

CONTENTS LIST

Volume 1

	Page
Foreword	V, VII
Preface	IX

The Moon

G. I. PETROV

- Investigation of the Moon with the Lunokhod 1 Space Vehicle 1

Chemical and Biological Investigations of Lunar Soil

G. E. KOCHAROV, S. V. VICTOROV, O. M. VOROPAYEV, A. YU. DZEVANOVSKAYA, G. V. KIRIAN, V. V. PETROV and V. A. SAKULSKY

- Investigation of the Chemical Composition of the Lunar Surface along the Route of Lunokhod 1 13

A. P. VINOGRADOV and I. K. ZADOROZHNY

- Rare Gases in the Regolith from the Sea of Fertility 23

Yu. A. SURKOV, A. S. STAN, F. F. KIRNOZOV, I. N. IVANOV and L. P. MOSKALEVA

- Investigation of the Composition and Radioactivity of the Lunar Rock from the Sea of Fertility 33

G. J. WASSERBURG, J. C. HUNEKE, D. A. PAPANASTASSIOU, F. A. PODOSEK, F. TERA and G. TURNER

- Age Determinations on Samples from the Apollo 14 Landing Site. 39

Physical and Mechanical Investigations of Lunar Soil

V. V. GROMOV, A. K. LEONOVICH, V. A. LOZHIN, A. V. RYBAKOV, P. S. PAVLOV, A. D. DMITRYEV and V. V. SHVAREV

- Results of Investigations of the Physical and Mechanical Properties of the Lunar Sample from Luna 16 43

A. K. LEONOVICH, V. V. GROMOV, A. V. RYBAKOV, V. N. PETROV, P. S. PAVLOV, I. I. CHERKASOV and V. V. SHVAREV

- Investigations of the Mechanical Properties of the Lunar Soil along the Path of Lunokhod 1 53

A. K. ALEXANDROV, G. B. NIKOLAYEV, V. I. GRAFOV, O. G. IVANOV, V. P. VELIKANOV, V. G. ROMOV, P. S. SEMENOV, P. P. ARTEMYEV, N. V. PEROV and V. P. PUCHKOV

- Methods of Investigation of Lunokhod's Mobility under Terrestrial Conditions. 65

A. K. ALEXANDROV, B. M. BORISOV, I. S. GARIN, V. I. GRAFOV, A. G. IVANOV, YU. P. KOTLOV, V. I. KOMAROV, A. F. KULESHOV, V. K. MISHKIN, G. B. NIKOLAYEV, L. N. POPENOV, P. S. SEMENOV and F. P. YAKOVLEV

- Investigations of Mobility of Lunokhod 1 73

E. S. GORSHKOV, E. G. GUS'KOVA and V. I. POCHTAREV

- Magnetic Properties of Lunar Specimens returned by ALS Luna 16 83

M. V. AKHMANOVA, B. V. DEMENTYEV, A. V. KARYAKIN, M. N. MARKOV, V. S. PETROV, A. M. PROKHOROV and M. M. SUSHCHINSKY

- The Infrared Reflection, Emission and Absorption Spectra of Regolith from the Sea of Fertility and its Scattering Coefficient 87

	Page
I. I. ANTIPOVA-KARATAYEVA, YU. I. STAKHEYEV and K. P. FLORENSKY The Optical Parameters of Mare Foecunditatis Regolith	95
<i>Atmosphere, Geology and Figure of the Moon</i>	
F. S. JOHNSON, D. E. EVANS and J. M. CARROLL Observations of Lunar Atmosphere	99
K. P. FLORENSKY, A. T. BASILEVSKY, A. A. GURSHTEIN, V. V. ZASETSKY, R. B. ZEZIN, A. A. PRONIN and Z. V. POPOVA Geomorphological Analysis of the Area of Mare Imbrium explored by the Automatic Roving Vehicle Lunokhod 1	107
K. P. FLORENSKY, A. V. IVANOV, YU. I. STAKHEYEV and L. S. TARASOV The Morphology, Types and Distribution of Sizes of Regolith Particles in the Sea of Fertility	123
T. V. MALYSHEVA and V. V. KURASH Mössbauer Spectroscopy of Regolith from the Sea of Fertility	137
A. S. PAVLENKO, L. S. TARASOV, I. D. SHEVALEYEVSKY and A. V. IVANOV Petrology and Mineralogy of Lunar Rocks from the Sea of Fertility	141
E. S. MAKAROV, N. P. ILYIN and V. I. IVANOV The Composition and Crystalline Structure of the Minerals of Regolith from the Sea of Fertility	155
A. S. LIU and P. A. LAING Lunar Gravity Field as determined by Orbiters	163
<i>Lunar Laser Experiments</i>	
W. E. CARTER, D. H. ECKHARDT and W. G. ROBINSON AFCRL Lunar Laser Instrumentation Status Report	177
A. TACHIBANA, Y. YAMAMOTO, M. TAKATSUJI, K. MURASAWA and Y. KOZAI A Preliminary System of Lunar Laser Ranging	187
C. G. LEHR, M. R. PEARLMAN and J. A. MONJES The SAO Lunar Laser	197
A. ORSZAG, J. RÖSCH and O. CALAME La Station de Télémétrie Laser de l'Observatoire du Pic-du-Midi et l'acquisition des cataphotes français de Luna 17	205
Y. KOZAI Lunar Laser Ranging Experiments in Japan	211
E. C. SILVERBERG and D. G. CURRIE A Description of the Lunar Ranging Station at McDonald Observatory	219
J. E. FALLER The Apollo Retroreflector Arrays and a new Multi-lensed Receiver Telescope	235
R. F. CHANG, C. O. ALLEY, D. G. CURRIE and J. E. FALLER Optical Properties of the Apollo Laser Ranging Retroreflector Arrays	247
M. FOURNET Le Réflecteur Laser de Lunokhod	261
Venus and Mars	
<i>Latest Investigations of Venus and Mars</i>	
M. YA. MAROV, V. S. AVDUEVSKY, M. K. ROSHDESTVENSKY, V. V. KERZHANOVICH, N. F. BORODIN and O. L. RYABOV Results of the Venus Atmosphere Measurements made by the Landing Station Venera 7	281

	Page
M. SHIMIZU Diurnal Variation of the Exospheric Temperatures on Venus and Mars	293

Cosmic Dust

M. SHIMA, H. YABUKI, A. OKADA and S. YABUKI The Study of Cosmic Dust	301
V. N. LEBEDINETS, A. V. MANOCHINA and V. B. SHUSHKOVA Meteor Dust Motion in the Upper Atmosphere and in the Vicinity of the Earth's Orbit	309

Lunar Results

P. W. HODGE, D. E. BROWNLEE and W. BUCHER Craters in Surveyor 3 Glass Surfaces	313
B. G. COUR-PALAIS, H. A. ZOOK and R. E. FLAHERTY Meteoroid Activity on the Lunar Surface from the Surveyor 3 Sample Examination .	319
J. A. M. McDONNELL and D. G. ASHWORTH Erosion Phenomena on the Lunar Surface and Meteorites	333

Direct Observations¹

W. M. ALEXANDER, C. W. ARTHUR, J. L. BOHN, J. H. JOHNSON and B. J. FARMER Lunar Explorer 35: 1970 Dust Particle Data and Shower related Picogram Ejecta Orbits	349
L. V. LEONTYEV, A. V. TARASOV and I. A. TERYESHKIN Some Peculiarities of Cosmic Dust Distribution	357
C. W. ARTHUR, W. M. ALEXANDER, J. L. BOHN, J. H. JOHNSON and B. J. FARMER Results of a 1970 Geminid Dust Particle Rocket Experiment and Analysis of OGO 3 Dust Particle Velocity Measurements	361
N. H. FARLOW and G. V. FERRY Cosmic Dust in the Mesosphere	369
G. V. FERRY and N. H. FARLOW Upper Atmospheric Dust Concentration in Polar Regions	381
P. RAUSER and H. FECHTIG Combined Dust Collection and Detection Experiment during a Noctilucent Cloud Display above Kiruna, Sweden	391

Optical Methods

S. K. POULTNEY Laser Radar Studies of Upper Atmosphere Dust Layers and the relation of Temporary Increases in Dust to Cometary Micrometeoroid Streams	403
F. RÖSSLER Aerosol Layers in the Atmosphere	423
F. LINK and R. ROBLEY The Influence of Cosmic Dust on Twilight Phenomena	433
R. H. GIESE Zodiacal Light and Interplanetary Particle Number Densities	437
M. S. HANNER and C. LEINERT The Zodiacal Light as seen from the Pioneer F/G and Helios Probes	445

The Earth observed from Space

Surface and Meteorological Surveys

	Page
S. RUTTENBERG Summary of National Activities in Earth Surveys	459
R. O. PILAND Earth Observations from Manned Spacecraft	469
K. YA. KONDRATYEV, A. A. BUZNIKOV, E. V. KHRUNOV and O. I. SMOKTY Some Results of Geophysical Investigations from the Soyuz Manned Spacecraft	481
T. H. VONDER HAAR, E. RASCHKE, M. PASTERNAK and W. BANDEEN The Radiation Budget of the Earth-Atmosphere System as measured from the Nimbus 3 Satellite (1969-1970)	491
V. M. ZAKHAROV, O. K. KOSTKO, E. A. CHAYANOVA and V. E. ROKOTYAN Investigation of Underlying Earth Surface and Clouds with the use of an Airborne Lidar	499
A. G. GORELIK, V. V. KALASHNIKOV and YU. A. FROLOV Observations of Precipitation Zones from Satellites using Microwave Radiometers	503
F. R. CAYLA Precipitation Detection over the Ocean using Microwave Satellite Radiometry	509
K. K. BAZILEVSKY, L. A. PAKHOMOV, T. A. TSITOVIDCH and V. G. SHKLYAREVSKY Polarization Characteristics of Short-wave Radiation	511

Radio Interferometry

R. D. MICHELINI and M. D. GROSSI Very Long Baseline Interferometry Observations of Radio Emissions from Geostationary Satellites	517
---	-----

The Earth's Neutral Atmosphere

K. S. W. CHAMPION The Properties of the Neutral Atmosphere	529
D. K. WEIDNER, J. L. CHAMBERS and G. Y. LOU A Global Model of Atmospheric Temperature, Chemical Composition and Density (25-1000 km Altitude)	565

Tropospheric Refraction

J. KAKKURI Reduction of Refraction Effects close to the Horizon	575
H. S. HOPFIELD Tropospheric Range Error at the Zenith	581
Cs. FERENCZ and Gy. TARCSAI Refraction Effects due to Moving Media in Doppler Measurements	595

Stratosphere and Mesosphere

M. RAHMATULLAH and S. A. JAFRI Wind and Temperature Structure in the Stratosphere at Sonmiani during Autumn 1970	601
I. SHIMIZU Commencement of Routine Meteorological Rocket Observation at Ryori, Japan	607

Contents

XVII

	Page
A. AZCÁRRAGA, L. SÁNCHEZ, G. ROSE and H. U. WIDDEL An Evaluation of the Scale of Mesospheric Wind Disturbances	613
S. P. ZIMMERMAN, A. C. FAIRE and E. A. MURPHY The Measurement of Atmospheric Stability from 30 to \sim 90 km	615
S. P. ZIMMERMAN and N. W. ROSENBERG Wind Energy Deposition in the Upper Atmosphere	623
A. E. COLE Models of Extreme Arctic and Subarctic Winter Atmospheres between 20 and 90 km	629
S. S. GAIGEROV, L. M. KOLOMIITSEVA and D. A. TARASENKO Peculiarities of Thermodynamic Parameters in the Stratosphere and Mesosphere at High Latitudes	637

Minor Constituents

L. BERKOF SKY and S. GYOERI A Comparison between Total Ozone as measured by Nimbus 3 and that computed from a Numerical Model	645
D. FELSKE, L. MARTINI, B. STARK and J. TAUBENHEIM O_2 Densities from Solar Hydrogen Lyman α Absorption Measurements by Inter-cosmos 4 and Vertical 1	651
A. A. POKHUNKOV Mass-Spectrometric Investigations of Upper Atmosphere Neutral Composition at Equatorial, Middle and Polar Latitudes	657
D. OFFERMANN and K. U. GROSSMANN Neutral Composition Measurements in the Lower Thermosphere by means of a Mass Spectrometer with Helium Cooled Ion Source	665
D. GOLOMB and R. E. GOOD Atomic Oxygen Profiles over Churchill and Hawaii from Chemical Releases	675
V. I. KONKOV, G. I. KUZNETSOV, G. F. SITNIK, A. H. HRGIAN, A. F. CHIZHOV and O. V. SHTYRKOV Experimental Measurements of Emission (OI) $\lambda = 5577 \text{ \AA}$ and Scattered Day-time Sky Radiation	685
G. M. MARTYNKEVICH and E. D. BYURO Atomic Nitrogen in the Lower Thermosphere in the period of Rising Solar Activity .	691

Theoretical Considerations

J. D. GEORGE, S. P. ZIMMERMAN and T. J. KENESHEA The Latitudinal Variation of Major and Minor Neutral Species in the Upper Atmosphere	695
R. H. KUMMLER and M. H. BORTNER Vibrational Temperatures in the E and F Regions	711
M. YA. MAROV, A. A. PYARNPUU and G. I. ZMIEVSKAYA Atmospheric Density and the Accuracy of Determination of the Drag Coefficient of a Satellite	721

Upper Atmospheric Density and Composition

P. E. ELYASBERG, B. V. KUGAENKO, V. M. SYNITSYN and M. I. VOISKOVSKY Upper Atmosphere Density Determination from the Cosmos Satellite Deceleration Results	727
D. GOLOMB, D. F. KITROSSER and R. H. JOHNSON Thermosphere Structure over Churchill and Hawaii from Chemical Releases	733
C. R. PHILBRICK and J. P. MCISAAC Measurements of Atmospheric Composition near 400 km	743

H. C. BRINTON and H. G. MAYR Thermospheric Hydrogen: Absolute Densities and Temporal Variations deduced from <i>in situ</i> Measurements	751
G. M. KEATING, E. J. PRIOR, J. S. LEVINE and J. A. MULLINS Seasonal Variations in the Thermosphere and Exosphere, 1968–1970.	765

Variations of Density with Geomagnetic Activity

L. L. DEVRIES Analysis and Interpretation of Density Data from the Low-G Accelerometer Cali- bration System (LOGACS)	777
F. A. MARCOS and K. S. W. CHAMPION Gravity Waves observed in High Latitude Neutral Density Profiles.	791
M. ROEMER and G. LAY Characteristics of the Geomagnetic Activity Effect in the Thermosphere.	797

Semi-Annual Density Variations

M. YA. MAROV and A. M. ALPHEROV Semi-Annual Density Variations of the Atmosphere at Heights of 200–300 km.	803
J. P. McISAAC and K. S. W. CHAMPION Direct Measurement of the Semi-Annual Variation during 1968.	809
C. WULF-MATHIES The Latitudinal Dependence of the Semi-Annual Effect.	815

