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Winterization and Upgrade of Remote Weather Station

The Optical Remote Sensor Laboratory (ORSL) operates a weather station at the field test site of the Zero Emissions Research and Technology Center (ZERT), located on the Montana State University (MSU) Agriculture Experiment station a few miles west of campus. The weather station uses a wireless link to transmit data to ORSL in Cobleigh Hall on the MSU campus. The ZERT weather station was traditionally not operated in the winter, because ZERT's research is confined to the summer months and because the cold weather causes frequent loss of battery power and a weakened wireless link. However, ORSL has expanded its use of the ZERT weather station to include long-term climate monitoring, which requires that it be operated year-round. To achieve this, the power system of the weather station must be upgraded. General improvements must also be made to improve overall performance and to protect against lightning strikes and other damage. The upgrade of the ZERT weather station consists of three phases. First, the components of the weather station's wireless link are tested in low temperatures to assess their performance and capabilities in cold weather. The power system of the weather station is then redesigned based on the results of the low temperature tests to ensure optimal year-round performance. Finally, the redesigned components are deployed at the ZERT field site and field tested to determine their effectiveness.