

New directions in the measurements of organic nitrates: field observations and lab studies

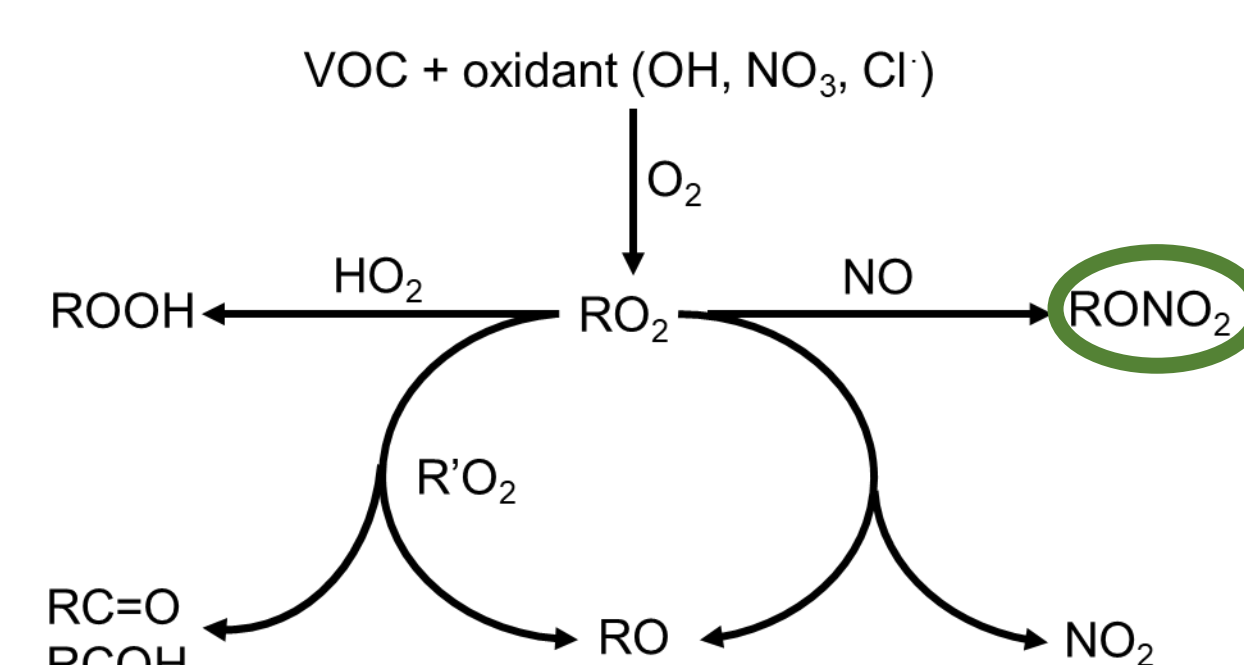
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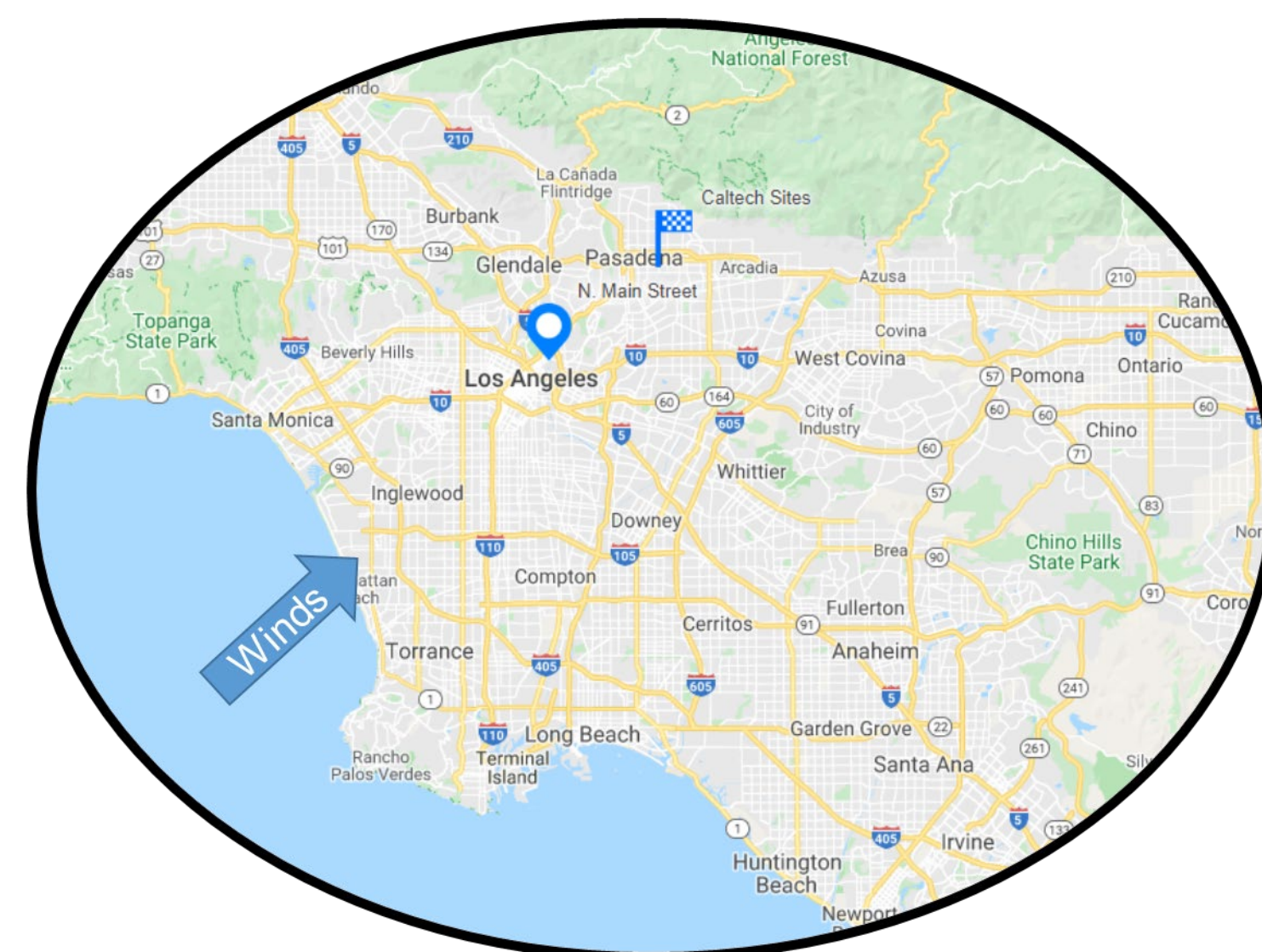
Importance of organic nitrates (ONs) in the troposphere



- ONs are an atmospheric reservoir for NO_x
- 10% of NO_x oxidized to ON over southeast US, 50% over Amazon¹
- ONs impact global OH concentration projections by up to 7%²

Ambient Measurements

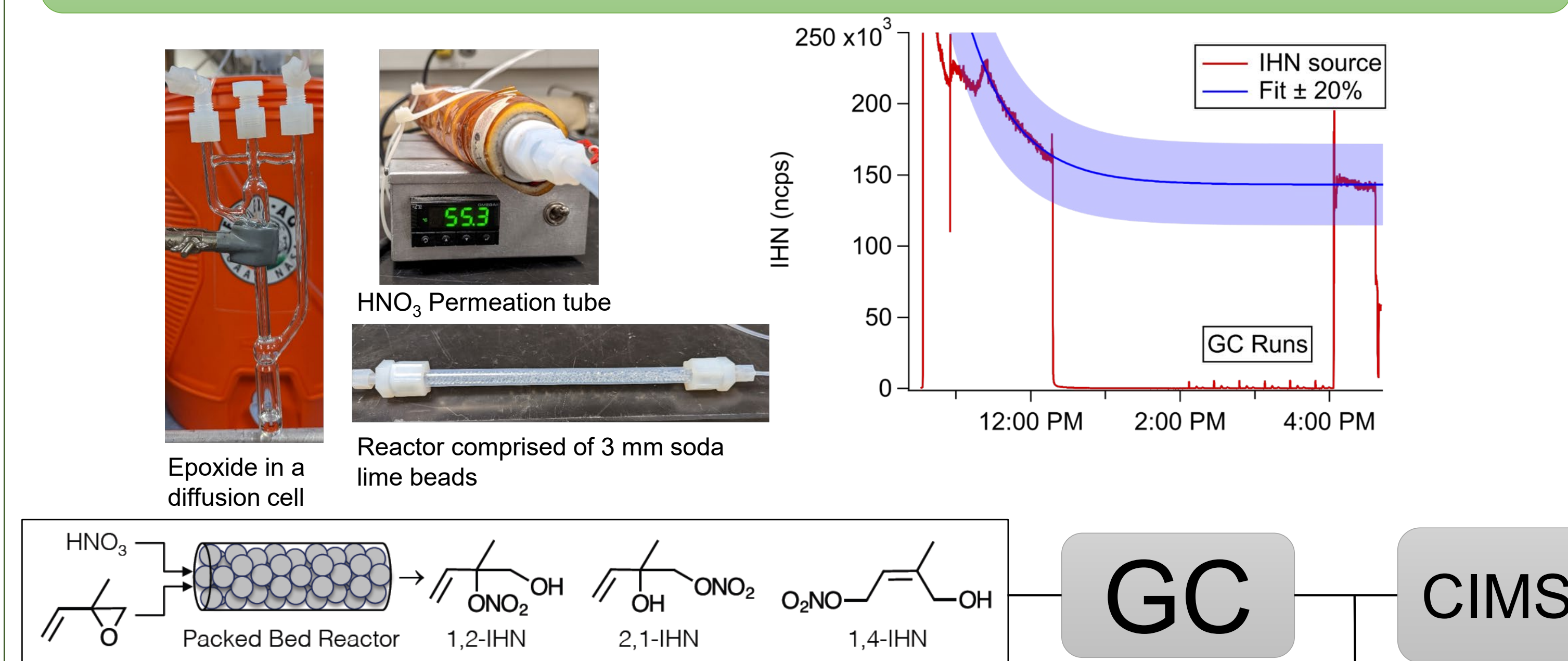
- Summer of 2021: NOAA Iodide (I⁻) chemical ionization mass spectrometer (CIMS) was deployed at a Pasadena ground site to help evaluate trends in regional air quality



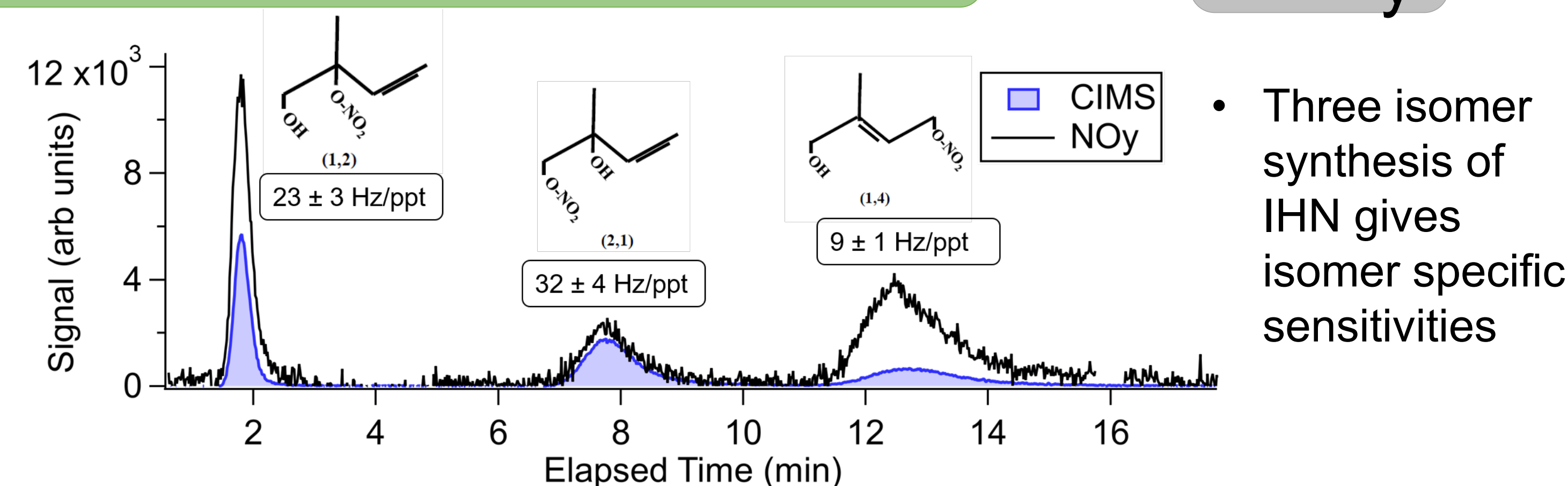
Online synthesis and calibration

- Coupling gas chromatography (GC) with NO_y and CIMS allows for quantitative calibration of I⁻ CIMS sensitivity to ONs^{3,4,5}

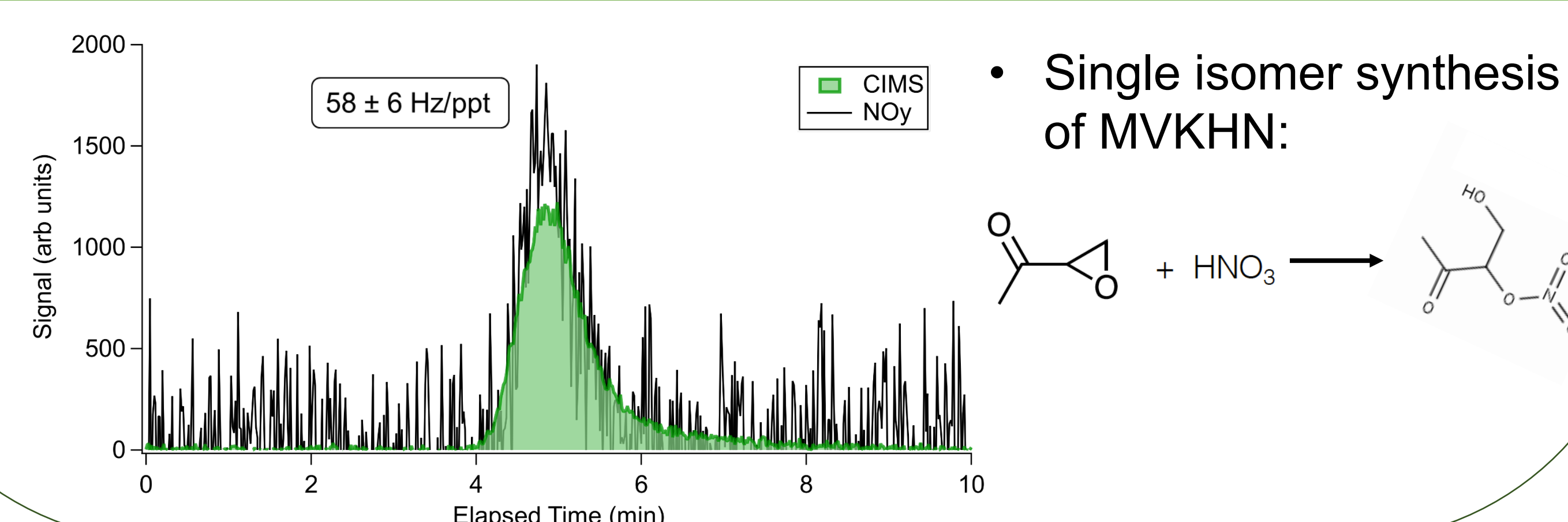
Isoprene hydroxy nitrate (IHN) synthesis



IHN gas chromatography:

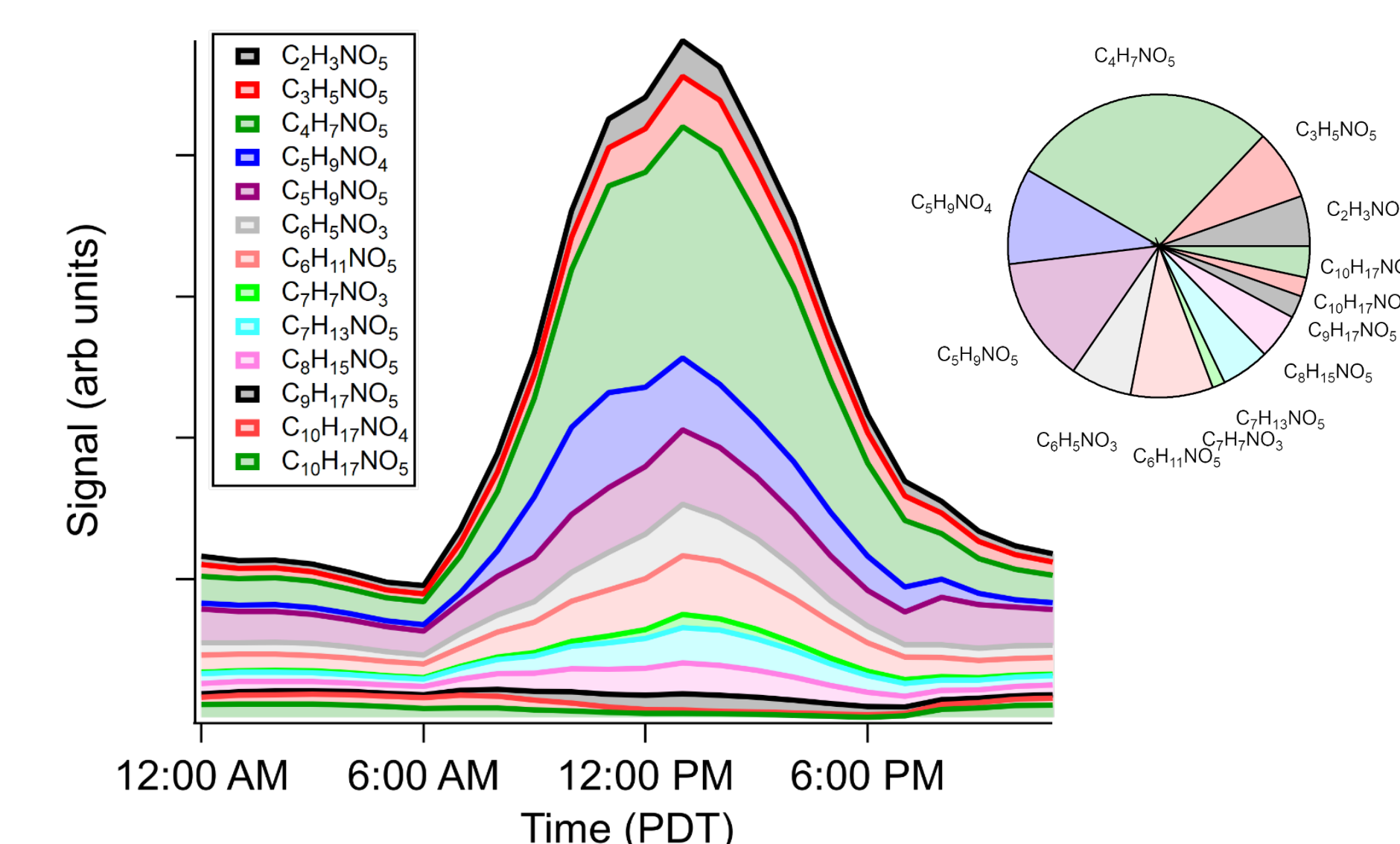


Methyl vinyl ketone hydroxy nitrate GC:



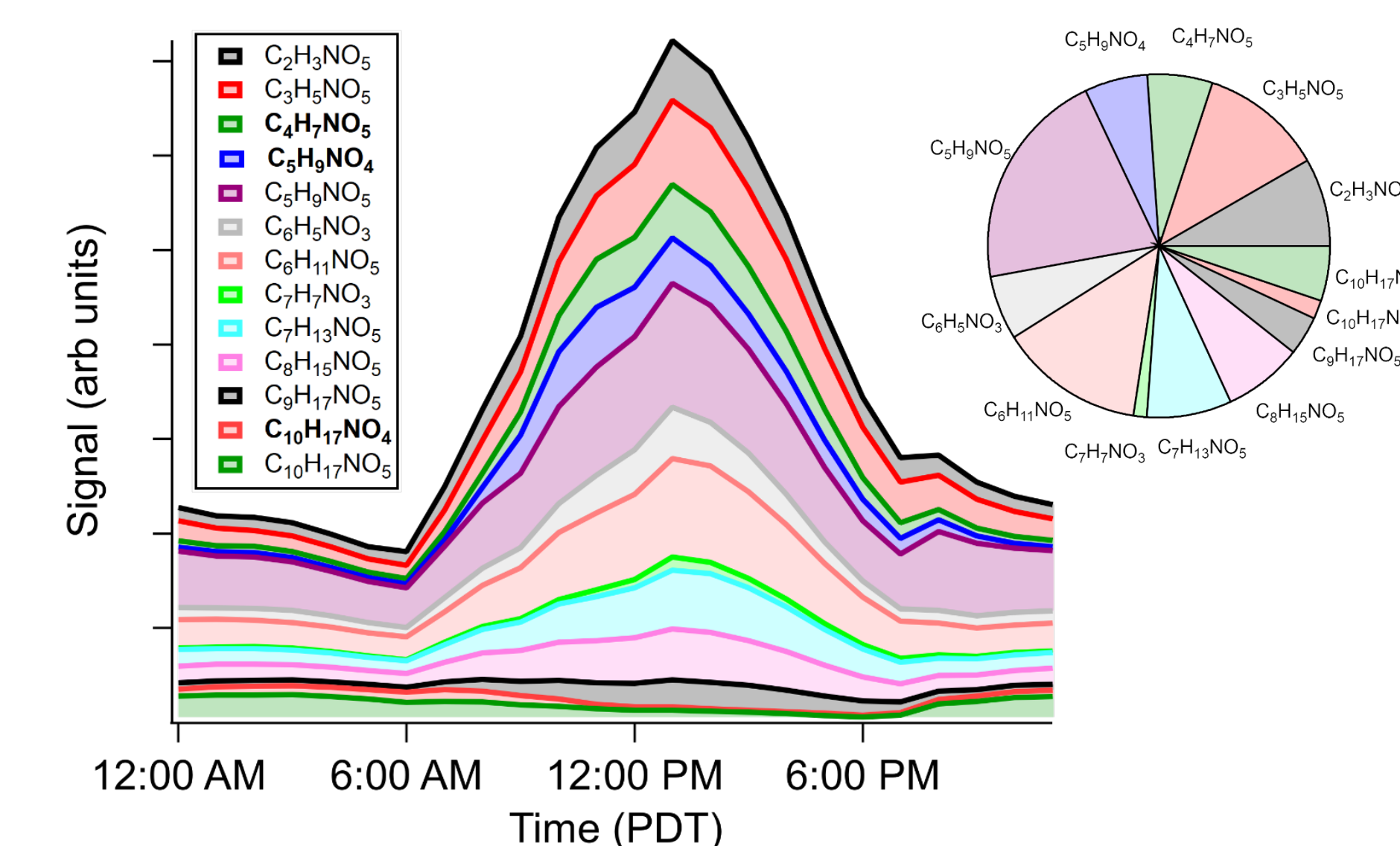
Calibration determines partitioning of ONs

Field observations from Pasadena, CA 2021:



- Assuming constant sensitivity, MVKHN (30%) and IHN (10%) are dominant signals in the ON mass spectra

After calibration



- Due to MVKHN's high sensitivity, it's contribution to the ON budget decreases to 6%

Future work

- Further calibration of complex ONs
- Major aircraft campaign in 2023 to evaluate trends in continental North America air quality

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References:

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