

We propose to install and operate an ionospheric radio sounder, or digisonde, at the Ordway Swisher Biological Station for a period of ten years.

This research effort aims to perform electromagnetic observations of the long-distance effects of lightning. We are investigating the effects of both natural and rocket-triggered lightning on the ionosphere (60-300 km altitude). Natural lightning occurs often in Florida (of course!), so we expect to make immediate use of this radio sounder. We also conduct rocket-triggered lightning experiments at the International Center for Lightning Research and Testing (ICLRT) at Camp Blanding, Florida. Rocket-triggered lightning provides a unique opportunity to perform high resolution measurements of the effects of lightning, primarily because we know when and where we will launch the rocket (at Camp Blanding).

The digisonde consists of a ~100-foot tower with an antenna at the top. Several small receiving antennas are placed a short distance away from the tower. The entire system requires ~1 acre of space. The digisonde broadcasts short bursts of radio waves between 1 and 10 MHz and listens for the radio echoes as the waves reflect from the ionosphere. The system is used to quantify the electron density of the ionosphere as a function of altitude between ~100 and 300 km. We expect that thunderstorms and lightning will produce changes in electron density at these altitudes, and we aim to prove it using this instrument. The digisonde is remotely operable. It will be connected to power and Internet. The general mode of operation will be for the digisonde to perform one ionospheric scan per hour. During thunderstorms over Florida, scans will be performed more frequently.