



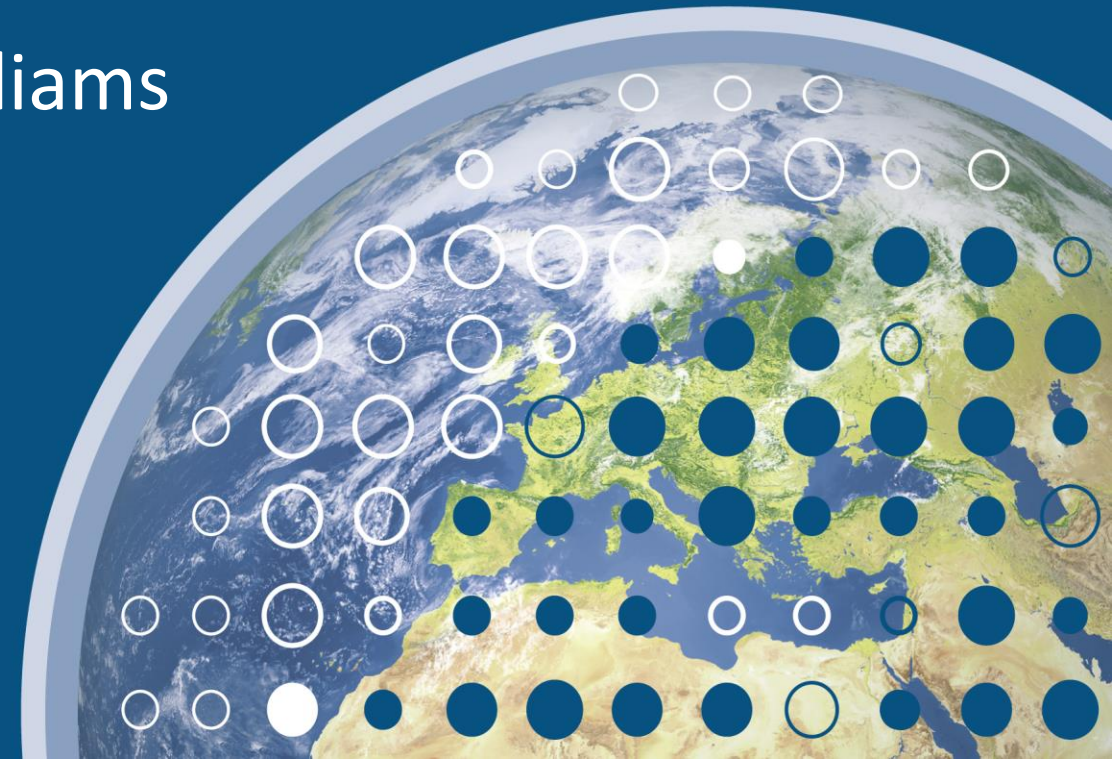
# Was können wir aus der Luft lesen?

Prof. Jonathan Williams  
Prof. Peter Kaul



**KLUGER Transfer**

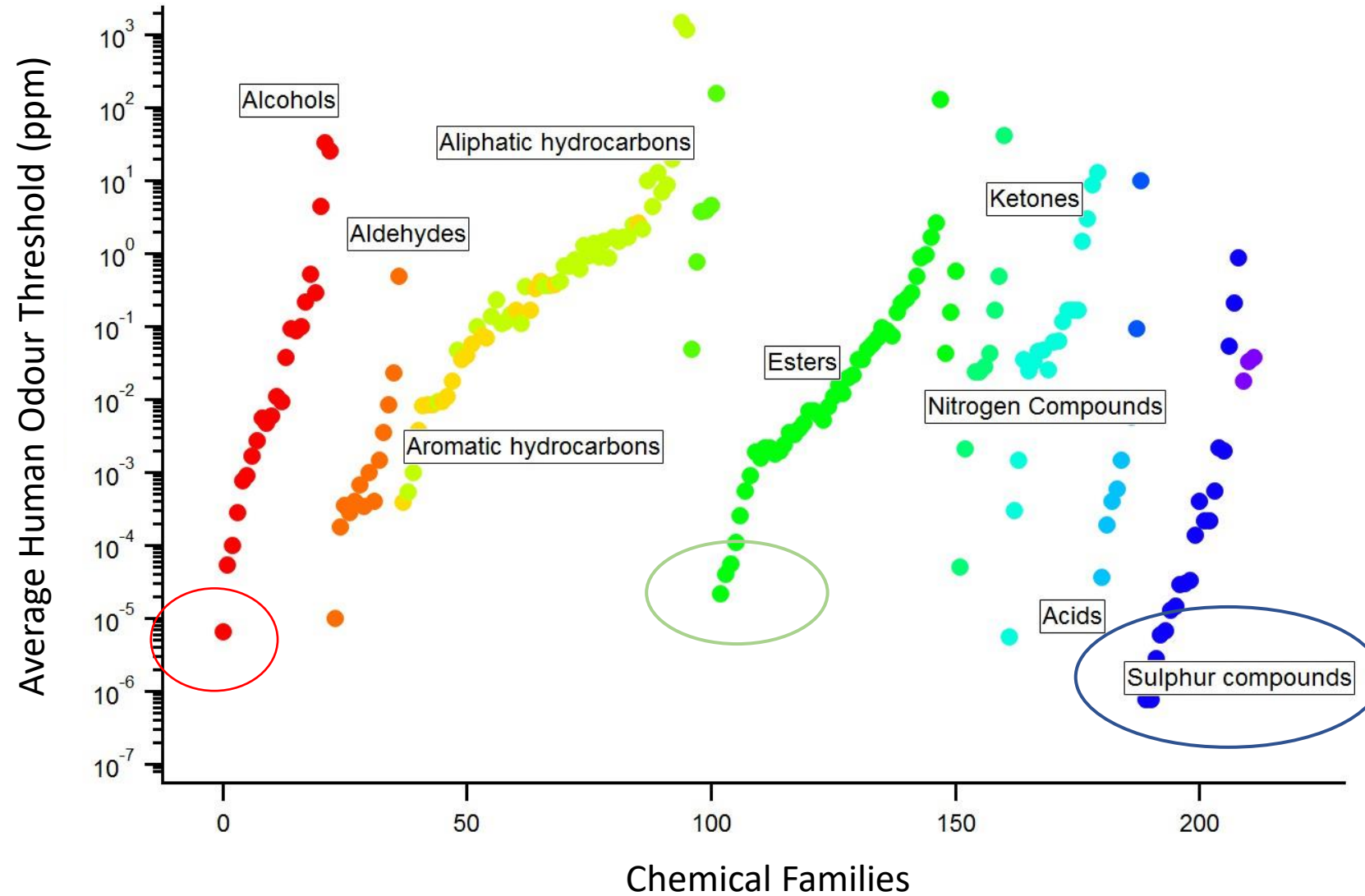
Klima – Umwelt – Gesundheit – Transfer



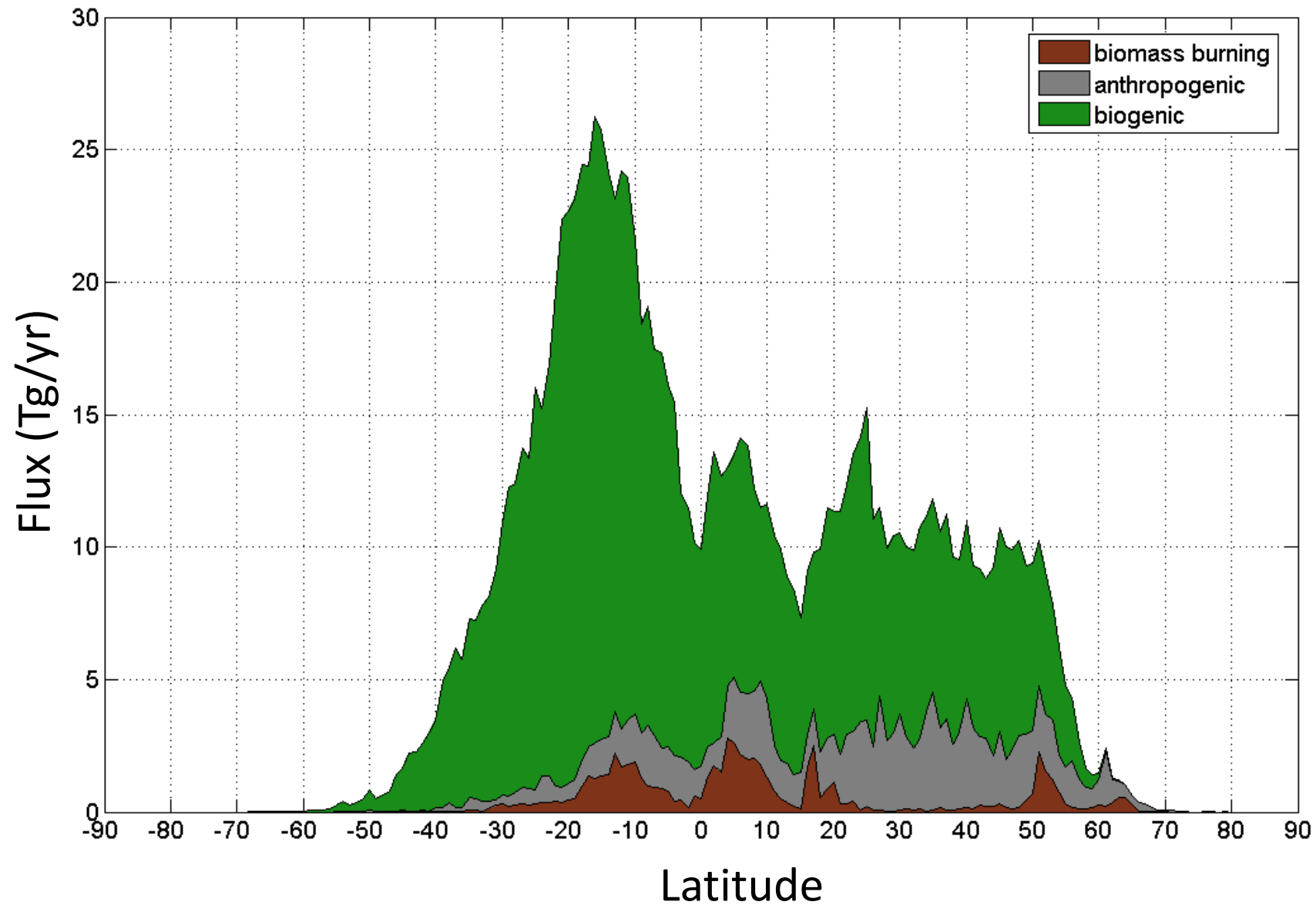
Volatile  
Organic  
Compounds

VOC

# Olfactory Thresholds for Chemical Families

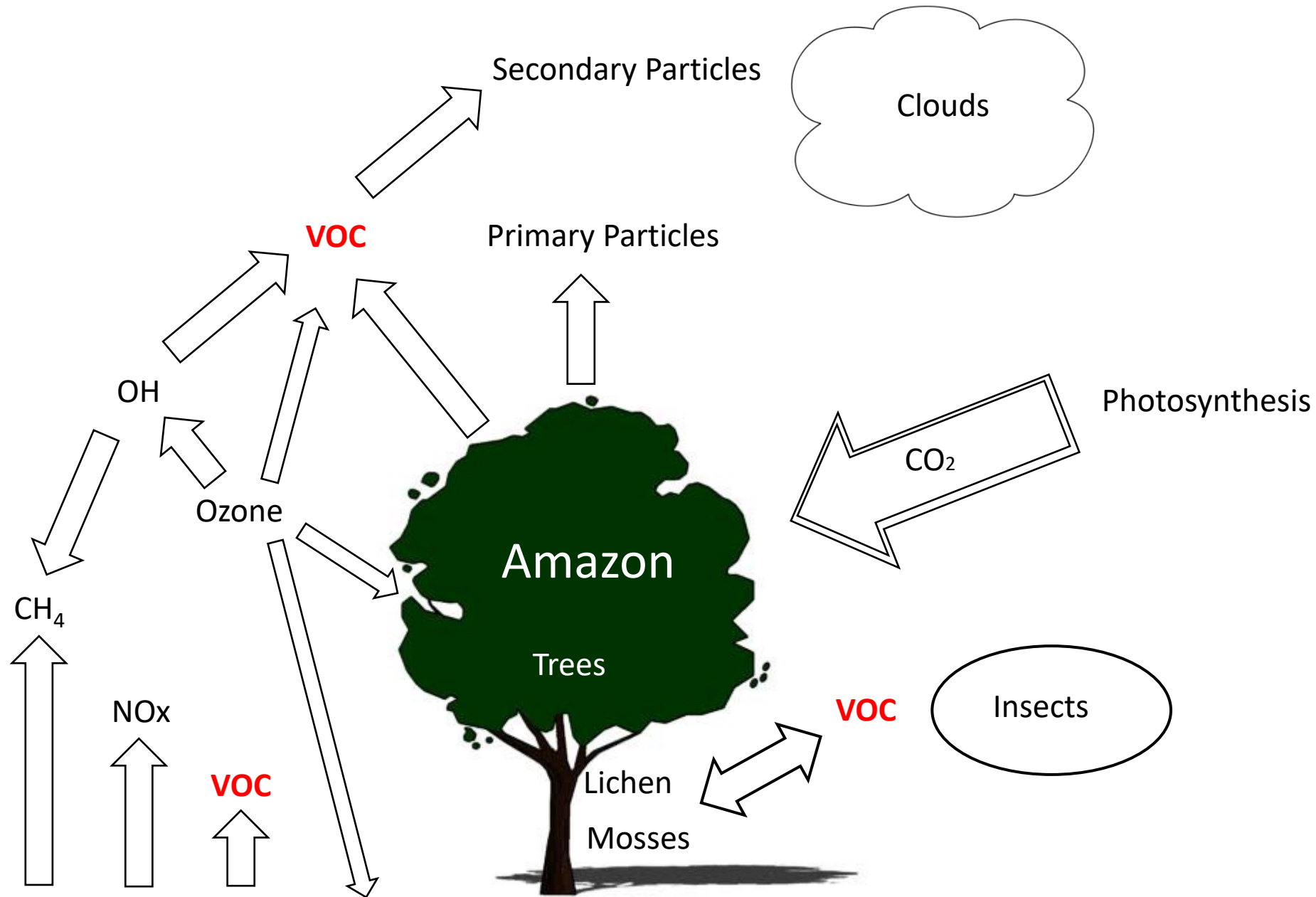
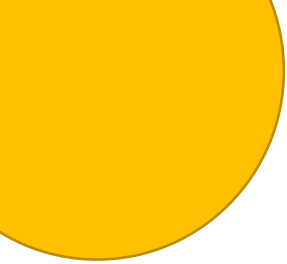


# Global emissions of Volatile Organic Compounds



# Measurement Tower (ATTO)



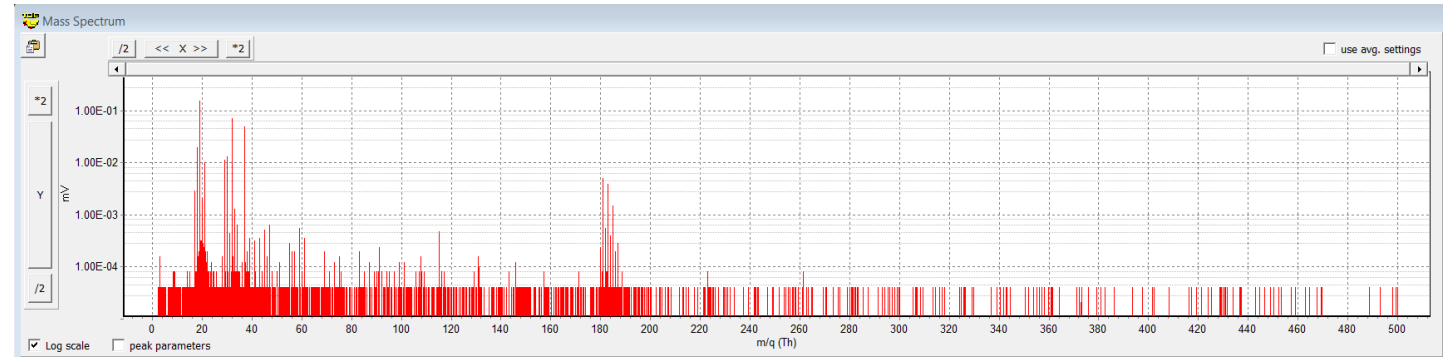
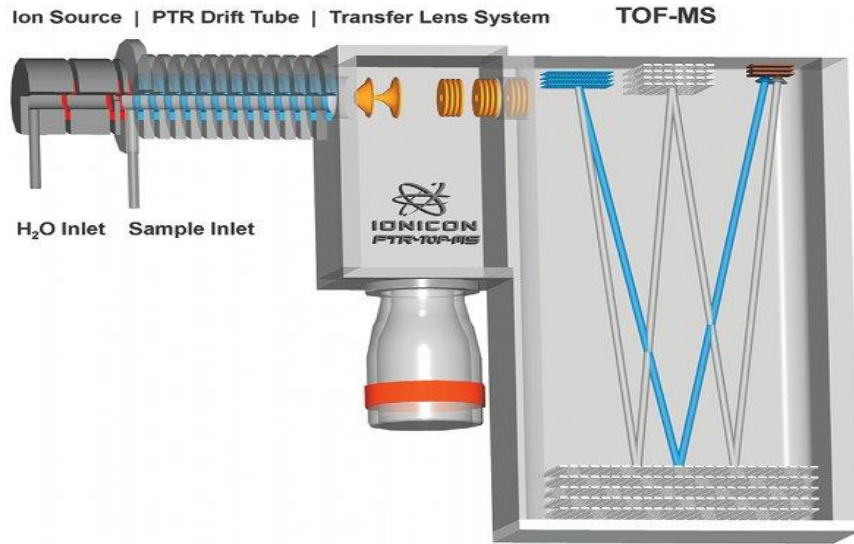




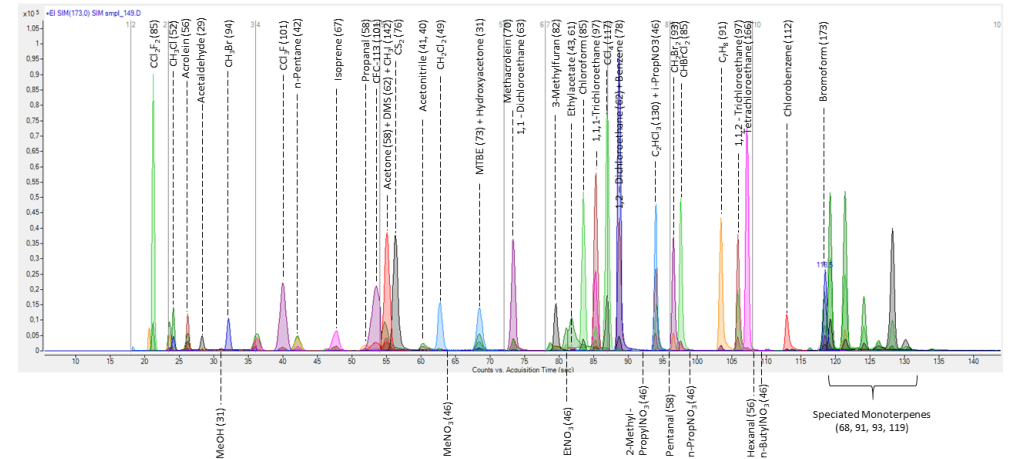
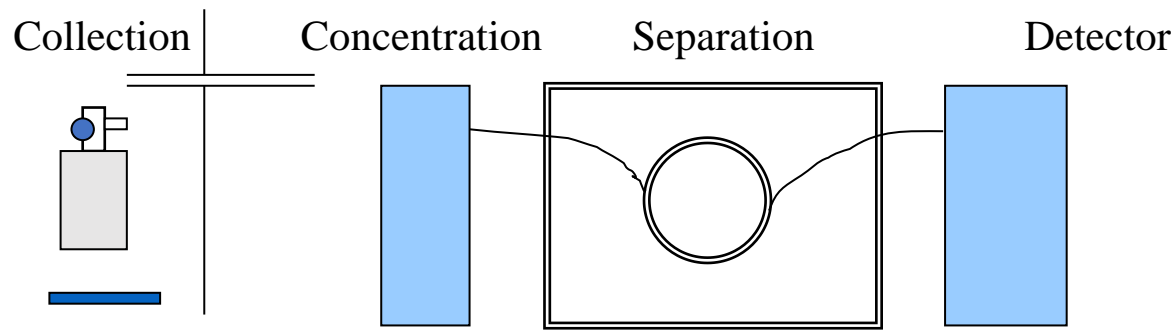
325m

80m

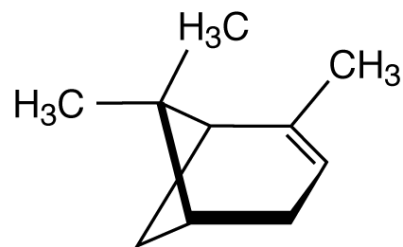
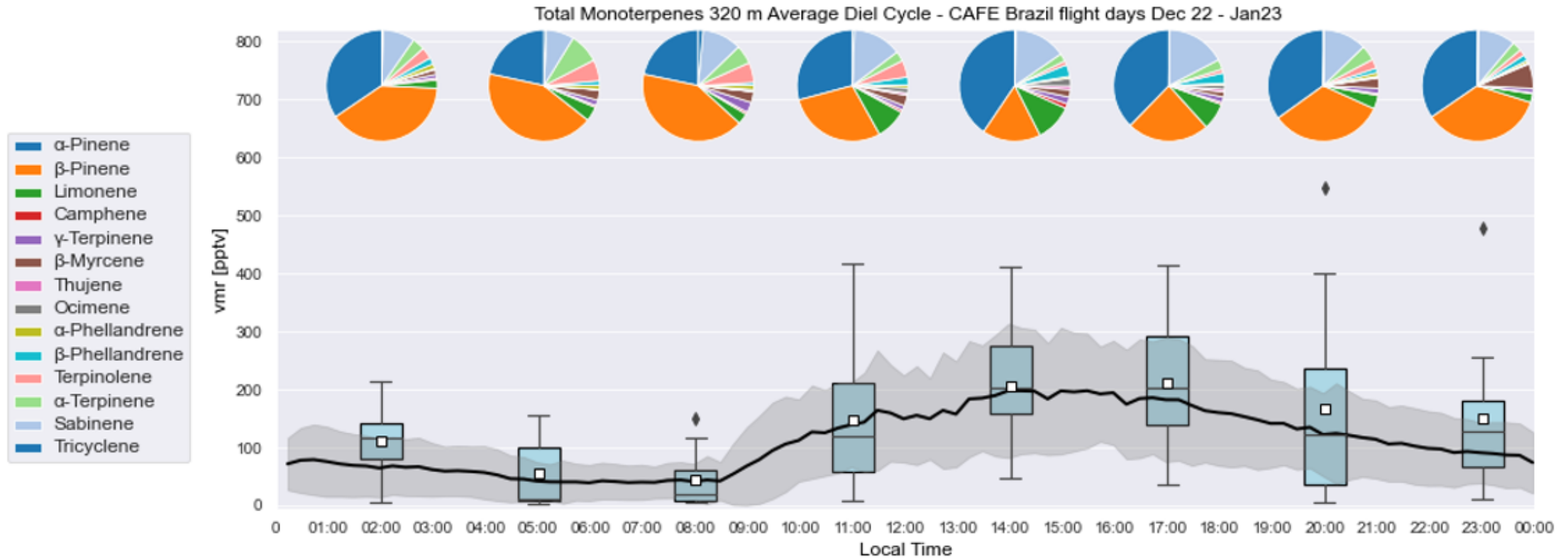
# 1) Proton Transfer Reaction Time of Flight Mass Spectrometry



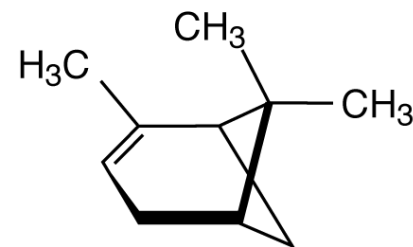
# 2) Gas Chromatography Mass Spectrometry



# PTR-ToF-MS and GC-ToF-MS at 325m



(+) - α - pinene



(-) - α - pinene

**CAFE**  
**BRAZIL**

Chemistry of the Atmosphere  
Field Experiment in Brazil

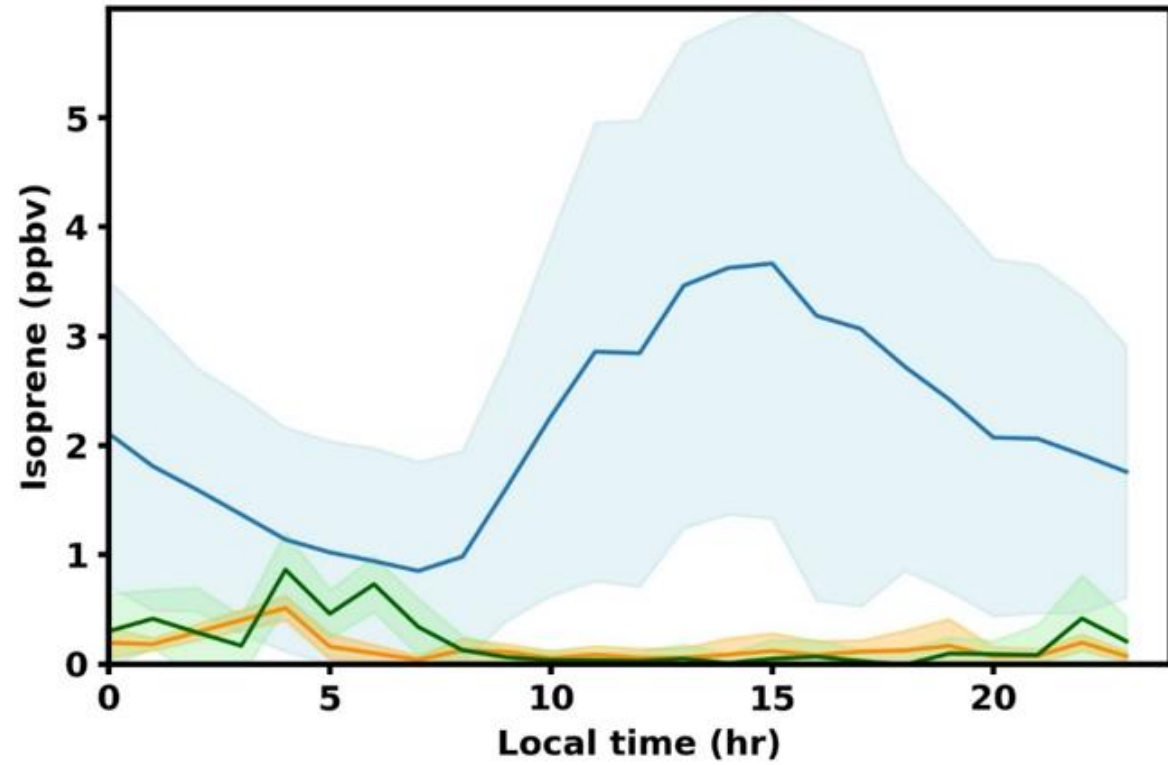
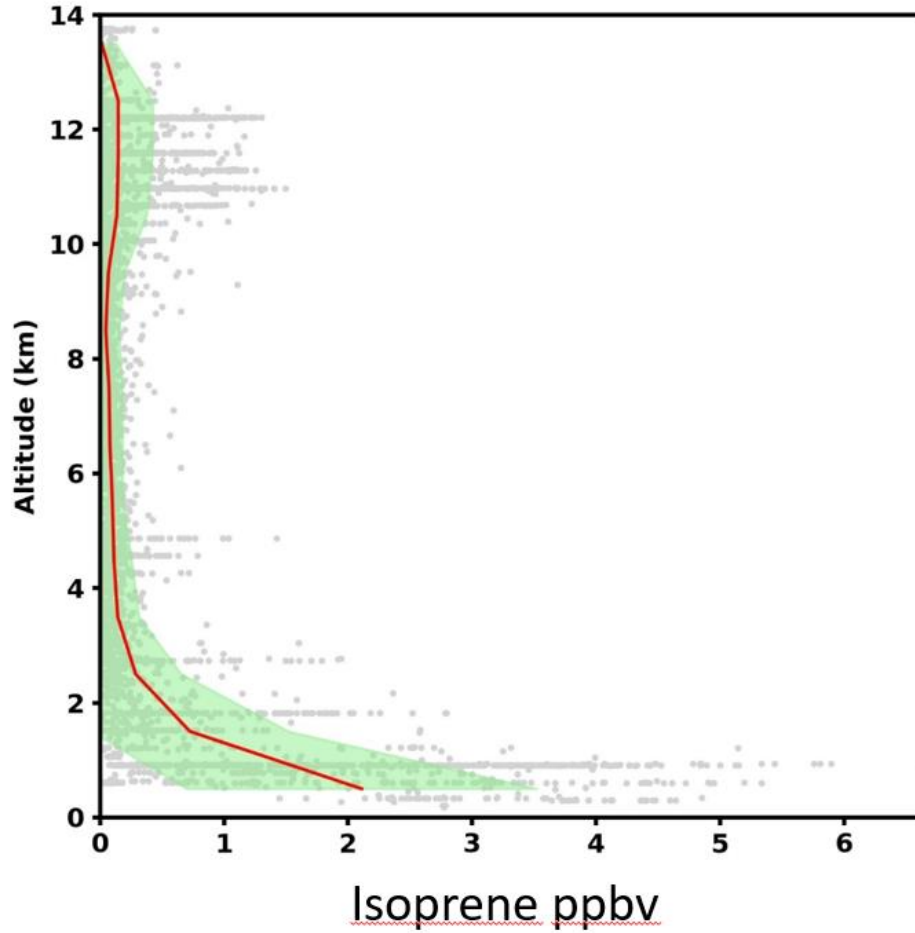
# HALO – Airborne VOC Measurements

PTR-ToF-MS  
1 minute average  
VOC, OVOC

Fast GC-MS  
1 measurement per 2.5 minute  
VOC, OVOC, organohalogens



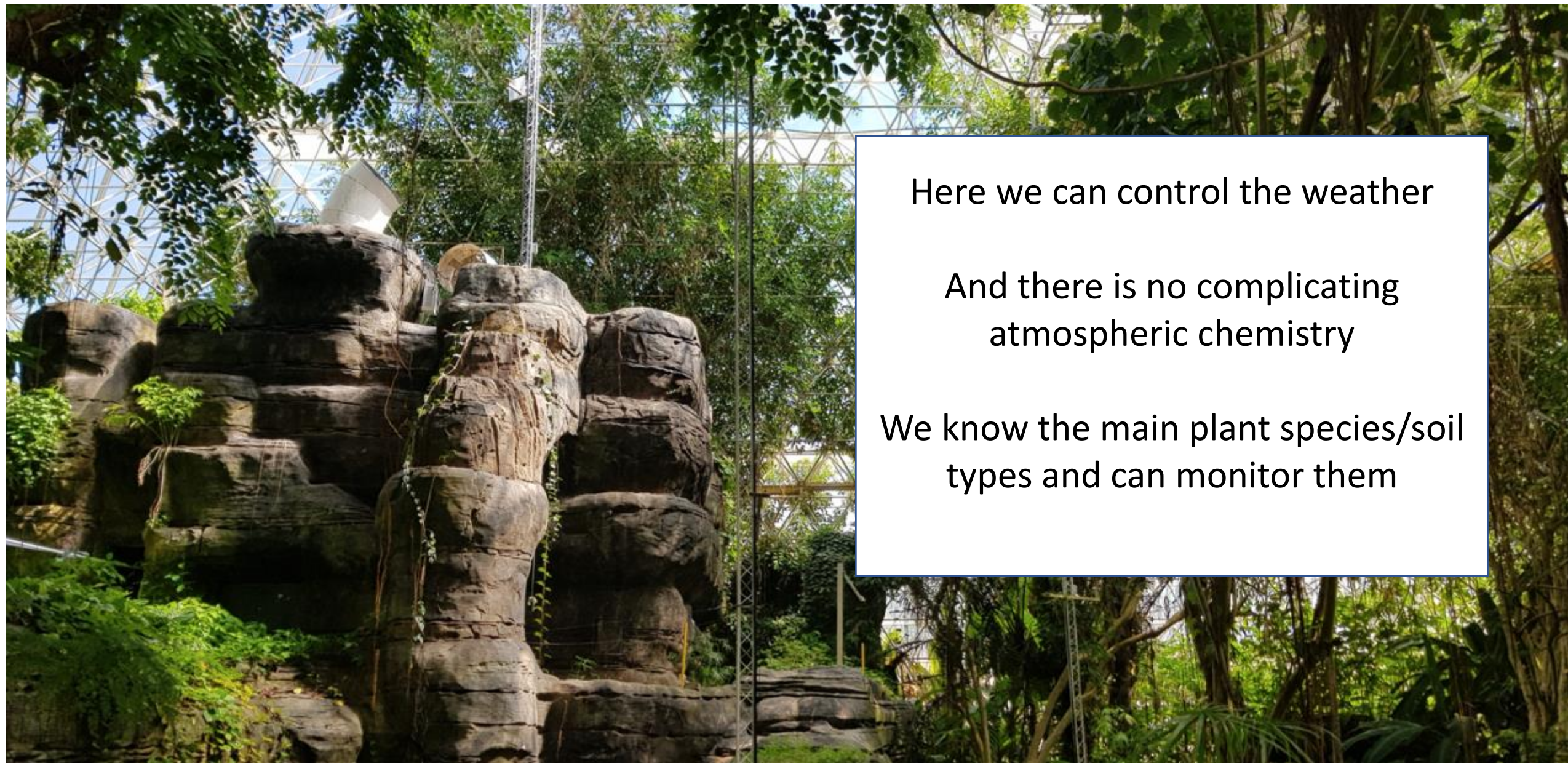
# Isoprene over the Amazon Rainforest



1) 320m 2) 3-9 km 3) 9-14km

An enclosed rainforest ecosystem  
BIOSPHERE 2



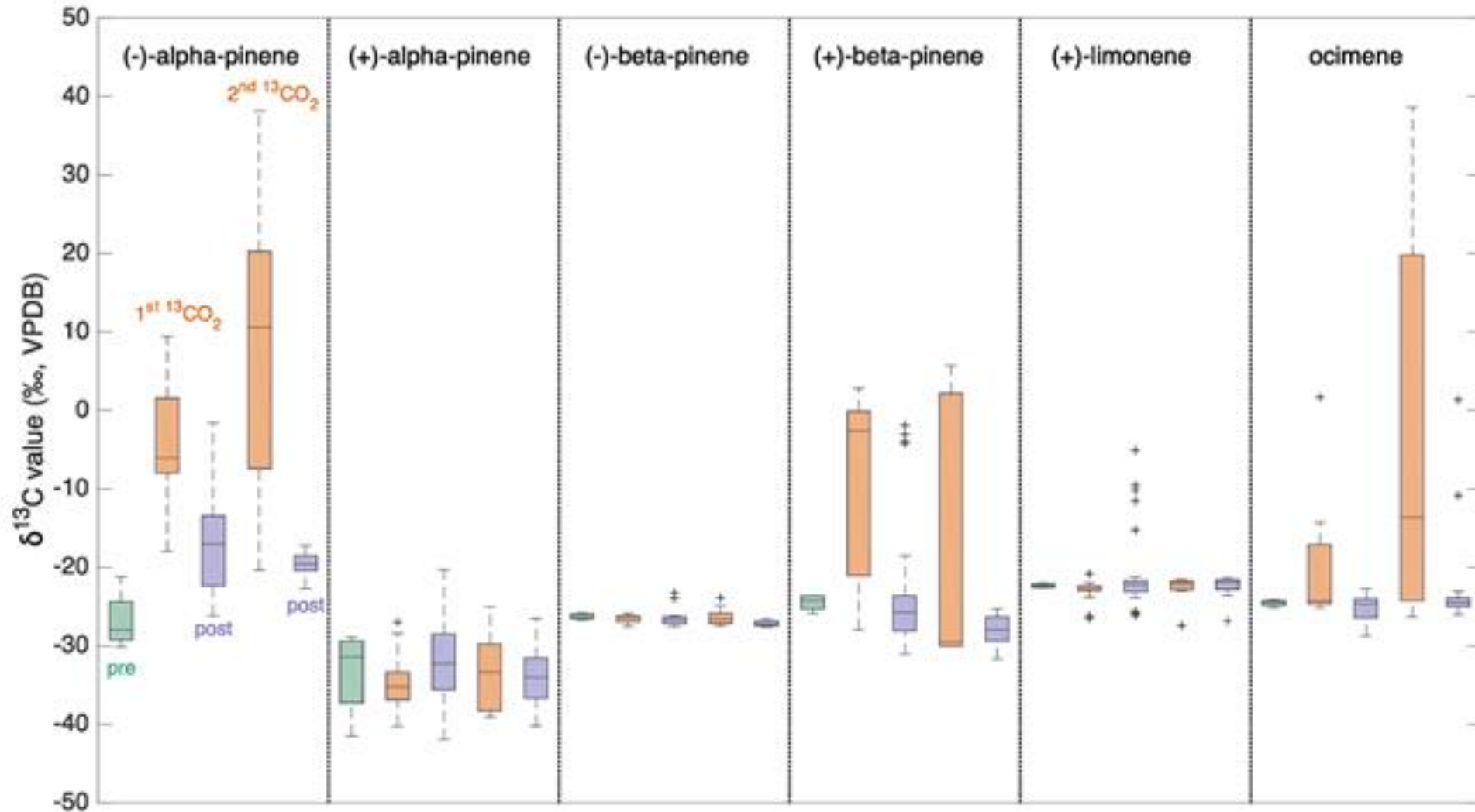


Here we can control the weather

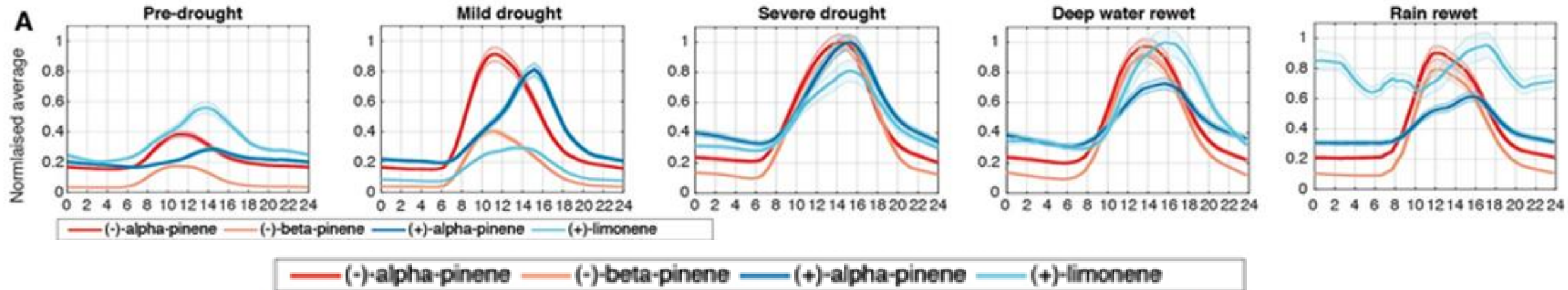
And there is no complicating  
atmospheric chemistry

We know the main plant species/soil  
types and can monitor them

# Decoding with isotopically labelled $^{13}\text{CO}_2$



# Drought brings chiral changes



Emissions increase upon drought (possible feedback mechanism)

Chiral compounds peak at different times of day

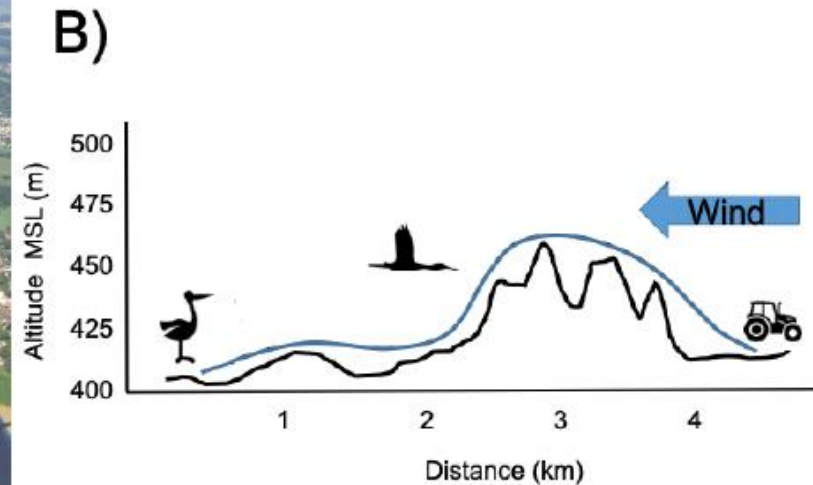
Chiral emissions shift in the drought



Storks

Green Leaf Volatiles  
(Z)-3-hexenal, (Z)-3-hexenol and hexenyl acetate

# Smell of cut grass attracts the Storks



Field sprayed with chemical mixture but not cut attracted Storks

Field covered in cut grass from elsewhere (but not itself cut) attracted Storks

Thank-you