Get closer to the mustery of Sprites and Elves.

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We have been researching Transient Luminous Events such as sprites and elves. Transient Luminous Events are luminescence phenomena that occur with lightning in the mesosphere at an altitude of about 50 to 100 km, and include sprites and elves. Elves is a donut-shaped light emission phenomenon that occurs around an altitude of about 100 km. It is said that the frequency of occurrence is higher than that of sprites, but even in Transient Luminous Events, the duration of light emission is as short as 1 millisecond or less, so the number of data that we can actually observe is smaller than that in sprites. In addition, since the light emission time is short, the number of frames of the camera does not match, and in many cases the peak of brightness does not appear, so many Elves images are unclear. We are collaborating with 32 high schools across the country. This is the world's largest Transient Luminous Events observation team, and holds many data. This time, we analyzed and considered using data taken at our school and data taken at a joint observation school.
This time we did research on sprites and the mystery of Elves. Sprites are a phenomenon of light emission from electrons that have lost their place due to lightning strikes, so it is natural that they occur just above lightning strikes, but there is an unnatural point of about 50 km away from the lightning strike point, and the reason is unknown . Therefore, we identified locations of sprites, elves, lightning strike points for events with very low shooting frequency, where elves and sprites occur simultaneously, and observe simultaneously at multiple schools, and consider their positional relationships.
In addition, it is known that the electromagnetic pulse that causes Elves is generated by the time change of the current intensity, is strongest at a right angle to the current, and emits light by moving the electrons in the sky. However, it is often the case that the lightning strike point and the center of Elves are separated, and the reason is not known. Therefore, it is assumed that the lightning that generates Elves extends horizontally for several kilometers in the cloud and then strikes directly under it, and it is thought that it is impossible to deduce the shape and location of Elves from the intensity distribution of electromagnetic waves emitted from the horizontally extended current. The experiment was performed using a simplified model.

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