TM104534

NASA Technical Memorandum ~~100776~~

The Magsat Bibliography

(Revision 1)

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February 1991

(NASA-TM-104534) THE MAGSAT BIBLIOGRAPHY. REVISION 1 (NASA) 110 p CSCL 08G

N91-20586

Unclas
G3/46 0007277

NASA

NASA Technical Memorandum 100776

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1991

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PREFACE

Publications related to the Magsat project number 402, as of February, 1991. Of these 44 deal with analysis of the Earth's main magnetic field, 209 with analysis of the Earth's crustal field, 43 make use of Magsat based main field models, and 63 with analysis of the magnetic field originating external to the Earth. The remainder document the Magsat program, satellite, instruments or data or are review papers or books which use or refer to Magsat and its data. The Bibliography is divided into two parts. The first lists all papers by first author, the second is subdivided by topic.

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INTRODUCTION

Magsat was a NASA Project/Mission with primary objectives to obtain data for improved modeling of the time varying magnetic field generated within the core of the earth, and to map variations in the strength and vector characteristics of crustal magnetization. Such a mission was discussed initially by U.S. Geological Survey (USGS) and NASA scientists in the late 1960's and was officially approved in 1977. The instruments and the satellite were constructed from 1977-1979, under the direction of the NASA Headquarters Program Manager, T. Fischetti, and Program Scientist, J. Murphy, and of the GSFC project office headed by G. Ousley. Principal contractor for the spacecraft was the Johns Hopkins Applied Physics Laboratory with L. D. Eckard as project manager.

Launch occurred on October 30, 1979, into a twilight, sun-synchronous orbit with 96.76° inclination, 561 km apogee and 352 km perigee. The spacecraft remained in orbit for seven and a half months, until June 11, 1980.

By almost any measure this project has been a success. Launch was within budget and on time. The data acquired exceeded prelaunch quality requirements even though the instrumentation encountered some problems.

Perhaps a better measure of success for a scientific mission is the number and quality of publications. For Magsat this measure is documented in this bibliography. We have included all papers we are aware of which have to do directly with the Magsat project. This includes scientific papers, papers describing the spacecraft and its instrumentation, and papers describing the data and its processing. There are, of course, some grey areas. We have tried to limit the scientific papers to those which actually utilized either Magsat data or a product, such as a spherical harmonic main field model, which directly depended upon the Magsat data. Further, if it was a product which was used, we tried to only include papers where that product was important to the result of the paper. In this revision we have added a new category of paper, i.e. those papers dealing with other data or with theory but which utilize a Magsat based model of the main field. For example, if a paper is studying cosmic-ray cutoff rigidities and is using a Magsat field model, it is included. As might be expected, there is some fuzziness about whether some papers belong in this category or in the category for papers analyzing the main geomagnetic field. We have also included only a few theoretical papers which were prompted by Magsat but did not use the Magsat data or a product therof.

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The present Bibliography is the first revision of the original Bibliography. That original was finalized on 1 March, 1987, and comprised 229 papers. This first revision is complete, to the best of our knowledge to 1 February, 1991 and comprises 402 papers. These include descriptions of the program, the spacecraft and the data as well as scientific papers. We trust that this Bibliography will prove a valuable resource to both the scientific community and to anyone who wishes to gain insight into the nature and results of the program.

ORGANIZATION OF THE BIBLIOGRAPHY

The Bibliography proper is in two parts. Part I lists all the papers together in order by author. Part II is subdivided into nine parts as follows:

1. Papers giving background for Magsat.
2. Papers having to do with the Magsat program.
3. Papers describing the spacecraft/instrumentation.
4. Papers describing the data and its processing.
5. Scientific papers studying, or related to studies of, the field from the earth's crust.
6. Scientific papers studying, or related to studies of fields originating external to the earth.
7. Scientific papers studying, or related to studies of, the field originating in the earths core.
8. Scientific studies related to fields originating both in the Earth's core and crust.
9. Scientific papers related to earth induction.
10. Scientific papers making use of a model of the Earthi's main field based on Magsat data.
11. Review papers.

Included are some papers which are "submitted", "in press" and a few preprints. As these are published the totals for 1990 will shift somewhat into 1991 and beyond. At present the Bibliography is not annotated. It is hoped that annotation can be added in a later edition.

PUBLICATION STATISTICS

There are a total of 402 papers listed in the Bibliography. These include papers from three "special issues": The April 1982 issue of **Geophysical Research Letters**, with 36 papers; Volume 36, Number 10, 1984 of **Journal of Geomagnetism and Geoelectricity**, with 13 papers, and the February 28, 1985 issue of **Journal of Geophysical Research**, with 26 papers. Thus, these three issues account for 75 of the 402 papers.

The bibliography includes 11 Doctoral and 9 Masters theses.

Enough time has passed such that Magsat results are beginning to appear in books. Nine such are listed. (Conference Proceedings are not counted as books.) These include textbooks, such as "The Earth's Magnetic Field" by R.T. Merrill and M.W. McElhinny, "Solid Earth Geomagnetism" by T. Rikitake and Y. Honkura, and "Introduction to Geomagnetism" by Parkinson; and specialized books such as "The Continental Crust: A Geophysical Approach", by R. Meissner, "Geomagnetics: Selected examples and case histories", by A. Hahn and W. Bosum, "Atmospheric Electrodynamics" by H. Volland, and two chapters [Chapter Four: The Main Field, by Langel; Chapter Five: The Crustal Field, by Harrison] in "Geomagnetism", edited by J. Jacobs. Also included is an encyclopedia article, "Satellite Magnetic Measurements" by Langel, which appeared in the Encyclopedia of Solid Earth Physics edited by D.E. James.

A breakdown by Journal or publication type is as follows (the number in parentheses is the number of papers in that journal):

Books (9)
Journal of Geophysical Research (68)
Geophysical Research Letters (53)
Journal of Geomagnetism and Geoelectricity (30)
Physics of the Earth and Planetary Interiors (30)
Geophysical Journal, International [Formerly Geophysical Journal and Geophysical Journal of the Royal Astronomical Society] (21)
Theses (20)
Tectonophysics (21)
APL Technical Digest (13)
Earth and Planetary Science Letters (13)
Geophysics (7)
Bull. Australian Society of Exploration Geophysics (5)
Geophysical Lineaments:Indian Acad. Sci. Conf. Proceedings. (5)
Proceedings of the Indian Academy of Sciences (5)
Reviews of Geophysics and Space Physics (5)

Advances in Space Research (4)
NASA Technical Memos (4)
Magnetospheric Currents: AGU Publication (4)
Nature (4)
Journal of Geodynamics (4)
Journal of Geophysics (4)
Philosophical Transactions
of the Royal Society of London (4)
Prospect and Retrospect in studies of Geomagnetic Field
Disturbance: U. of Tokyo Publication (4)
Geomagnetism and Aeronomy (3)
Journal of Atmospheric and Terrestrial Physics (3)
NATO: ASI Series (3)
Ann. Rev. Earth Planetary Science (2)
EOS, Transactions of the AGU (2)
Geology (2)
Gerlands Beitr. Geophysik (2)
Acta Geophysica Sinica
Antarctic Earth Science:4th Int. Symposium
Gondwanda Six:AGU Monograph
AIAA Guidance and Control Conf.
Annales Geophysicae
Annals de Geophysics
BMR Journal of Australian Geology and Geophysics
C.R. Academy Science Paris
Canadian Journal of Earth Science
Cold Regions Science and Technology
Computers and Geosciences
Consiglio Nazionale delle Ricerche
Endeavour
Geoexploration
Geomagnetic methods and structure beneath India
Geological Journal
Geological Society of America
Geophysics:leading edge explorer
Global Tectonics and Metallogenesis
Heinrich Hertz Inst. Publication
IEEE Transactions on Magnetics
IMS sourcebood:AGU Publication
Izvestia: Earth Physics
Journal of Guidance, Control, and Dynamics
Journal of the Alaska Geological Society
Journal of the British Interplanetary Society
Kodaikanal Observatory Bulleton
La Recherche
Mantle Xenoliths, John Wiley
NIPR Symposium on Upper Atmospheric Physics
Physics of the Solid Earth:USSR Acad. Sci.
Planetary and Space Science

Proceedings of the IEEE
Proceedings of the International Symposium on Neotectonics in South Asia
Proceedings of the Symposium on Mesozoic and Cenozoic Geology, China
Proceedings 7th Symposium on Coordinated Observations of Ionosphere and Magnetosphere in the Polar Regions
Proceedings 9th Symposium on Coordinated Observations of Ionosphere and Magnetosphere in the Polar Regions
Properties and Processes of Earth's lower crust: AGU Pub.
Reflection Seismology:The Continental Crust:AGU Pub.
Reviews of Geophysics
Space Science Reviews
Science Today
Solar Wind Magnotosphere Coupling:Terrapub
Transactions of the Geological Society of South Africa
In Press/Submitted (4)

Table 1 Summarizes the publications by category, as used in the second part of the Bibliography, and year. Figure 1 shows a plot of the number of main field, crustal field, model user and external field studies per year, as well as the total number of publications per year.

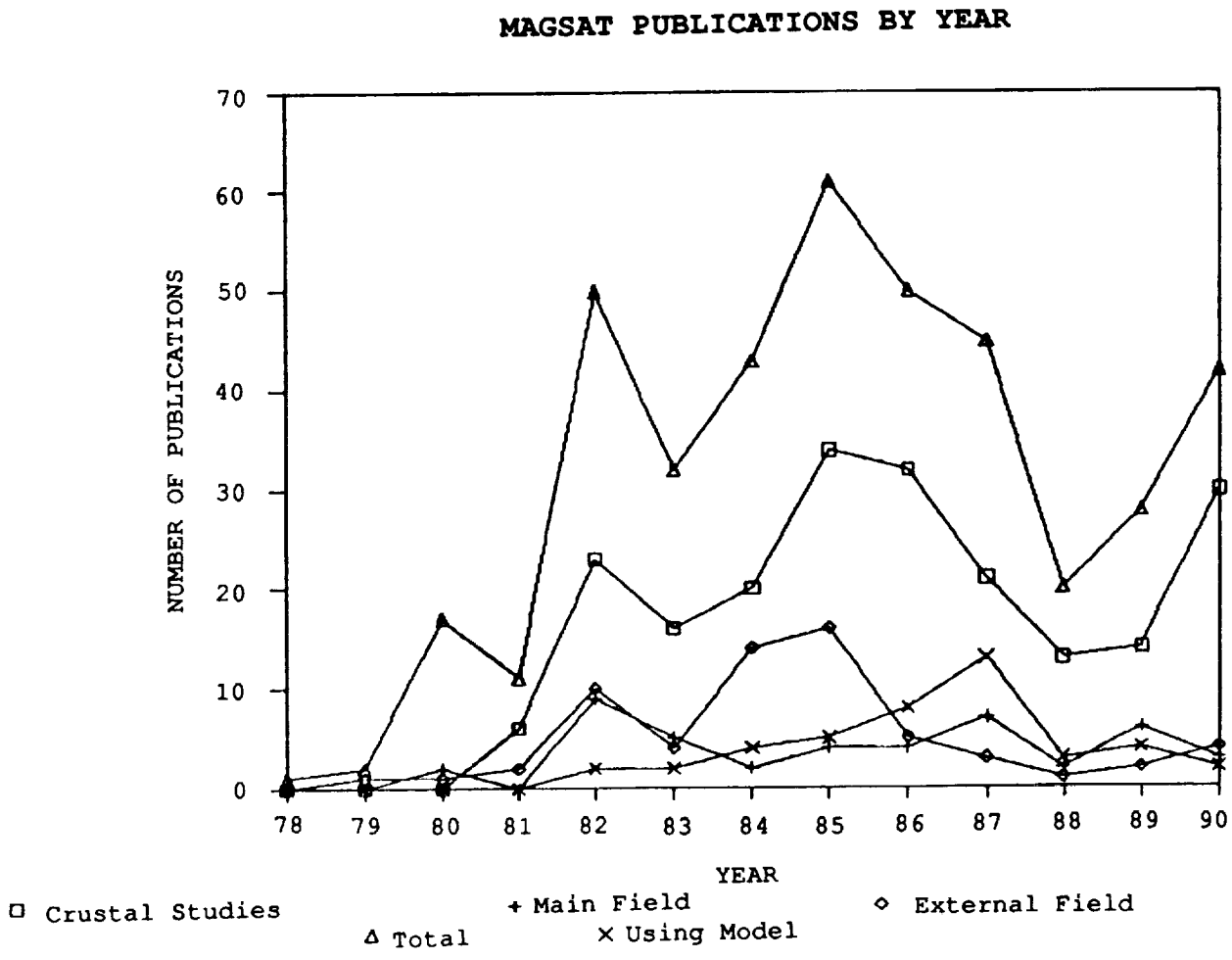
Some comments are in order. As might be expected, the peak years for publication are 1982, 1984 and 1985, the years of the GRL, JGG and JGR special issues. The strong continuation of published studies into 1990 is an indication of the importance of the Magsat data and of the vitality of geomagnetism as a discipline. This is especialy true since major project funding terminated in 1983.

The number of main field studies may seem low, but this is to be expected. There is only one main field at 1980 and once it is accurately determined further calculation simply serves to give small refinements. The possibilities of significant modeling papers is thus limited. Two things are very encouraging. First, many of the papers have to do with the development of new techniques for models which both give more accuracy and which better reflect the physics of the inner earth. The second is that significant studies of the inner earth, the core, core-mantle boundary and mantle have been steadily forthcoming. These, in fact, account for the majority of the most recent papers in this and the model users categories. It seems that Magsat not only provided a good data base for some of these studies but also injected new enthusiasm into the community.

Study of crustal fields from satellite data is a relatively new discipline in geophysics. It has gotten off to a somewhat slow start and there has been a measure of skepticism regarding the meaning and usefulness of the data. As pointed out by Langel in the introduction of the JGR special issue, there was a great deal of effort spent in just trying to gain confidence in the data and verify that we were indeed measuring crustal fields that could be interpreted meaningfully. In fact, the dominance in numbers, and the continuing publication rate, in this category reflects the development of concepts and technique in this discipline. This can be expected to continue for some years. Some skepticism remains. But as the data have become better understood the initial questions regarding the data are beginning to be answered. And it is more and more clear that significant advances in understanding of the crust have been made and will continue to be made by the study of this data. The continuing rate of publication attests strongly to this fact.

SUMMARY OF PUBLICATIONS FROM THE MAGSAT PROGRAM

YEAR-->	78	79	80	81	82	83	84	85	86	87	88	89	90	Total
CLASSIFICATION														
Bkgrnd/programatic	0	1	2	0	0	0	0	0	0	0	0	0	0	3
Instrumentation	1	0	11	1	0	0	1	0	0	0	0	0	0	14
Data description	0	0	0	1	2	0	0	0	0	0	0	0	0	3
Review	0	0	1	1	3	3	2	2	1	1	1	2	3	20
Crustal studies	0	0	0	6	23	16	20	34	32	21	13	14	30	209
Main field	0	0	2	0	9	5	2	4	4	7	2	6	3	44
Crust and Main	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Using model	0	0	0	0	2	2	4	5	8	13	3	4	2	43
External field	0	1	1	2	10	4	14	16	5	3	1	2	4	63
Earth induction	0	0	0	0	1	1	0	0	0	0	0	0	0	2
Total	1	2	17	11	50	32	43	61	50	45	20	28	42	402



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NASA
National Aeronautics and Space Administration

Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA TM [redacted] 104534 per GSFC		

4. Title and Subtitle	5. Report Date
The Magsat Bibliography (Revision 1)	February 1991
	6. Performing Organization Code 922
7. Author(s) R.A. Langel, B.J. Benson, and R.M. Orem	8. Performing Organization Report No. 91B00063
	10. Work Unit No.
9. Performing Organization Name and Address Laboratory for Terrestrial Physics Goddard Space Flight Center Greenbelt, Maryland 20771	11. Contract or Grant No.
	13. Type of Report and Period Covered Technical Memorandum
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, D.C. 20546-0001	14. Sponsoring Agency Code

15. Supplementary Notes

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16. Abstract

Publications related to the Magsat project number 402, as of February 1991. Of these, 44 deal with analysis of the Earth's main magnetic field, 209 deal with analysis of the Earth's crustal field, 43 make use of Magsat-based main field models, and 63 deal with analysis of the magnetic field originating external to the Earth. The remainder document the Magsat program, satellite, instruments or data, or are review papers or books which use or refer to Magsat and its data. The Bibliography is divided into two parts; the first lists all papers by first author, and the second is subdivided by topic.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Magsat, magnetic field, main field, crustal field, geomagnetism	Unclassified - Unlimited Subject Category 46

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of pages	22. Price
Unclassified	Unclassified	105	

NASA FORM 1626 OCT 86