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Lightning induced whistlers, their penetration through the ionosphere

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We investigate a characteristic size of the area in the ionosphere through which lightning induced whistlers penetrate into the magnetosphere. We use a correspondence between whistlers observed on the DEMETER satellite during a burst mode and lightning discharges detected by European lightning detection network EUCLID. We have analysed approximately 200 passes of DEMETER over the Europe using an algorithm for the automatic detection of fractional hop whistlers. We conclude that the area through which the electromagnetic energy produced by lightning enters into the magnetosphere is up to several thousand kilometres wide and that discharges with higher currents are significantly more effective in producing whistlers. During the night, the intensities of whistlers are about three times higher than during the day for lightning discharges of the same or similar strength. We also show that this size of the area of the penetration is consistent with comparisons of observed spectrograms with results of simulations.