Athabasca University Geophysical and GeoSpace Observatories (AUGO and AUGSO)

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Athabasca University has operated geophysical instruments at AUGO (113º49’ 42” W,54º49’ 42” N) since 1998, and now (since 2012) most are located at AUGSO (113º38’ 40” W,54º36’ 10” N) in a very dark rural location. The geomagnetic latitude of about 61º, less than that of most comprehensive observatories, has led to insight into subauroral and transition region processes. The new AUGSO location has residential facilities capable of hosting up to 9 researchers for campaign style work or installation of equipment. An important feature is fiber optic internet access to both sites, allowing remote operation of instruments. Although most instruments have dedicated, restricted access, sky conditions may be verified, or live auroras may be viewed if they are present, when it is dark, at http://autumn.athabascau.ca/auroracamhd.htm . A magnetometer of the AUTUMN network has operated at the site since 1998, however should not be confused with the nearby NRCan observatory, Meanook. Sample data for the AUTUMN network during the St. Patrick’s Day Storm of 2015 may be found at http://autumn.athabascau.ca/autumnquery.php?year=2015&mon=03&day=17 . Navigation to other pages is easy from there. The AUTUMN sites do not all have the same type of magnetometer, but most take measurements every second, or at 2 Hz, and the data are publicly available and contributed to THEMIS and via there to CDAWeb.

Since 2003, imaging has been done from the Athabasca location. A NASCAM All-Sky Intensified imager was operated from 2004 to 2012, when it was superseded by an EMCCD-based multispectral imager manufactured by Keo Scientific Ltd., at the new, darker site. THEMIS allsky monochrome imagers were tested at Athabasca, and one currently operates there. In 2005, an OMTI multispectral imager was installed along with an H-beta spectrometer. A particularly fruitful field has been that of proton auroras, for which the subauroral location and very dark skies are well suited. Search coil magnetometer detection of Pc1 pulsations coincident with detached proton auroras showed the importance of EMIC waves in causing proton precipitation. More recent coordinated investigations have involved faster imaging so that pulsations in the proton aurora could be detected, as well as VLF emissions coincident with proton auroras and compression events. A riometer was recently installed. Instrument development has also been fostered by AUGSO, most notably the FESO meridian imager which is photomultiplier based with advanced background removal, taking H-beta detection into a new realm of sensitivity and temporal sampling. The combined comprehensive instrumentation is expected to soon be coordinated with in situ measurements by the ERG/Arase satellite, and some preliminary studies involving Van Allen probes have been done.

We continue to operate two sites, with the original one used mainly for instrument testing and support of

a telescope and non-auroral guest instruments. Some specialized studies benefit from having two sites, and we have been very successful in stereo imaging of noctilucent clouds (NLC). Rapid motion of auroral forms has meant less success in stereo studies, but there is great potential.
External instrument development has involved Canadian commercial companies Keo Scientific and Unihedron, both taking advantage of the auroral zone location for optical detection. We are extending our magnetometry and electronics expertise into other domains as well, with most testing done at AUGO.
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