

**METEORITES ON MARS: IMPLICATIONS FROM THREE PROBABLY PAIRED METEORITE CANDIDATES AT MERIDIANI PLANUM.** C. Schröder<sup>1</sup>, J. W. Ashley<sup>2</sup>, I. Fleischer<sup>1</sup>, R. Gellert<sup>3</sup>, G. Klingelhöfer<sup>1</sup>, P. A. de Souza Jr.<sup>4</sup> and the Athena Science Team. <sup>1</sup>Johannes Gutenberg-Universität, Mainz, Germany. E-mail: schroedc@uni-mainz.de. <sup>2</sup>Arizona State University, Tempe, AZ, USA. <sup>3</sup>University of Guelph, Guelph, Ontario, Canada. <sup>4</sup>Tasmanian ICT Centre, CSIRO, Hobart, Australia.

**Introduction:** The Mars Exploration Rover (MER) Opportunity has come across several possible meteorites, among them the only officially recognized meteorite on another planet, the IAB iron meteorite Meridiani Planum [1]. Three meteorite candidate rocks investigated by Opportunity - informally dubbed Barberton, Santa Catarina and Santorini by the MER team - have very similar chemical and mineralogical compositions and are probably paired [1-3]. We discuss the implications for the Meridiani Planum terrain.

**Results and Discussion:** High Ni contents and the minerals kamacite and troilite detected in Barberton, Santa Catarina and Santorini by Opportunity's Alpha Particle X-ray (APXS) and Mössbauer spectrometers provide evidence for a meteoritic origin [1-3]. The chemical composition of the three rocks is most consistent with mesosiderite silicate clasts [1-2]. It is also possible that these rocks represent a new class of meteorite not yet encountered on Earth. Because of the similarity in composition and because mesosiderites are a relatively rare group of meteorites, the three rocks are probably fragments of the same larger body and thus paired. The three rocks were investigated serendipitously several kilometers apart from each other, suggesting a larger population of similar rock fragments in this area and that Opportunity may be driving across a meteorite strewn field. Victoria crater is ~800 m in diameter and was investigated extensively by Opportunity [4]. Barberton, with a long-axis of ~3 cm is the smallest fragment of the three, and was encountered at the rim of Endurance crater, ~7 km to the north of Victoria crater. Santa Catarina and the surrounding cobble field are located at the Cabo Anonimo promontory on the northwestern rim of Victoria. The cobbles in the Santa Catarina field appear to be of similar composition on the basis of Miniature Thermal Emission Spectrometer (Mini-TES) and multispectral Panoramic Camera (Pancam) data. Santorini was discovered ~800 m south of Victoria. Because 1) the largest observed accumulation of rock fragments of this kind is at the rim of Victoria, and 2) the population as a whole appears to surround Victoria, it is possible that Barberton, Santa Catarina and Santorini are associated in some way with the impactor that created Victoria crater. If these rocks are unrelated to the formation of Victoria and fell later, a strewn field would not necessarily stop at the crater rim. Thus, finding another fragment on the floor of Victoria would argue against this hypothesis, but rover mobility constraints precluded such investigations. The full distribution of these fragments may also allow conclusions on the properties of the impactor, the formation of Victoria crater, or the thickness of the atmosphere at the time of the fall.

**References:** [1] Schröder C. et al. 2008. *Journal of Geophysical Research* 113, E06S22, doi:10.1029/2007JE002990. [2] Schröder C. et al. 2006. *Meteoritics & Planetary Science* 41:A160. [3] Schröder C. et al. 2009. Abstract #1665. 40th Lunar & Planetary Science Conference. [4] Squyres S. W. et al., *Science*, accepted for publication.