Geophysical Research Abstracts
Vol. 20, EGU2018-1892, 2018
EGU General Assembly 2018

Extreme Space Weather (ESW) Such as the 1859 Carrington Magnetic Storm: What Caused Electrical Arcing and Fires on the Ground?

Bruce Tsurutani (1), Rajkumar Hajra (2), Gurbax Lakhina (3), and anthony mannucci (1)

(1) Jet Propulsion Laboratory MS169-506,California Institute of Technology, Heliospheric Physics, Pasadena, United States (bruce.tsurutani@jpl.nasa.gov), (2) CNRS, Orleans, France, (3) Indian Institute of Geomagnetism, Navi Mumbai, India

The 1859 Carrington magnetic storm is the most intense magnetic storm in recorded history, reaching an estimated peak Dst value of $\sim$ -1760 nT. During the storm, people who were close to open ended wires received electrical shocks. Fires were started in telegraph stations. With today's technology, power grids would have been damaged. This is just one facet of an extreme space weather event. However a question that has not been addressed is "what is it about the Carrington storm that caused such strong voltages at Earth?" One thought is that intense substorms and their concomitant intense ionospheric currents flowing at $\sim$100 km altitude (the auroral electrojet) are the cause of induced electric fields at the Earth's surface. We will discuss some recent work on the causes and properties of "supersubstorms", substorms with SML (or AL) indices < -2500 nT.