THE RIO CUARTO CRATER FIELD RE-VISITED: REMOTE SENSING IMAGERY ANALYSIS AND NEW FIELD OBSERVATIONS. P.A. Bland[1], C.R. de Souza Filho[2], R.M. Hough[1], E. Pierazzo[3], J. Coniglio[4], L. Pinotti[4], A.J.T. Jull[5] and V. Evers[6], [1]Planetary and Space Sciences Research Institute, The Open University, Milton Keynes MK7 6AA, UK (p.a.bland@open.ac.uk), [2]Instituto de Geociências, Universidade Estadual de Campinas, Campinas, Brazil, [3]Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ 85721, USA, [4]Departamento de Geologia, Universidad Nacional de Rio Cuarto, 5800 Rio Cuarto, Cordoba, Argentina, [5]NSF-Arizona AMS Laboratory, University of Arizona, 1118 East Fourth St, Tucson, AZ 85721, USA, [6]BCG, Devonshire House, Mayfair Place, London W1X 5FH, UK

Introduction: The Rio Cuarto crater field consists of 10 elongate depressions occurring along a line 30-40km long. It is found in the Pampas of Argentina, north of the city of Rio Cuarto, at ~32°50'S, 64°10'W, and was first described in detail by Schultz and Lianza [1]. Previously, some of these features had been identified as deflations [2], however, based on the morphology of the depressions, and recovery of glass and fragments of chondritic meteorite, Schultz and Lianza [1] interpreted the structures as the result of the highly oblique impact of a chondritic body 150-300m in diameter. Glass was later shown to have elevated Cr, Ni, and Ir abundances [3,4], a low water content [3], and contained rare shocked quartz grains [3], suggesting that the material was in fact an impactite, and further strengthening the impact argument.

Results and Discussion: We conducted an extensive remote sensing study of the Rio Cuarto site and the surrounding Pampas, using CORONA and EOS Terra-ASTER satellite imagery. Our survey reveals >100 features that bear a strong similarity to those described previously [1], with several >5km in length.

We visited >50 of these features (including several of those previously identified [1]) during fieldwork in the area. Similarities indicated by the satellite imagery (elongate scars with high length-to-width ratios and orientations ~NNE-SSW) are confirmed on the ground: rims (occasionally degraded) 3-10m above the plains, and bases 3-10m below the plains are characteristic. In addition, 3 samples of chondrite were recovered from craters D and E (both these craters also yielded abundant glass, the largest sample 17x9x6cm), and glass was found in 2 of the new structures following brief searches. The absence of glass at other sites appears to be related to variable preservation of the original surface – many features are infilled with lakes, swamp, or dunes, or are cultivated.

Conclusion: Our findings suggest that all the depressions (those previously identified [1], and the new features we describe) have a common formation mechanism. Further work is needed to establish the formation mechanism, either exogenic or endogenic, of the Rio Cuarto structures.

Figure 1: Rimmed depressions in the vicinity of Carnerillo (east of craters D and E [1]), from Corona satellite imagery. The image is oriented N-S, and is ~8km from top to bottom.

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