A global mechanism creating low atmospheric luminous cold plasmas

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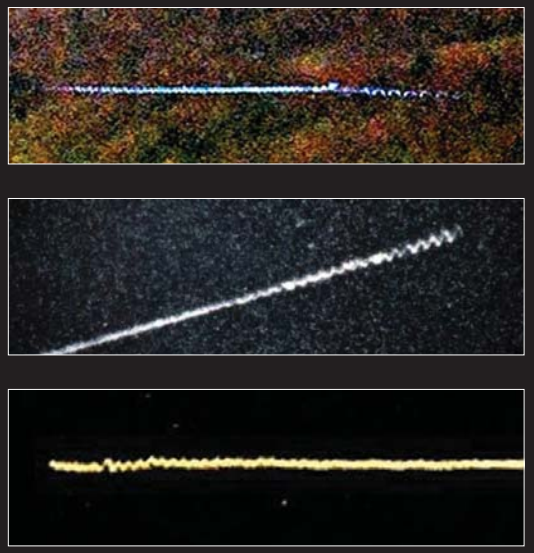
White/yellow and blue Balls of light have been observed in the low atmosphere over the Hessdalen valley, Norway, standing still and moving horizontally with huge speed. Characteristics of these transient luminous phenomena in Hessdalen, and data from America, suggest that the process which creates these low atmospheric plasmas is a global mechanism, not only localized to the remote and desolated Hessdalen valley in Norway (62°N – 11°E).

Transient luminous phenomena's has been observed in the low atmosphere over the Hessdalen valley for over 200 years. The first written documentation goes back to 1811 when the priest Jakob Tode Krogh wrote about it in his diary. Since 1982, inhabitants, tourists, journalists and scientists have done recurrent observations. E. P. Strand conducted the first scientific campaign in 1984, documenting over 50 observations in one month. 15 years later, Norwegian and Italian scientists installed the first permanent automated research base here. In 2010 French researchers joined this collaboration and installed two additional research bases. This transient luminous phenomenon, TLP, has been detected simultaneously on optical and radar devices, but electromagnetic radiation from this phenomenon has until now eluded detection. Smirnov (1994) and Zou (1994) was among the first scientist who used plasma physics trying to explain this phenomenon. Work done by Pavia & Taft (2010 and 2012) suggests that the TLP in Hessdalen probably is dusty or cold plasma, arranged as a cluster of Coulomb crystals. Optical spectrum data obtained by Strand (1984), Teodorani (2004) and Hauge (2007) showing a continuous optical spectrum support this hypothesis. Pictures of spiraling light rays obtained by Strand in 1984, and Hauge in 2004 and 2010 suggests that this plasma is moving in a strong magnetic field, and might be created by it. Radar reflections from the TLP in Hessdalen obtained by Strand in 1984 and Montebugnoli and Monari in 2007 points towards that the TLP acts as an reflecting surface for electromagnetic waves in the frequencies ranging from 0,4 – 10 GHz, which ionized matter, plasma, will do. The non-explained TLP in Hessdalen may therefor be related to the generation of low atmospheric plasma, created by an undetected energy /excitation source. Data obtained from Mexico and USA seems to correlate with the characteristics of the Hessdalen phenomena, suggesting that the mechanism creating the Hessdalen phenomena is global and not only localized to the Hessdalen valley. These data will be shown and analyzed. Hessdalen is known for having a very high frequency of TLP observations yearly, compared to other places in the world. This very active process creating TLPs in Hessdalen may be connected to magnetic pulsations/storms since several optical observations done the last 6 years are coupled to Aurora Borealis outbreaks in the Hessdalen atmosphere. Aurora borealis is often seen on these latitudes, and this may be one of the explanations for the high observation frequency.

The Hessdalen region is an old mining district with deep mining-shafts, going down to 1000 m of depth, and huge layers of zinc and copper ore. This creates conducting channels for current in the ground and reflecting surfaces for electromagnetic radiation. Examining these physical facts coupled to outbreaks of Aurora borealis may contribute to an better understanding of the mechanisms creating atmospheric plasma in Hessdalen valley and other places in the world.



Spiraling blue rays of light have been photographed several times in Hessdalen, giving evidence of possible plasma vortex/ray moving in a magnetic field. The upper picture is shot in 1984 by E. Strand and the one in center in 2004 by B. G. Hauge. A. Cox shoot the lower picture in northwest Alabama, in USA, showing the same spiraling mechanism as in Hessdalen, and indicating that these phenomena is of a global type, and may be a cold plasma mechanism.

Under the green light from the Aurora Borealis we can se the Hessdalen phenomena flying over the Øyungen lake in the southern end of the Hessadalen valley. The lake is at 811 m altitudes while in the background we can se the mountain Raudhovdet at 1088 m altitudes, not more than 6 Km away from the photographer. During 2006, several observations of this phenomenon has been made right after or during outbreaks of Aurora Borealis, which is not unfamiliar at these latitudes, 62°N, and not being the single mechanism, but merely a contributor, which may make these phenomena so frequent in this area.

Light phenomena's seen in Marfa Texas, USA has similarities with the lights in Hessdalen. Jim Bunnell shot the upper picture in 2004 using a Canon Rebel camera with diffraction grating and B. G. Hauge shot the lower picture using a Canon D80 camera, also with diffraction grating. The continuous spectrum, splitting and horizontal movement seen in both pictures are characteristic for these phenomena.