

# Biogenic Hydrocarbons and the Atmosphere: An European Perspective



**Air Quality in Europe**



**From Regional to Local Scales**



**Radicals in Forest Air**



**Outlook: Climate and BVOC**

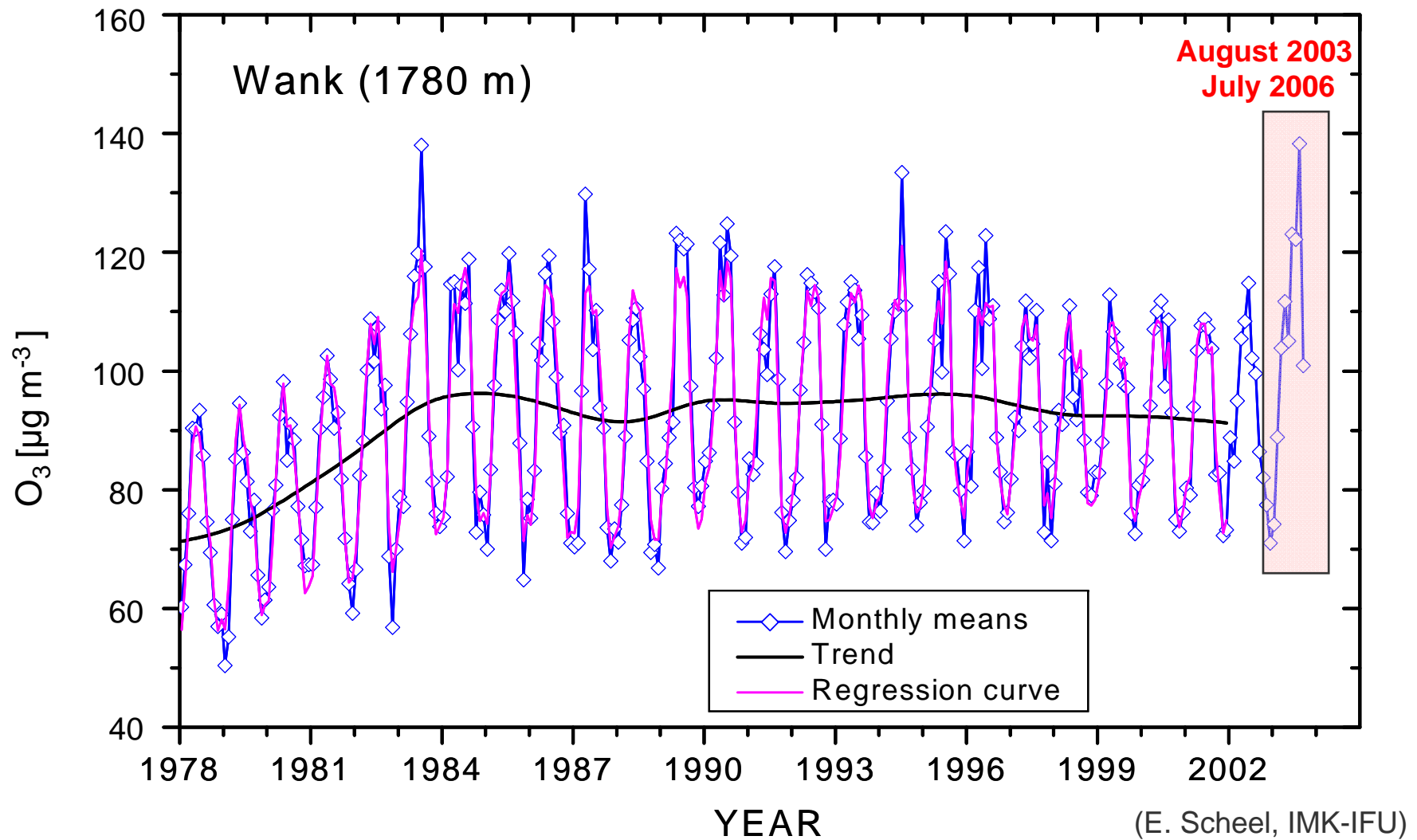
*Rainer Steinbrecher*



(Schulze et al., 2006)

# Air Quality in Europe

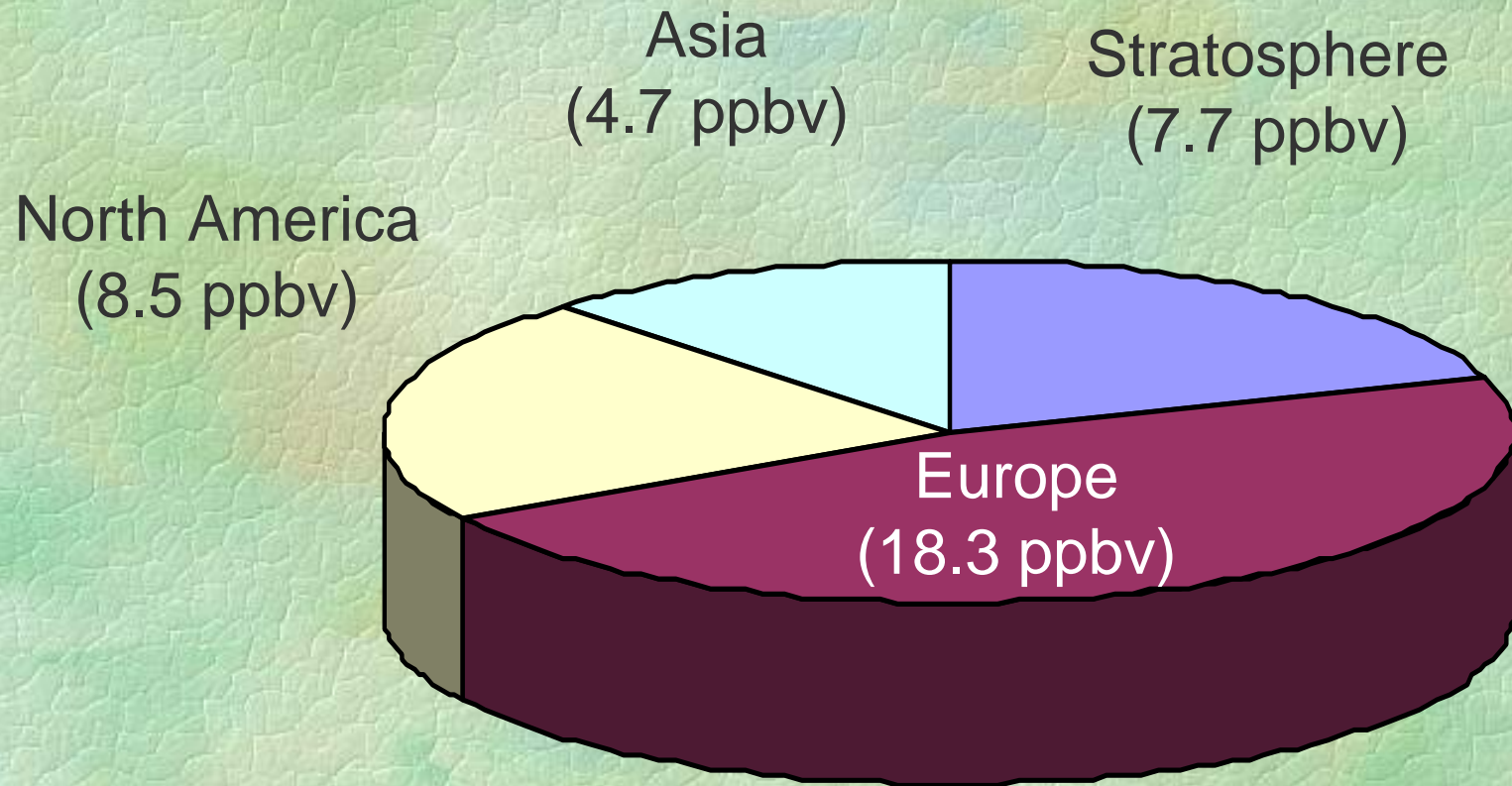
## Ozone Wank (1780 m asl.), Garmisch-Partenkirchen



# Air Quality in Europe

## Surface Ozone: Sources

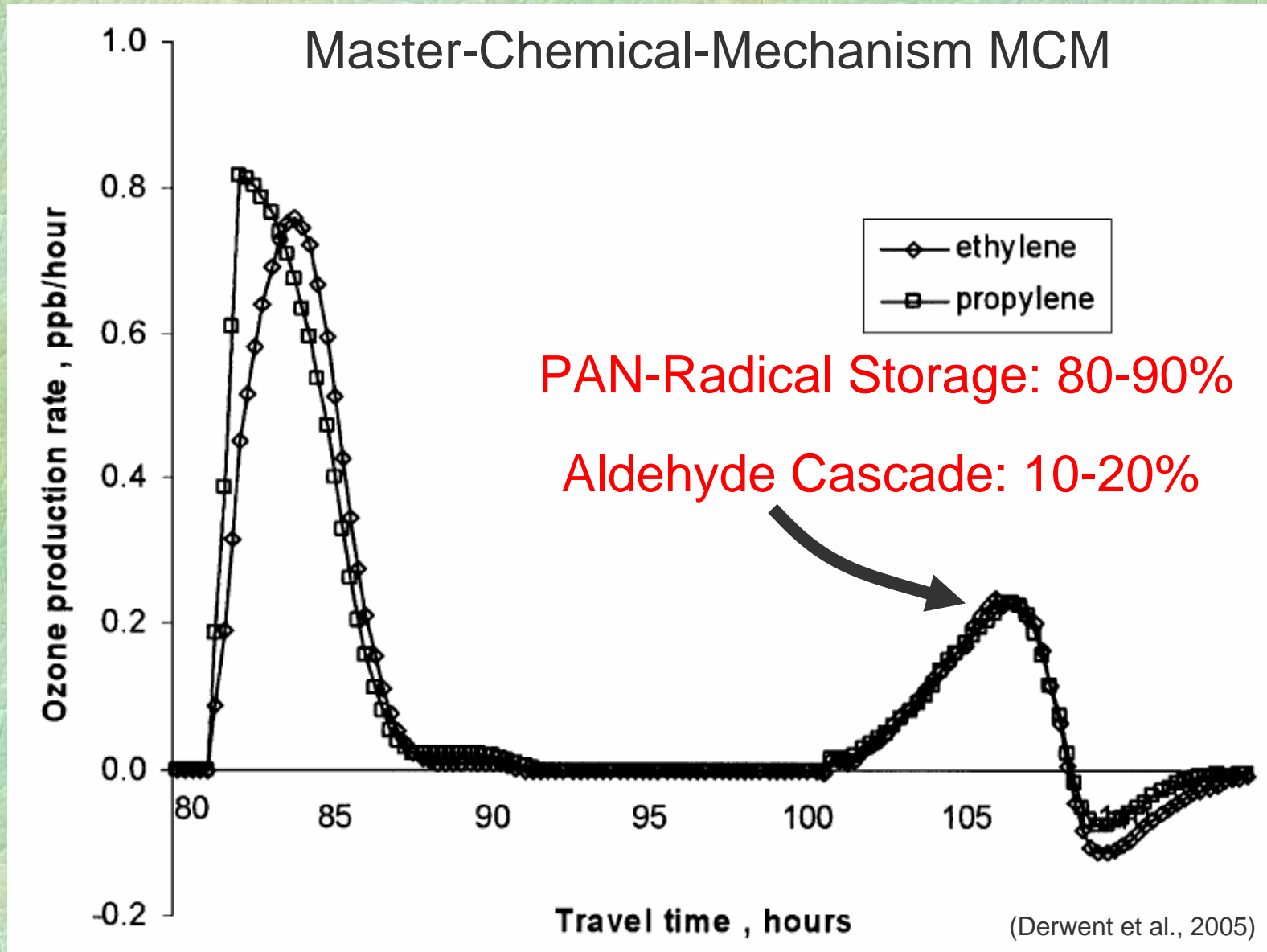
Waldhof, Germany ( $O_3$  background 1998: 39,2 ppbv)



Transport or Production?

(Derwent et al., 2004)

# Air Quality in Europe



# Air Quality in Europe

## Surface Ozone: Trends

- Mace Head, Ireland (background ozone)
- 12-months running mean
- 1990 to 2003
- Increase

+ 0.48 ppbv per year

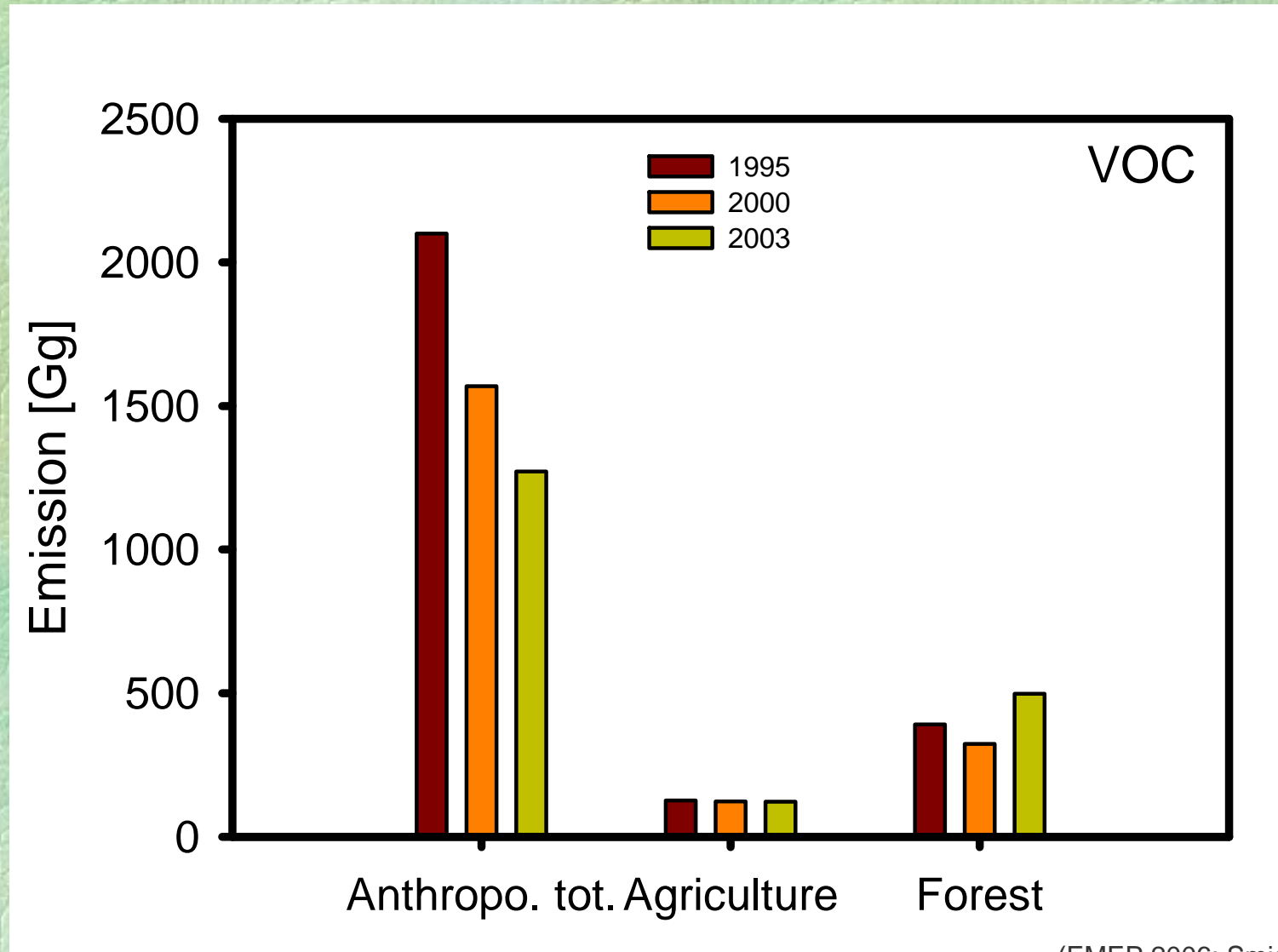
- Will continue at a similar rate!

What are the Reasons for that?

(Derwent et al., 2006)

# From Regional to Local Scales

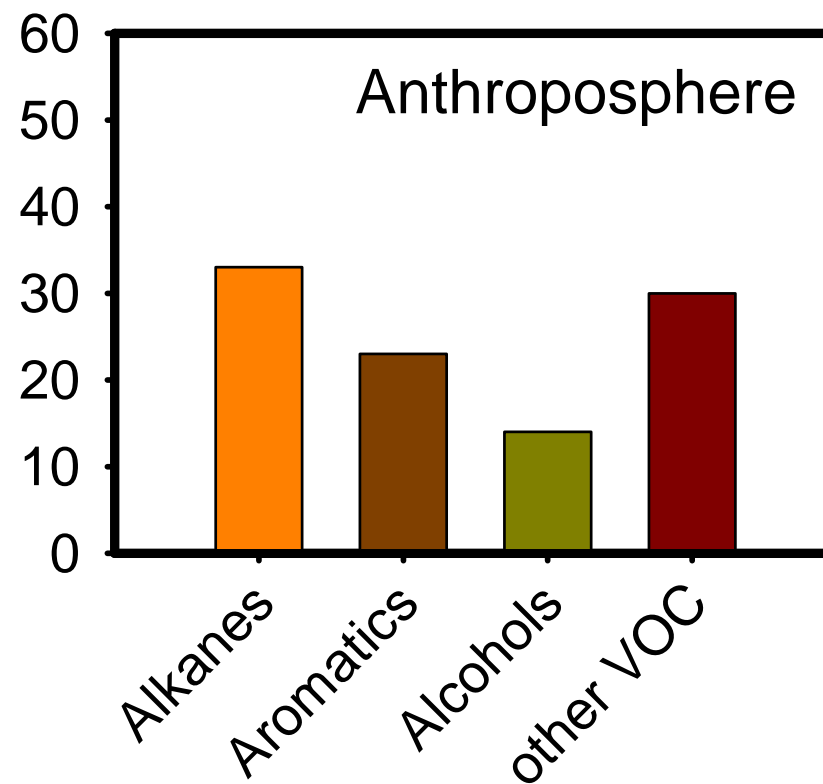
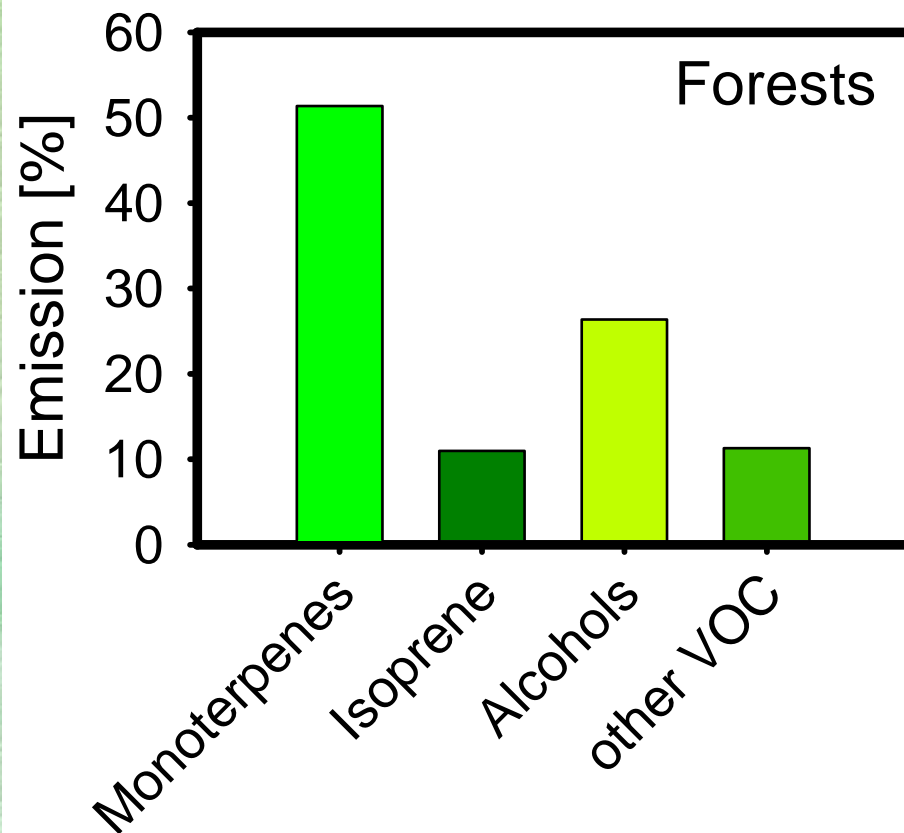
## Emissions in Germany: Sources and Trends



(EMEP 2006; Smiatek, Steinbrecher 2006)

# From Regional to Local Scales

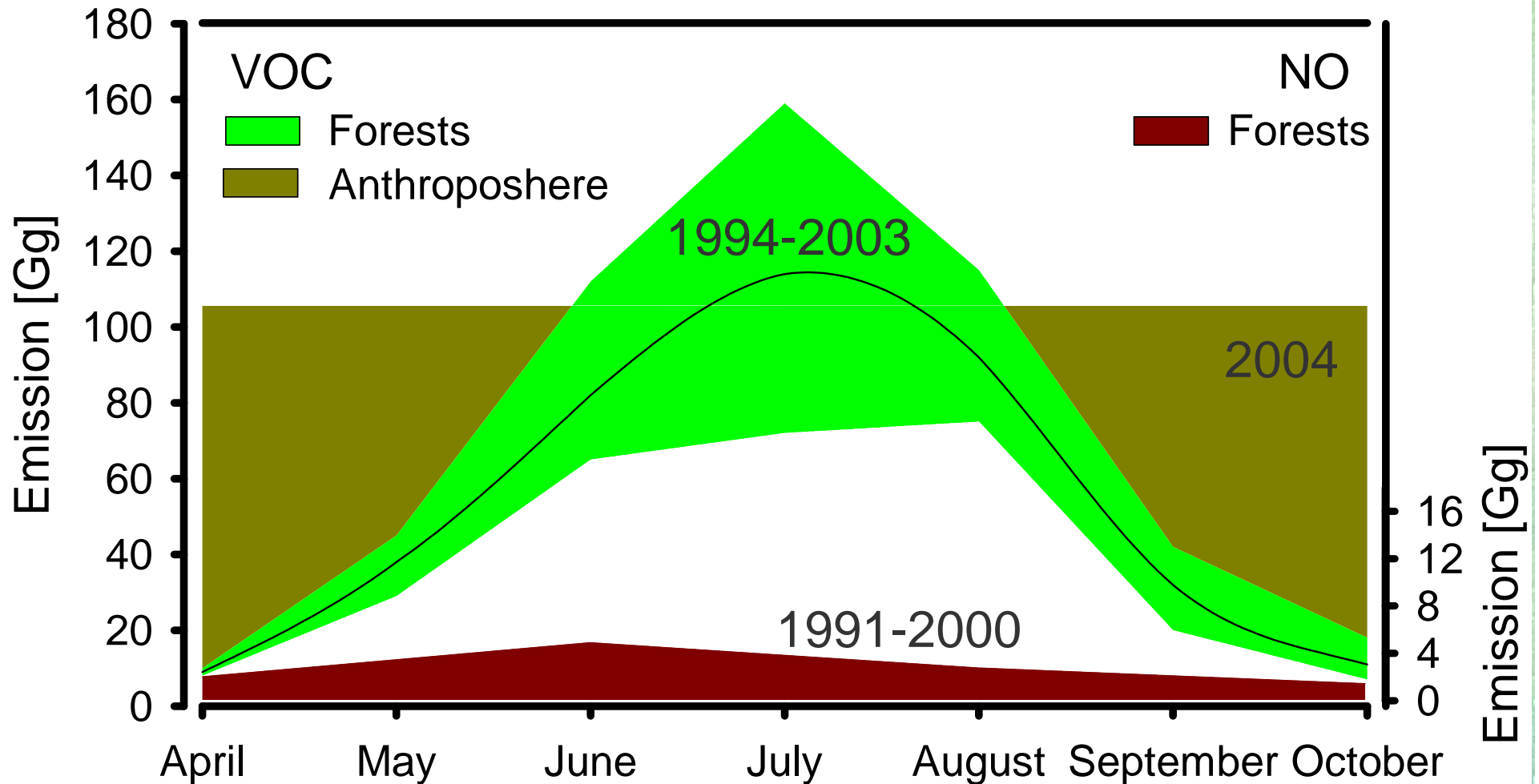
## Emissions in Germany: Source Split



(Smiatek, Steinbrecher 2006; Theloke, Friedrich 2007)

# From Regional to Local Scales

Emissions in Germany: Monthly and Annual Variability

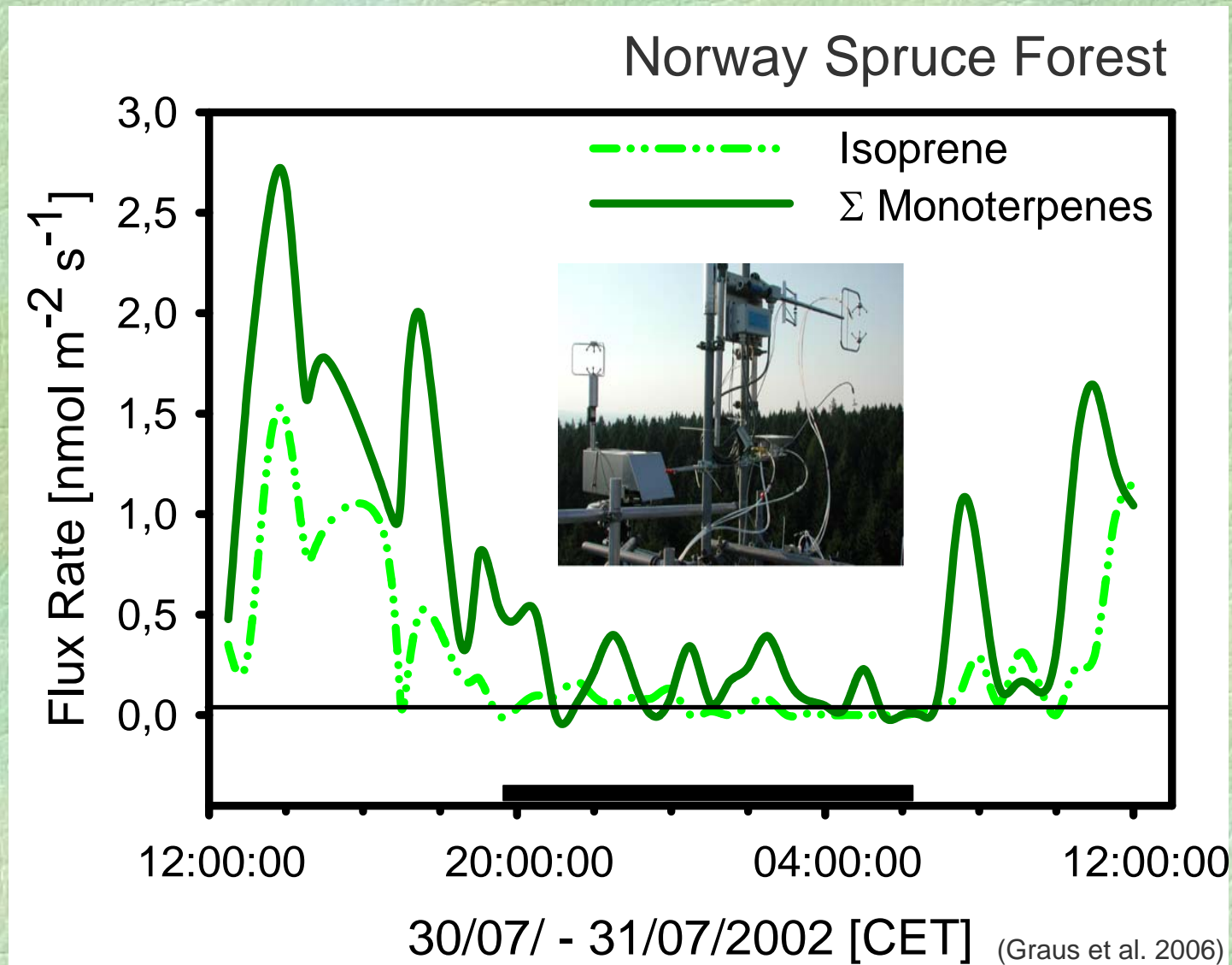


(EMEP 2006; Smiatek, Steinbrecher 2006)



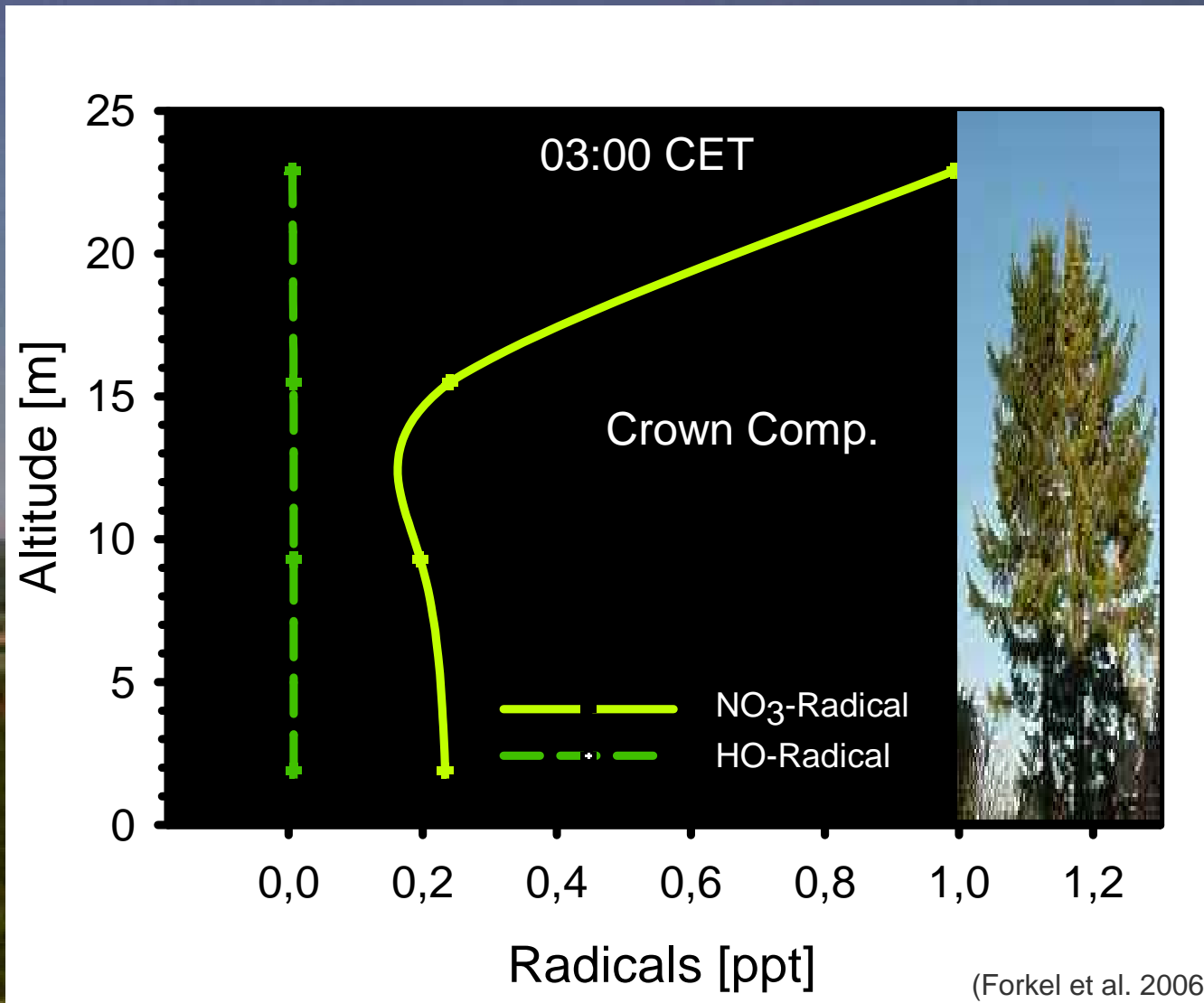
# From Regional to Local Scales

Emissions of in Germany: Hourly Variability



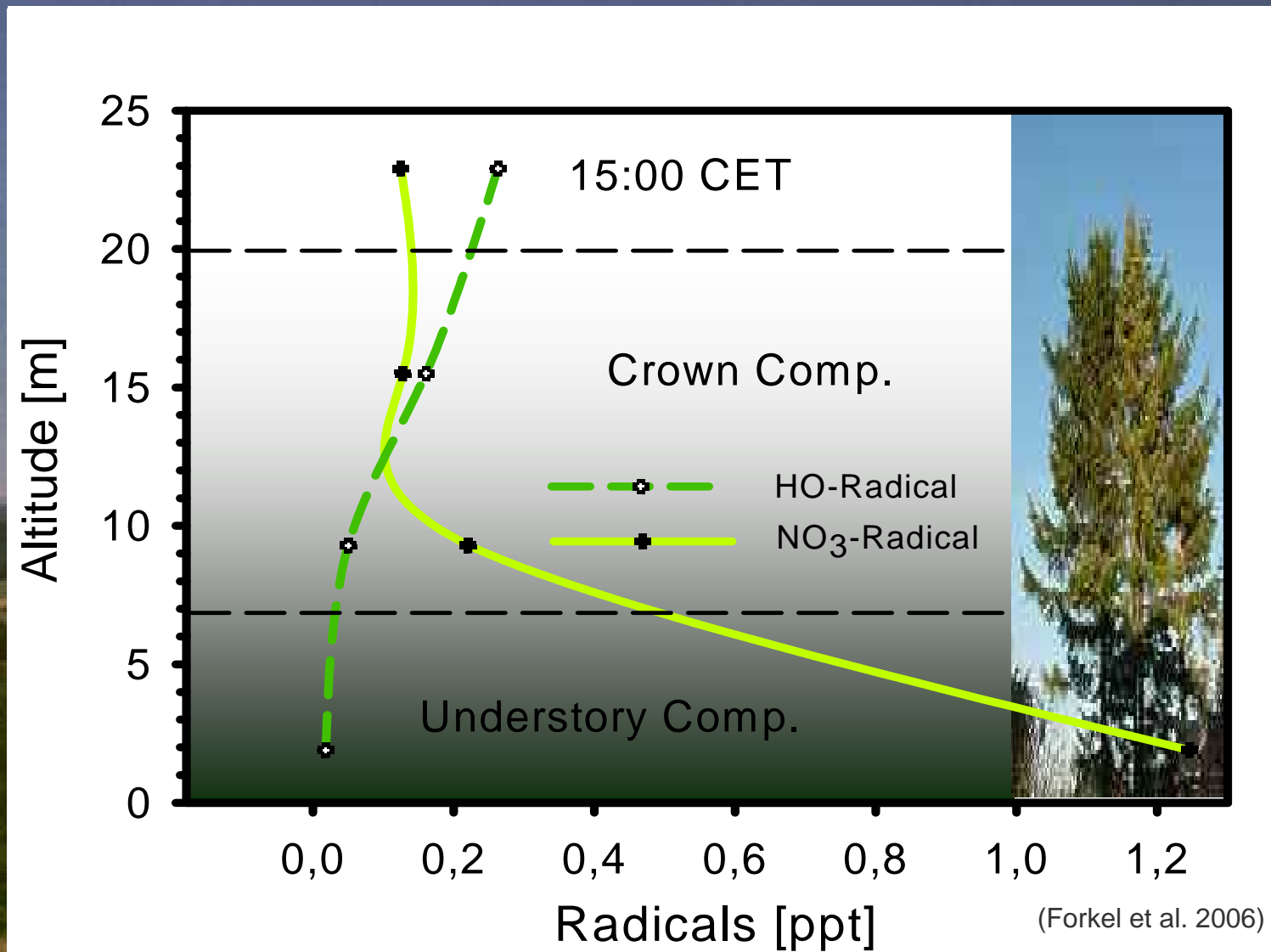
# Radicals in Forest Air

Norway Spruce Forest: Night Time



# Radicals in Forest Air

Norway Spruce Forest: Day Time

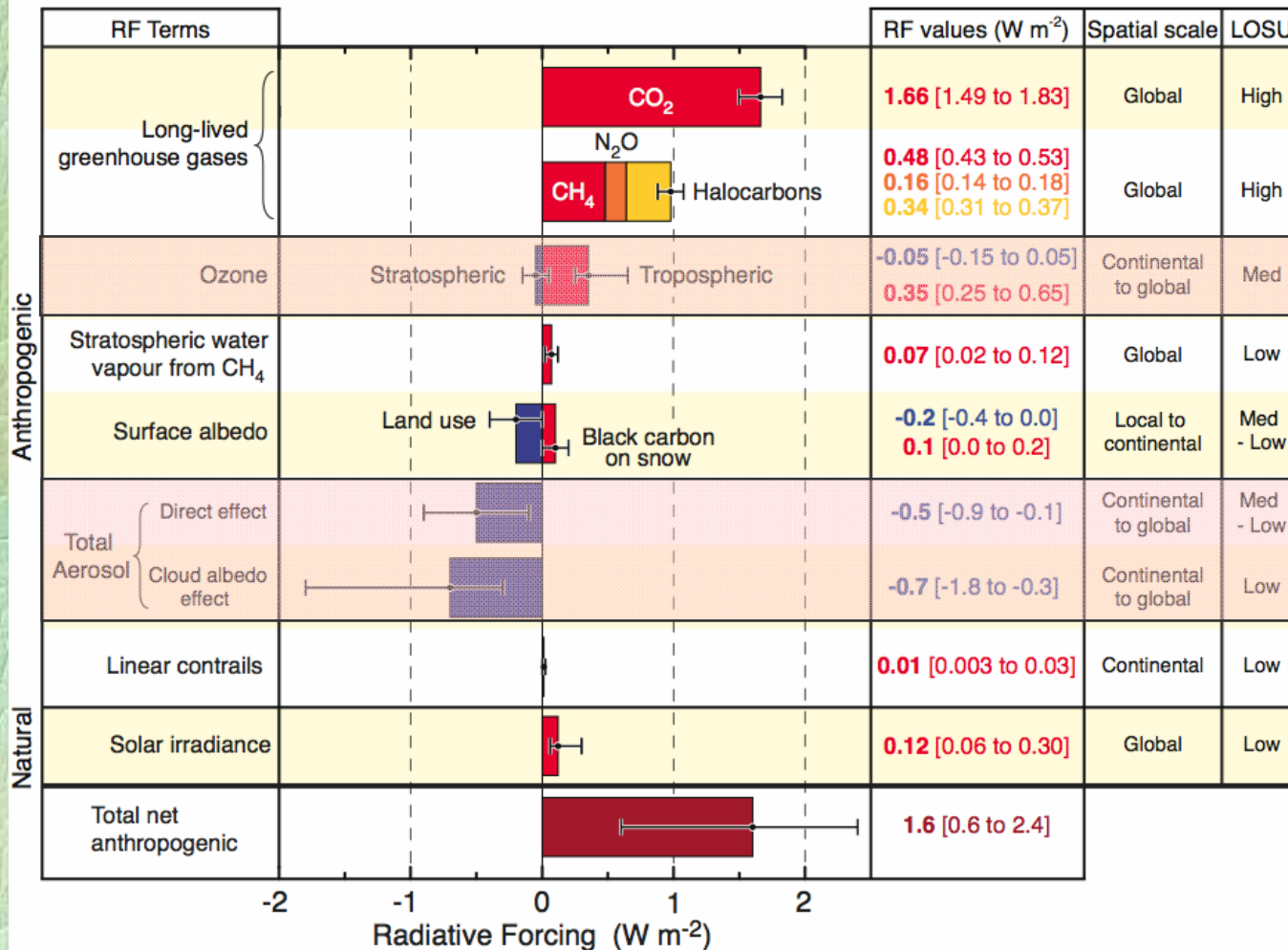


(Forkel et al. 2006)

# Global Change and VOC

## VOC Oxidation in the Atmosphere

### Radiative Forcing Components



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# References:

- R. G. Derwent et al. *Atmos. Environ.* **1998-2006**
- EMEP, <http://webdab.emep.int>, **2006**
- R. Forkel et al., *Atmos. Environ.* **2006**, 40, S28
- M. Graus et al., *Atmos. Environ.* **2006**, 40, S43
- IPCC, <http://www.ipcc.ch>, 2007
- M. Kesik et al., *Biogeosciences* **2005**, 2, 353
- B. C. Schulze, C. Kost, G.-I. Arimura und W. Boland, *Chem. Unserer Zeit* **2006**, 40, 366
- G. Smiatek, und R. Steinbrecher, *Atmos. Environ.* **2006**, 40, S166
- J. Theloke und R. Friedrich *Atmos. Environ.* **2007**,  
doi:10.1016/j.atmosenv.2006.12.026