What is the Atmosphere?

- Troposphere: 11 km
- Stratosphere: 50 km
- Mesosphere: 87 km
- Thermosphere: 500 km
- Exosphere: Beyond 500 km
A Closer Look at the Troposphere & Stratosphere
High-altitude slow ascent from outflow

Air descending

Net zero radiative heating

Air ascending

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.

Short-lived halocarbons decompose, yielding:

- Br
- I
- BrO
- IO
Flying Laboratory

NSF/NCAR HIAPER Research Aircraft
Flying Laboratory

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Why Guam?
Why are we studying this?

Science Serving Society:
Impacts of human activity on atmospheric composition
The People of CONTRAST
The People of CONTRAST
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ITCZ: Inter-tropical Convergence Zone
rainy region of the tropics
Aircraft track flown Sat, 8 Feb (yellow) on top of satellite cloud map.

Red & Yellow: Aircraft flight track
Note aircraft did return to Guam
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
Any Questions?