

How will forests change the atmosphere in the future?

How will isoprene emissions and canopy concentrations change under elevated CO₂ in a mature temperate woodland?

What is Isoprene?

- **Isoprene** is the **dominant** Volatile Organic Compound (VOC) emitted **globally**.
- It plays an important role in plant **oxidative stress resilience**.
- It drives local and regional atmospheric chemistry, governing the chemical **formation** and **loss** of tropospheric **ozone** and **secondary organic aerosols**.
- **Oak** is the dominant **isoprene emitter** at BIFOR FACE.

Previous Literature

- Elevated CO₂ has been shown to have **inhibitory** effects on isoprene emissions **per leaf area**.
- Most research has concentrated on **short term** fumigation and **saplings**.
- Therefore, understanding how this dynamic work in a **mature woodland over a long period** is the aim of this research.

Summer 2019

- Isoprene emissions from oak leaves in the canopy were measured in arrays 5 and 6 using GC-MS.
- Emissions were **normalized** using **Temperature** and **PAR**.
- Normalized Emission Rates were **suppressed** under **eCO₂**.

2022 Results

- **Isoprene concentrations** were measured at **three heights** (Above Canopy, In Canopy and Understory) in arrays 5 and 6 using GC-MS.
- Data was normalized using **temperature**, **PAR** and **soil moisture**.
- **Isoprene concentrations were reduced** at all heights under **eCO₂**.

Conclusion

- Isoprene **emissions** and canopy **concentrations** are **suppressed under long term fumigation** in a **mature** temperate forest.
- This has consequences for **forest resilience** and **atmospheric chemistry**.

