

The Sweet Briar College Land-Atmosphere Research Station (SBC-LARS) became operational in July, 2014 and features a 37-meter triangular tower within an 18-meter-tall, ~25 year-old, loblolly pine plantation (~27 ha) that is surrounded by mixed deciduous forest at the eastern edge of the Blue Ridge Mountains. The primary research focus at the facility is currently determining controls on atmospheric new particle formation (aerosol nucleation) in a region strongly influenced by biogenic volatile organic carbon (BVOC) emissions. However, the tower's location in a privately-owned, loblolly pine plantation presents interesting opportunities for research and experimental manipulations within a managed ecosystem that is expanding across regional and global landscapes. The PI is currently seeking collaborators to develop research projects in these areas.



Dr. Tom O'Halloran and Dr. Jordan Barr (whose assistance we gratefully acknowledge) during installation, and a view of the tower.



View from the tower looking north

squares denote the strongest, most homogenous (class 1) events, and green squares denote the more transient, class 2 events.





The site features line power and a climate-controlled laboratory with high-speed internet. The tower supports meteorological instruments above and below the canopy at three different heights (2, 26, and 34 meters) and two air sampling inlets located above the canopy (see table).



8-hour back trajectories of air parcels reaching the sampling site could be divided into four clusters (Stag., NW, SW, and NE). Almost half of the air parcels originated from stagnant air.



Instrument	Model	Measured Variable	Derived variables	Height (m)
Aerosol OPS	TSI 3330	Aerosol size distribution	0.3 to 10 µm diameter range	3
Aerosol SMPS	TSI 3034	Aerosol size distribution	10 to 430 nm diameter range	21
Anemometer	RM Young Propeller	Wind speed/direction	wind shear	21, 33
Barometer	Setra 278	Barometric pressure	N/A	2
Gas inlet	ThermoFisher 42i, 43i, 49i	O ₃ , SO ₂ , NO, NO ₂ , NO _x	N/A	21
Pyranometer	Hukseflux LP02	Solar radiation	Shortwave albedo	21
Quantum sensors	Licor LI-190SL	Photosynthetically active radiation	PAR albedo, APAR, fAPAR	2, 21
Thermistor/hygristor	Vaisala HMP60	Air temperature, relative humidity	Static stability	2, 21, 33
Tipping bucket rain gauge	Texas Electronics	Precipitation	N/A	21

Air from the stagnant cluster (Stag.) was characterized by low velocity, and originated from all directions. Air from the southwest cluster (SW) was generally faster than that from Stag., and only contained air parcels from the south west. The fastest moving air parcels came from the north west (NW) and north east (NE) clusters.

Research experience for undergraduate women

The Sweet Briar College is a liberal arts college for undergraduate women. LARS provides hands-on research opportunities in areas where women are usually underrepresented, including atmospheric science and engineering. The site is also an excellent platform for community outreach.





(Clockwise from upper left) Research student Verena Joerger describes equipment at the site to visitors during the Summer Honors Research Program and then drills a new mounting plate. Dr. O'Halloran points out equipment on the tower to a group of visitors, and Joerger celebrates her first climb to the top of the tower.



support of SBC-LARS. Photos by Meridith De Avila Khan/Sweet Briar College and TLO.