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Virtual Meteorite Sections, an Aid to Conservation and Research Access.

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The Natural History Museum in London is the repository for one of the largest collections of meteoritic material in the world with some 5000 registered specimens representing 2000 individual meteorites. The collection consists of a range of examples from large single pieces (e.g. the Cranbourne meteorite weighing in at 3500 kg) to micrometeorites (e.g. the Challenger Cosmic Spherules, each spherule weighing just a few milligrams) and also includes a large number of polished sections and material mounted in resin blocks. Meteorites are extraterrestrial and come from a number of different sources including; Moon, Mars, asteroids, and comets [1]. Each meteorite is unique; no single one is identical in composition and heterogeneity to another, although they can be classified by source and type. These characteristics make them sought after by large numbers of research scientists endeavouring to answer fundamental questions about the solar system. For example, in the last five years the Natural History Museum has issued 369 loans, incorporating 1619 items to 114 different researchers. The nature of this research can involve chemical and isotopic studies, which can require both destructive and non-destructive analyses. This represents a dilemma for museums and their curators, in that their brief is to conserve and preserve material for future generations but also to allow collection access for researchers [2]. Virtual meteorite sections are a response to this dilemma. A project has been started at the Natural History Museum which will provide virtual data collected from a representative selection of meteorite sections. The data set consists of a high resolution optical image from a desktop scanner, montaged high resolution backscattered electron (BSE) images (FIG.1.) of complete sections and a large hyperspectral EDX dataset. These are at a reduced resolution compared to the BSE images (FIG. 2.). These three sets of data will allow researchers anywhere in the world to view available material within the collection, without the material leaving the Museum thus reducing the risks of damage, loss, and contamination to the sections. The data is not seen as a substitute for actual material. It is designed to allow researchers to narrow down the material requested as loans from the Museum by allowing them to first examine the virtual sections. The data is also envisaged as an aid when carrying out electron probe micro analysis (EPMA) in that it can be used as a navigational tool in order to quickly find areas of interest. The data will be useful to those researchers without ready access to scanning electron microscopes or EPMA, although it is qualitative rather than quantitative. In essence, each data set will be a “Google Earth image” of each meteoritic section including elemental distribution.

References

[1] J.J. Papike, *Planetary Materials: Reviews in Mineralogy V36,* Min. Soc. of America, Washington D.C. 1998
[2] H.M. Hey, *Meteoritics*, 4 (1969) 253-255.

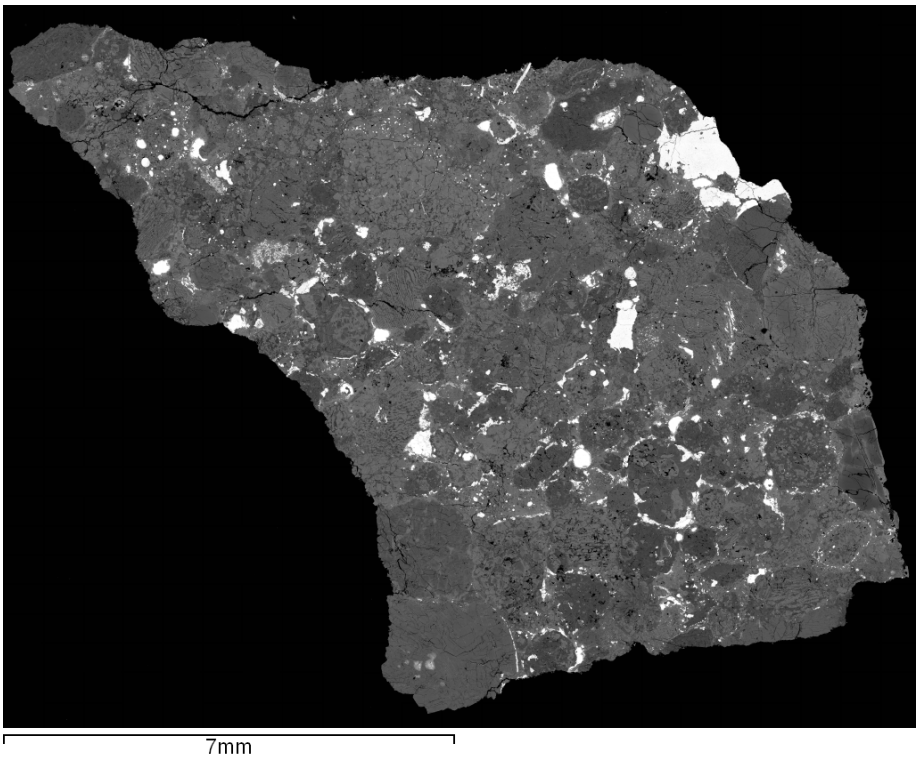

FIG. 1. Backscattered electron image montage of Parnallee meteorite (BM34792 P16191 – polished block).

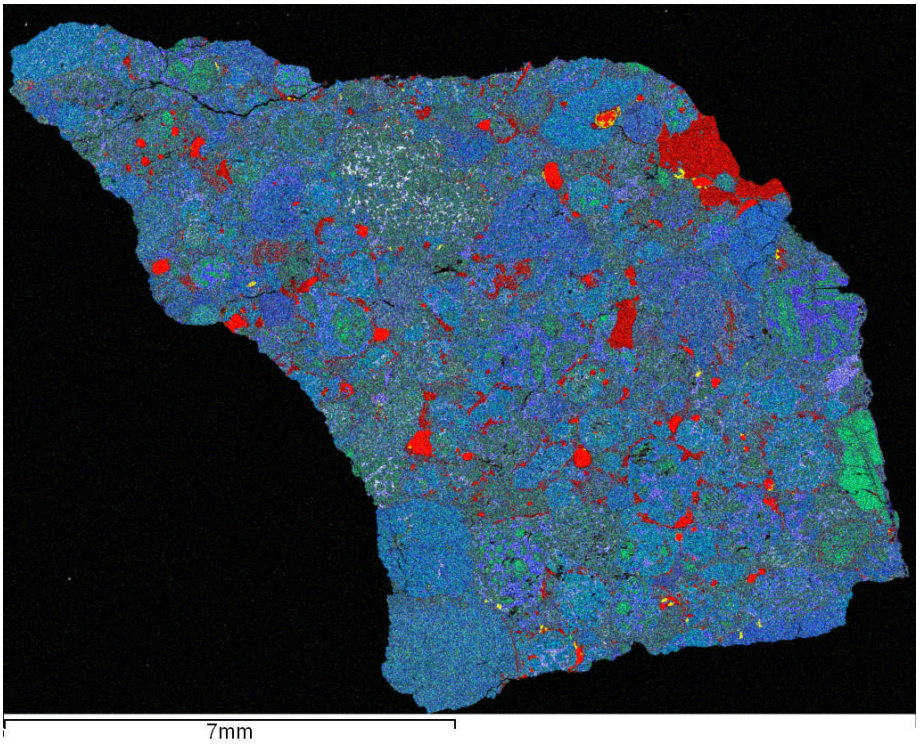

FIG. 2. Processed compositional image of Parnallee polished block (BM34792 P16191) combined elemental maps Mg = green, Al = White, Si = blue, Ca = Yellow, Fe = red.

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