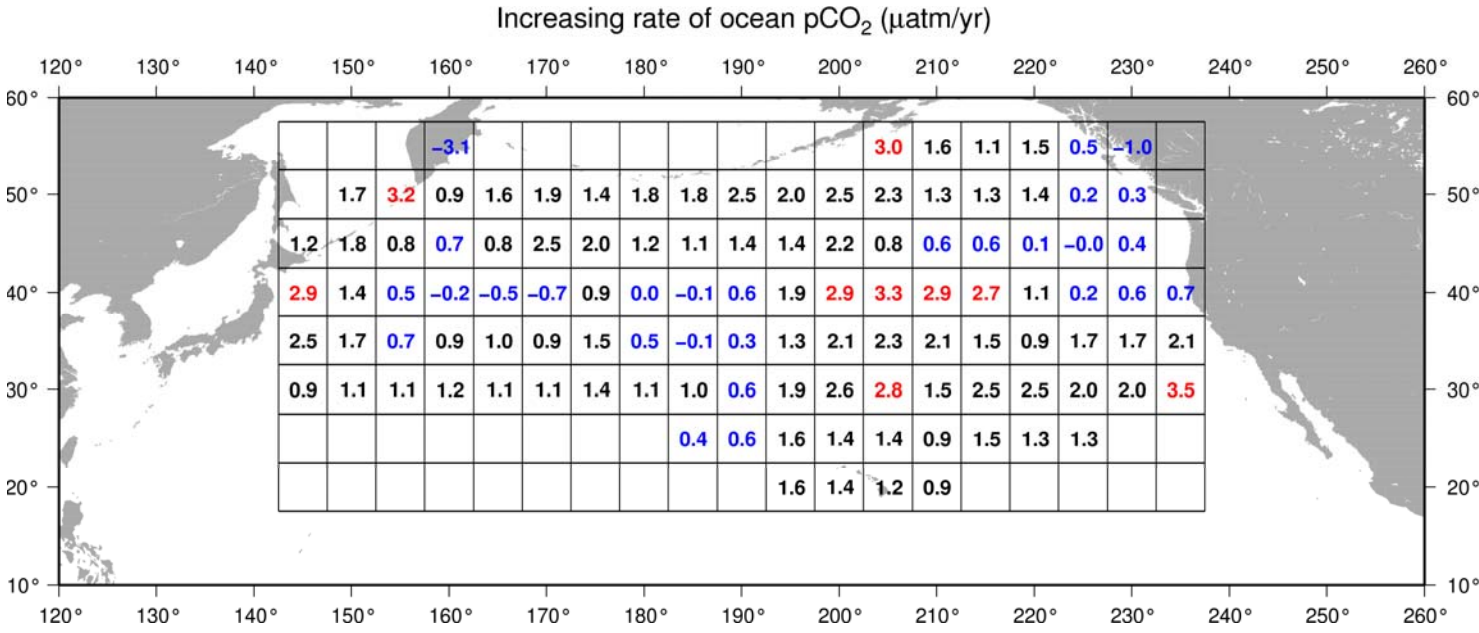




ΔpCO_2 climatology from NIES data set (1995-2006) for North Pacific

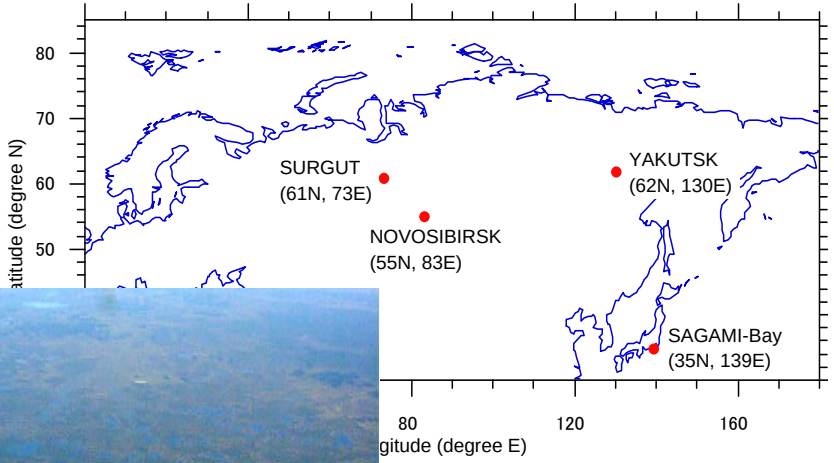
Zeng et al., *DSRII*, 2002

pCO_2 increasing rate map

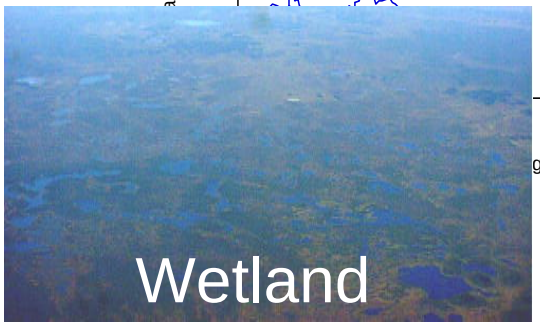


Monitoring of GHGs by Aircraft over Sibaria

Aircraft and Vegetation



Surgut

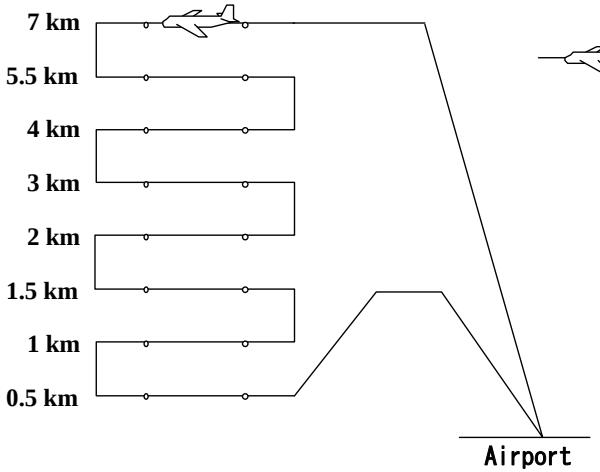


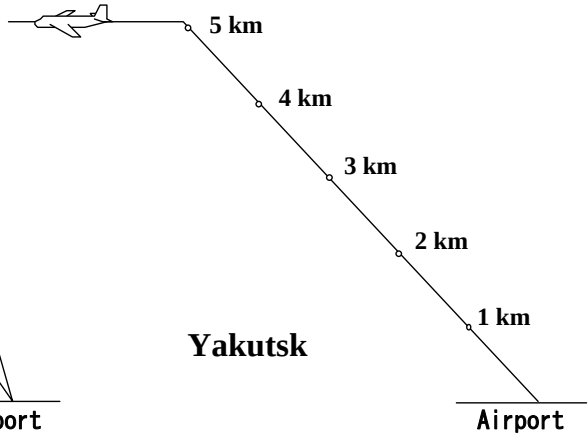
Novosibir

Yakutsk

Sampling and Analysis

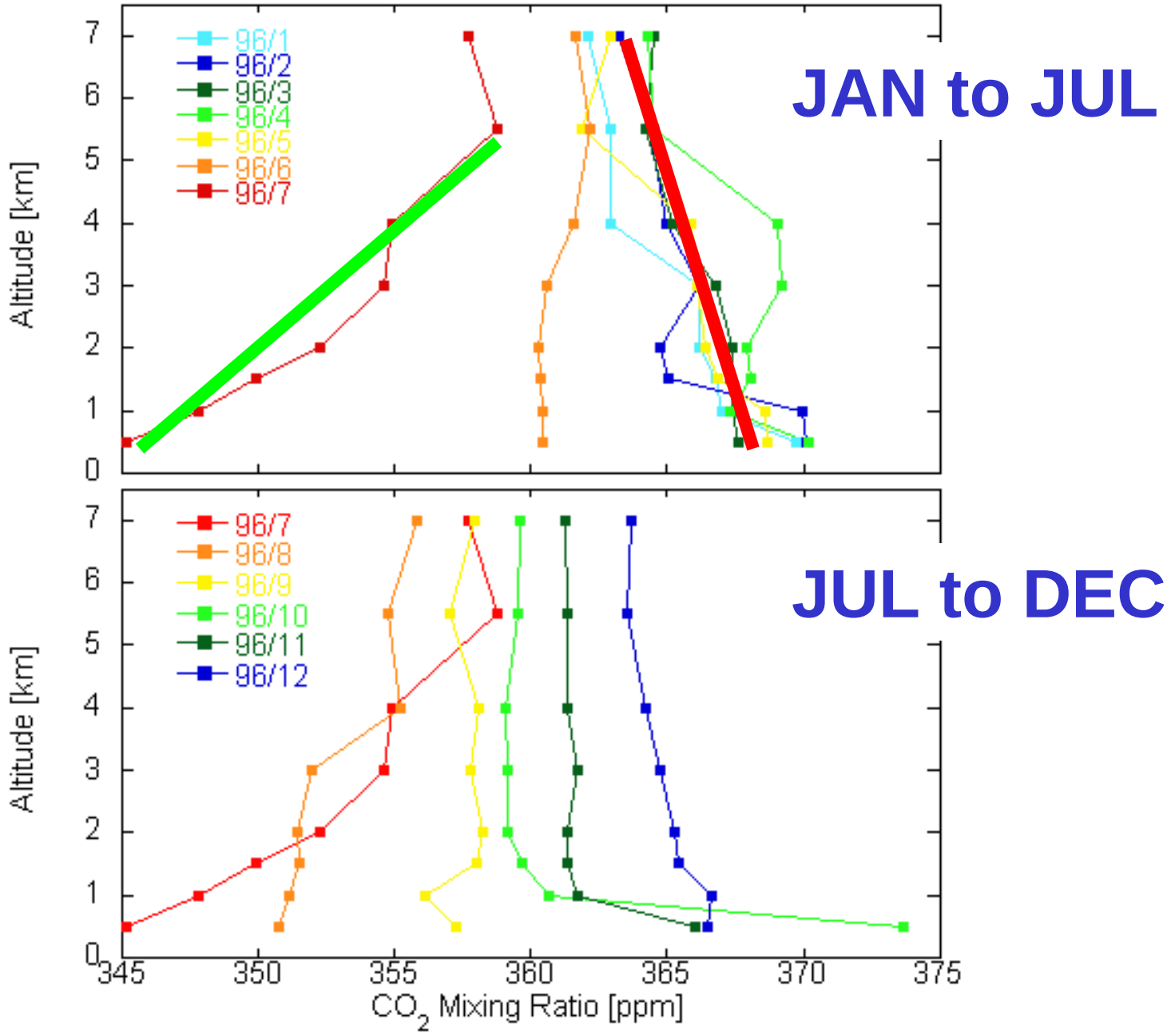
Surgut,
Novosibirsk,
& Sagami-bay



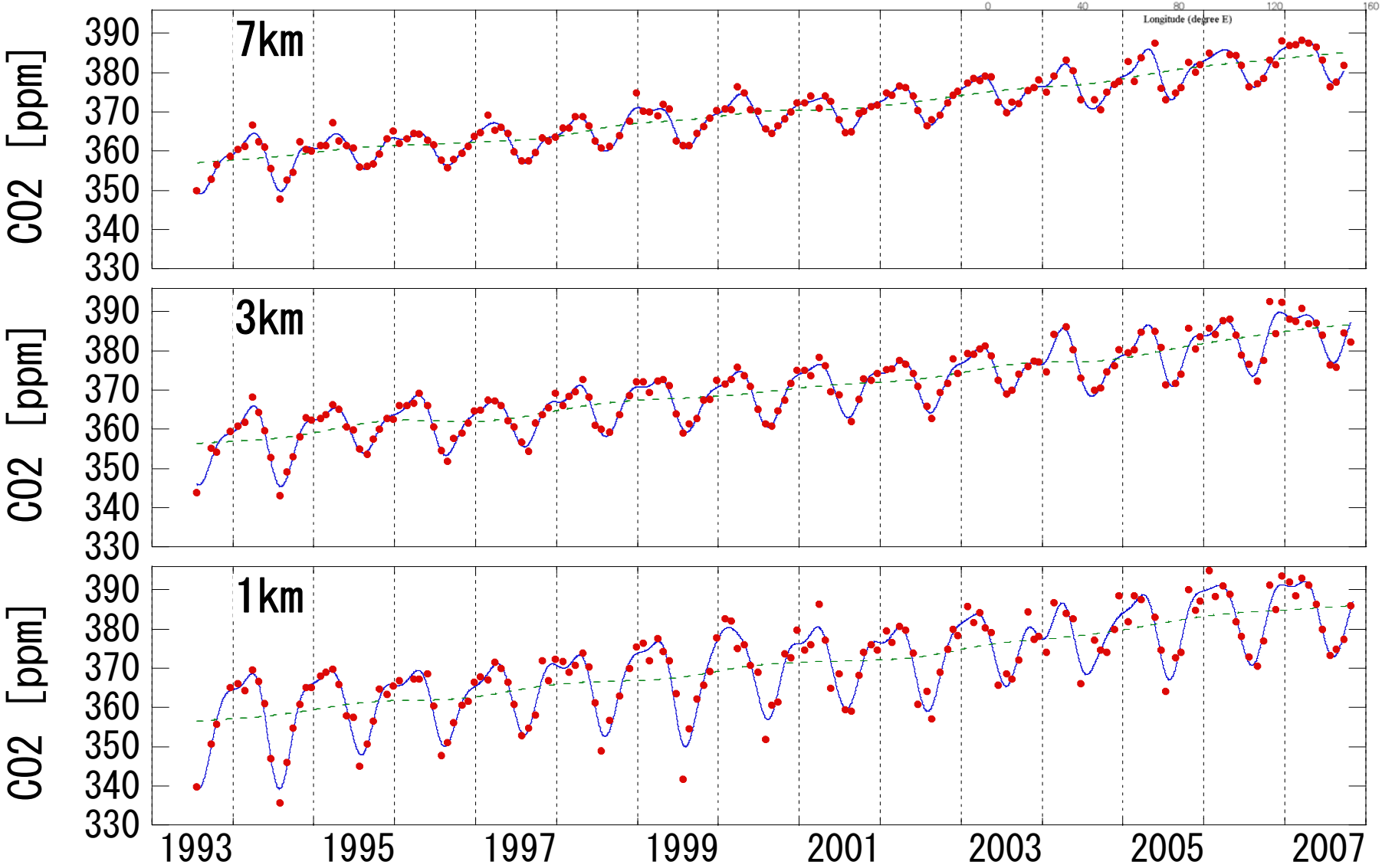


- CO2
- CH4
- CO
- H2
- N2O
- SF6
- CO2 isotope

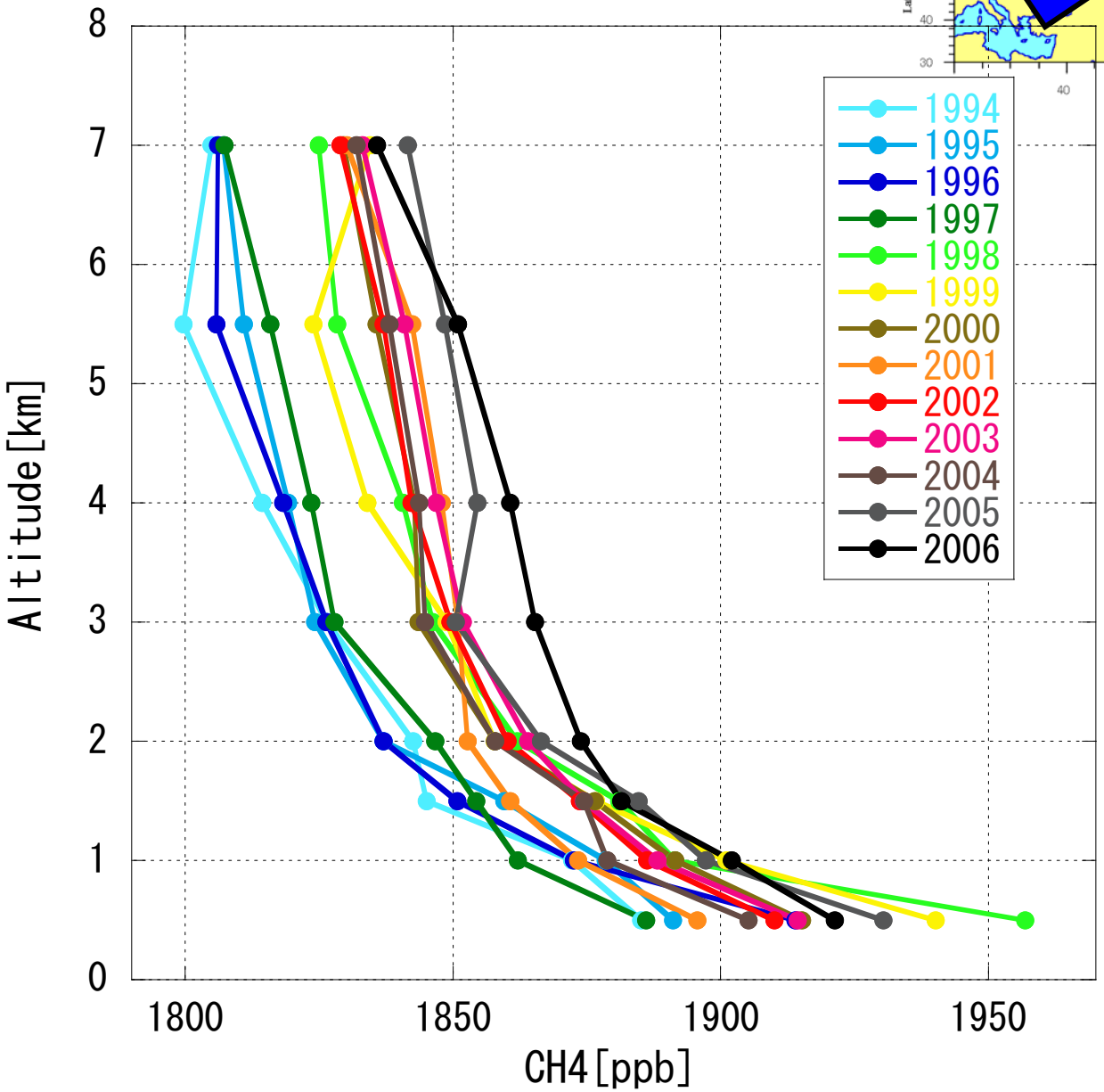
Vertical profile of CO_2 over Surgut



Observed CO_2 over Surgut



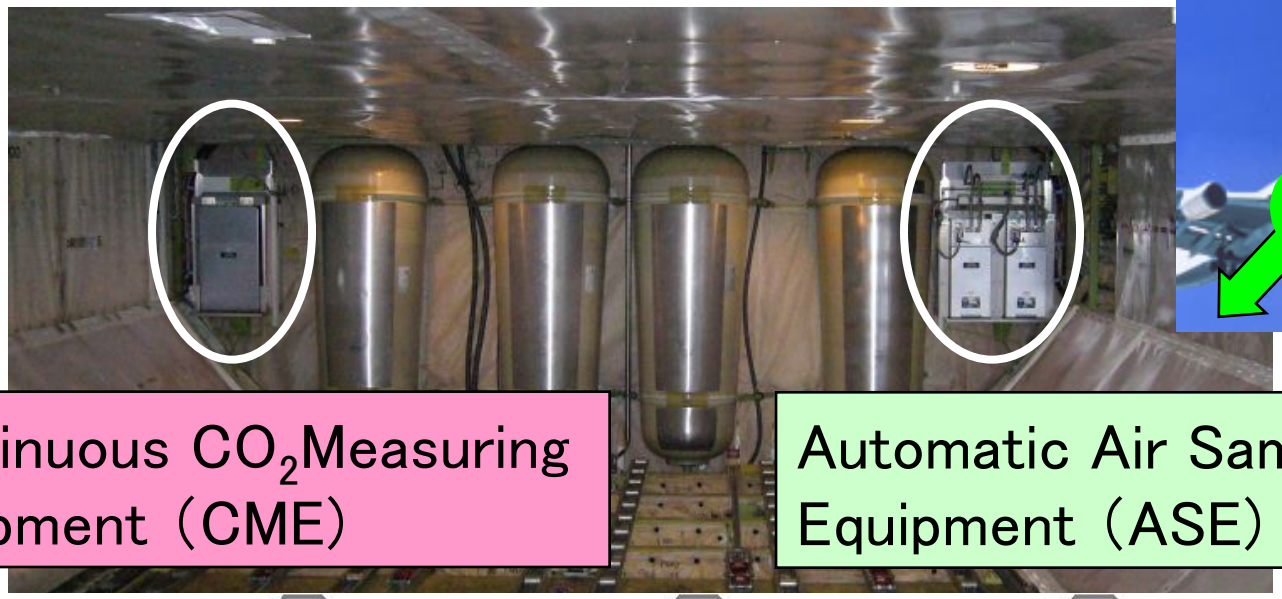
Annual Mean CH4 over Surgut



Observation of CO_2 and other Trace Species by Commercial Airliners

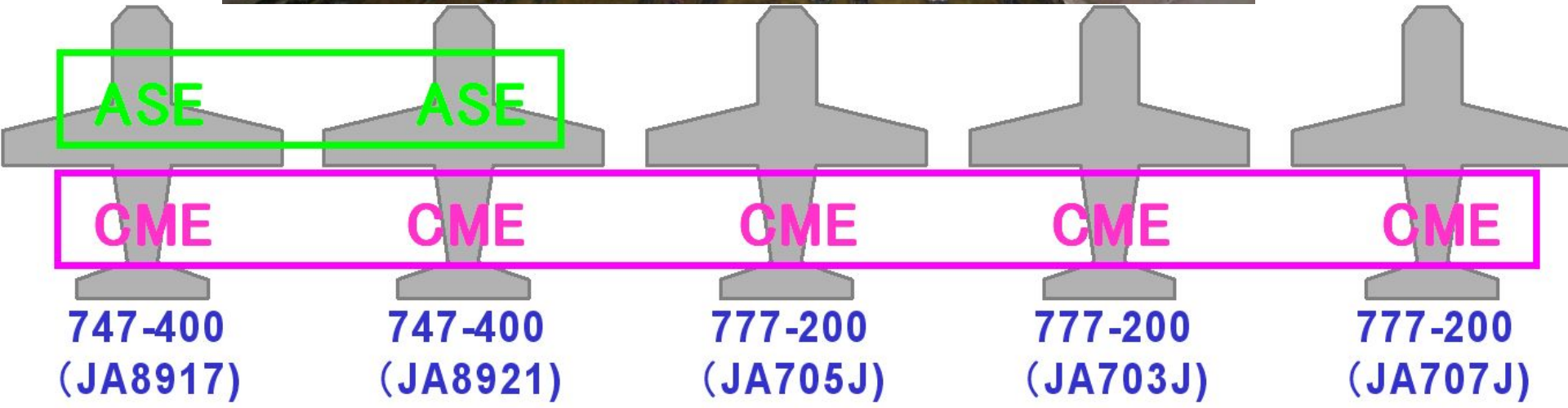
NIES, MRI, JAL, JAMCO, Tohoku U., JAL F.

Install in the Cargo Room



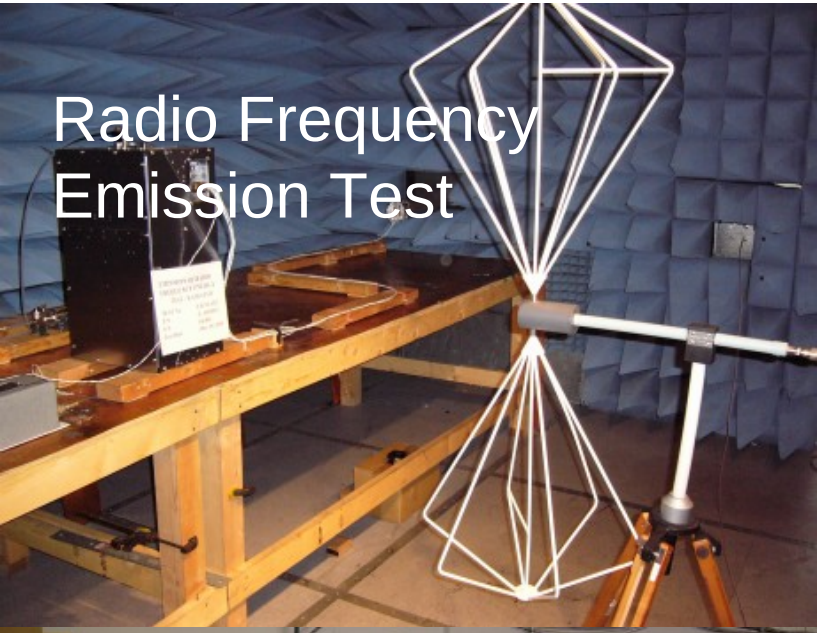
Continuous CO_2Measuring Equipment（CME）

Automatic Air Sampling Equipment（ASE）



Machida et al., J.Atmos.Ocean.Technol, 2008

FAA Official Test



High Temp Test
Power Input Test

Radio Frequency Emission Test

Static Load Test

Altitude Test

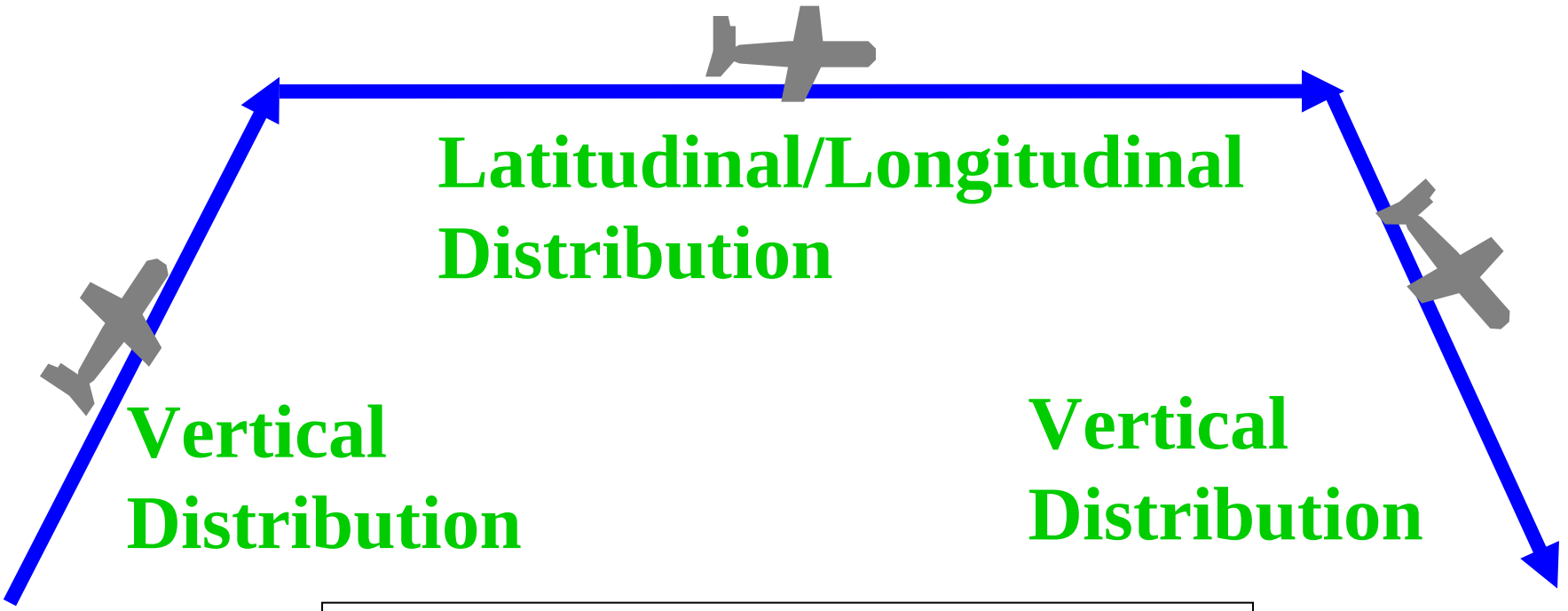
Waterproofness Test

Proof and Burst Pressure Test

Vibration Test
Radio Frequency Susceptibility Test
Voltage Spike Test
Static Load Test

Got an Approval from FAA in April 2005

CME can observe…



- High frequency
- Wide area coverage
- Vertical profile
- Detailed structure

Flight Routes and Frequency