

3D IMAGE-BASED MODELING ON METEORITICS. M. E. Zucolotto¹ and O. N. Grillo¹. ¹Museu Nacional/UFRJ. E-mail: mezuco@globo.com.

Here is described an easy and economical process of acquiring 3D surface data of a meteorite that allows extracting the shape, size and construct a three dimensional model of it.

The technique uses just digital photographs and a 3D software which allows to recognize the position of the camera and the object in each picture and guide a virtual space in order to generate a final model with three-dimensional reproduction of all details of the surface (texture). The model can then be exported to various formats such as VRML (Virtual Reality Modeling Language), 3D flash and others. It also permit a to get a closed 3D volumetric models to reproduce casts of the original sample.

This technique was proposed by the need of acquiring some measurements from Bendegó iron that was not possible through 2D photographs. The photogrammetry is becoming part of modern studies in other science such as Paleontology in which the Paleovertebrate sector of our department have the equipments and the experience in acquiring 3D models of the fossils by this technique [1].

A preliminary work was performed on small specimens of meteorites of the Museu Nacional/UFRJ collection using a photographic camera, Canon Rebel XT_i (28-55mm objective) and the computer program 3D Software Object Modeller Pro 2.1 (3D SOM).

The entire process are resumed in the following the steps: The meteorite is placed on a stand in the centre of special calibration target with a backdrop to simplify masking the scene; it was taken 30-40 photos of the meteorite from several positions against the a printed mat to get all the shape and texture details of its surface from different viewpoints; the distortions were eliminate with a software tool; the background was clean and the brightness/contrast adjusted; than picture masks were created and automatically adjusted followed by wireframe and finally the surface were generated; the 3D file were exported with the VRML.

Such procedure enables fast and low cost 3D acquisition of small and medium meteorite and is also applicable to larger ones with a careful room preparation.

Furthermore, the preliminary results indicated that Image-based 3D modeling is potentially a powerful alternative technique to meteorite reconstructions, specially for web publishing. It can be also used to get a 3D model of it before proceed any cut, so that permit to get posterior information from which part of the meteorite some special sample where obtained. It is also useful to keep information of the original aspect of the meteorites that for trade finalities were cut in many pieces. Closed 3D volumetric models can be used to reproduce casts of original meteorites.

However, the majority of meteoritical works has neglected any quantification of full three-dimensional (3D) shape, it is data base should be useful in any application in order to trying to reconstruct the real loss of mass during atmospheric flight or for ablation studies, in special on oriented meteorites.

The technique is also a promising tool for get the volume of the meteorites for many applications such as bulk density as previously made by visible 3D laser imaging [2].

The various sources of error in the data acquisition and model generation are been considered.

References: [1] Romano, P. S. R. et al. 2006. *Journal of Vertebrate Paleontology* 26: 116A. [2] [McCausland, P. J. A.](#) et al 2007 *Meteoritics & Planetary Science Supplement* 42:5066