

CONTRAST



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CONvective TRANsport of Active Species in the Tropics

Guam, Jan–Feb 2014



Weather & Climate Science



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University of Maryland
CONTRAST Scientist

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University of Miami
CONTRAST Scientist



AT&T M-Cell 7:28 99%

Boulder
Partly Cloudy
-17°

Wednesday		Today				10	-2
Now	08	09	10	11	12		
-17	-2	0	1	3	7		
Thursday						19	10
Friday						37	25
Saturday						34	21
Sunday						37	28
Monday						39	21

YAHOO!



Flying Laboratory

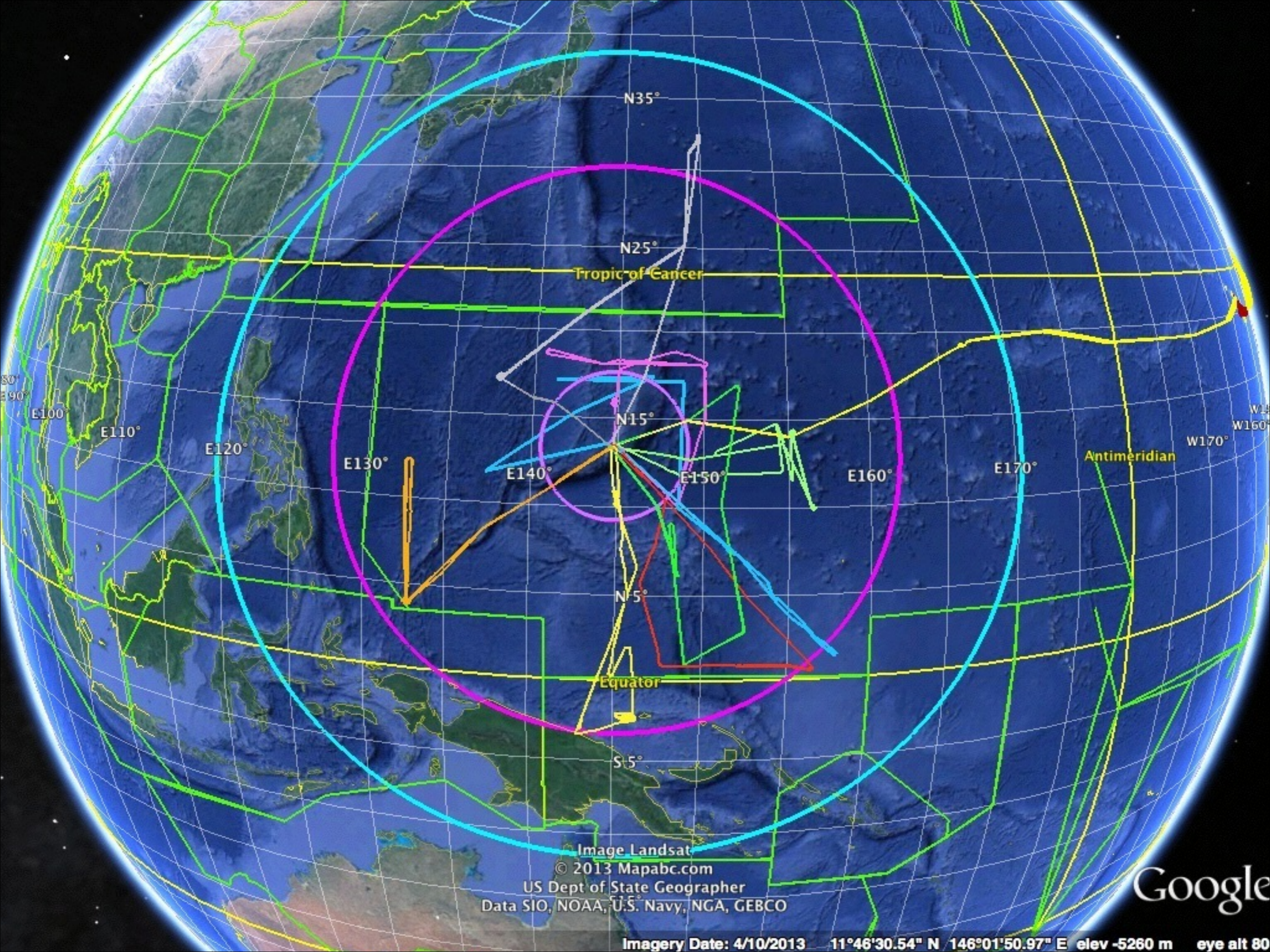


NSF/NCAR HIAPER Research Aircraft

Flying Laboratory



NSF/NCAR HIAPER Research Aircraft



N35°

N25°

Tropic of Cancer

N15°

N5°

Equator

S5°

E130°

E140°

E150°

E160°

E170°

Antimeridian

W170°

W160°

Image Landsat

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US Dept of State Geographer

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Google

Imagery Date: 4/10/2013

11°46'30.54" N 146°01'50.97" E elev -5260 m

eye alt 80

CONTRAST

CONvective TRansport of Active Species in the Tropics
Guam :: 15 January - 28 February 2014

Long-lived chlorofluorocarbons + sunlight + hydroxyl (OH)
→ chlorine monoxide (ClO)

Long-lived bromocarbons + sunlight + hydroxyl (OH)
→ bromine monoxide (BrO)

BrO and ClO react, leading to stratospheric ozone (O₃) depletion

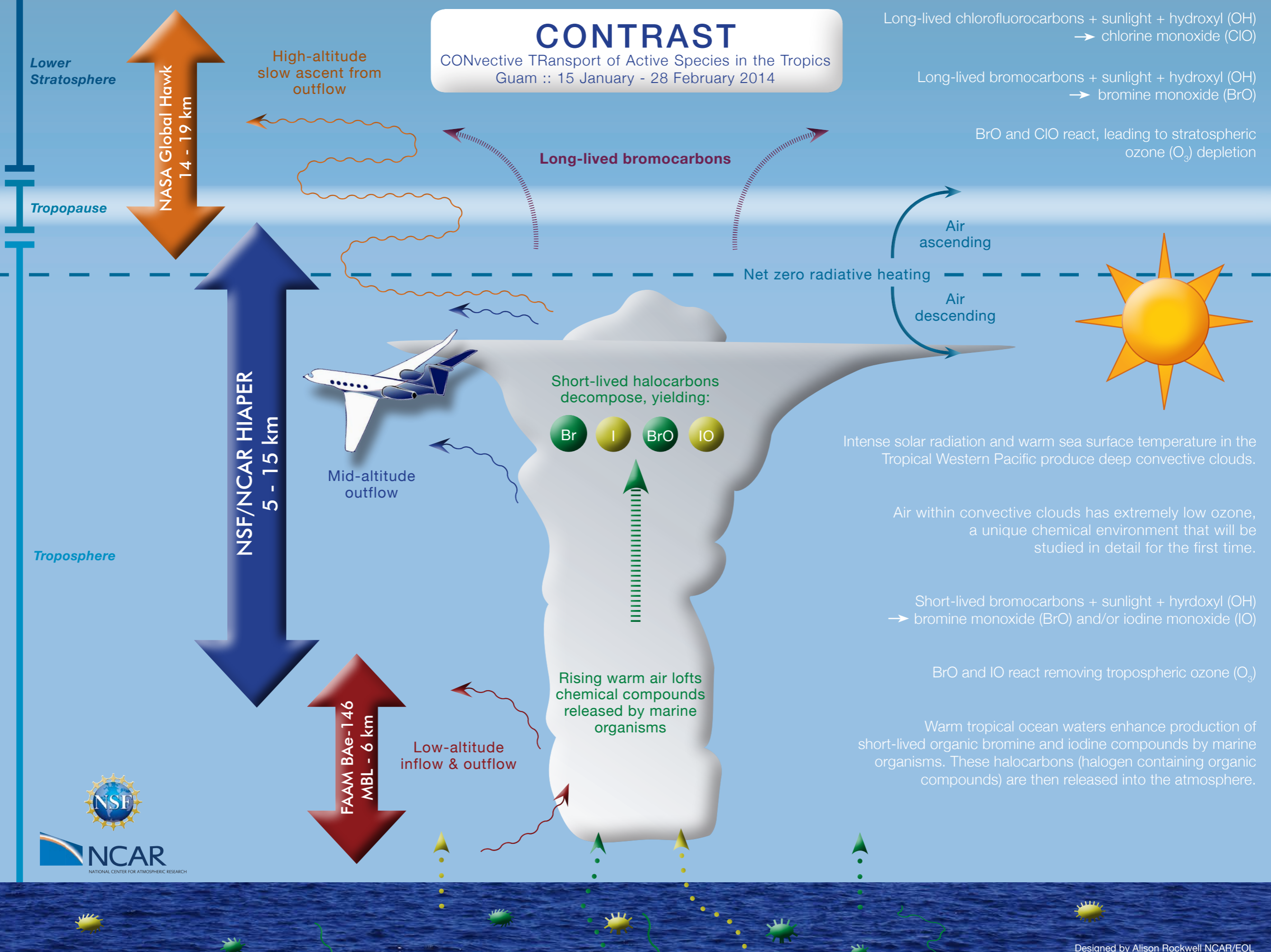
Intense solar radiation and warm sea surface temperature in the Tropical Western Pacific produce deep convective clouds.

Air within convective clouds has extremely low ozone, a unique chemical environment that will be studied in detail for the first time.

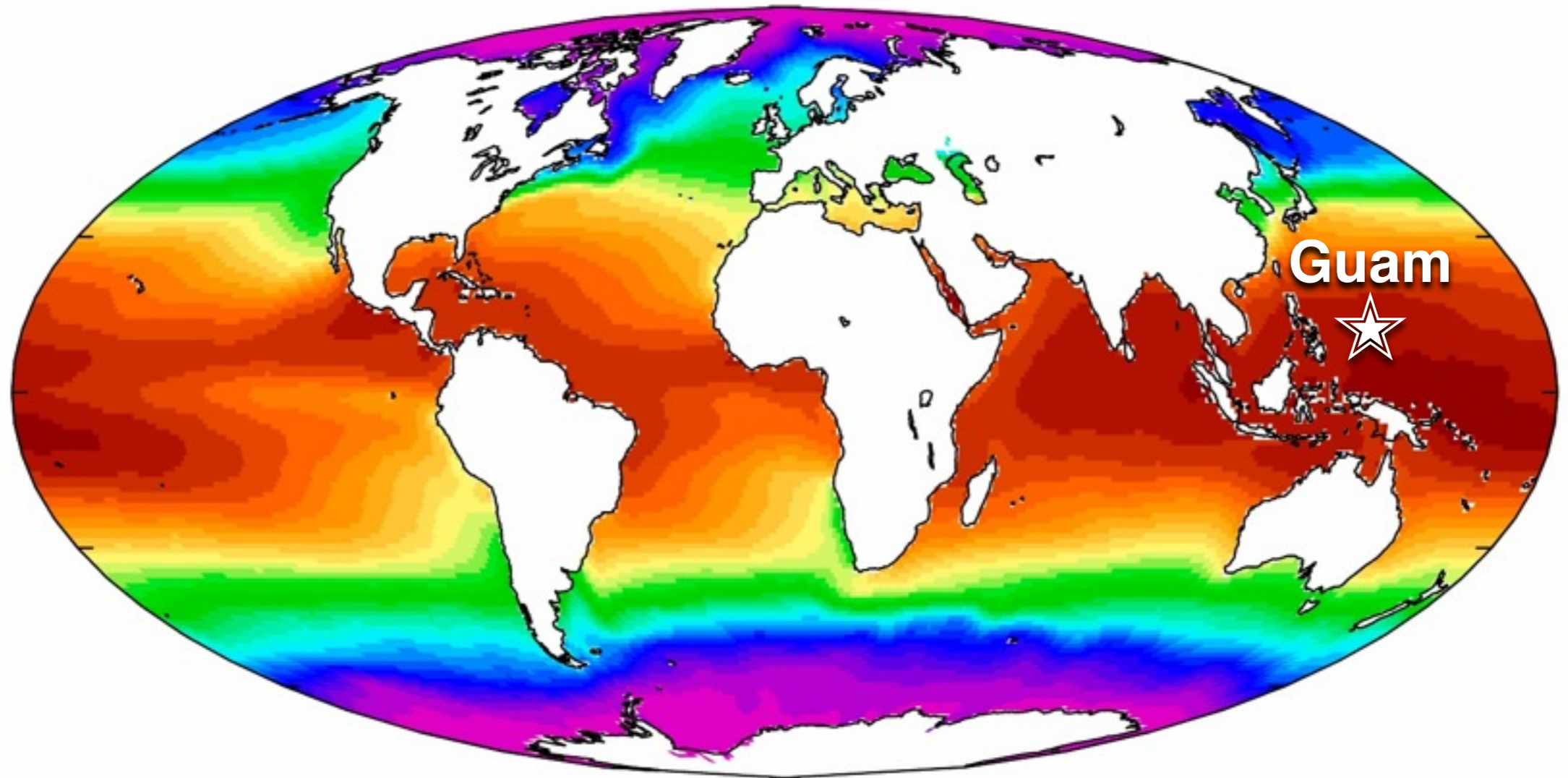
Short-lived bromocarbons + sunlight + hydroxyl (OH)
→ bromine monoxide (BrO) and/or iodine monoxide (IO)

BrO and IO react removing tropospheric ozone (O₃)

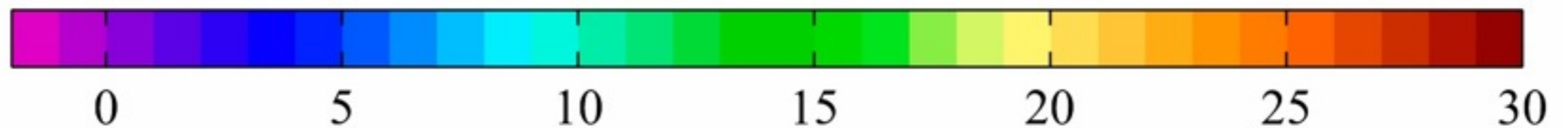
Warm tropical ocean waters enhance production of short-lived organic bromine and iodine compounds by marine organisms. These halocarbons (halogen containing organic compounds) are then released into the atmosphere.



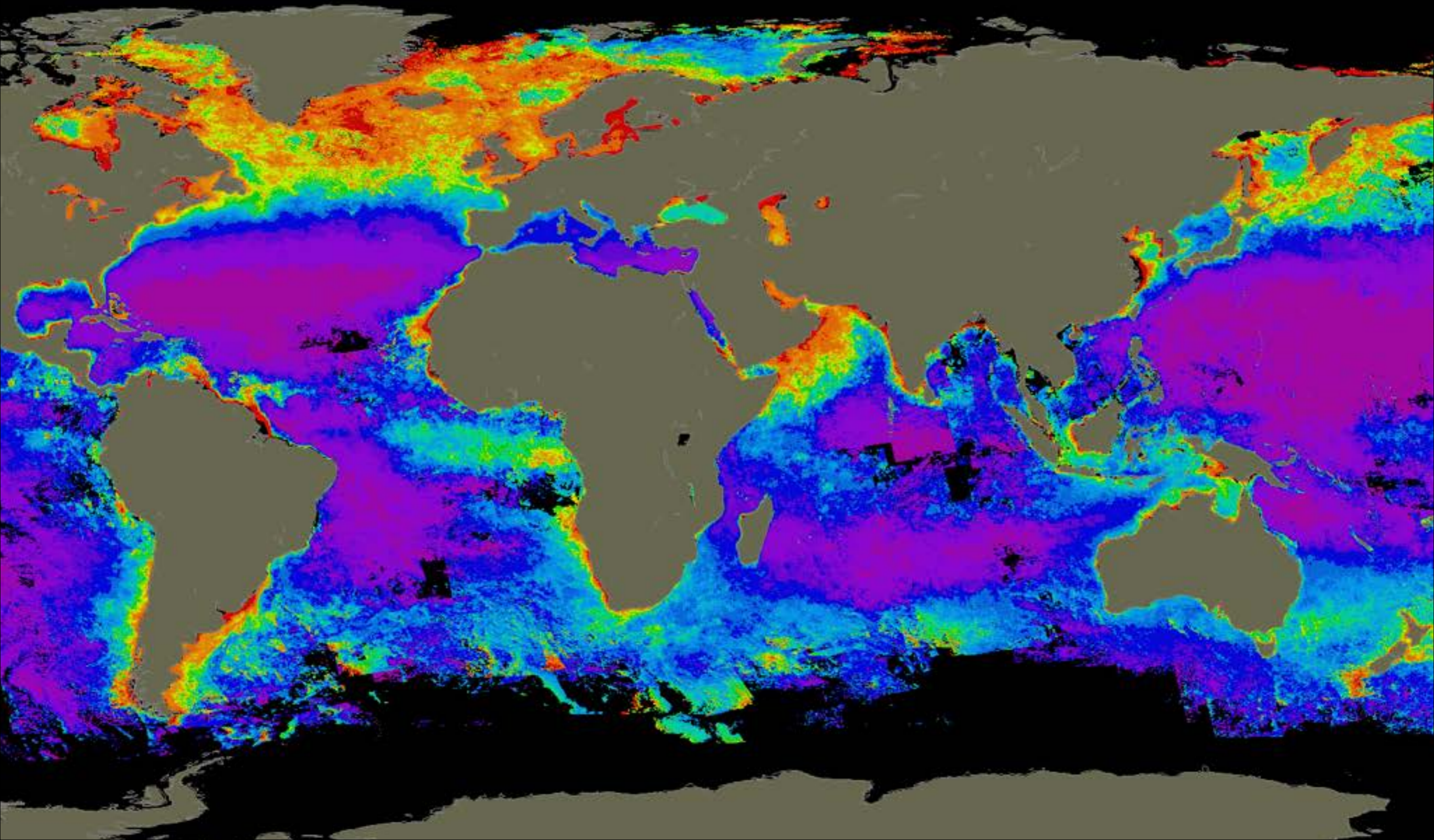
Why Guam?



Sea-surface temperature [°C]



Why Guam?



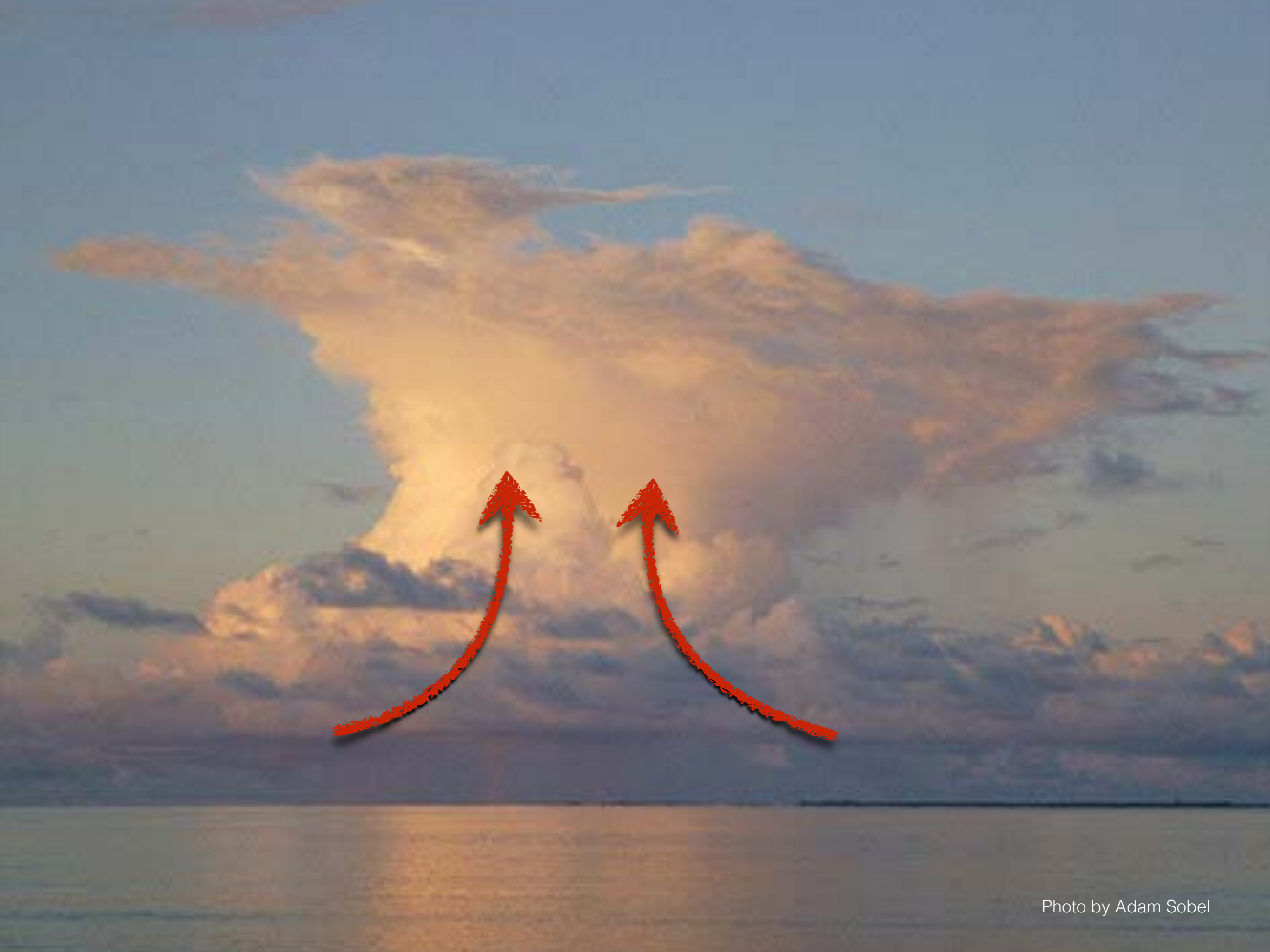


Photo by Adam Sobel

CONNT

The People of CONTRAST



The People of CONTRAST



The People of CONTRAST



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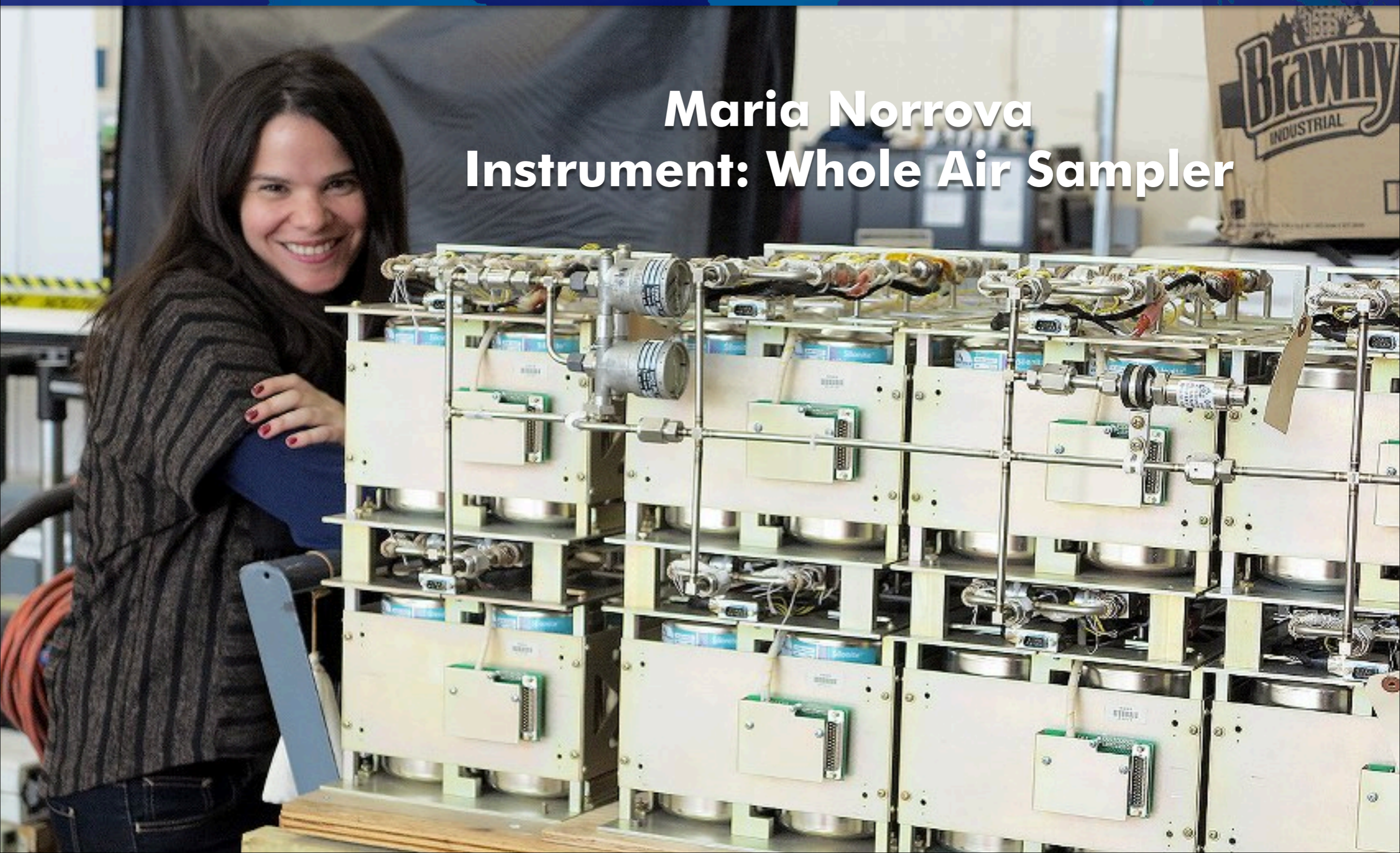


The People of CONTRAST



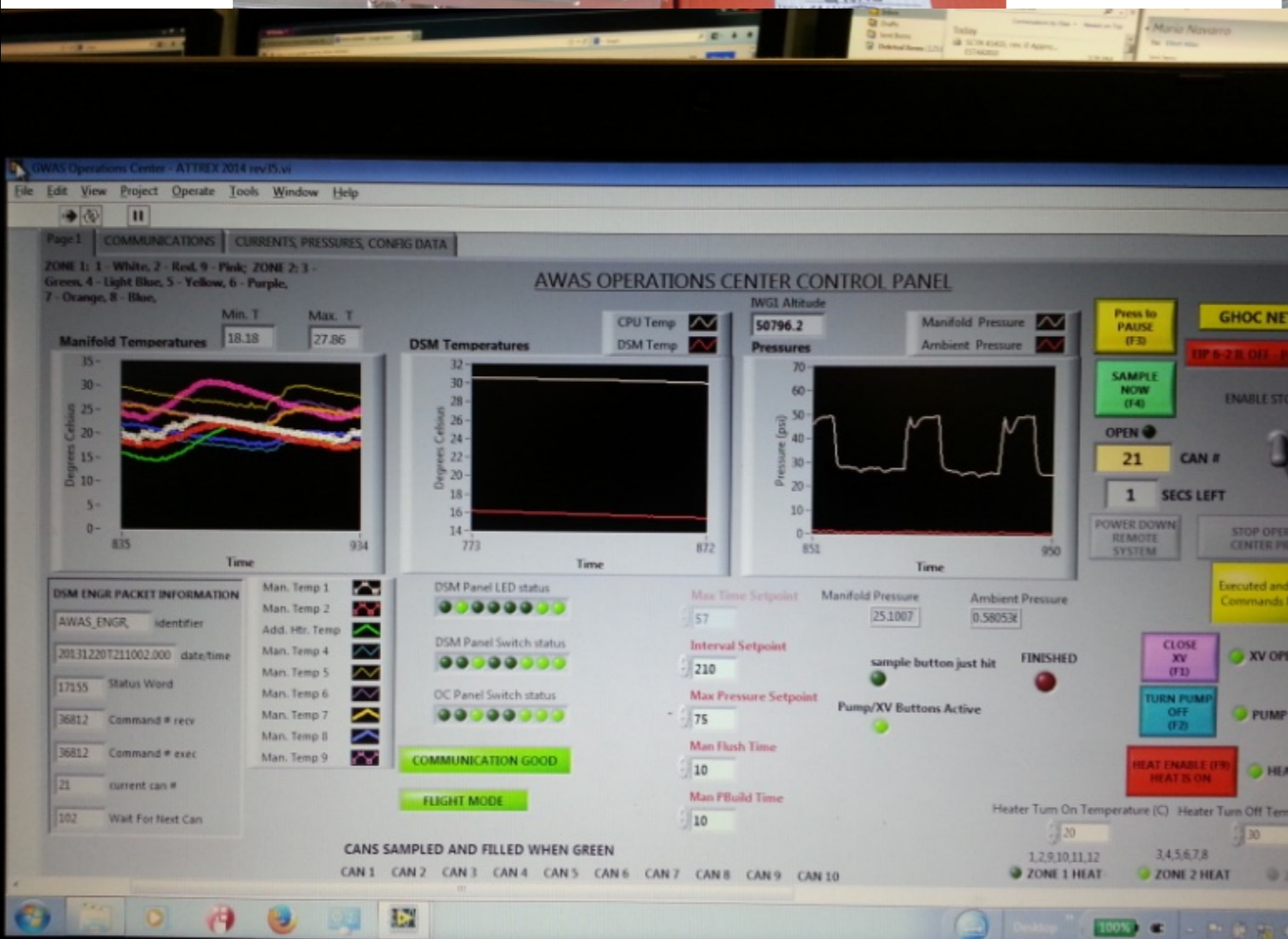
The People of CONTRAST

Maria Norrova
Instrument: Whole Air Sampler





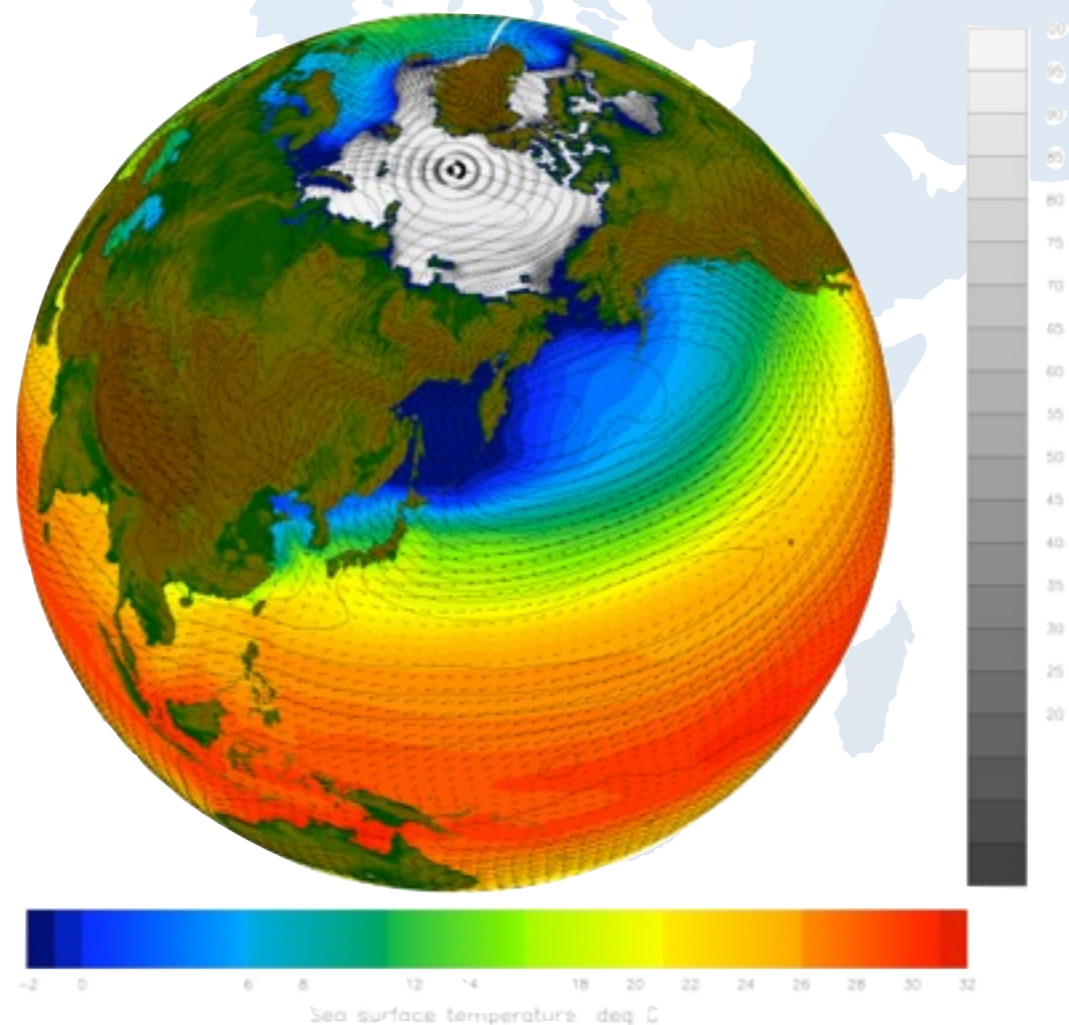




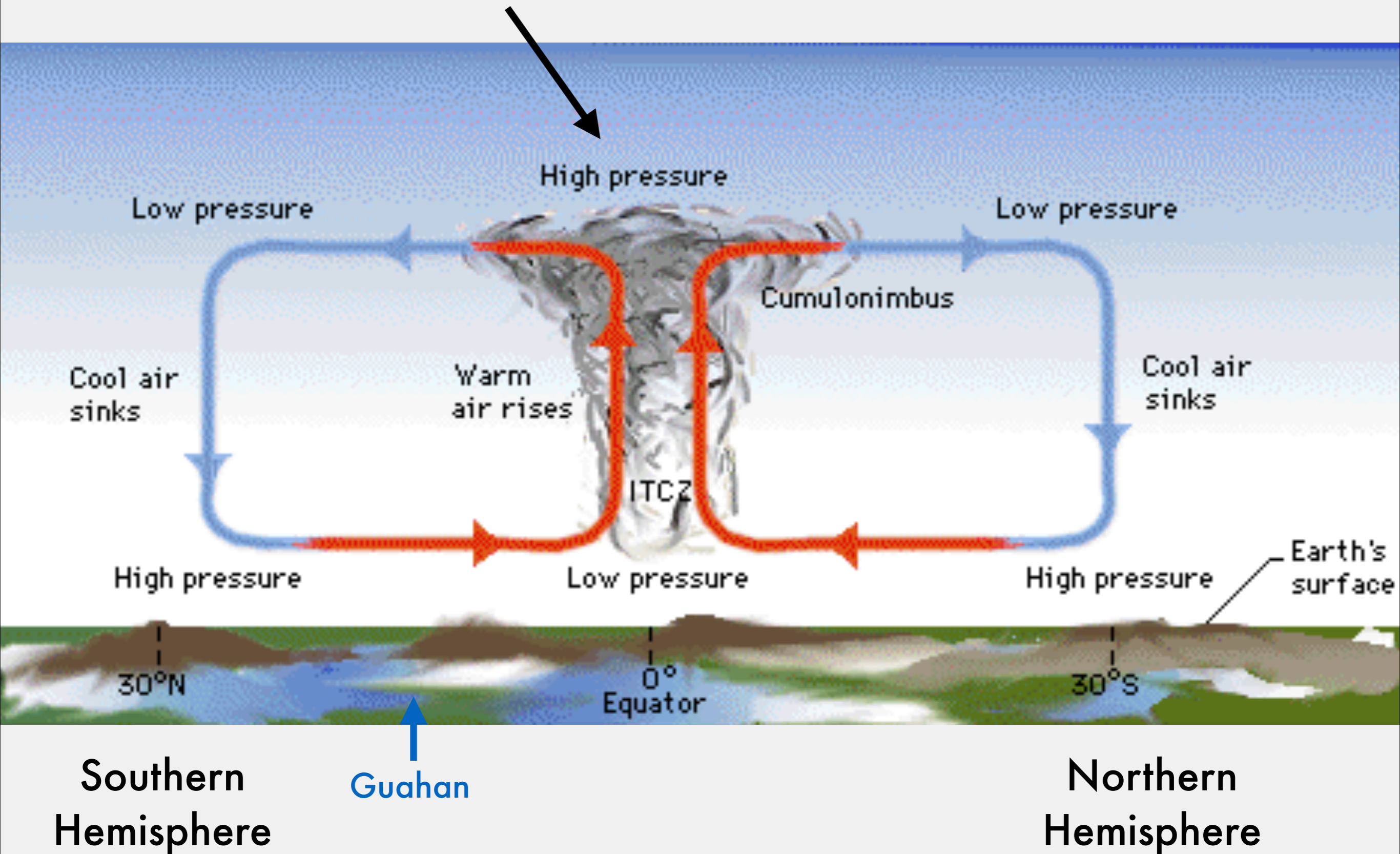


Why are we studying this?

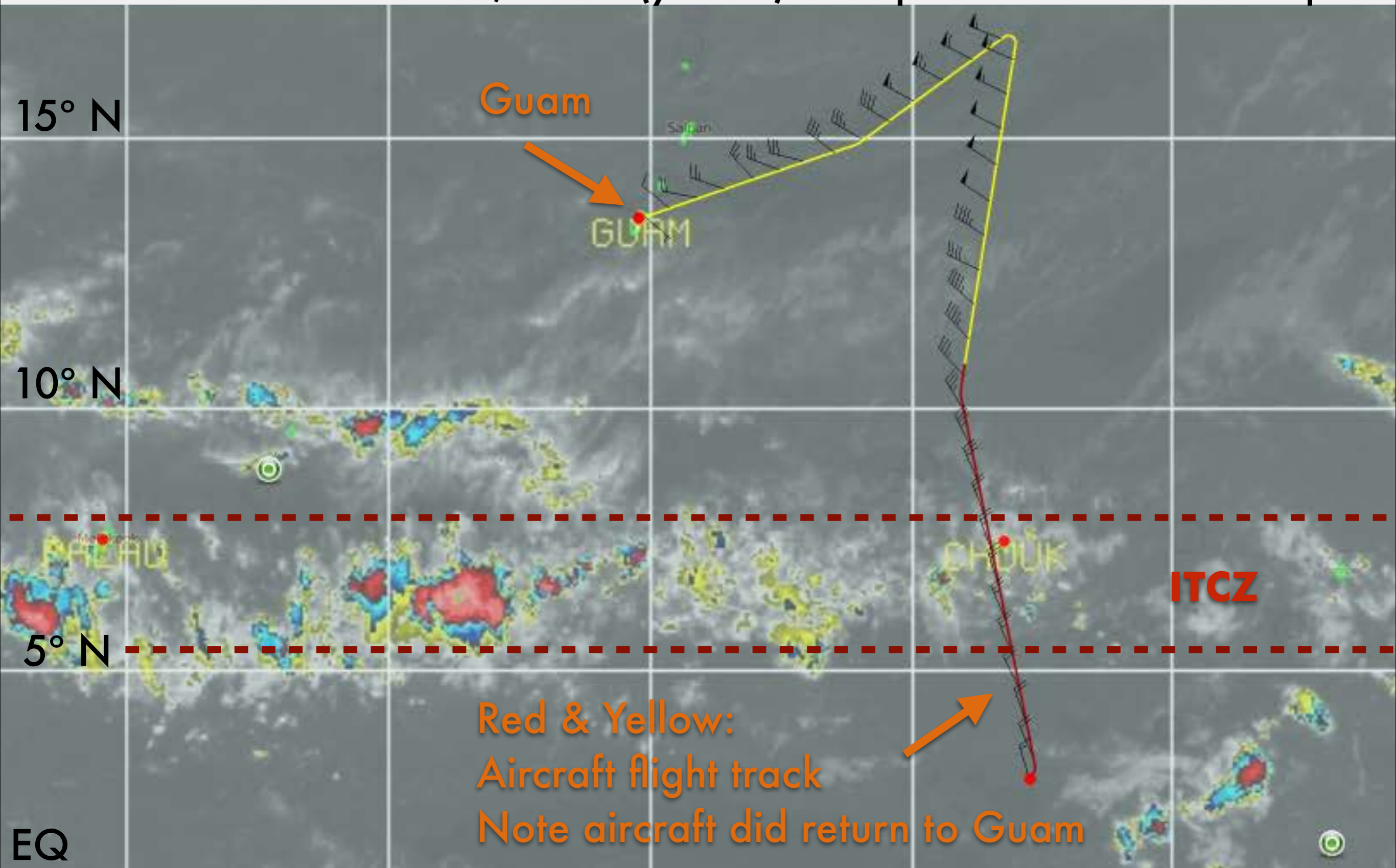
Impacts of human activity on
atmospheric composition



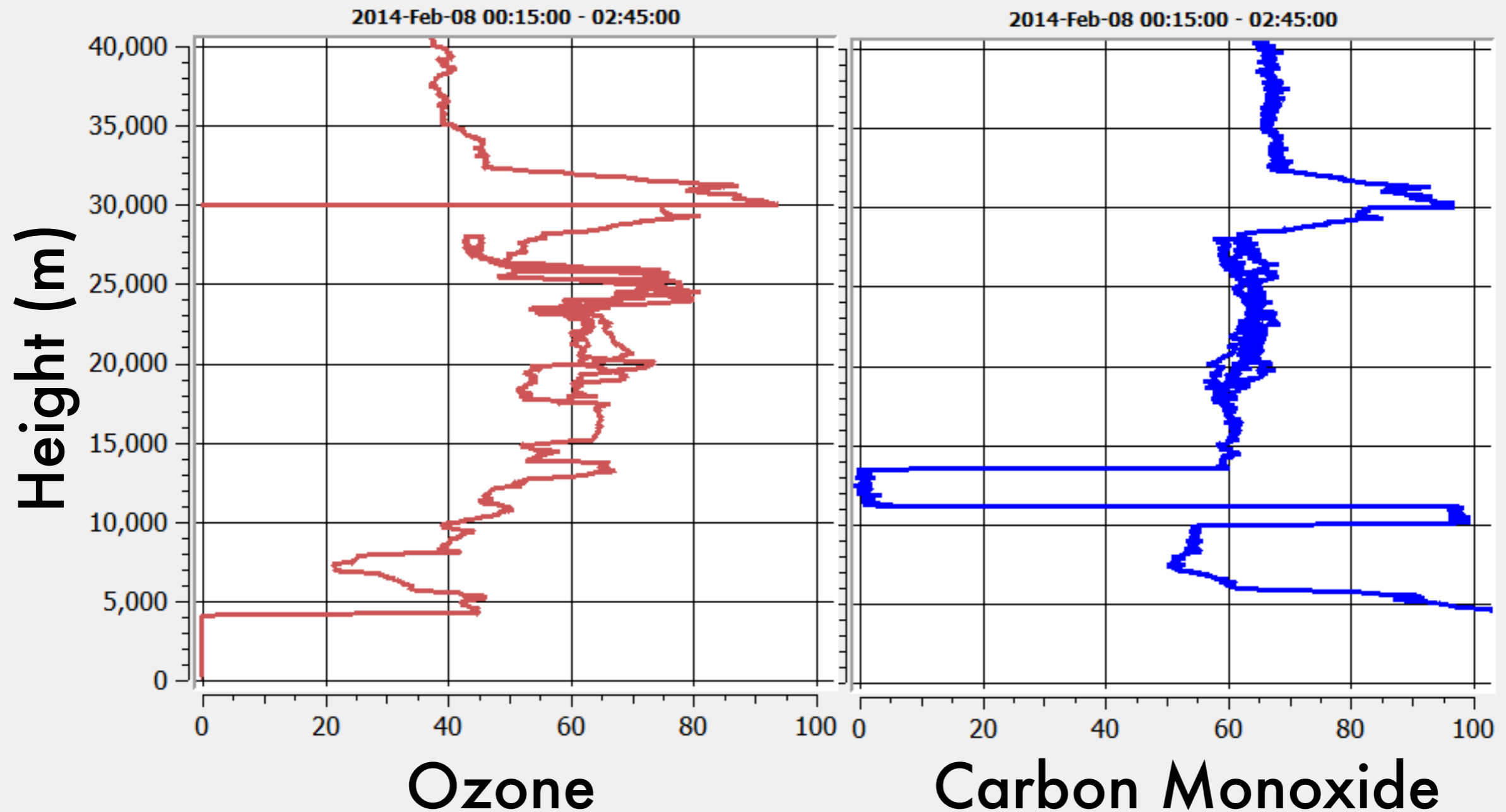
ITCZ: Inter-tropical Convergence Zone rainy region of the tropics



Aircraft track flown Sat, 8 Feb (yellow) on top of satellite cloud map



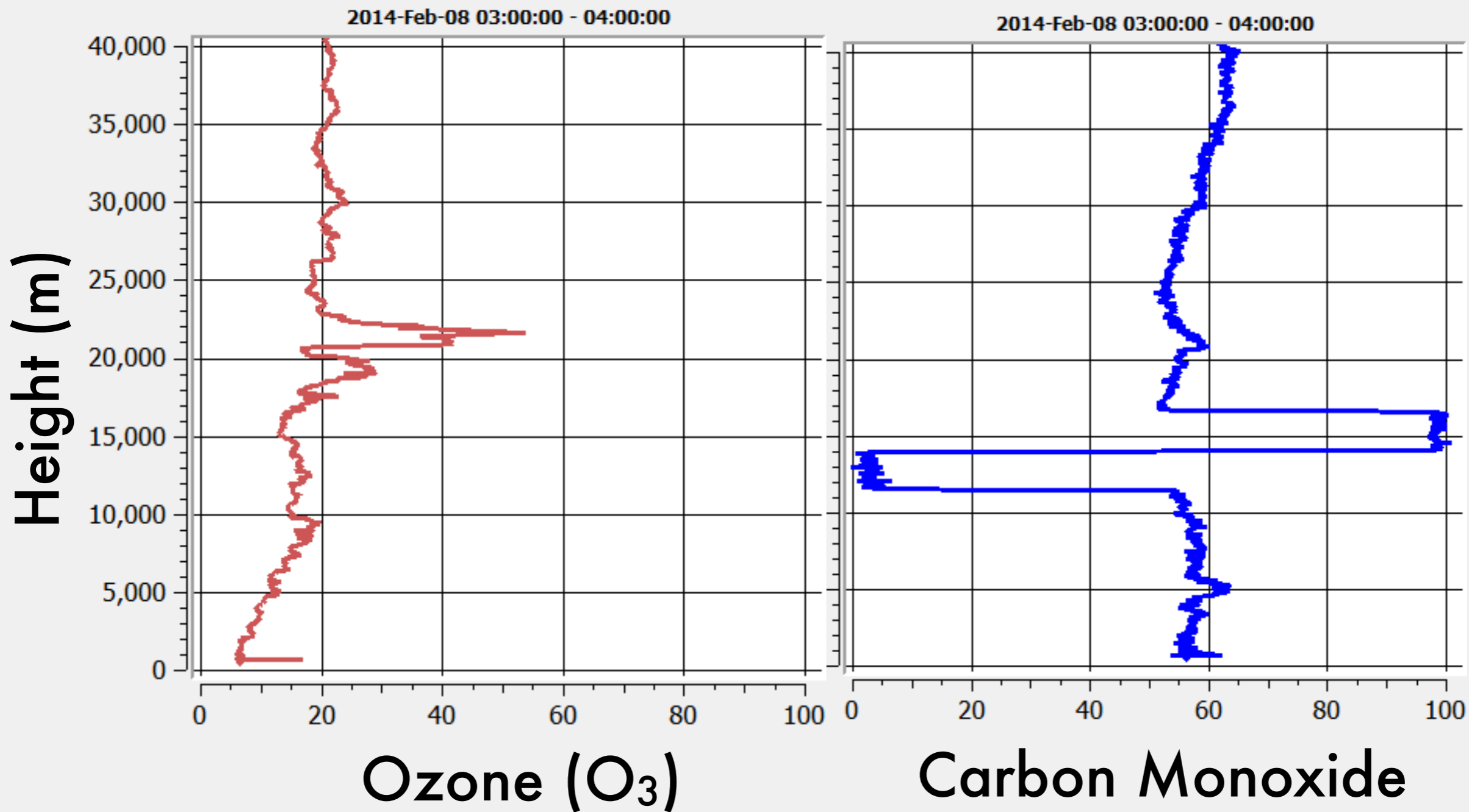
Northern Hemisphere



Ozone (O₃): Compromises air quality & causes global warming

Carbon monoxide (CO): Produced by combustion of fossil fuel & biomass burning

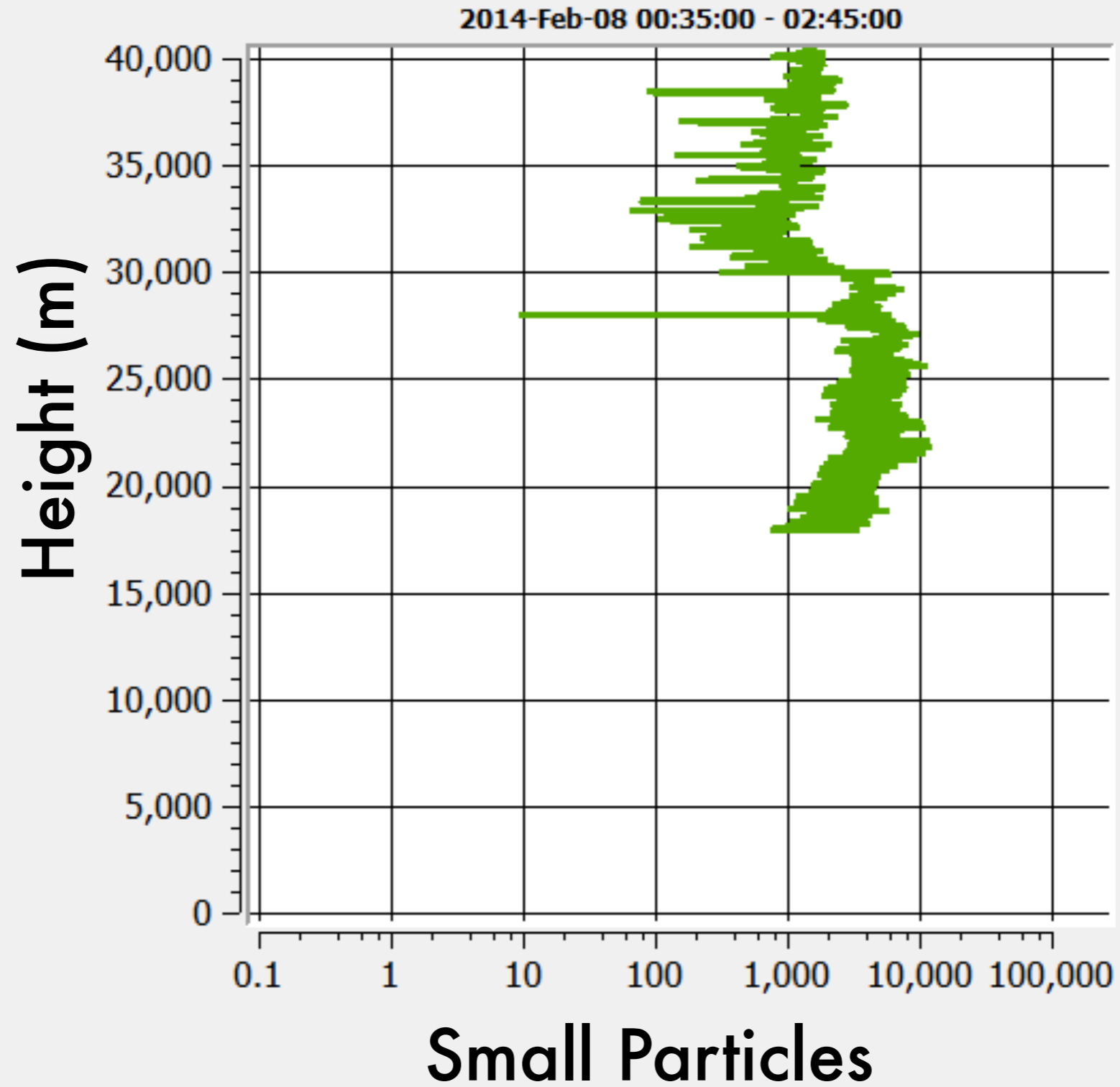
Southern Hemisphere



Ozone (O₃): Compromises air quality & causes global warming

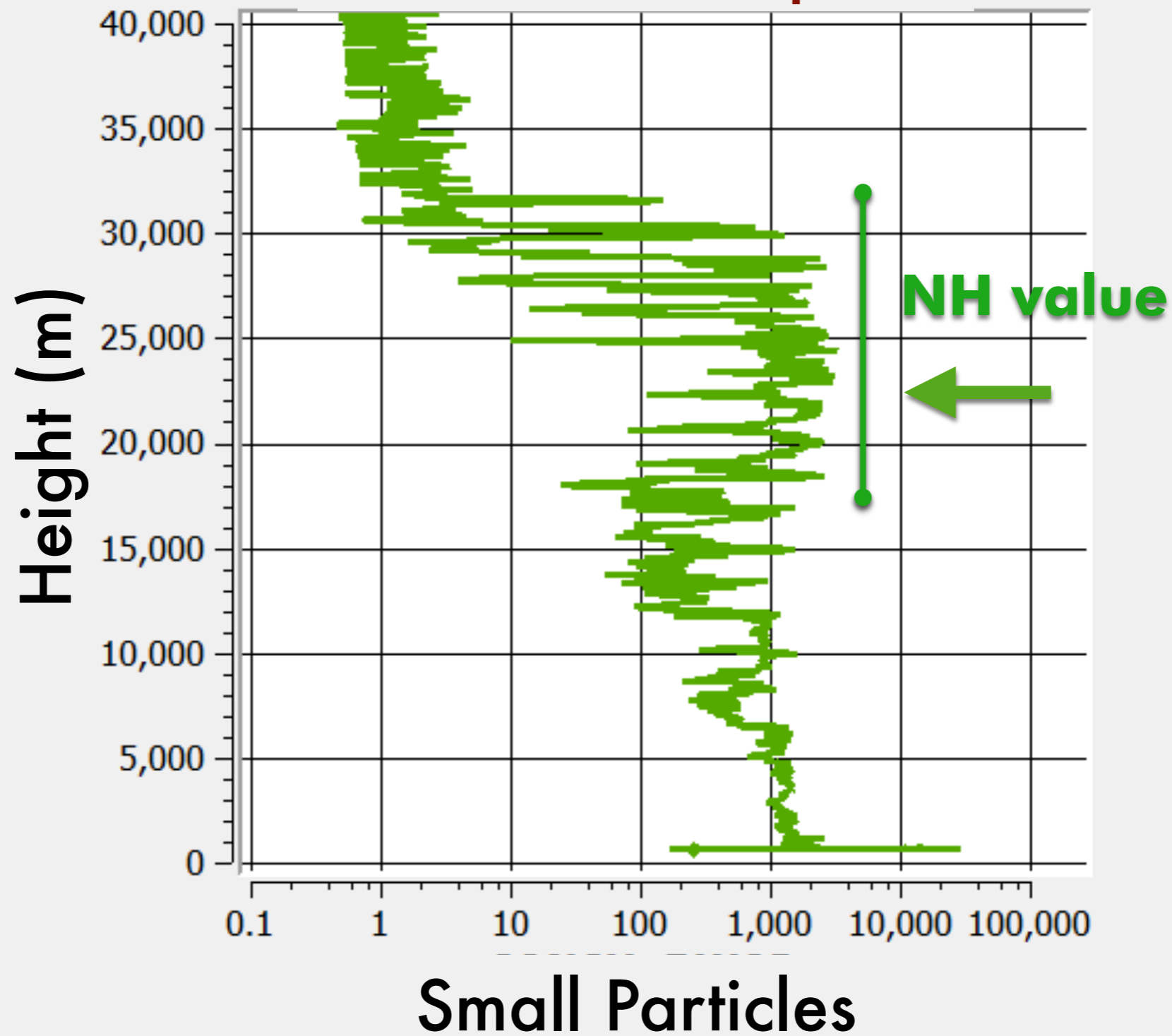
Carbon monoxide (CO): Produced by combustion of fossil fuel & biomass burning

Northern Hemisphere



Small particles: Particularly harmful to babies & elderly

Southern Hemisphere



Small particles: Particularly harmful to babies & elderly

Learn More



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Any Questions?

