

INTENSE SOLAR STORMS; CORROBORATION OF PREHISTORY ROCK RECORDINGS AND THEMIS MULTISPACECRAFT OBSERVATIONS

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The identification of prehistoric petroglyphs as artists recordings of MHD Z-pinch column instabilities has led to a global survey of these in 139 countries, from 70°N to 48°S.¹ In all cases, after a survey of fields of several million glyphs, the field-of-view (FOV) alignment is found to be within 1° of true south. This accuracy was determined from south-viewing caves in the Arnold Lave Tube system in Oregon and California, caves along 300 km of the Orinoco River in Venezuela,³ and the braided lava tube caves of Easter Island. Each unmoved petroglyph is treated as a pixel containing GPS position, survey transit FOV, and angle of inclination. GIS techniques on a 1-petaflop computer allow the reconstruction of a virtual image of the multi-gigaampere aurora. The reconstructed image shows one plasma column into the true South Pole at Antarctica. As the very intense solar storm appears sporadic, and its duration is very long compared to milder storms, it is not known if it was periodic, that is, if a north column once existed and evidence eroded due to time. Corroborating these results were witnesses of the polar storm of 1859 who reported 'figures in the sky as if drawn with fire on a black background'.⁴ Unexpected were the 2008 observations of the THEMIS spacecraft whose discoveries were contrary to long standing views of how and when solar plasma enters the Earth's magnetosphere. A northward IMF orientation was found to allow 20 times more solar wind plasma to penetrate the magnetosphere when the sun's magnetic field is aligned with that of the Earth.⁵

¹A. L. Peratt, Characteristics for the occurrence of a high-current z-pinch aurora as recorded in antiquity. *IEEE Trans. Plasma Sci.* v.31, pp.1192-1214, 2003.

²A. L. Peratt, J. McGovern, A. H. Qöyawayma, M.A. Van der Sluijs, and M. G. Peratt, Characteristics for the occurrence of a high-current z-pinch aurora as recorded in antiquity Part II: Directionality and source. *IEEE Trans. Plasma Sci.* v.35, pp.778-807, 2007.

³A. L. Peratt and W. F. Yao, Evidence for an intense solar outburst in prehistory, *Physica Scripta*, T131, October 2008.

⁴S. Clark, *The Sun Kings: The Unexpected Tragedy of Richard Carrington and the Tale of How Modern Astronomy Began*, Princeton University Press, 2007.

⁵D. G. Sibeck, M. Øieroset, J. Raeder, and W. Li, Breach in the Earth's magnetosphere discovered, 2008 THEMIS Science Nuggets.