

CO₂ Fluxes in the US and Africa

Sahel Conference 2007



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The Global Carbon Cycle

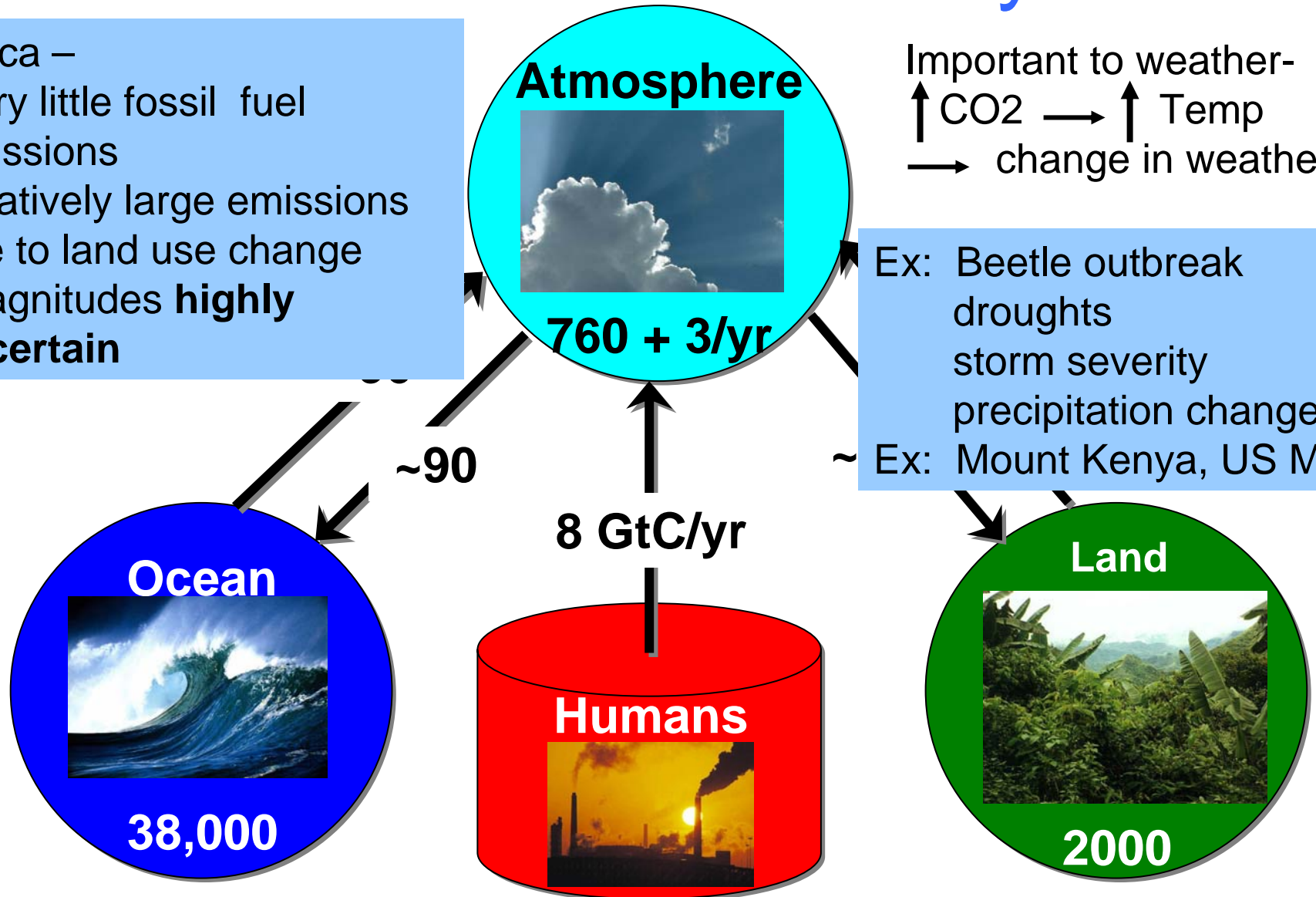
Africa –

- very little fossil fuel emissions
- relatively large emissions due to land use change
- magnitudes **highly uncertain**

Important to weather-

↑ CO₂ → ↑ Temp
→ change in weather

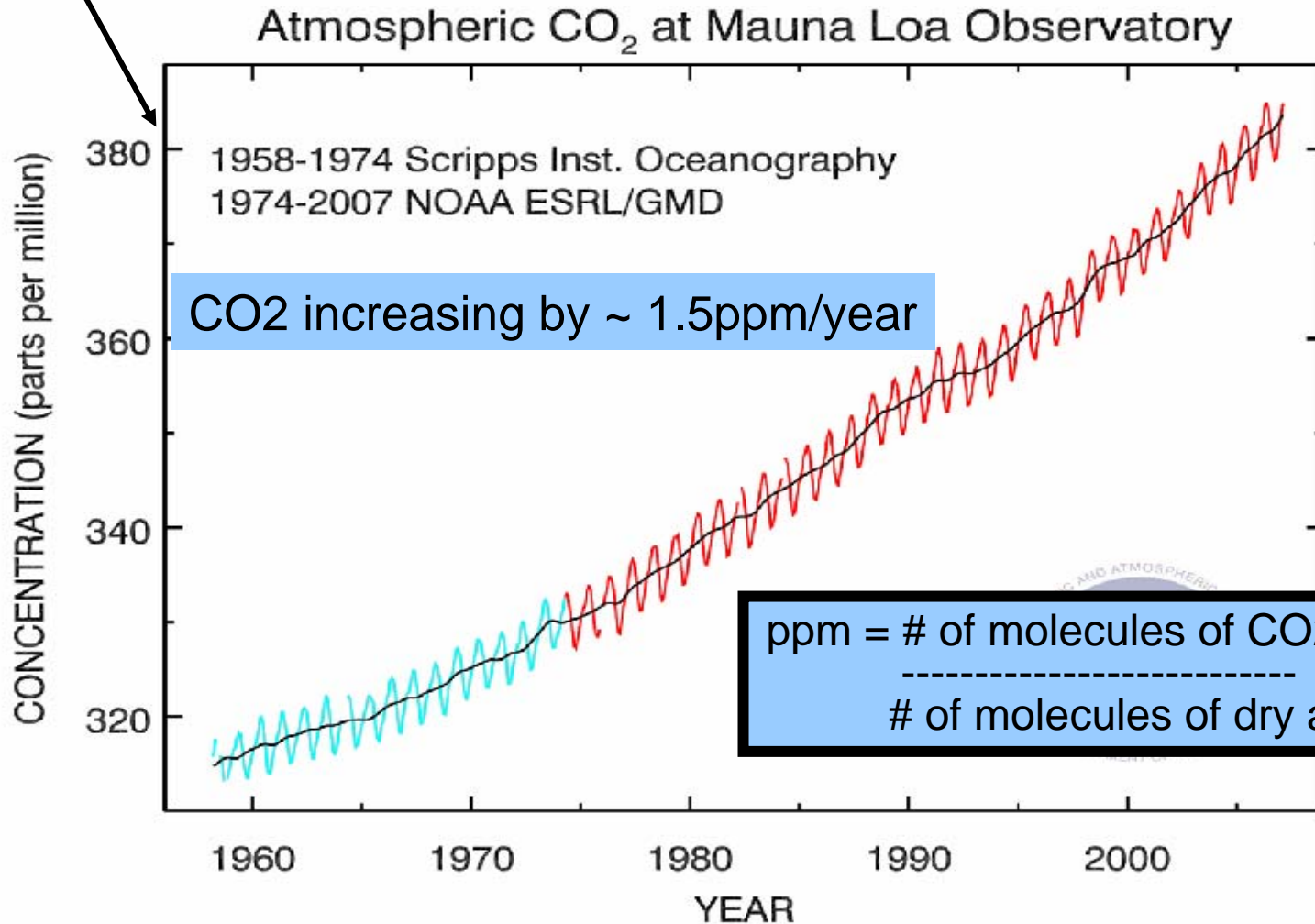
Ex: Beetle outbreak
droughts
storm severity
precipitation changes
Ex: Mount Kenya, US Mtns



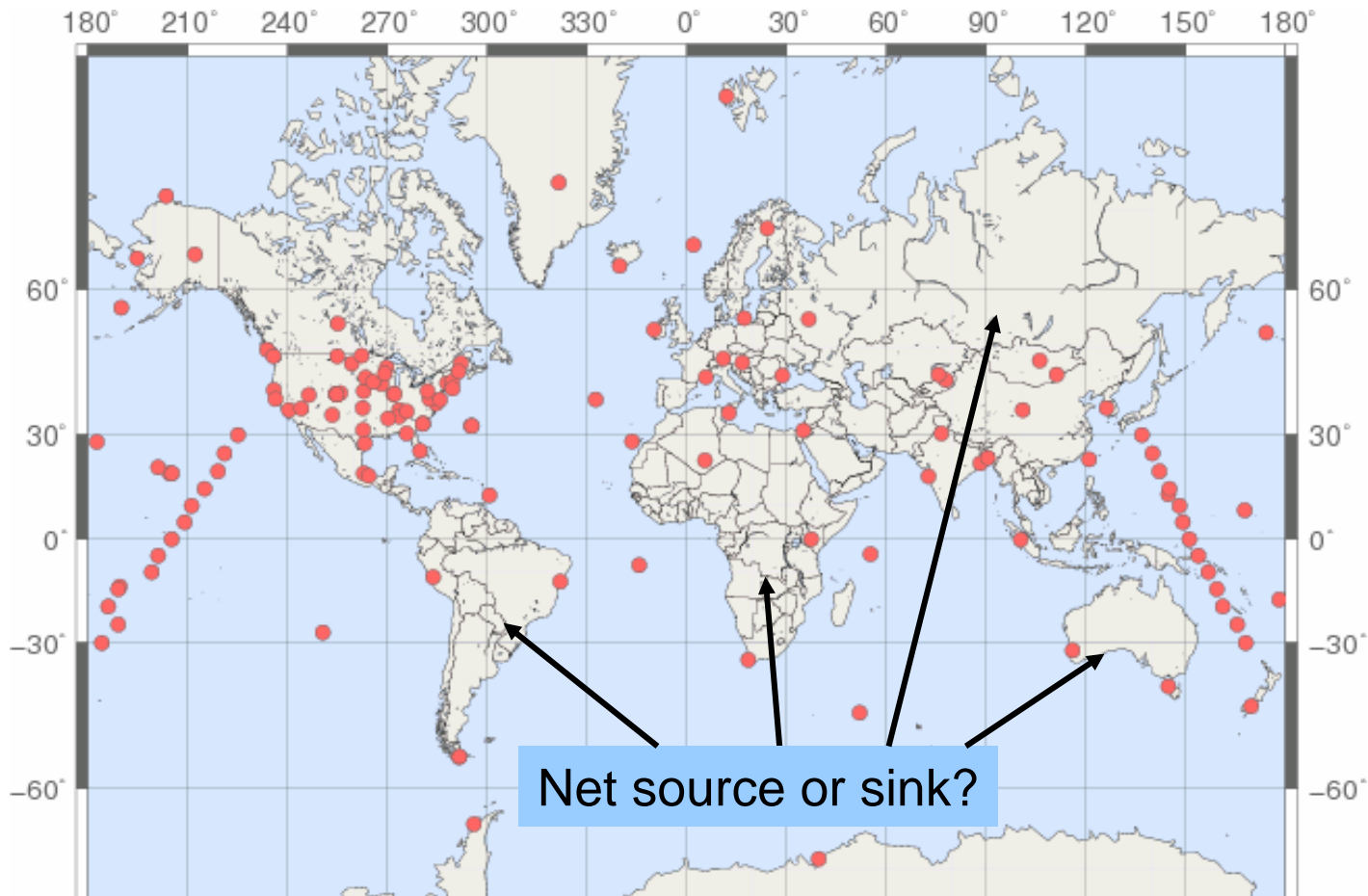
(figure courtesy of Scott Denning)

CO2 Trend

380 ppm C = 760 GtC



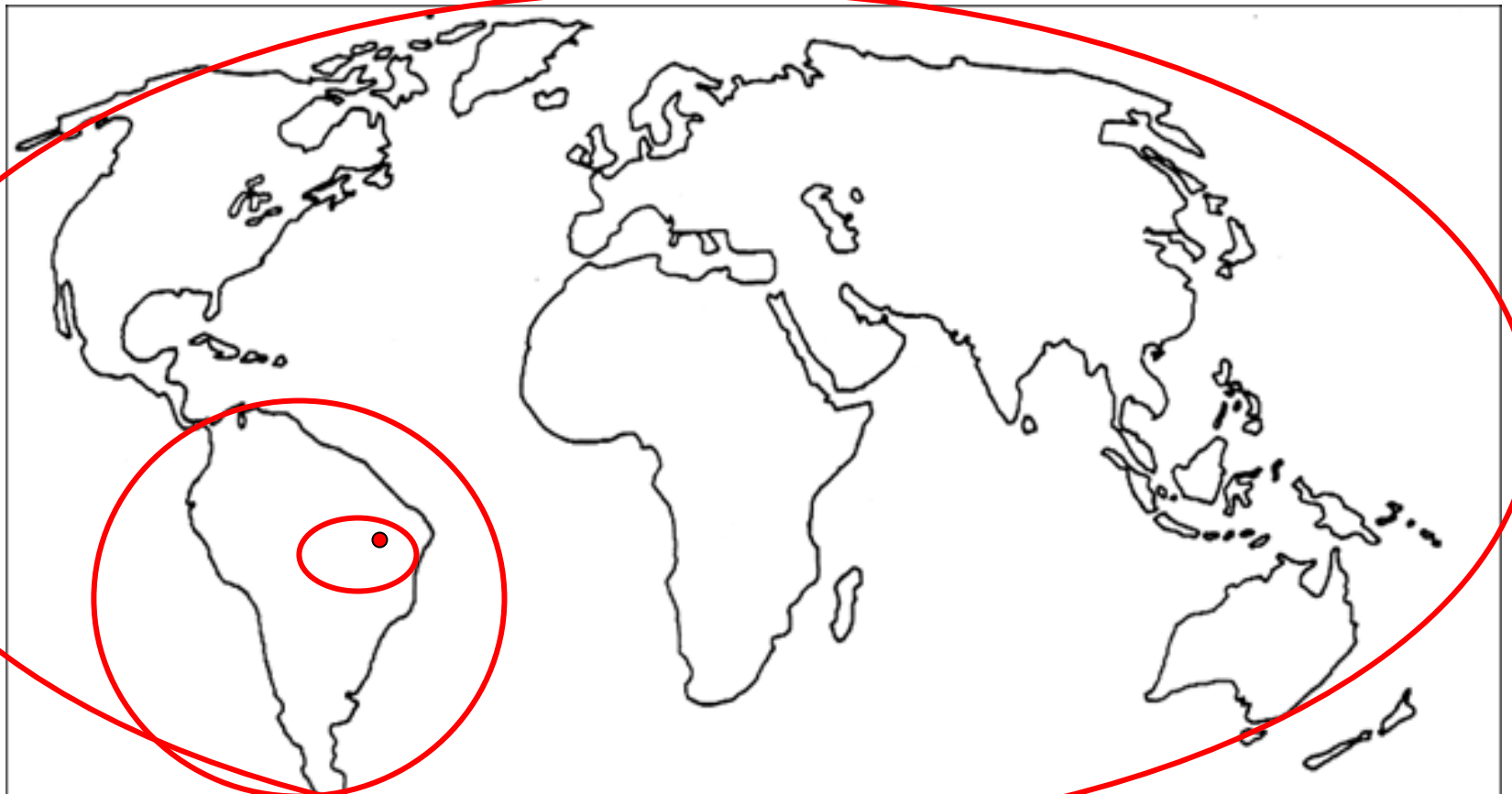
Carbon Dioxide Monitoring Systems



Some areas not well represented to determine CO₂ sources & sinks

We do not know if these areas are sources or sinks

CO2 Monitoring Scales



C₁ Regional Scale – uses direct measurements
- important for policy decisions for

Instrumentation

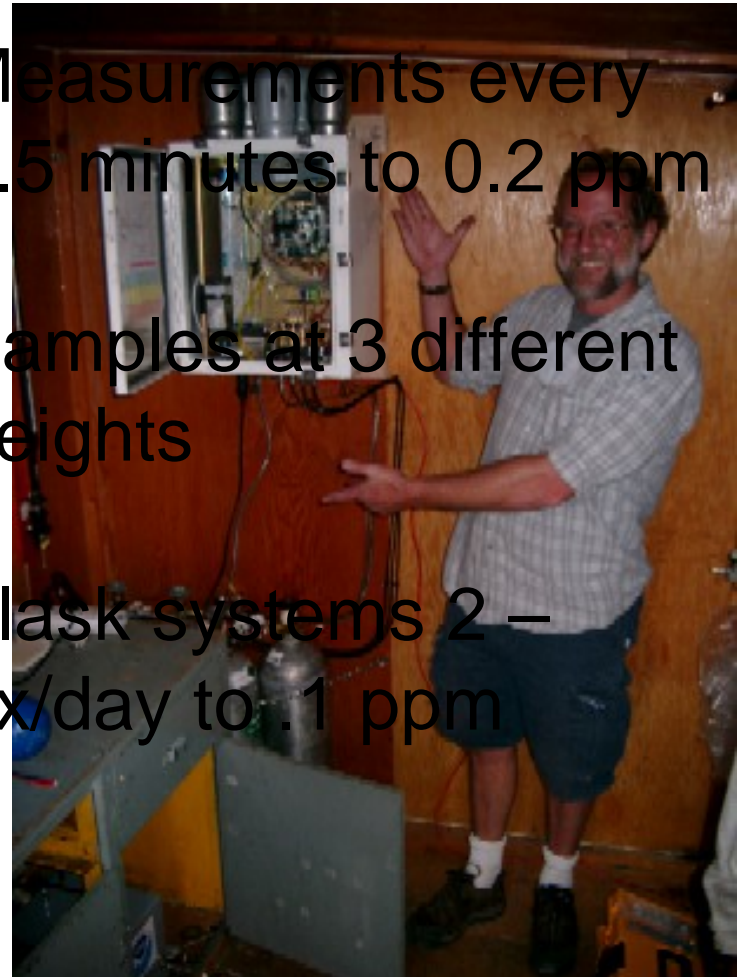
Autonomous Inexpensive Robust CO2 Analyzer (AIRCOA)



Measurements every
2.5 minutes to 0.2 ppm

Samples at 3 different
heights

Flask systems 2 –
3x/day to .1 ppm



Rocky Mountain Site

Fraser, Colorado USA



Automated web-based output

Daily drawdown of CO₂
Due to photosynthesis

Continuous CO₂ Network in the Rocky Mountains (Rocky RACCOON)

050826 to 050918 CO₂ Concentrations by Site Zoomed

[SPL](#)

[FEF](#)

[Comparisons](#)

AIRCOA Units:

[Schematic](#)

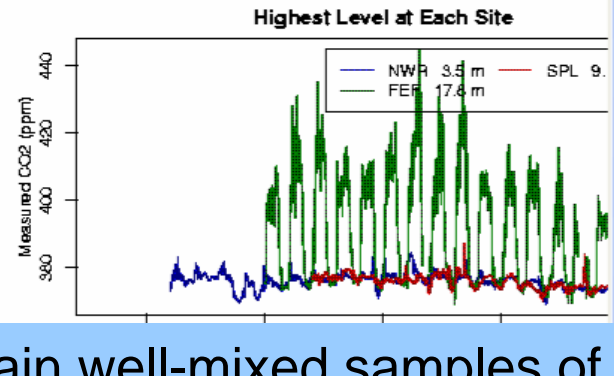
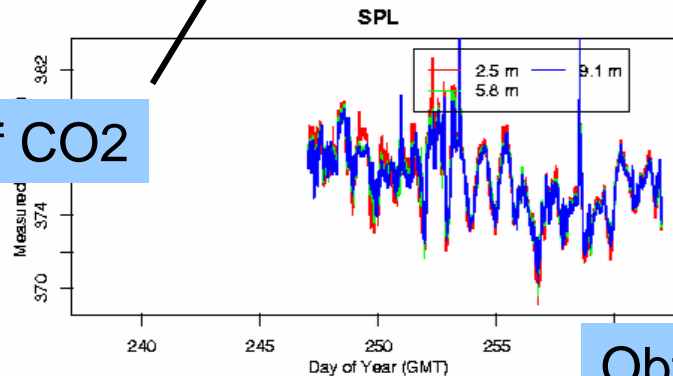
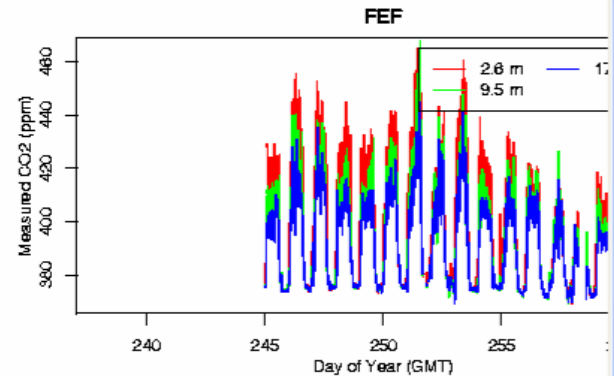
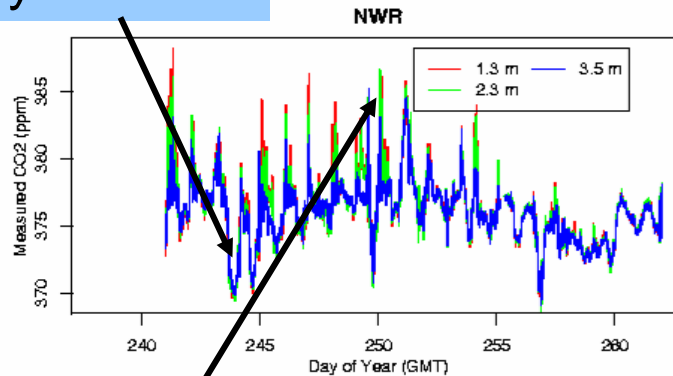
[Photo](#)

[Valve Switching](#)

[Processing Code](#)

[Parts List](#)

[Assembly Details](#)



Respiration of CO₂

Obtain well-mixed samples of CO₂
To better represent region

<http://www.eol.ucar.edu/~stephens/RACCOON>

Education and Outreach

Example: Navajo Nation, US



- Two year Collaboration with faculty members and students on:
 - estimating regional carbon fluxes
 - instrument operation & maintenance
 - long-term technology transfer
 - long-term CO₂ measurements (as long as possible).



- Creating curriculum that utilizes the CO₂ data so that students may create their own research project.
- Helping to teach science education in local schools and other settings

CO₂ is a global issue



- Reaches across the world – affects everyone
- Set up collaborations
- Study this problem
- Work together to find solutions

Thank you!