

# Exploring The Birch Effect In The Subsurface Using Diffusive Soil Probes

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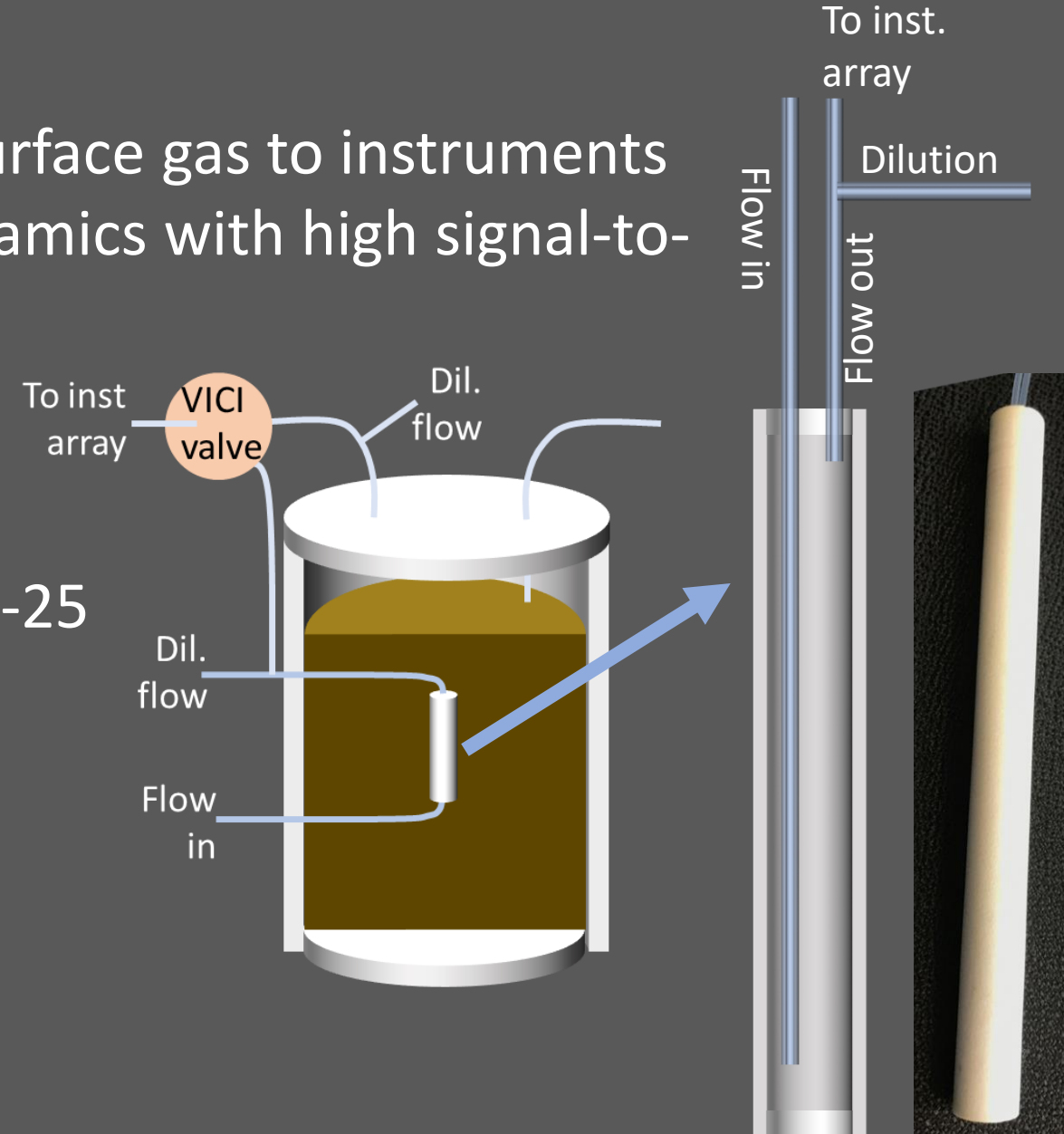


•Department of Energy Grant No. DE-SC0018459

# Diffusive Gas Probes to Explore Subsurface Processes

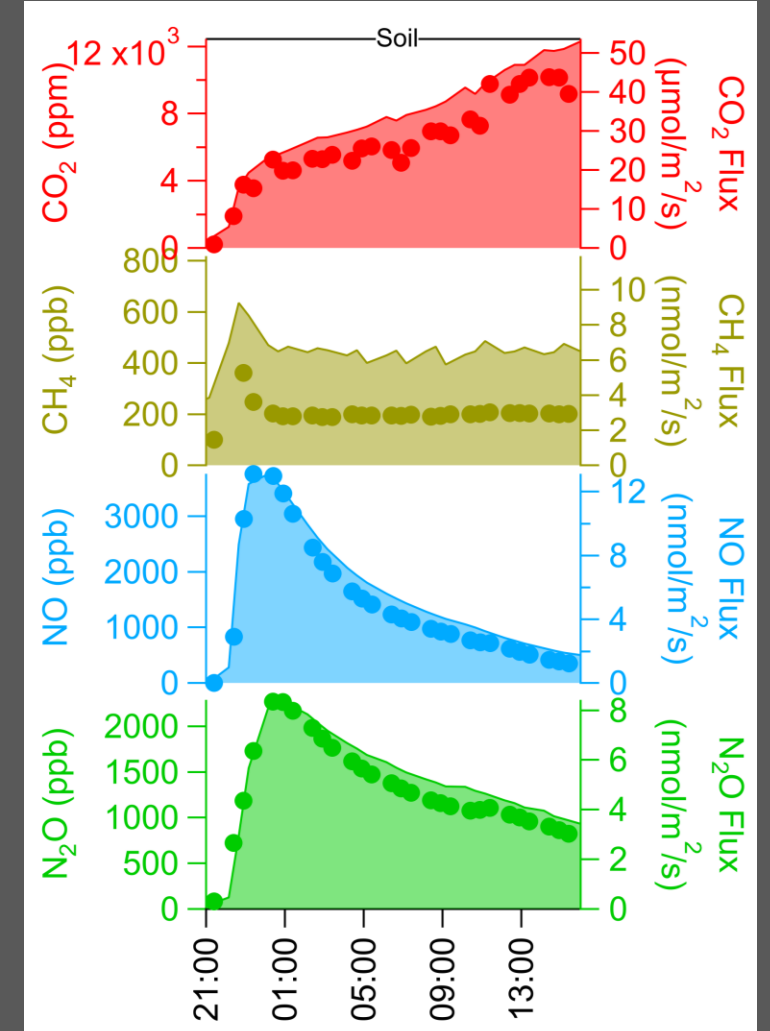
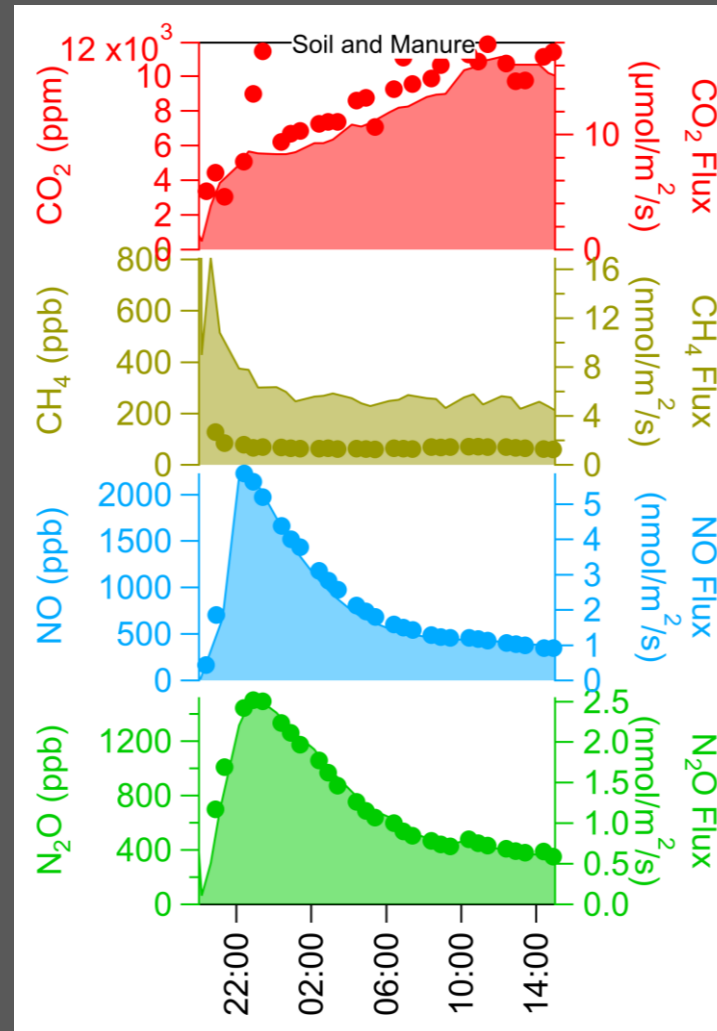
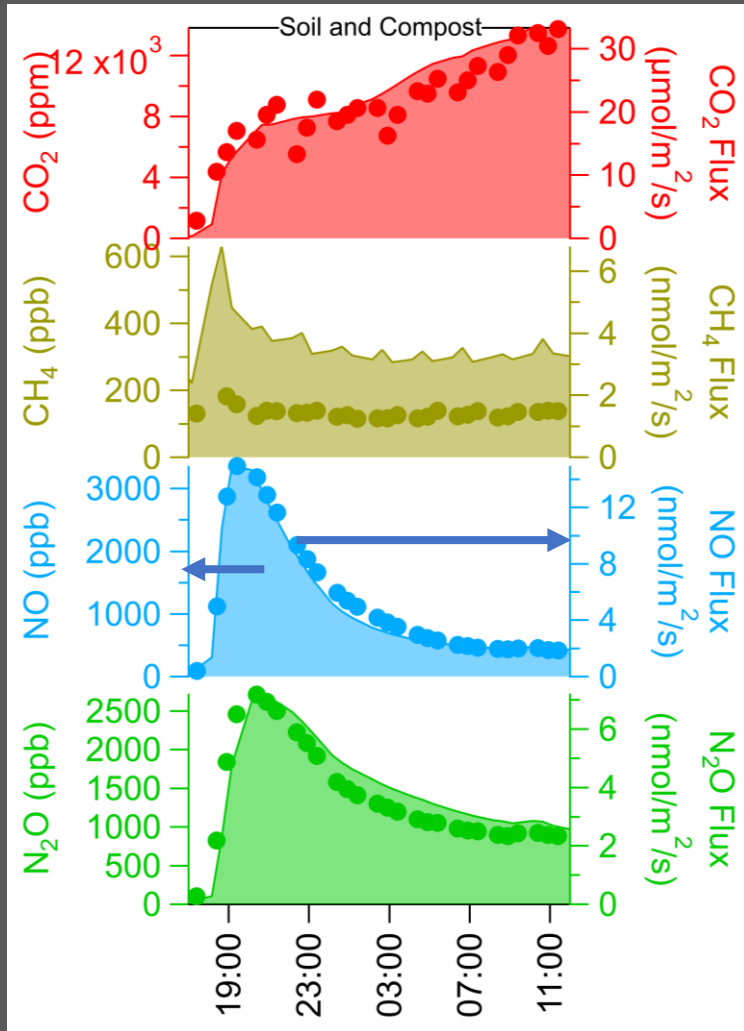
- Buried hydrophobic porous probes
  - Subsurface dynamics by carrying subsurface gas to instruments
  - *spatially* and *temporally*-resolved dynamics with high signal-to-noise
  - **Quantifying:  $N_2O$ ,  $NO$ ,  $CO_2$ ,  $CH_4$ , VOCs**  
Measuring both *subsurface* and *fluxes*

- 3x 20 L columns, single probes buried ~10-25 cm below surface
  - 1) northern temperate forest soil
  - 2) 50/50 northern temperate forest soil / town compost
  - 3) 50/50 northern temperate forest soil / composted manure



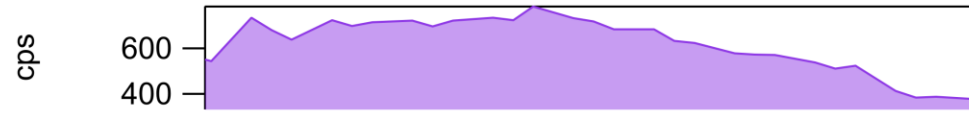
# Trace Gases From 3 Columns – Rewetting After Drought

- Comparable behavior between all three columns *despite different composition*
- $\text{N}_2\text{O}/\text{NO}$  pulses fast compared to  $\text{CO}_2$  response • NO pulse precedes  $\text{N}_2\text{O}$  • Fluxes (circles) temporally match subsurface concentrations (shaded)



# Subsurface VOC Response to Rewetting

ethanol



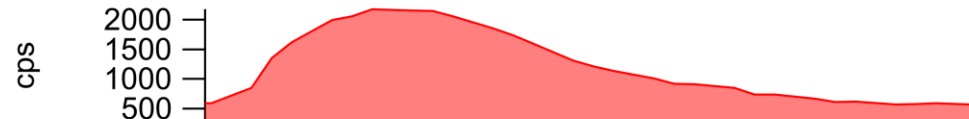
CO<sub>2</sub>



sesquiterpenes



monoterpenes



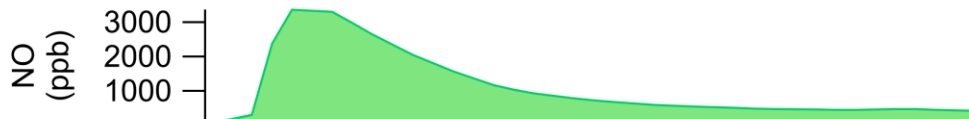
isoprene



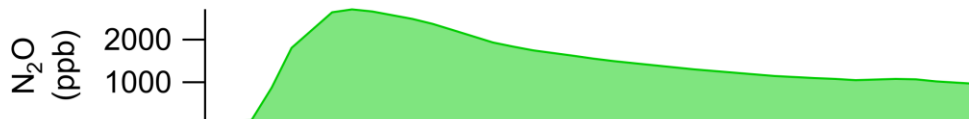
acetonitrile



NO



N<sub>2</sub>O



- Rise and fall among metabolites
  - Characteristically different responses among VOCs
- Acetonitrile follows N<sub>2</sub>O
- Isoprene, mono-, sesquiterpenes slower response
- Ethanol slowly decreases