HESSDALEN LIGHTS AND THERMOLUMINESCENCE FROM ROCK DUST AEROSOLS

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The "Hessdalen Lights" reported in the Hessdalen valley in Central Norway represent a prototype of atmospheric luminous phenomena (Fig. 1a) [1,2]. In general they consist of light balls of many forms and colors, characterized by pulsations, often erratic movements, occasional long duration, and intense emission of energy. Their dimensions range from decimeters up to 30 m. These lights are reported both in the sky and close to the ground. Here we have reported a model (Fig. 1 b,c) that potentially accounts for many of those properties based in the thermoluminescence of rock dust aerosols. Light emission of these unusual atmospheric phenomena is due to thermoluminescence and fluorescence of atmospheric dust aggregates containing fluorite (and its associated minerals: calcite, dolomite, quartz) from the valley floor. The light emission of these minerals is primarily produced by heat released by chemical reactions in the atmosphere.

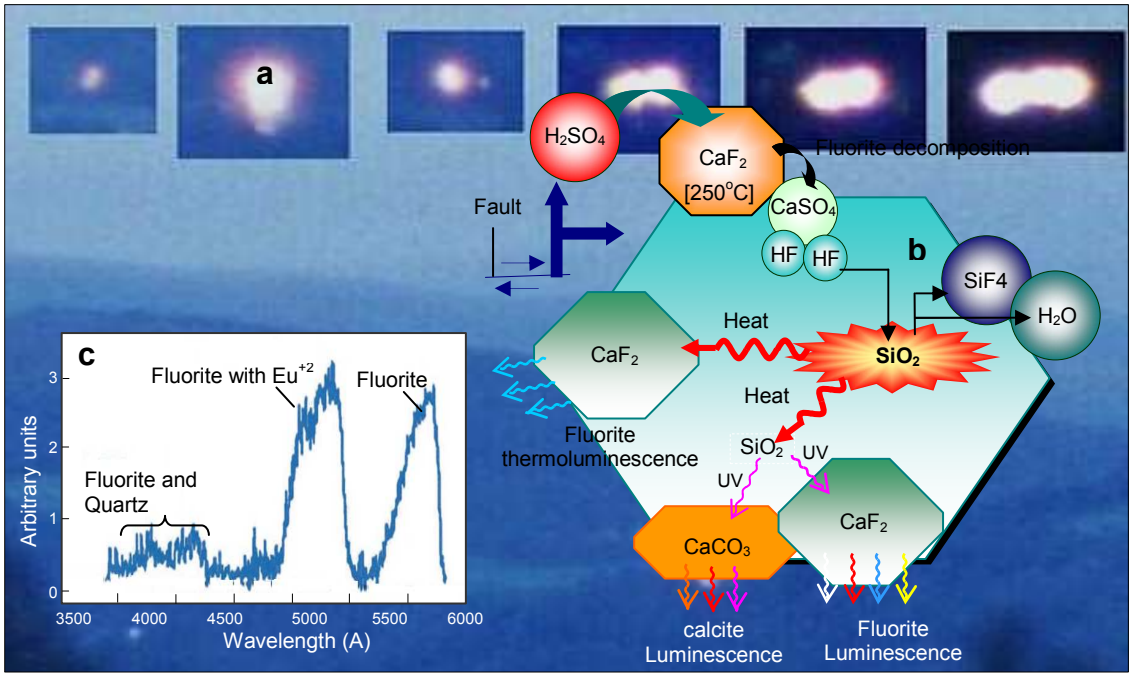

Fig. 1 - Hessdalen Lights (a). The proposed mechanism for the light emission of this phenomenon (b). The spectrum of Hessdalen Light containing emission spectra of rock dust aerosols (c).

Light balls can be produced when thin dust (aerosols) of rocks interacts with humid, sulfurous atmospheric air. The electrostatic attraction amongst aerosol particles of opposed charges (feldspar aerosol and quartz aerosol, with negative charge and calcite with positive one) produces a fractal free floating structure (aerogel). Fluorite, when decomposed by air acidity (in high temperatures), reacts with quartz and products heat (exothermic reaction). Optically stimulated luminescence by long wave ultraviolet radiation (LW-UV) from quartz produces glow peaks in fluorite and calcite in different temperatures. This model can explain the soft light spectrum and long life of anomalous light balls (Fig. 1c).

[1] Teodorani, M., (2004) A Long-Term *Scientific* Survey of the Hessdalen Phenomenon, J. Scient. Expl., 18, 217-251.