**Solar Induced Fluorescence (SIF) as an Indicator of Photosynthesis**
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Plants shape the composition of the air we breathe through the process by which they transform sunlight, water, and carbon dioxide gas into oxygen that they release into the air and into sugar that they use to fuel their growth. Information regarding the rate of this process, called photosynthesis, is useful for foresters, farmers, ecologists, and for scientists who study climate change. Current methods to measure rates of photosynthesis of plants are time-consuming, labor-intensive, and do not scale well. This summer, I collaborated with Professor Barry Logan and Jaret Reblin at Bowdoin College, Bowdoin students David Bombard and Elena Sparrow, a team of scientists at the National Institute of Standards and Technology (NIST) in Maryland, and scientists from Boston University to test whether prototype sensors could measure plants' rates of photosynthesis in real-time.

The sensors that I worked with measure a fluorescent signal that plants emit called solar-induced fluorescence (SIF). My research team investigated whether this signal could be a proxy for how much photosynthesis occurs at a given instant in leaves on a select branch. SIF levels have been shown to correlate with the

the branch scale. We measured the photosynthesis rates and SIF values of leaves on select branches of pin oak and tuli

that causes them to close their stomata, small apertures on the leaf surface that enable them to exchange gasses and undergo photosynthesis. We also cavitated branches through pressurizing sections of these branches to shut down photosynthesis. After imposing these treatments, I was involved in using a gas-exchange instrument to measure photosynthesis and a spectrometer to collect SIF data. I also helped collect samples from these select leaves and analyzed their pigment compositions back at Professor Logan's lab at Bowdoin to gain i