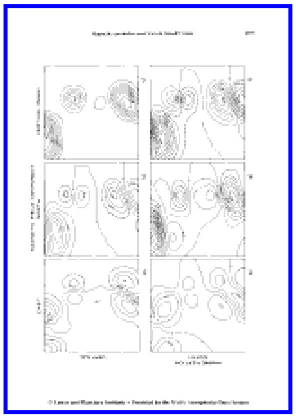
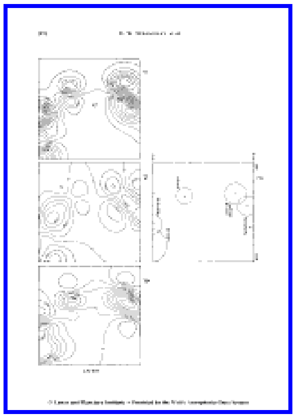
1975LPSC....6.2975S


Page 2975


Page 2976


Page 2977

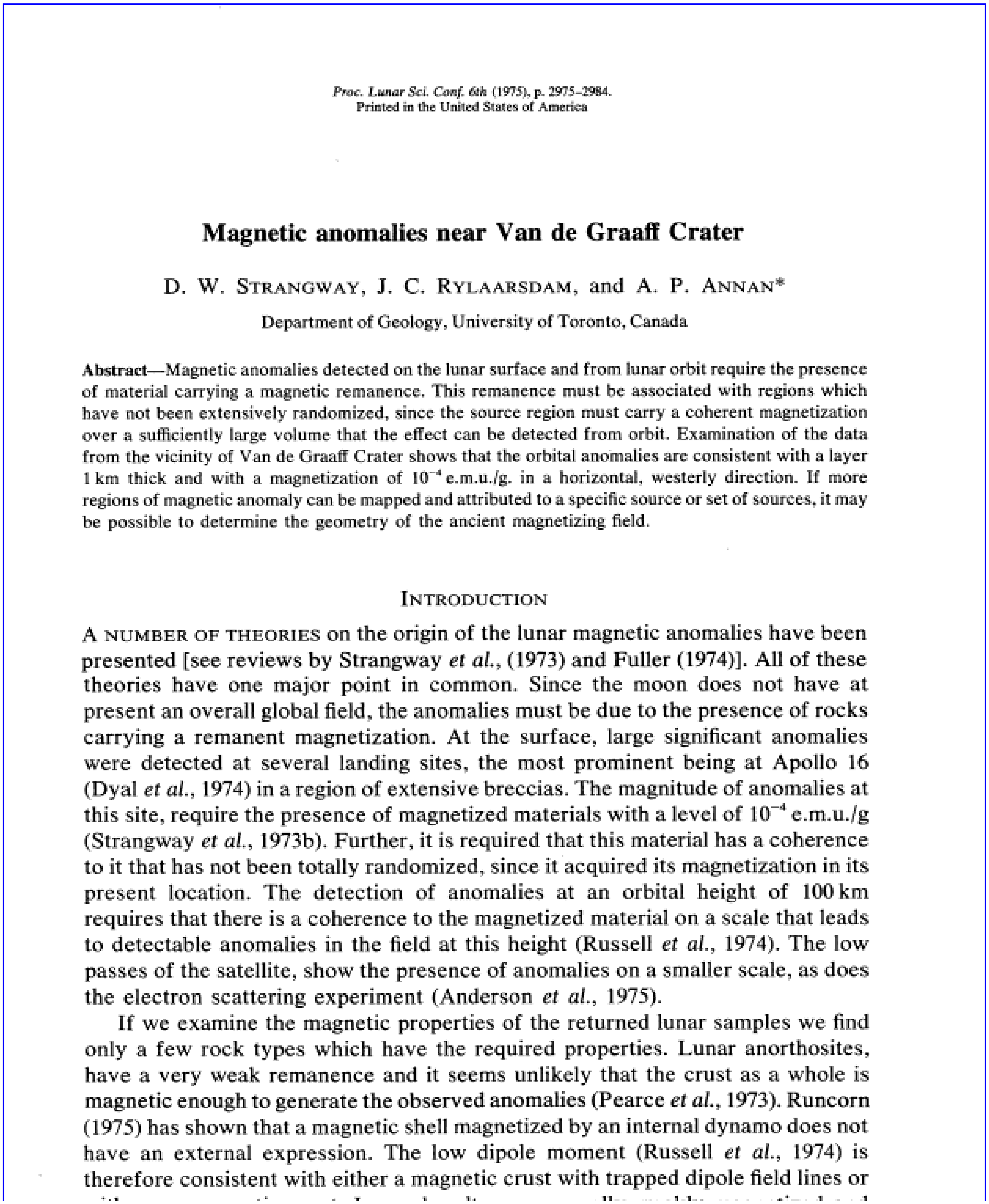

Page 2978

SAO/NASA Astrophysics Data System (ADS)

Title: Magnetic anomalies near Van de Graaff Crater
Authors: Strangway, D. W., Rylaarsdam, J. C., & Annan, A. P.
Journal: In: Lunar Science Conference, 6th, Houston, Tex., March 17-21, 1975, Proceedings. Volume 3. (A78-46741 21-91) New York, Pergamon Press, Inc., 1975, p. 2975-2984. Research supported by the National Research Council of Canada.
Bibliographic Code: 1975LPSC....6.2975S

Complete bibliographic record | Other article options | Print this article

Previous article page | Print this page | Next article page



Proc. Lunar Sci. Conf. 6th (1975), p. 2975–2984.
Printed in the United States of America

Magnetic anomalies near Van de Graaff Crater

D. W. STRANGWAY, J. C. RYLAARSDAM, and A. P. ANNAN*

Department of Geology, University of Toronto, Canada

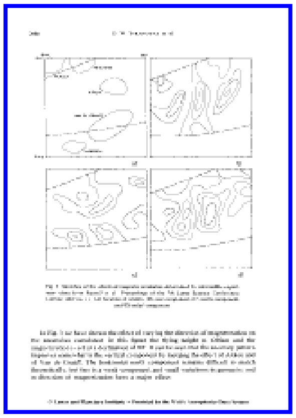
Abstract—Magnetic anomalies detected on the lunar surface and from lunar orbit require the presence of material carrying a magnetic remanence. This remanence must be associated with regions which have not been extensively randomized, since the source region must carry a coherent magnetization over a sufficiently large volume that the effect can be detected from orbit. Examination of the data from the vicinity of Van de Graaff Crater shows that the orbital anomalies are consistent with a layer 1 km thick and with a magnetization of 10^{-4} e.m.u./g. in a horizontal, westerly direction. If more regions of magnetic anomaly can be mapped and attributed to a specific source or set of sources, it may be possible to determine the geometry of the ancient magnetizing field.

INTRODUCTION

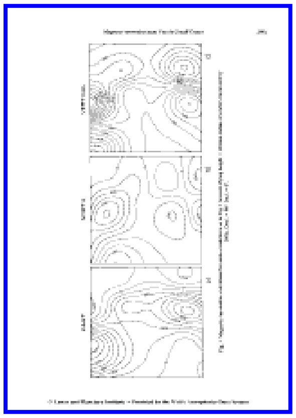
A NUMBER OF THEORIES on the origin of the lunar magnetic anomalies have been presented [see reviews by Strangway *et al.*, (1973) and Fuller (1974)]. All of these theories have one major point in common. Since the moon does not have at present an overall global field, the anomalies must be due to the presence of rocks carrying a remanent magnetization. At the surface, large significant anomalies were detected at several landing sites, the most prominent being at Apollo 16 (Dyal *et al.*, 1974) in a region of extensive breccias. The magnitude of anomalies at this site, require the presence of magnetized materials with a level of 10^{-4} e.m.u./g (Strangway *et al.*, 1973b). Further, it is required that this material has a coherence to it that has not been totally randomized, since it acquired its magnetization in its present location. The detection of anomalies at an orbital height of 100 km requires that there is a coherence to the magnetized material on a scale that leads to detectable anomalies in the field at this height (Russell *et al.*, 1974). The low passes of the satellite, show the presence of anomalies on a smaller scale, as does the electron scattering experiment (Anderson *et al.*, 1975).

If we examine the magnetic properties of the returned lunar samples we find only a few rock types which have the required properties. Lunar anorthosites, have a very weak remanence and it seems unlikely that the crust as a whole is magnetic enough to generate the observed anomalies (Pearce *et al.*, 1973). Runcorn (1975) has shown that a magnetic shell magnetized by an internal dynamo does not have an external expression. The low dipole moment (Russell *et al.*, 1974) is therefore consistent with either a magnetic crust with trapped dipole field lines or

Page 2979



Page 2980



Page 2981

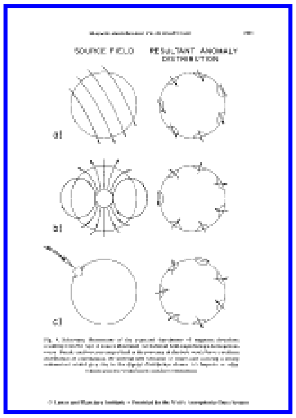
Page 2982

therefore consistent with either a magnetic crust with trapped dipole field lines or with a nonmagnetic crust. Lunar basalts are generally weakly magnetized and thicknesses of tens of kilometers would be required to explain the observed

---

*Now at Geological Survey of Canada, Ottawa.

Previous article page Print this page Next article page



Page 2983

Page 2984