CONJUGATE GROUND-BASED MAGNETIC OBSERVATIONS FOR HEMISPHERIC ASYMMETRY RESEARCH IN THE NEXT DECADE. P. J. Chi[1], [1]Department of Earth, Planetary and Space Sciences, University of California, Los Angeles (Box 951567, Los Angeles, CA 90095, pchi@igpp.ucla.edu).

Many conventional geospace models assume symmetry between the two hemispheres. While this assumption is good to the zeroth order, an increasing number of studies have demonstrated that many geospace phenomena exhibit clear north-south asymmetry. This asymmetry has often been attributed to the offset and tilt of the magnetic dipole, the differences in ionospheric conductivity due to seasonal illumination effects, and the effects of interplanetary magnetic field (IMF) orientation.

We can therefore expect that the geospace where all regions are interconnected in this intricate system should possess some level of hemispheric asymmetry. This means that the complete understanding of geospace phenomena must include the knowledge of the differences between nominally magnetically conjugate hemispheres. The time has arrived to incorporate hemispheric asymmetry into geospace observations and models in order to improve future space weather forecasting.

While several ground-based magnetometer projects are providing conjugate observations between the northern and southern hemispheres at high and low latitudes, conjugate magnetometer networks at auroral latitudes are still seriously lacking. Figure 1 shows that the best magnetically conjugate lands at auroral latitudes are between eastern Canada and West Antarctica. The auroral latitudes are the region in the geospace where most dramatic changes in the electric currents take place.

Establishing new ground-based magnetometers in West Antarctica that are magnetically conjugate to the stations in east Canada can fill the critical observation gap for hemispheric asymmetry research. Because the auroral electrojets are known to shift equatorward drastically during magnetic storms, it is necessary to implement at least a chain of magnetometers instead of a single station. The snowy weather in West Antarctica, however, presents many technical and logistical challenges in operating and maintaining ground-based instruments. More efforts and investments can overcome these hurdles and enable the needed conjugate magnetic observations in the next decade.

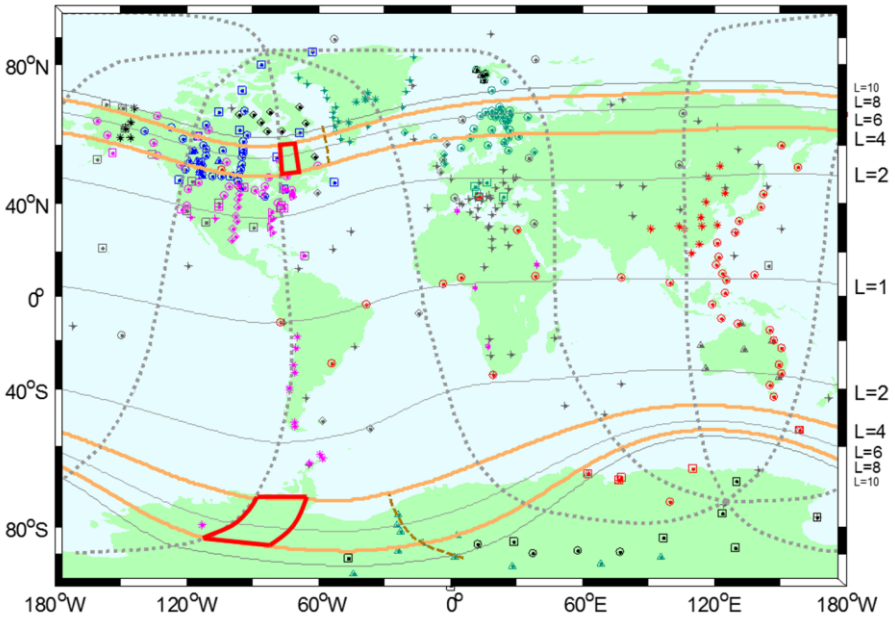

Figure 1. World map of magnetic observatories. Two red rectangles denote the only magnetically conjugate regions where a continuous coverage of *L*-values between 4 and 8 is available for ground-based measurements. The Canadian AUTUMN-X project has installed magnetometers in the northern red rectangle in this map.