

Japan Geoscience Union Meeting 2011

(May 22-27 2011 at Makuhari, Chiba, Japan)

©2011. Japan Geoscience Union. All Rights Reserved.



AEM002-05

Room:201A

Time:May 27 09:30-09:45

ISUAL recorded halos brightness and their parent lightning emission

Cheng-Ling Kuo^{1*}, Earle E. Williams², Jozsef Bor³, Gabriella Satori³, Toru Adachi⁴, Alfred Chen¹, Han-Tzong Su¹, Rue-Rou Hsu¹, Mitsuteru Sato⁵, Yukihiro Takahashi⁵

¹Physics, Natl Cheng Kung Univ, Taiwan, ²Parsons Laboratory, MIT, USA, ³Hungarian Academy of Sciences, Hungary, ⁴Stanford University, USA, ⁵Cosmoscience, Hokkaido University, Japan

Halo, another type of transient luminous event, is a bright disk at altitude 80-85 km above the thunderstorm. Unlike the fact that almost exclusively +CG triggered sprites, most of halos were induced by -CG that occurred exclusively over the open water [Frey et al., 2007]. In this presentation, we analyzed total 185 ISUAL recorded pure halo events from July 2004 to Dec 2007. Using 1PN2-filter Imager, the average brightness of halos is ~ 0.25 MR. We also derived the current moment using the 777.4 nm lightning emission of their parent lightning to [Adachi et al., 2009]. It is found that a relatively strong linear relationship between lightning peak current and lightning-induced halo emission. In total recognized 121 events by ELF radio emission at Nagycenk Observatory (NCK), Hungary, the polarities of their parent lightning for 23 halos are identified as +CG while 98 halos are for -CG associated with NCK recorded ELF data. From NCK estimating CMC, we found a relatively weak correlation between NCK CMC and halo brightness. Furthermore, the extremely brightest halos over ocean were also found, and their lightning polarities were dominated by -CG. The finding reflects the nature of intense peak current for oceanic lightning [Fullekrug et al., 2002]. It seems that lightning current may have more important effect on halos generation than charge moment.

Keywords: ISUAL, Halo