THE PUERTO LAPICE EUCRITE FALL PHENOMENON.

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Introduction: The fall of the Puerto Lápice eucrite occurred in the afternoon of May 10, 2007, 17h57m20±2s UTC. This impressive daylight bolide was witnessed by thousands of people from Spain, and is being carefully studied in the framework of the Spanish Meteor and Fireball Network (SPMN) in a similar way that we previously did after the fall of the Villalbeto de la Peña L6 ordinary chondrite [1,2]. Unfortunately, there is no video records to our knowledge of the Puerto Lápice event, but some eyewitnesses were able to take pictures of the persistent train from at least two different locations. Nocturn astrometric calibrations from both places have been obtained, and these data together with *in situ* trajectory measurements with theodolite of casual eyewitnesses have allowed to estimate the atmospheric trajectory and the radiant with reasonable accuracy. A preliminary trajectory reconstruction by the SPMN obtained only two weeks after the event helped to recover the first meteorite specimens. The meteorite was presented on June 11, 2007 during the International Conference Meteoroids 2007 in Barcelona. In addition to the fall phenomena, the interest of this bolide lies in the eucrite nature of the recovered meteorite, that has been recently reported in the Meteoritical Bulletin [3]. Of the 200 eucrites known until 2000, only 25 correspond to observed falls, but the fall circumstances are poorly known except in few remarkable cases like e.g. Pasamonte.

Methods: We made detailed stellar calibrations for the photographic records of the bolide train with horizon details in a similar way as was done for the Morávka [4] and the Villalbeto de la Peña falls [2]. Additionally we interviewed about one hundred eyewitnesses, from which we selected 10 visual reports, seven of which were considered reliable for being measured *in situ* by using a theodolite. In those seven cases the theodolite measurements were calibrated against celestial objects, following the procedure described in [5].

Results and discussion: The pictures of the persistent train and the collected eyewitnesses reports shown that the fireball suffered several fragmentations along its atmospheric luminous trajectory. The main fragmentation occurred at 27 km height. Several sonic booms were audible from several locations in the Spanish provinces of Ciudad Real and Toledo. The early stages of fireball flight in the atmosphere also produced electrophonic sound. Expeditions to the area allowed to obtain quite good eyewitnesses reports, so a preliminary trajectory was obtained a couple of weeks after the fall. Several SPMN recovery groups were in the *Sierra de las Labores* area searching for meteorite specimens, but a meteorite hunter (T. Grau) found the first meteorite on early June. A couple of weeks later the area suffered flooding due to intense rain. For this reason, extensive meteorite recovery activities were delayed until the end of June. Such tasks demonstrated to be complicated due to the characteristics of the landing area, mostly ploughland covered by wineyards, and olive tree fields. In addition, about 90% of the strewnfield was ploughed in the following three months. Since then, several SPMN expeditions to the meteorite strewnfield have allowed the recovery of about 20 specimens exhibiting a shiny fusion crust, and a nice interior exhibiting different lithologies (Fig. 1) [3]. Numerous meteorite hunters traveled to the strewnfield area and removed about 50 pieces more.

The preliminary estimate of the fireball trajectory based on the fireball train images, the position of the largest meteorite (taking into account the wind shift), and 7 eyewitness reports measured with theodolite from various sites, places the radiant at right ascension of 194 degrees and declination of +30 degrees, corresponding to the geographic azimuth of 82 degrees (nearly East) and zenith distance of 50 degrees. Such preliminary trajectory is shown in Figure 2. The coordinates of the lower end of the train are 3.60º W, 39.37º N, and altitude of 25 km. We are still calibrating additional pictures of the train, and searching for additional data so these results should be considered preliminar.

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Figure 1. Piece of the Puerto Lápice eucrite recovered by the SPMN. (Square=1mm).

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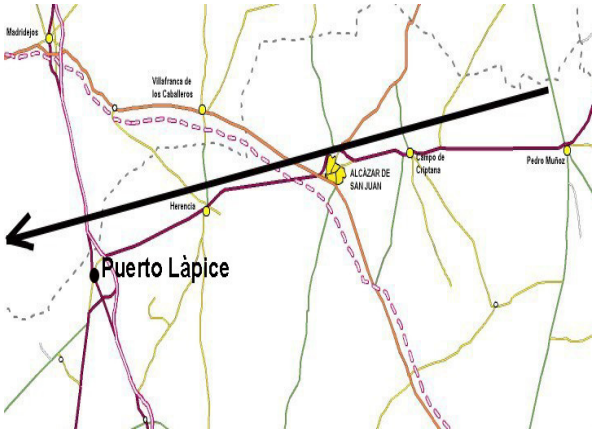

Figure 2. Trajectory projected on the ground of the Puerto Lápice bolide.

Figure 3. Panoramic view of the strewnfield with an artistic reconstruction of the bolide showing its fragmentations on the basis of the pictures and eyewitnesses' reports.