

Interactive comment on “Global Distribution of Winter Lightning: a threat to wind turbines and aircraft” by J. Montanyà et al.

Anonymous Referee #1

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The paper is the first to discuss the global activity of winter-type lightning as the authors write, and is valuable to the community considering the importance of lightning protection against this type of lightning. It requires some revision, however, e.g. it lacks explanation on the definition of winter lightning, and an important aspect of winter lightning around Japan. It follows specific comments.

Fig. 1 d) does not match the explanation of page 3, 2nd paragraph, where is written that lower positive charge might not be accumulated.

Fig. 1 e) is wrong. Page 3, 3rd paragraph is explanation of downward positive flash (the cited references are for summer MCS). Fig. 1 e) has to be a cartoon of a downward positive flash.

page 3, line 27: This paragraph refers to downward positive flashes, which rarely strike

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wind turbines or aircrafts in the cold season, too. Upward positive flashes are the threat to wind turbines in winter, and this is a different phenomenon from that explained in this paragraph.

page 5, Section 3.1.1: Adachi et al. examined sprite-producing storms only. Sugita and Matsui (2008) report on other type of lighting activity in the cold season. They call it “isolated type”, producing only a few lightning flashes a day, and is clearly distinguished from JPCZ-type, which is much more active (may correspond to Sugita and Matsui’s coastline type). The isolated type may not produce sprites, but contributes significantly to winter thunderstorm days of over 30 around Japan. reference: Akiko Sugita, Michihiro Matsui, “Examples of winter lightning observed by the JLDN”, 2008 ILDC/ILMC, Tucson, Arizona, 2008. <http://www.vaisala.com/en/events/ildcilmc/Documents/Examples%20of%20Winter%20Lightn>

page 5, Section 3.1.2 does not have a reference.

page 6, Section 3.2, 1st paragraph: Basis is not given to the criterion of winter lightning, “temperatures equal or lower than 5°C at the 900 hPa level”. Saito et al. (2012) suggest a boundary of 5.7 km of -10°C level, based on their observation. reference: M. Saito, M. Ishii, F. Fujii, M. Matsui: Seasonal Variation of Frequency of High Current Lightning Discharges Observed by JLDN, IEEJ Trans. P&E, Vol. 132, No. 6, pp. 536-541, 2012.6.

page 6, Chapter 4 and Fig. 5: Tw should be “the number of winter thunderstorm days per year” and not the number of thunderstorms.

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