**GIC during strong geomagnetic activity on 23-24 April 2023**

*P.V. Setsko1, I.V. Despirak1, Ya.A. Sakharov1, A.A. Lubchich1, R. Hajra2, G. Lakhina3, V.N. Selivanov4, B. Tsurutani5*

*1 Polar Geophysical Institute, Apatity, Russia*

*2 University of Science and Technology of China, Hefei, China*

*3 Retired, Vashi, Navi Mumbai, India*

*4Northern Energetics Research Centre KSC RAS, Apatity, Russia*

*5 Retired, Pasadena, California, USA*

A thorough analysis of geomagnetically induced currents (GICs) during a complex space weather event has been conducted. This event involved two geomagnetic storms with SYM/H indices of -179 and -233 nT, triggered by southward Interplanetary Magnetic Field (IMF) conditions with Bz values of -25 and -33 nT during both sheath and magnetic cloud (MC) periods. Observations of GICs were divided into two time segments: nighttime (1700-2400 UT on April 23) during the interplanetary sheath magnetic storm, and morning (0000-0700 UT on April 24) amid the magnetic cloud magnetic storm. Our analysis utilized direct GIC measurements obtained from two substations along the Karelian-Kola power line (located in north-west Russia) and a gas pipeline station near Mantsala (south of Finland). These data, combined with IMAGE magnetometer data and MIRACLE ionospheric equivalent current distribution, enabled us to concurrently track the increase in GICs and geomagnetic disturbances along the meridional profile across various latitudes (from approximately 57 to 66 CGMLAT)

It was demonstrated that the rise in GICs during the nighttime period (ranging from approximately 18 to 42 A) coincided with the poleward expansion of the westward electrojet during a substorm. Conversely, the notable increase in GICs during the morning period (ranging from approximately 12 to 46 A) was associated with Ps6 pulsations. Furthermore, it is particularly intriguing to note that there was a weighty GIC recorded (44 A at ~0400 UT) concurrently at all stations, coinciding with a local substorm-like disturbance. This disturbance could potentially be attributed to a high-density solar wind structure, such as a segment of a coronal loop within an Interplanetary Coronal Mass Ejection.