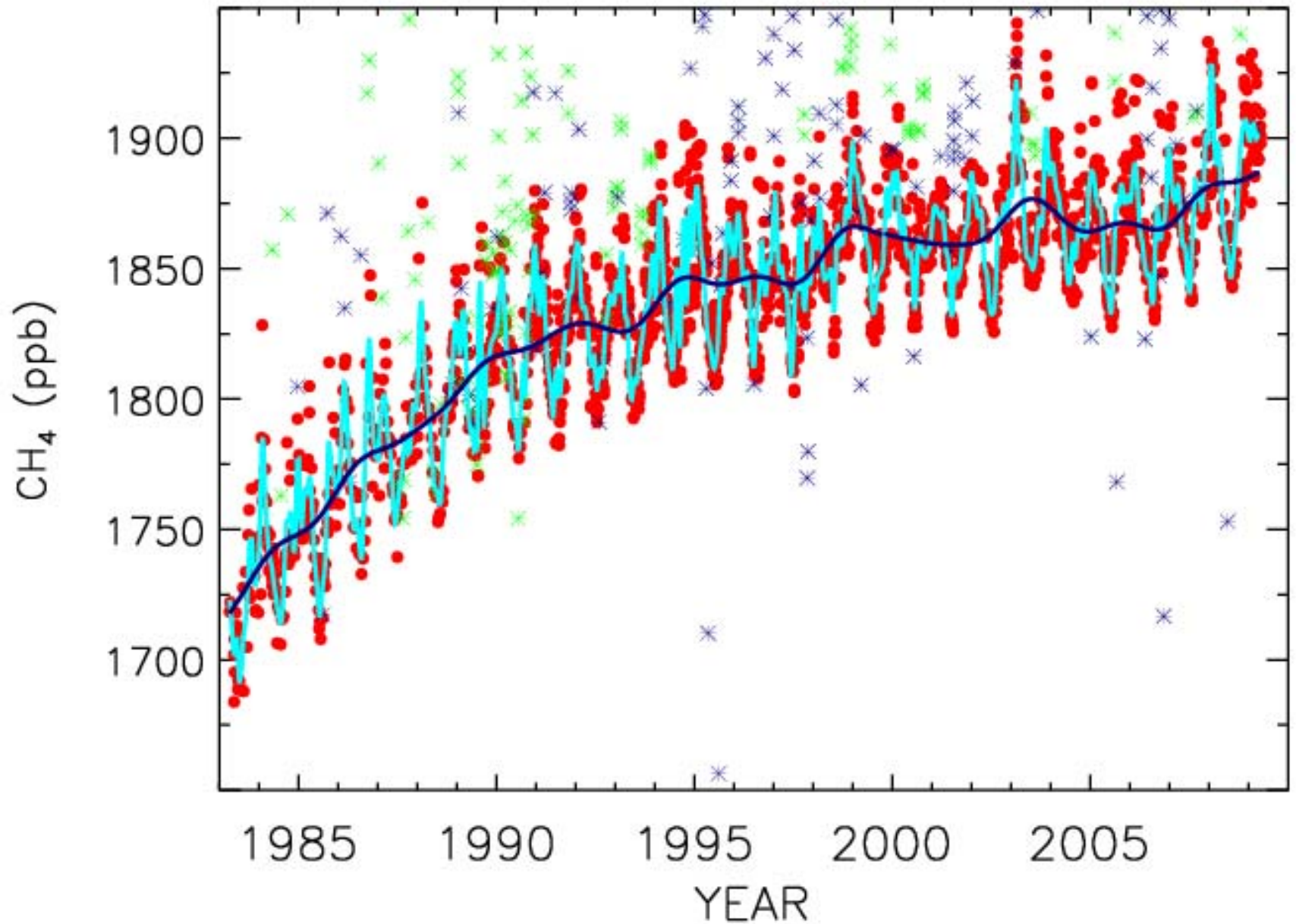
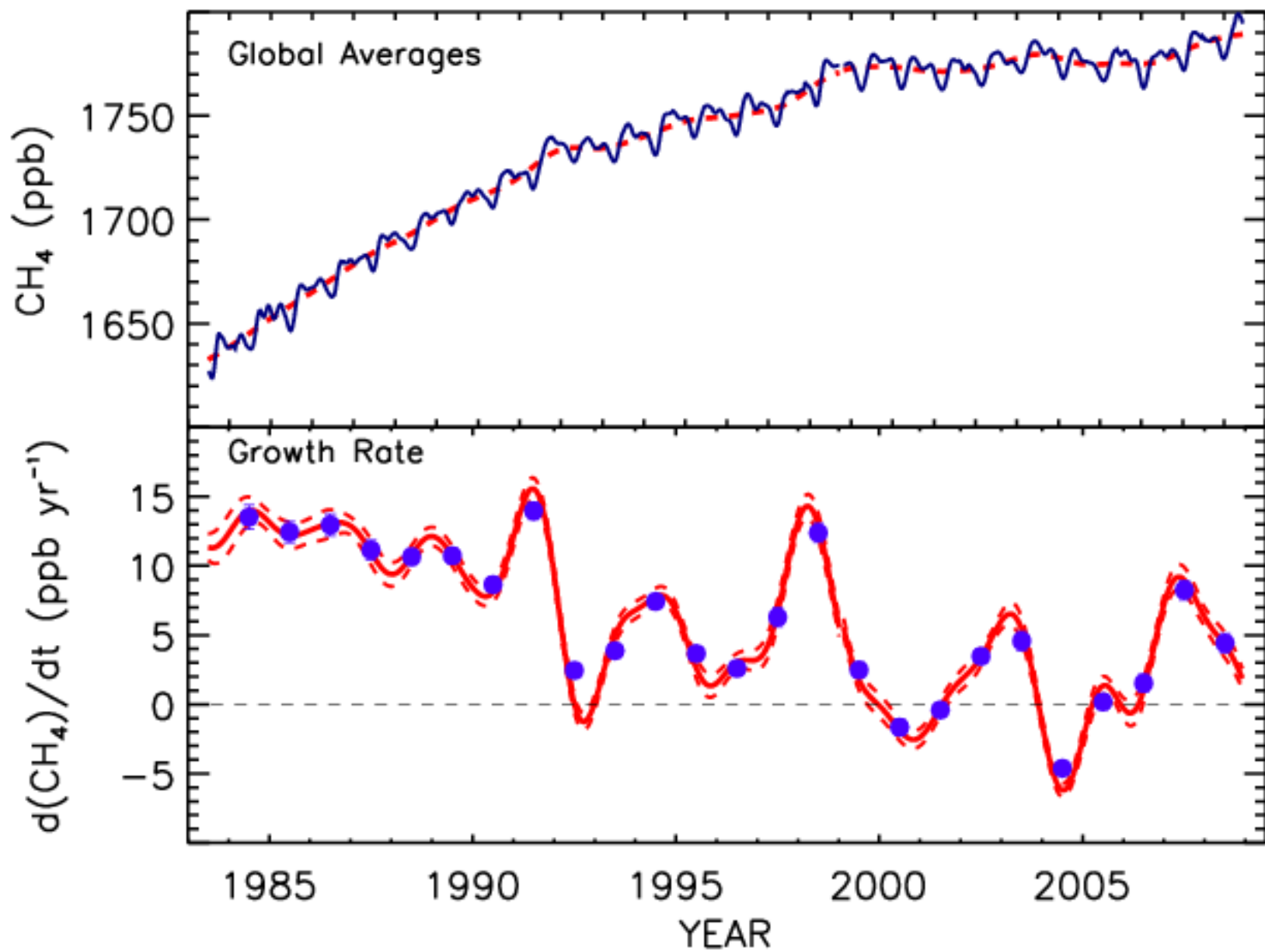


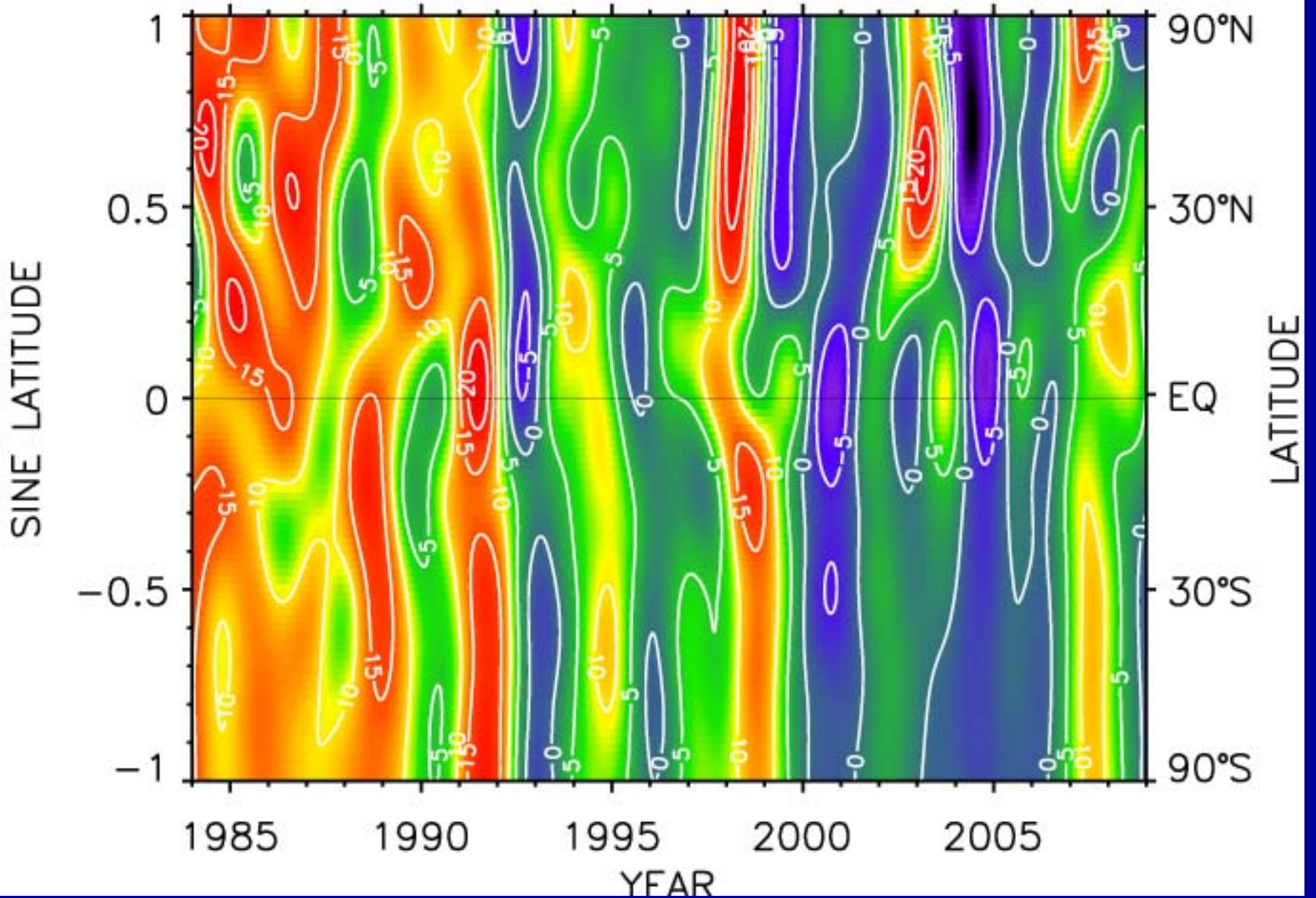
Is Atmospheric CH₄ on the Rise Again?

Ed Dlugokencky, Pat Lang, Ken Masarie,
Andrew Croswell, Lori Bruhwiler, Louisa
Emmons, Steve Montzka, and Jim White

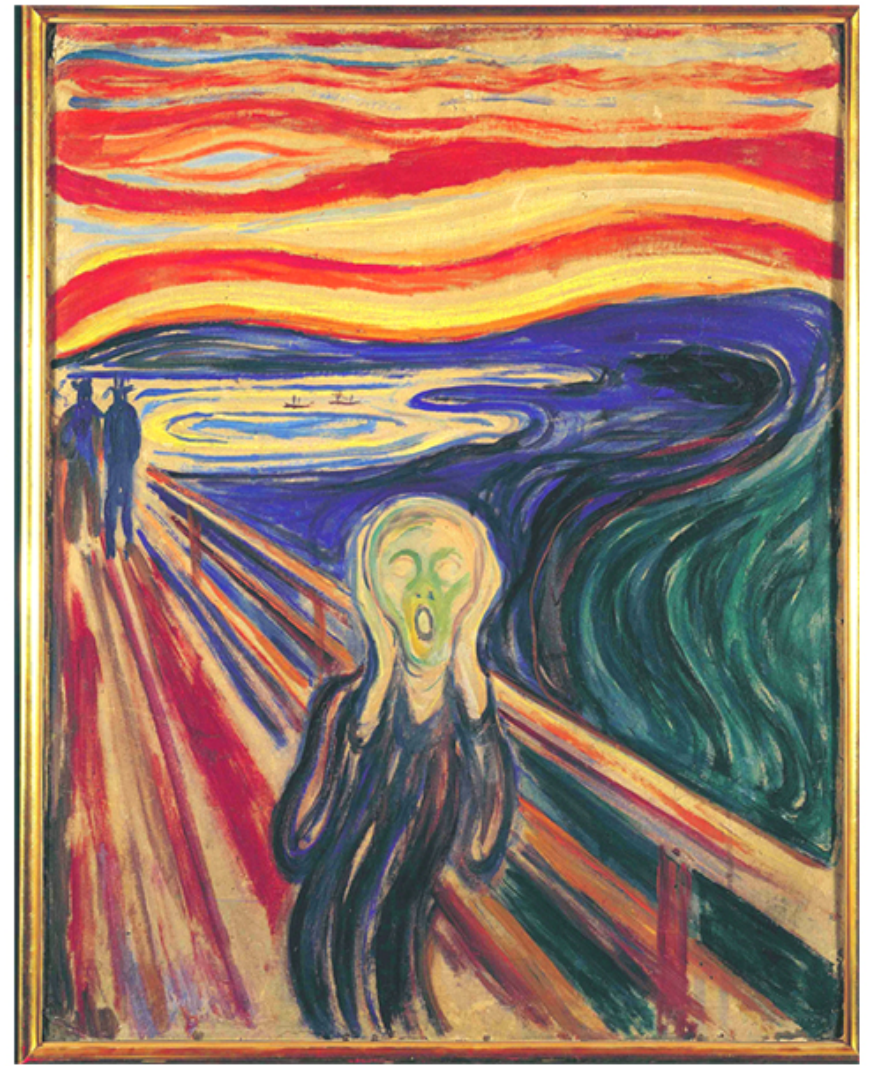
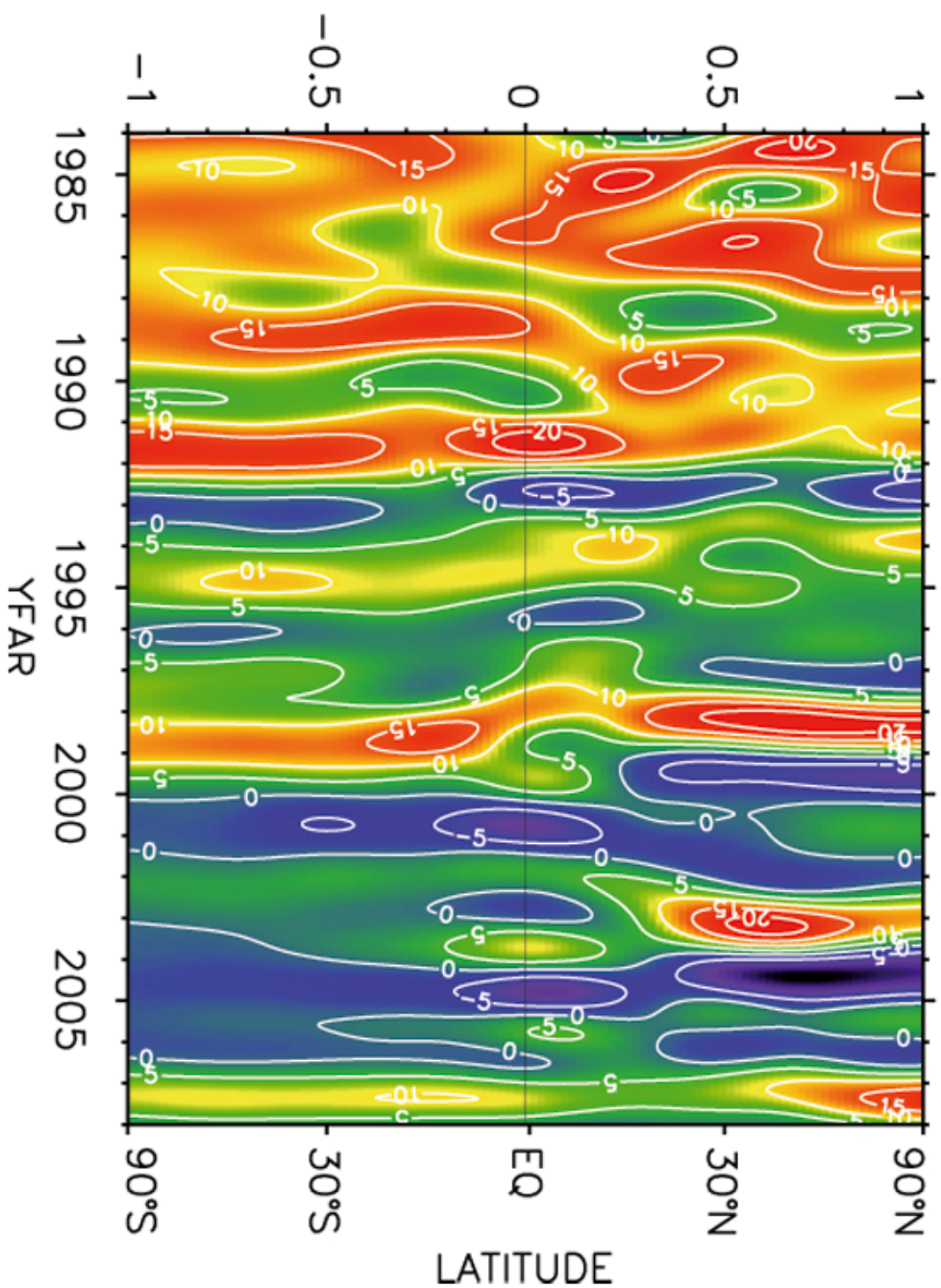




Growth rate (ppb/yr)



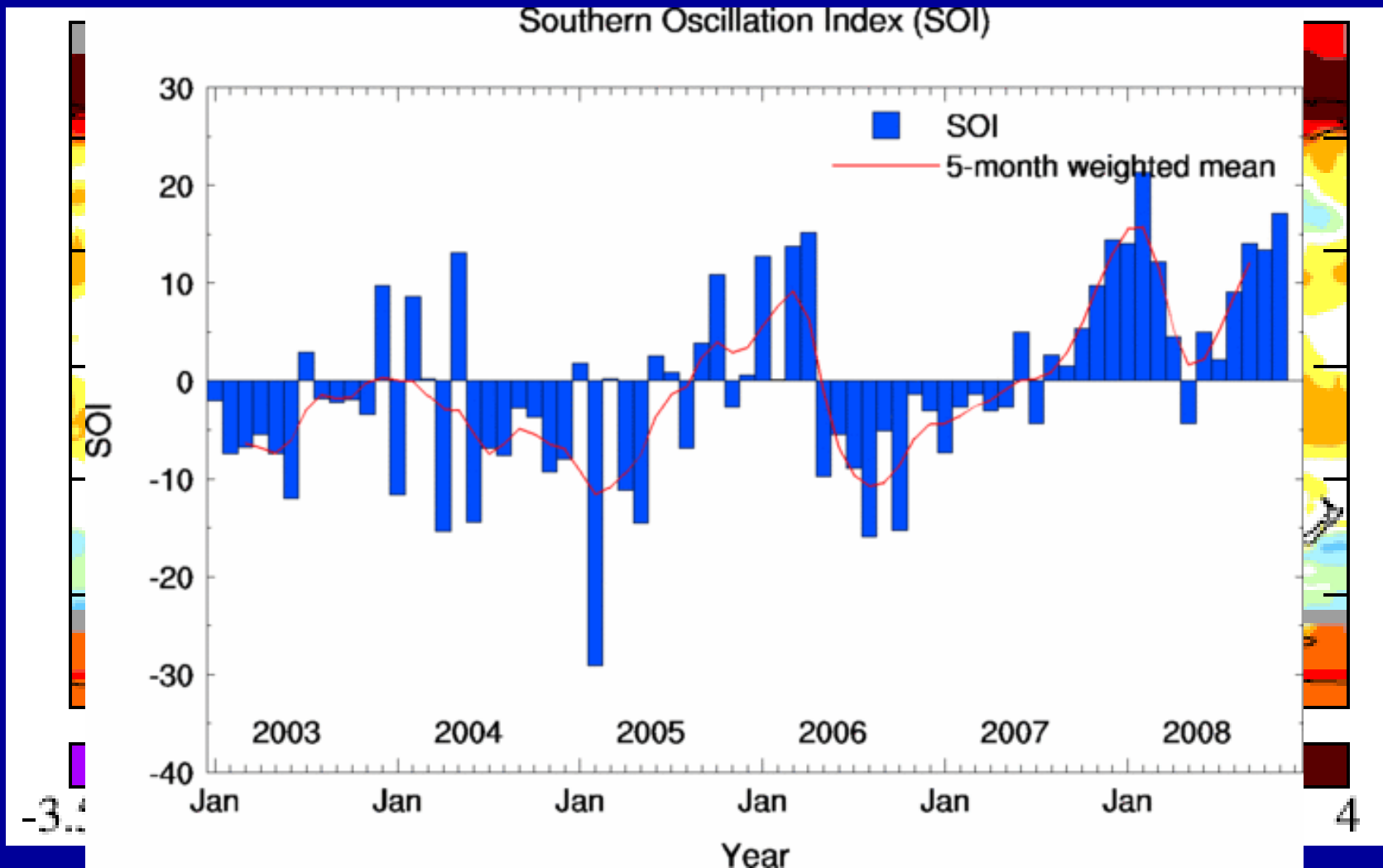
SINE LATITUDE



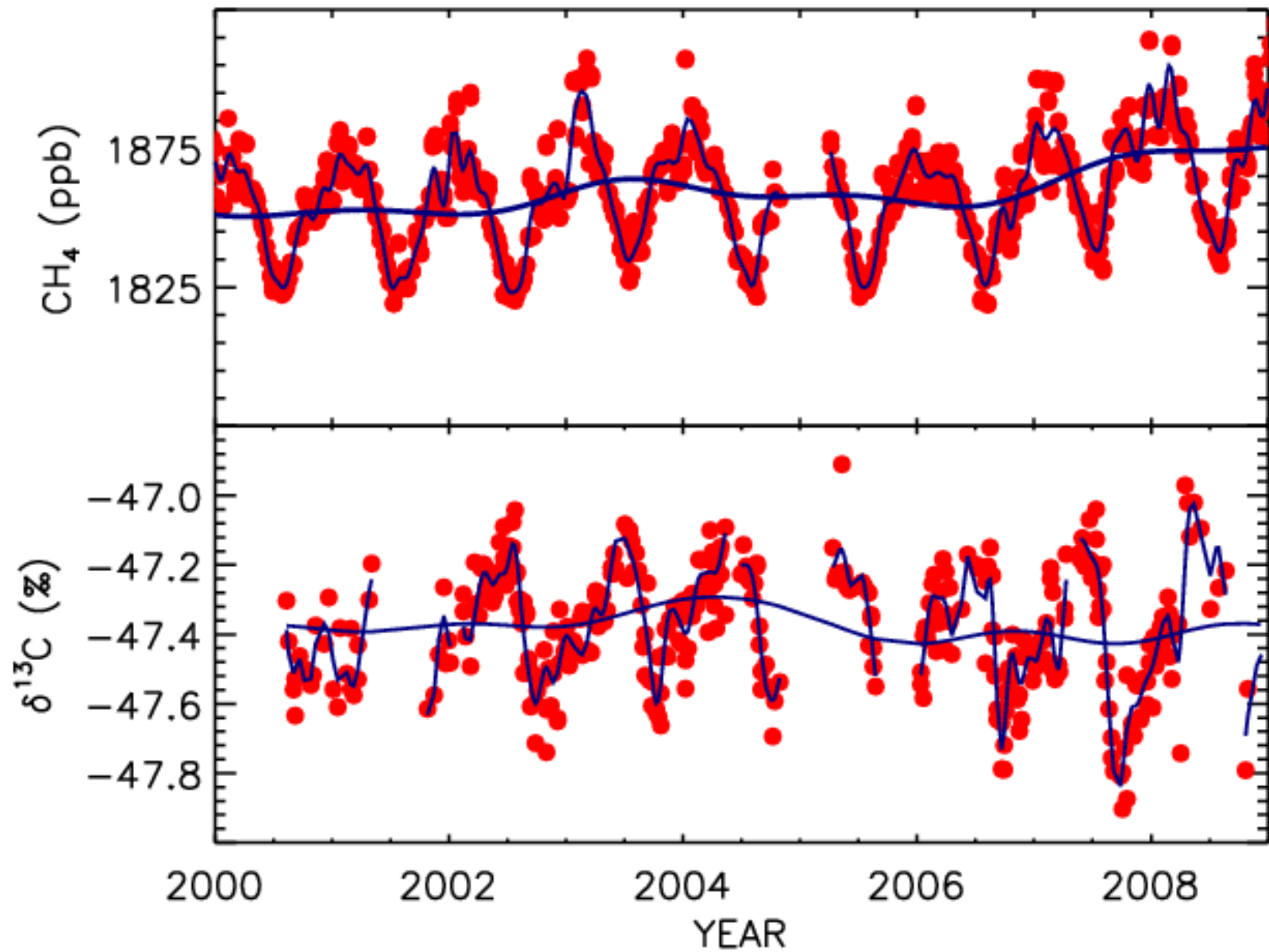
Potential contributions to 2007/2008 CH₄ increases:

- Δ Anthropogenic emissions
 - Expect gradual changes
- Δ Loss rate (Δ [OH])
 - CH₃CCl₃ analysis suggests not
 - PCE also suggests not (UCI)
- Enhanced inter-hemispheric exchange related to La Niña

Wetland contribution to 2007/2008 CH₄ increases:



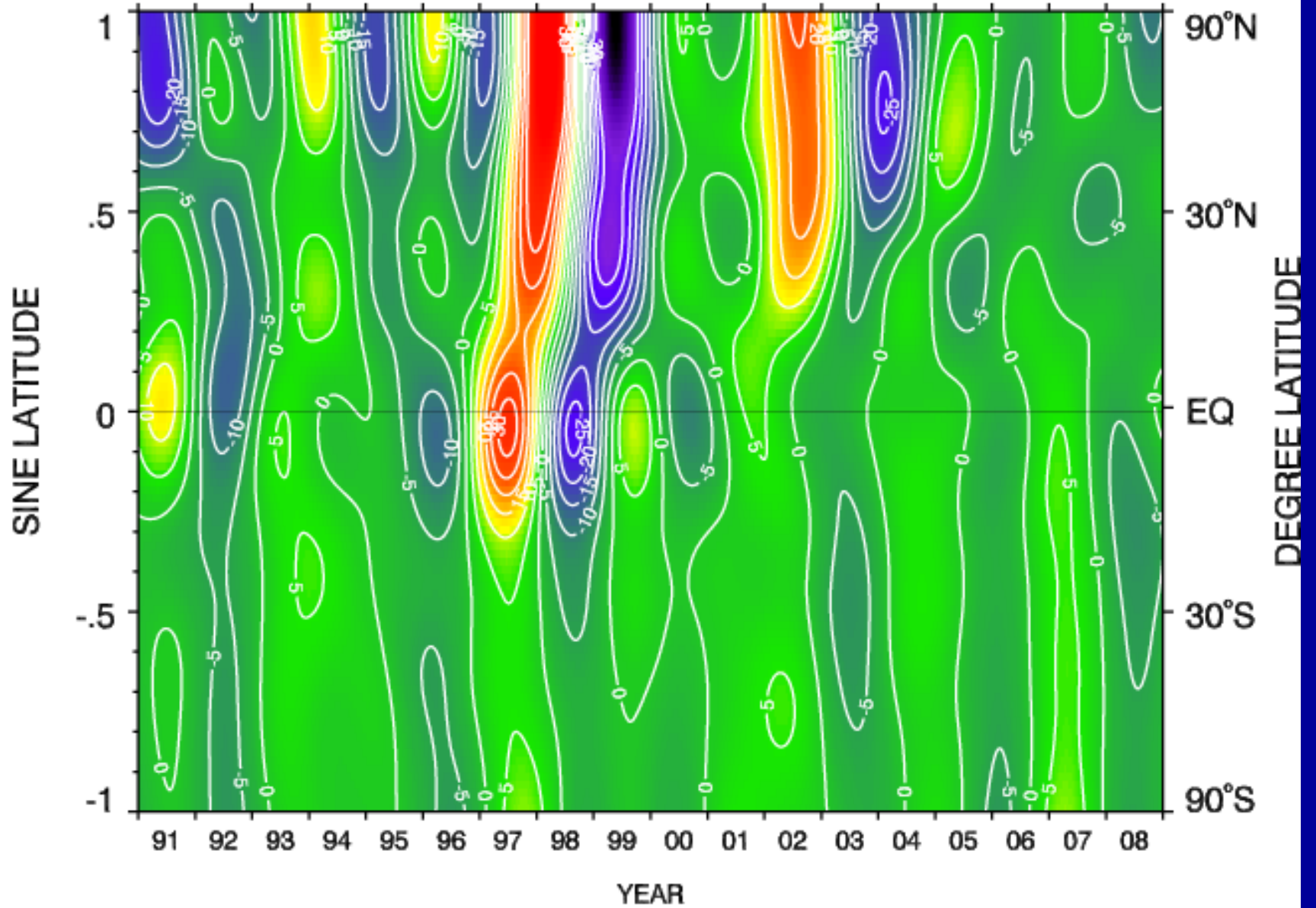
Alert, Canada



Biomass burning contribution to 2007/2008 CH₄ increases:

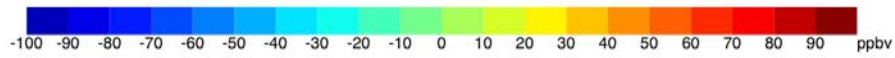
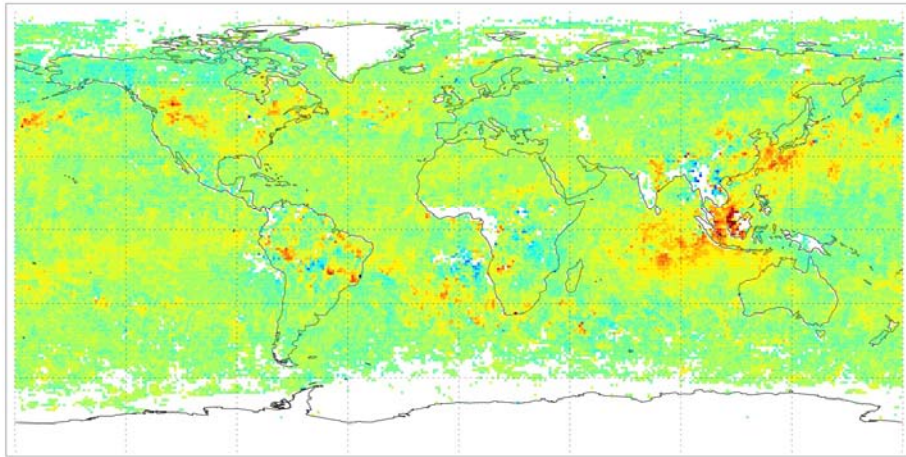
- NOAA surface CO observations
- Remotely sensed CO (MOPITT)
- Ethane (UCI)
- Chloromethane, CH₃Cl (NOAA)

CO GROWTH RATE (ppb yr⁻¹)

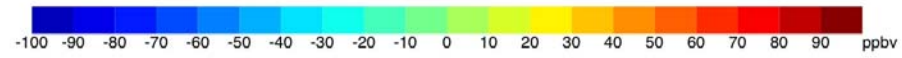
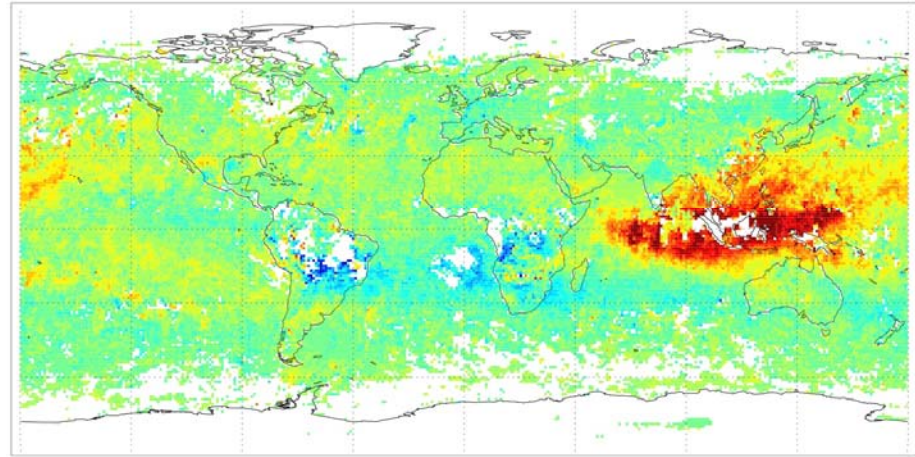


Compliments of Paul Novelli, NOAA ESRL

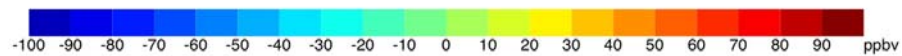
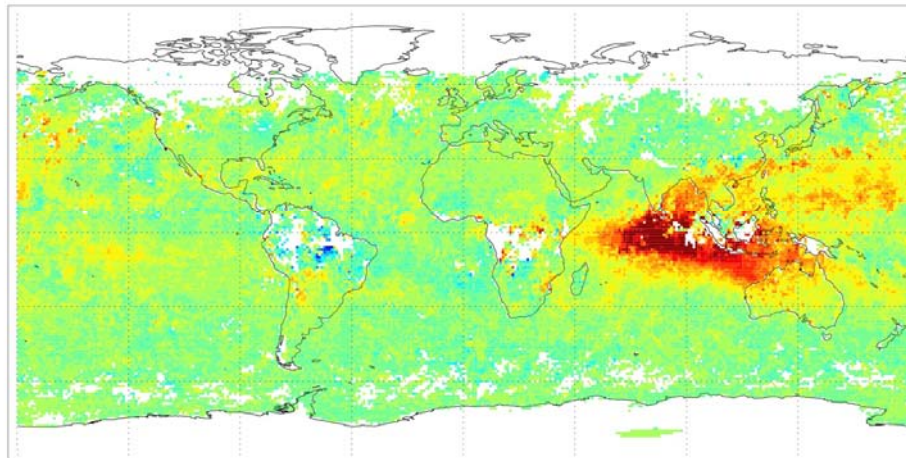
MOPITT CO 700 hPa Anomaly 200609



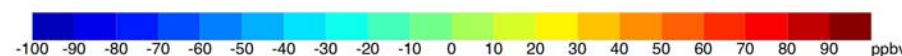
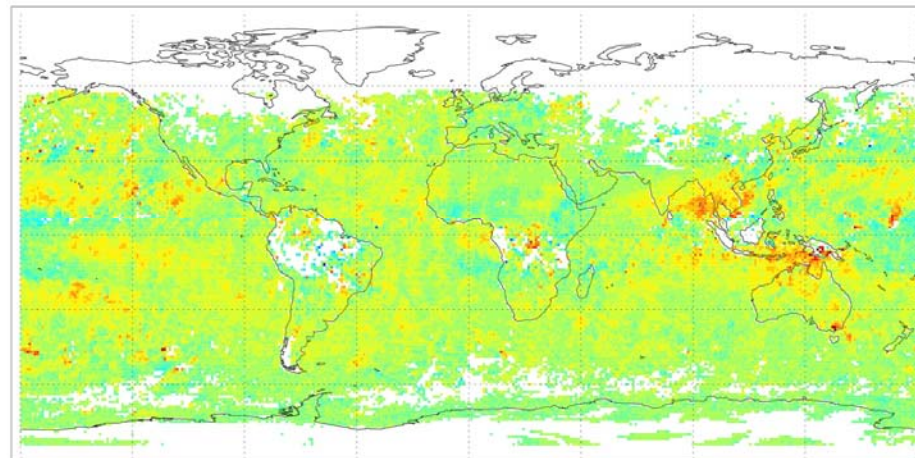
MOPITT CO 700 hPa Anomaly 200610

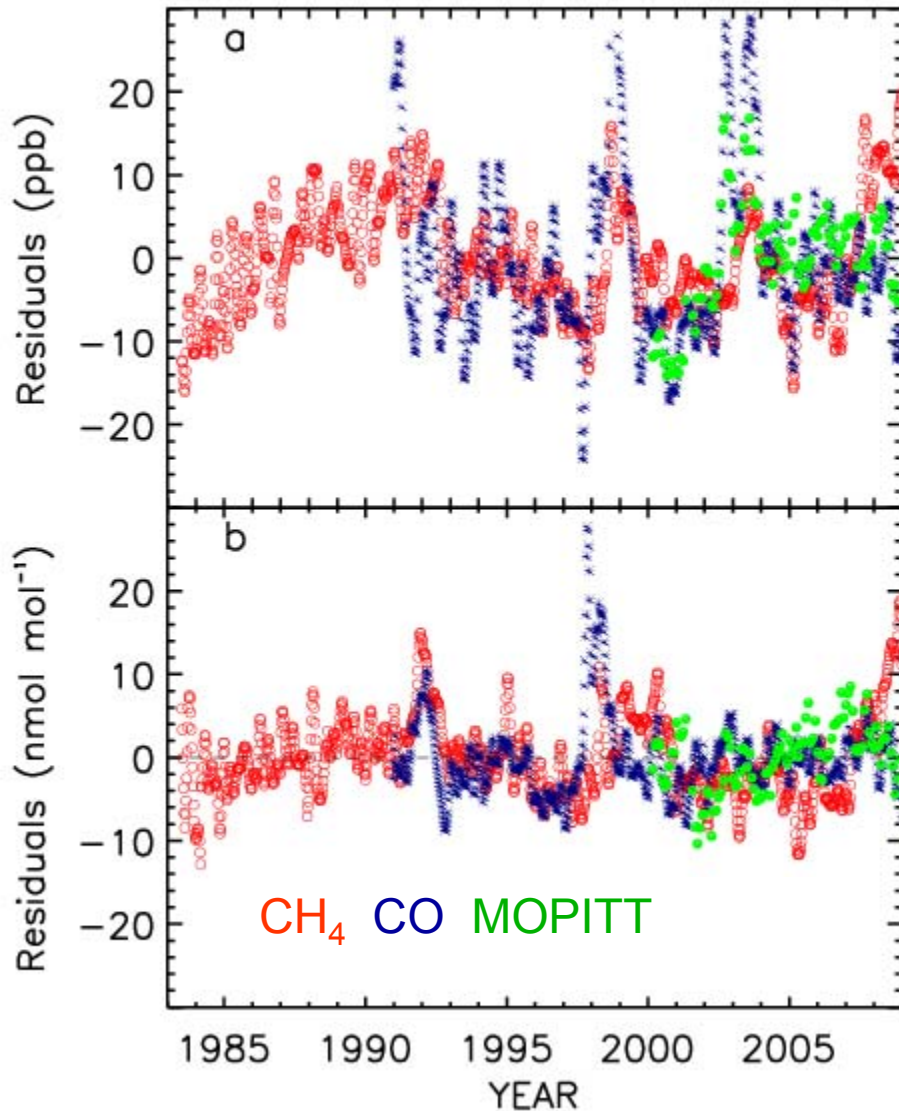


MOPITT CO 700 hPa Anomaly 200611



MOPITT CO 700 hPa Anomaly 200612





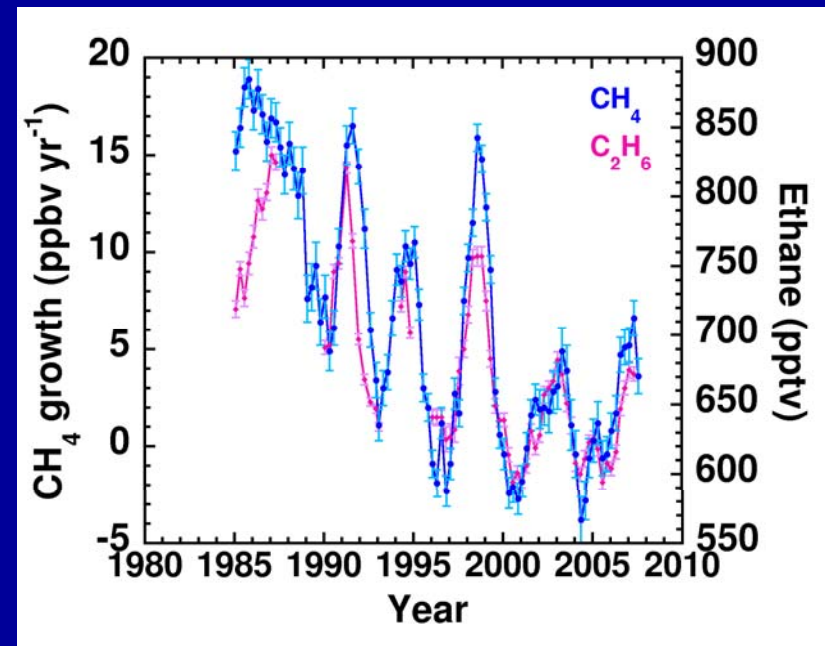
Polar northern latitudes

Tropics

MOPITT CO courtesy of Louisa Emmons, NCAR

Thirty years of global atmospheric CH₄ and ethane monitoring: What can ethane teach us about CH₄?

- Simpson et al., UCI; 2008 ESRL review
 - $d[\text{CH}_4]/dt$ and C₂H₆ correlate
 - PCE and CH₄ do not
 - Suggests BB source

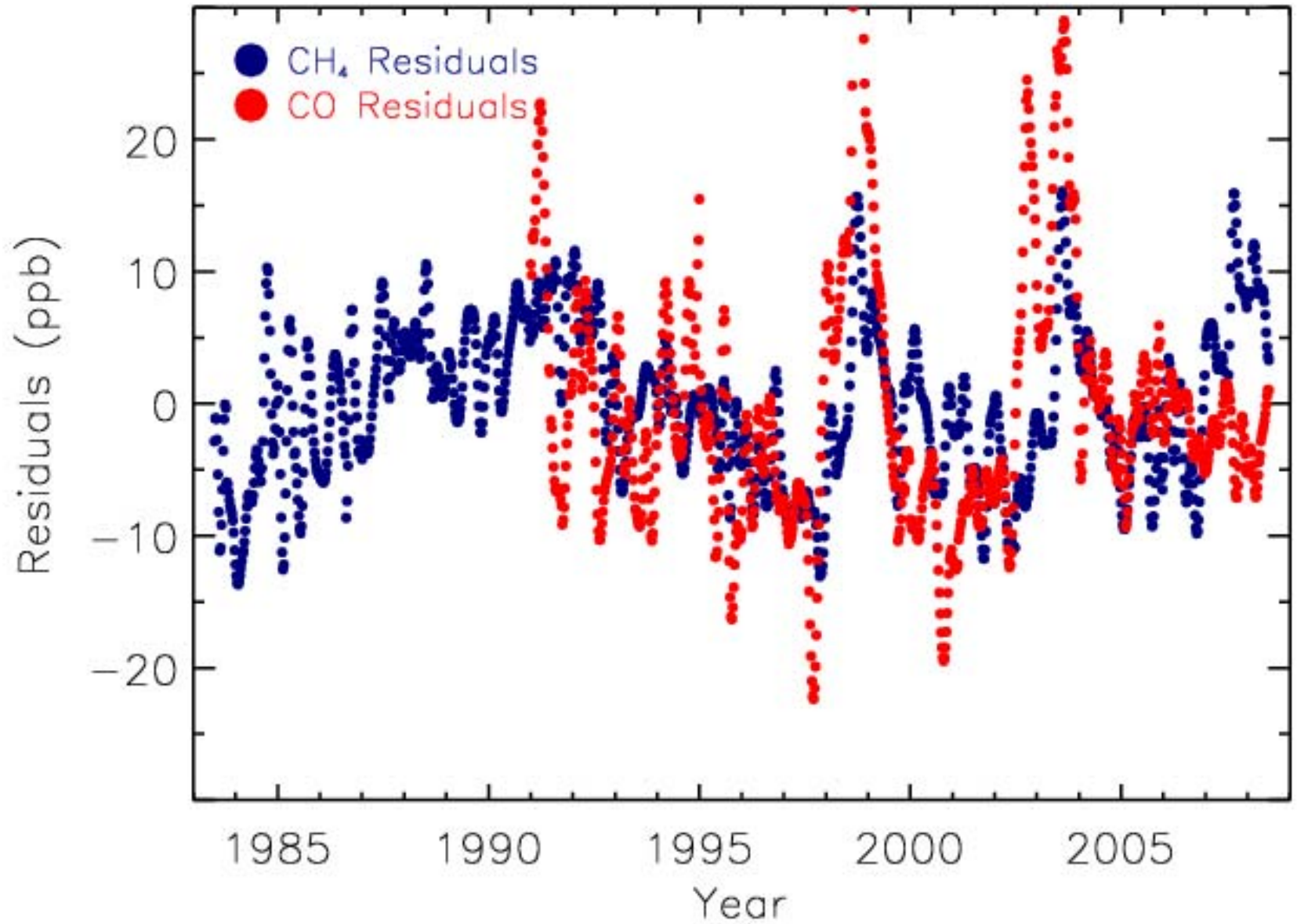


Conclusions

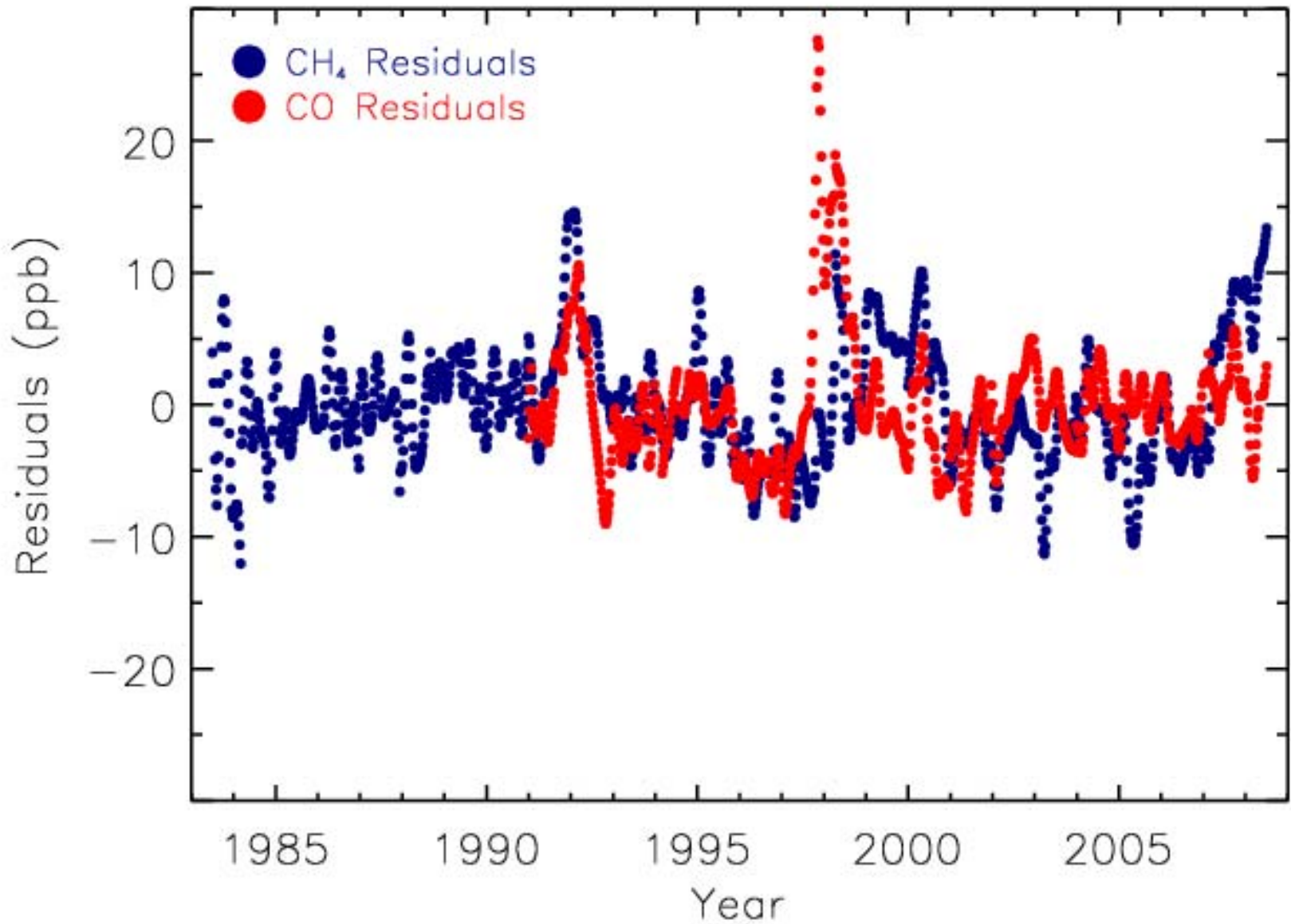
- CH₄ increased globally:
 - 8.3±0.2 ppb in 2007; 4.4±0.2 ppb in 2008
- Causes of increase:
 - Biomass burning (tropics)
 - Wetlands (tropics and Arctic)
- Not yet at Arctic tipping point
 - Recovery at HN latitudes suggests 2007 and 2008 increases are natural IAV

Extra Slides

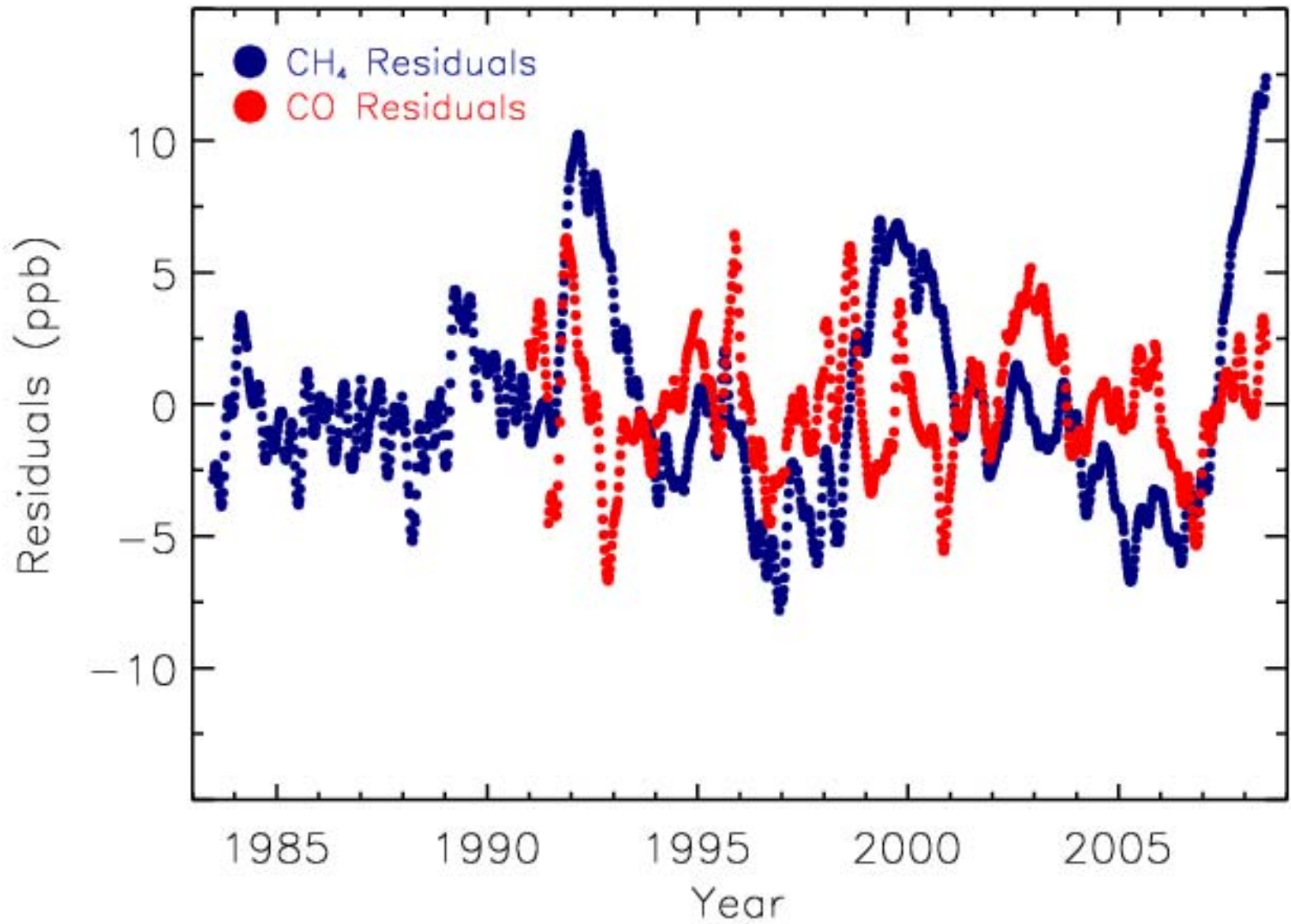
Residuals for 30°N to 90°N



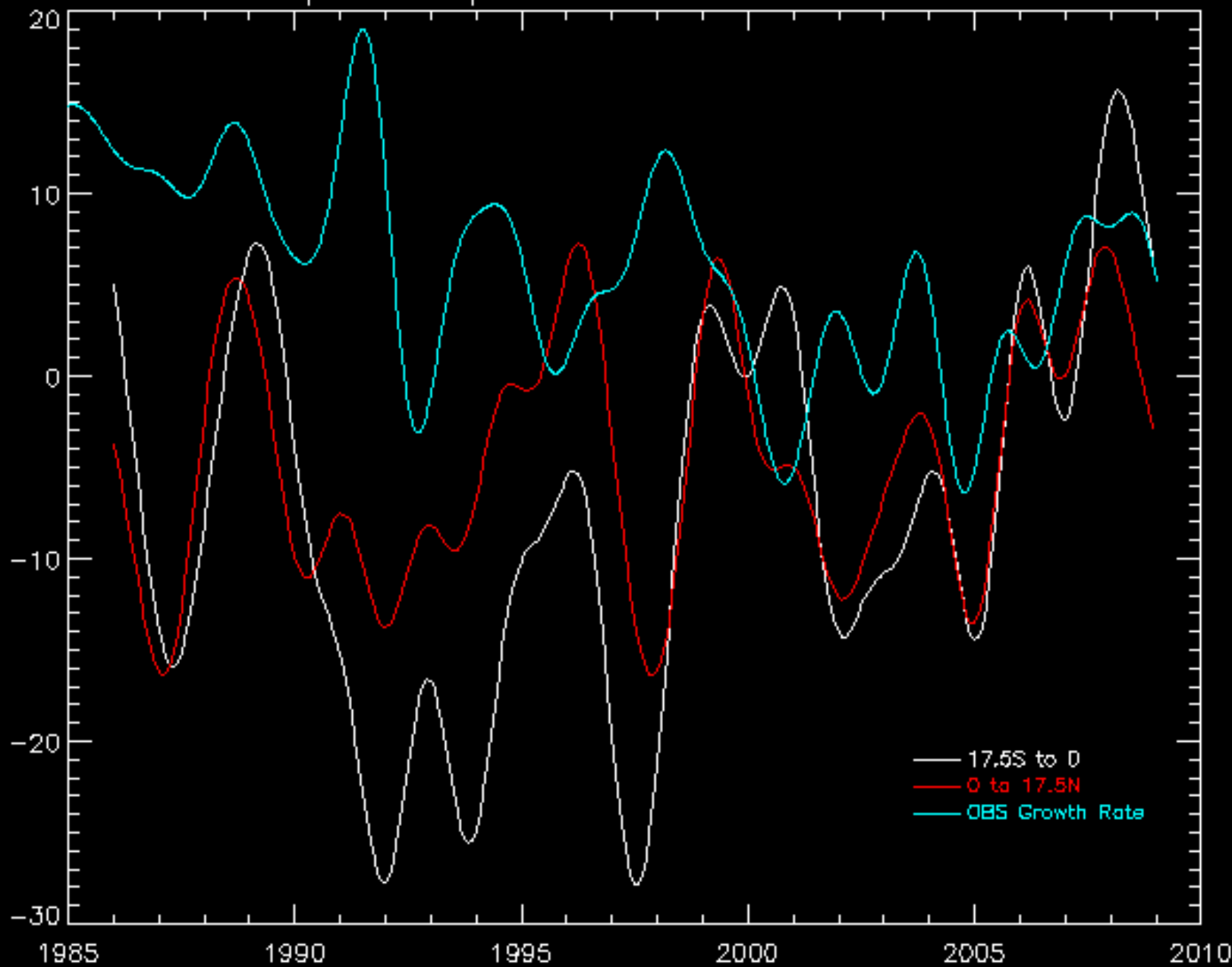
Residuals for 17.5°N to 17.5°S



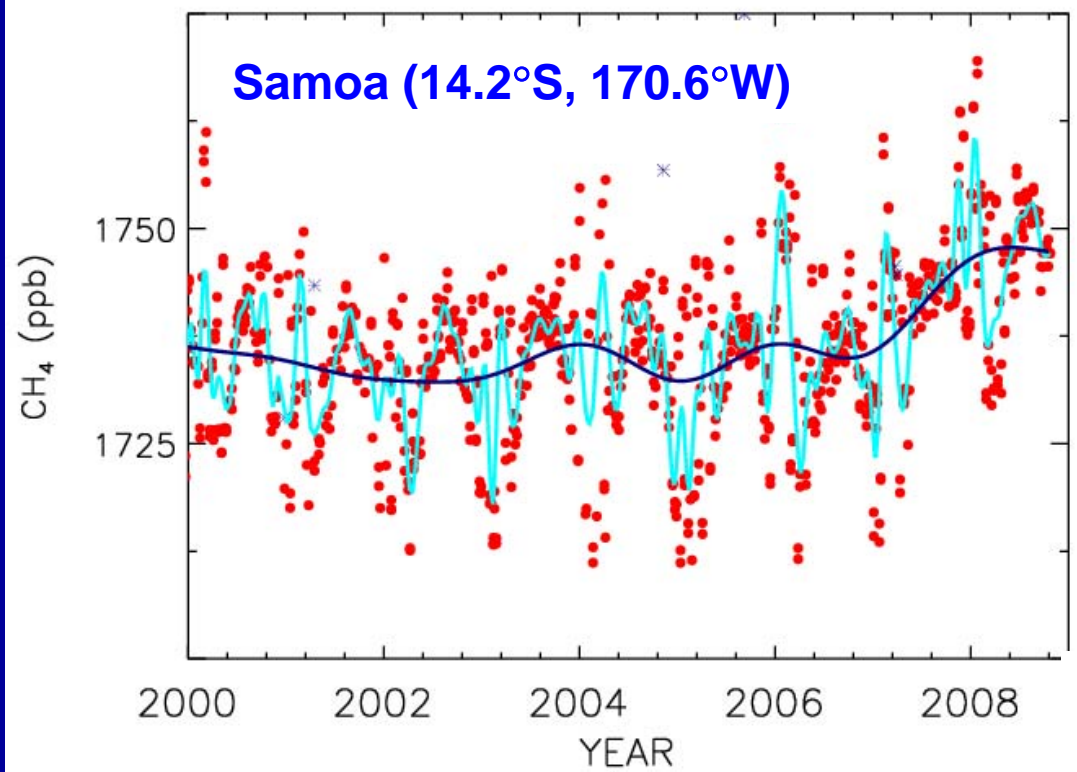
Residuals for 30°S to 90°S



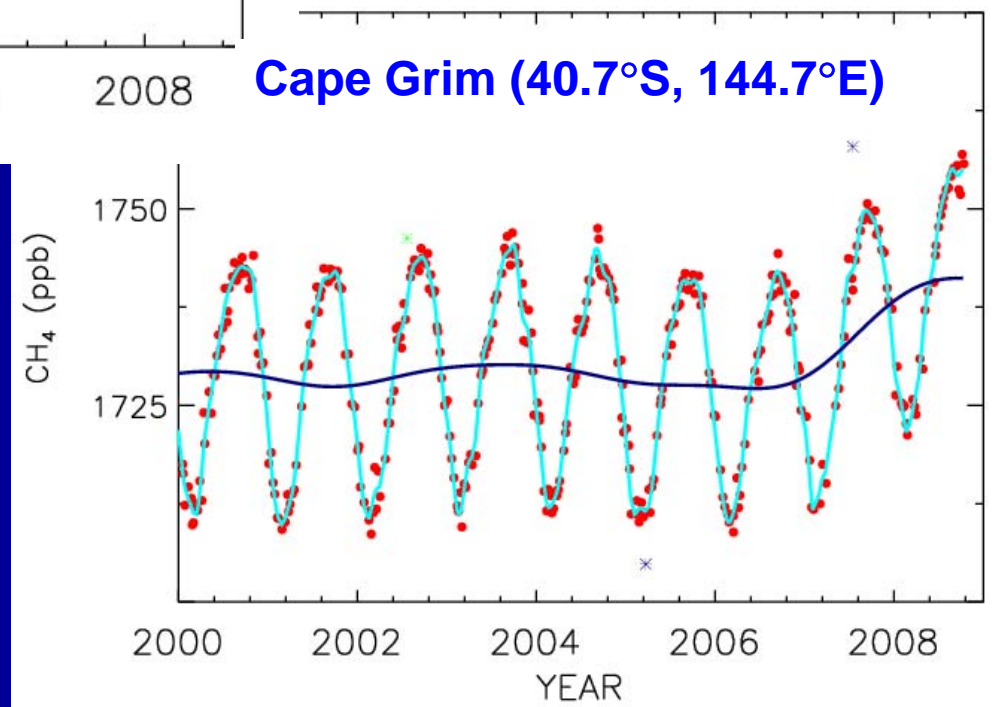
Tropics: Precipitation and Obs CH4 Growth Rate



Samoa (14.2°S, 170.6°W)



Cape Grim (40.7°S, 144.7°E)



$$\text{Emissions} = d[\text{CH}_4]/dt + [\text{CH}_4]/\tau$$

