

INTERNATIONAL WORKSHOP

EUROPA LANDER: SCIENCE GOALS AND EXPERIMENTS

9-13 FEBRUARY, 2009
MOSCOW, RUSSIA

FINAL PROGRAM

Monday, February 9, 2009

Arrival day

Tuesday, February 10, 2009

Registration will be opened at 8-30 am at the first floor of entrance 4.
The workshop takes place at the CONFERENCE HALL of IKI.

Opening of the Workshop

9:30-9:50 Zelenyi L. and Blanc M.
Welcome and introduction

Session 1: Missions to Jupiter system

Chair: O. Korablev

- 9:50-10:10 Zelenyi L.
Russian program of planetary exploration
- 10:10-10:40 Lebreton J.-P. (Invited)
ESA Cosmic Vision programme: Outer Planet Mission studies
- 10:40-11:10 Blanc M., R. Pappalardo, R. Greeley, K. Clark, J.-P. Lebreton, A. Stankov, P. Grunthaner, P. Falkner, M Fujimoto, L. Zelenyi, **(Invited)**
The Europa-Jupiter System Mission: study results and prospects
- 11:10-11:40 Clark K., R. T. Pappalardo, R. Greeley, A. R. Hendrix, J. Boldt, T. Van Houten, I. Jun, R. Lock, J. Ludwinski, R. Rasmussen, G. Tan-Wang **(Invited)**
Status of NASA Jupiter Europa Orbiter Mission Concept Study
- 11:40-12:10 *Coffee break*
- 12:10-12:40 Viso Michel, Cassie Conley, Gherard Kminek **(Invited)**
Planetary Protection and the Icy Moons of the Giant Planets

Session 2: Technical aspects of the Europa Lander mission

Chair: L. Zelenyi

- 12:40-13:10 Martynov M.B., Simonov A.V., Lomakin I.V., Zelenyi, L.M., Popov G.A. **(Invited)**
The concept of expedition to Europa, the Jupiter's satellite
- 13:10-13:40 Hand K.P., A. Sengstacken, M. Rudolph, J. Lang, R. Amini, J. Ludwinski **(Invited)**

'Stop and Drop' Hard Lander Architectures for Europa Astrobiology Investigations

13:40-13:45 V. Sasi Prabhakaran **(POSTER PRESENTATION)**
SCOUT- Europa Terrestrial Lander (ETL)

13:45-15:20 *Lunch Break*

14:00-15:00 *Lunch time: Lecture by Prof T. Gehrels*
The History of our Universe and its Physics.

Session 2: Technical aspects of the Europa Lander mission (continued)

Chair: L. Zelenyi

15:20-15:40 Akim E.L., V.V.Sasonov, V.A. Stepanyants, A.G. Tuchin
Navigation and control problems during low-thrust transfer from Earth to Jupiter

15:40-16:10 Podzolk M.V., I. V. Getselev, Yu. I. Gubar, I. S. Veselovsky, A. A. Sukhanov
Charged particle fluxes and radiation doses in Earth-Jupiter-Europa spacecraft's trajectory

16:10-16:30 Gurvits L.I., S.V. Pogrebenko, P.A. Fridman, G. Cimo
Planetary radio interferometry and Doppler experiment for a mission to Europa

16:30-17:00 *Coffee break*

Session 3: Europa environment

Chair: G. Managadze

17:00-17:30 De Angelis G., J. E. Nealy, F. F. Badavi, B.M. Anderson, M. S. Cloudsley, J.W. Wilson
Models of the radiation environment in the Jupiter system: the case of Europa

17:30-17:50 Petrukovich A.A.
Plasma environment of Europa

17:50-18:10 Alexeev I.I., E. S. Belenkaya
Jovian magnetosphere: Magnetospheric magnetic field at Europa orbit and using magnetometer data to study of the Europa interior

18:10-18:15 Belenkaya E.S., Alexeev I.I. **(POSTER PRESENTATION)**
Solar Wind - Jovian Magnetosphere Coupling

18:15-18:35 Shematovich V. I. and R.E. Johnson
Near-surface atmosphere of Europa

18:35-18:40 Berezhnoy A.A. **(POSTER PRESENTATION)**
Impact-Produced Exosphere of Europa

Wednesday, February 11, 2009

Session 4: Europa: origin, internal structure and geophysics

Chair: R. Lorenz

9:30-10:00 Kuskov O.L., V.A. Kronrod **(Invited)**
Internal structure of icy satellites of Jupiter

10:00-10:20 Makalkin A.B., V.A. Dorofeeva
Origin of Jupiter's and Saturn's regular satellites in circumplanetary disks

10:20-10:40 Hussmann H., F. Sohl, and J. Oberst:
Tidal Deformation and the Interior Structure of Europa

- 10:40-10:45 Dokuchaev L.V. **(POSTER PRESENTATION)**
Gravitation-elastic waves in the system hidden ocean of the Jovian moon Europa – ice shell
- 10:45-11:05 Rabinovich B.I.
About the Evidence of Existence of an Ocean at the Jovian Moon Europa Based on the Study of Its Ice Cover's Rotation
- 11:05-11:25 Khavroshkin O.B., V.V. Tsyplakov
Europa: seismic geophysics (The thematic field of researches)
- 11:25-11:50 *Coffee break*

Session 5: Europa: surface, geology and Landing site

Chair: R. Hussmann

- 11:50-12:10 Basilevsky A. **(Invited)**
Morphology and geochemistry of Europa: A comparative planetology view
- Geissler Paul E. **(CANCELED)**
Geophysical investigations for a landed mission to Europa
- 12:10-12:40 Prockter L., Senske D.A. and G.W. Patterson **(Invited)**
Europa Regional-Scale Geology, Stratigraphy and Implications for Future Landers
- 12:40-13:10 Dalton J. B. **(Invited)**
The surface composition of Europa and implications for a landed mission
- 13:10-13:30 Ivanov M. (presented by R.Kuzmin)
Possible landing site on Europa
- 13:30-13:50 Patterson G.W., L.M. Prockter, C. Paranicas
Understanding Europa's radiation environment and how it influences landing site characterization.
- El Maarry M. R., Sierks H. **(CANCELED)**
Landing Site Candidates for a Europa Lander from the Galileo SSI and NIMS Instruments: A geologic and engineering perspective
- 13:50-13:55 Arnold G.E., H. Hiesinger **(POSTER PRESENTATION)**
Europa's surface composition and morphology – implications to in situ target definitions
- 13:55-15:20 *Lunch Break*

Session 6: Astrobiology

Chair: M. Blanc

- 15:20-15:50 Prieto-Ballesteros O., J.A. Rodriguez Manfredi, Felipe Gómez-Gómez **(Invited)**
Astrobiology of Europa
- 15:50-16:20 Galchenko V. **(Invited)**
Cryptolife and Cryptobiosphere: Triads of Existence Conditions
- 16:20-16:40 Vorobyova E.
Search for Life on Europa: Objectives for Lander Mission
- 16:40-17:00 Managadze G. **(Invited)**
Inhabited Europa
- 17:00-17:30 *Coffee break*

- 17:30-17:50 Prieur Daniel
Life detection on Europa from a lander: metabolic signatures
- Mukhin Lev (CANCELED)
Possible organic components for icy surface.
- 17:50-18:10 Gleeson D. F., R. T. Pappalardo, A. S. Templeton, S. E. Grasby, J. R. Spear and C. Williamson
An arctic analog to Europa: sings of life on the ice
- 18:10-18:30 Bulat S.A., I.A. Alekhina, J.-R. Petit
Life detection strategy for subglacial lake Vostok, Antarctica: lessons for bioexploration of the Jupiter Moon Europa
- 18:30-18:35 Managadze G. G., Moiseenko D.A., Chumikov A.E., Bondarenko A.I. **(POSTER PRESENTATION)**
Model of Europa and a possibility of organic compounds synthesis in an underwater torch

Thursday, February 12, 2009

Session 7: In-situ measurements

Chair: J.-P. Lebreton

- 9:30-9:50 Gowen R.A., A. Smith, I. A., Crawford, A. J. Ball, S. J. Barber, P. Church, Y. Gao, A. Griffiths, A. Hagermann, W. T. Pike, A. Phipps, S. Sheridan, M. R. Sims, D. L. Talboys, and N. Wells
Micro-penetrator for in-situ sub-surface investigations of Europa
- 9:50-10:10 Weiss P., K.L. Yung, N. Kömle, S.M. Ko, G. Kargl, E. Kaufmann
A thermal drill head for the exploration of subsurface ice layers on Europa
- 10:10-10:15 Chumachenko E.N., R. R. Nazirov, I. V. Logashina **(POSTER PRESENTATION)**
Mathematical simulation of cryobot movement
- 10:15-10:35 Lorenz Ralph D.
Tiltmeter for Europa lander: tidal distortion of the ice crust and long period seismometer.
- 10:35-10:55 Biele J., S. Ulmaec
In-situ analysis of Europa ices by melting probes
- 10:55-11:15 Gerasimov M.V.
Scientific tasks of the gas analytic package for the Europa lander
- 11:15-11:35 Brown P., H. O'Brien, M. Dougherty, C. Carr, and I. Müller-Wodarg
Concept magnetometer design for a Europa lander
- 11:35-12:00 *Coffee break*

Session 7: In-situ measurements (continued)

Chair: Gerasimov M.

- 12:00-12:20 Grigoriev A.V., Vorob'eva E.A., Korolev Yu.N.
Search for signs of life by means of ATR spectroscopy (experiment "MATROS")
- 12:20-12:40 Rodriguez-Manfredi J.A., O. Prieto-Ballesteros, F. Gomez, A. Sansano
Raman spectrometer for in-situ measurements on Europa's surface
- 12:40-13:00 Bowden S.A. and R. Wilson

Surface enhanced Raman spectroscopy (SERS) as a low resource analytical measurement for direct life detection on icy moons

- 13:00-13:20 Wurz Peter, Marek Tulej, G.G. Managadze
In Situ Composition Analysis of Planetary Surfaces by Laser-Based Mass Spectrometry
- 13:20-13:40 Rodin A.V., G.N. Goltsman, N.A.Evdokimova, M.V.Gerasimov, I.I.Vinogradov, A.A.Fedorova,
Search for complex organic matter and sounding of Europa' surface by means of far IR & terahertz spectroscopy
- 13:40-15:00 *Lunch Break*

Session 7: In-situ measurements (continued)

Chair: Gerasimov M.

- 15:00-15:20 Jessberger E.K., I. Rauschenbach, H. Henkel, S. Klinkner, H.-W. Huebers, S.G. Pavlov
GENTNER – a miniaturized laser instrument for planetary in-situ analysis
- 15:20-15:40 Digel I., B. Dachwald G.M. Artmann, P. Linder, O. Funke
A concept of a probe for particle analysis and life detection in icy environments
- 15:40-16:00 Managadze G. G, Managadze N.G., Saralidze G. Z, Chumikov A.E., Peter Wurz
Mass spectrometric measuring complex for the detection of the signs of life in the ice surface of Europa
- 16:00-16:05 Tulej M., P. Wurz, M. Iakovleva, and D. Abplanalp (**POSTER PRESENTATION**)
A Laser-Ablation Mass Spectrometer For the Space Research
- 16:05-16:25 Ksanfomaliti L.V., Petrova E.V.
The diffraction camera for hunting up the microorganisms traces
- Ozorovich Yu.R., Linkin V.M., Lukomsky A.K., Klimov S.I., Vaisberg O.L., Manukin A.B, Khavroshkin O.B (**CANCELED**)
Project "Europa lander-Sounding": Experimental possibilities for complex sounding of the subsurface-electrical structure of Europa moon
- 16:25-16:45 Vaisberg O.L.
Space plasma instruments for planetary studies
- 16:45-17:10 *Coffee break*
- 17:10-18:40 **DISCUSSION**
- 18:40 End of the workshop
- 19:00-21:00 **FRIENDLY DINNER**

List of Posters
CONFERENCE HALL

- 1) Belenkaya E.S., Alexeev I.I.
Solar Wind - Jovian Magnetosphere Coupling
- 2) Berezhnoy A.A.
Impact-Produced Exosphere of Europa
- 3) V. Sasi Prabhakaran
SCOUT- Europa Terrestrial Lander (ETL)
- 4) Dokuchaev L.V.
Gravitation-elastic waves in the system hidden ocean of the Jovian moon Europa – ice shell
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Europa's surface composition and morphology - implications to insitu target definitions
- 6) Managadze G.G., Moiseenko D.A., Chumikov A.E., Bondarenko A.I.
Model of Europa and a possibility of organic compounds synthesis in an underwater torch
- 7) Tulej M., P. Wurz, M. Iakovleva, and D. Abplanalp
A Laser-Ablation Mass Spectrometer For the Space Research
- 8) Chumachenko E.N., R. R. Nazirov, I. V. Logashina
Mathematical simulation of cryobot movement

Friday, February 13, 2009

Cultural program

- 1) *Excursion to S.P.Korolev Rocket and Space corporation "Energia" (full day; inscription closed)*
- 2) *Excursion to Kremlin (separately)*