

PROGRAM AT A GLANCE

7th Global MVA Workshop & Symposium 2023 Kurashiki/Tottori

Day 0 (December 6) Registration (16:30-) and Welcome Cocktail (17:00-19:00) @ Kurashiki International (Kokusai) Hotel

Day 1 (December 7) Workshop & Symposium @ Kurashiki City Art Museum Main Hall and else (9:00-20:00)

- Registration (8:40-)
- Opening Address, Co-Host Addresses
- MVA Activities Overview
- Plenary Talks
- MVA Award Ceremony & Sponsored Luncheon
- Plenary Talks
- Breakout Session 1 (Kurashiki City Art Museum Main Hall)
 - 1-1. Architecture, 1-2. Lunar Infrastructure
- Breakout Session 2 (Kurashiki City Art Museum 2nd Room: TBC)
 - 2-1. Human Factor / Radiation, 2-2. Food production/Science
- Breakout Session 3 (MASC Exhibition Hall: TBC)
 - 3-1. Mining/energy Architecture, 3-2. Technical issues
- Breakout Session 4 (Room TBD)
 - 4-1. Culture, 4-2. Underground Cave Utilization
- Banquet @ Ohara Museum of Art Main Gallery (18:00-20:00)

Day 2 (December 8) Workshop & Symposium @ Kurashiki City Art Museum Main Hall (9:00-17:30)

- Plenary Talks
- Sponsored Luncheon
- Astronaut Special Guest Talk
- Plenary Talks: Moon Village Reference Model Study
- Panel Discussion 1: Science to Drive Sustainable Human Activity on the Moon
- Panel Discussion 2: How to Promote Commercial Activities on the Moon

Day 3 (December 9) Excursion, Transportation to Tottori, and Outreach Events in Japanese

- Excursion: Kurashiki Historic Quarter Walking in English, upon onsite request, 10:00-13:00
- Transport to Tottori (Departure time & places to be announced on site)
- Outreach Event in Japanese @Mabi Fureai Center in Kurashiki (10:00-13:00)
- Outreach Event in Japanese @Mori-no-machi grace in Okayama (9:00-17:00)

Day 4 (December 10) Special Symposium (9:00-19:00) and Outreach Event in Japanese @ Tottori

- Opening Address (9:00-10:00)
- Special Symposium (Core-Biome) Session Part 1 (10:00-12:00)
- Demonstration Field at Lunar Terrace & Luncheon (12:00-13:30)
- Special Symposium (Core-Biome) Session Part 2 (13:30-14:50)
- Visit to Tottori Sand Dune and Sand Museum (14:50-17:30)
- Outreach Event in Japanese (16:30-18:30)
- Farewell cocktail (17:30-19:00)

PROGRAM

7th Global MVA Workshop & Symposium 2023 Kurashiki/Tottori

Day 0 (December 6)

Registration and Welcome Cocktail

@ Kurashiki International (Kokusai) Hotel (16:30- and 17:00-19:00)

Day 1 (December 7)

Workshop & Symposium @ Kurashiki City Art Museum Main Hall and Else

Opening Session Chair: Masashi Miura (ISAS/JAXA)

- 9:00 - 9:10 - Opening Address
 - Welcome Address: Eizo Nakamura (LOC Chair, Okayama Univ)
 - Opening Address: Giuseppe Reibaldi (MVA President)
- 9:10 - 9:25 - Co-Host Addresses
 - Yasutomo Nasu (President of Okayama Univ)
 - Yosuke Alexandre Yamashiki (Human Spaceology Center, Kyoto Univ)
- 9:25 - 10:10 MVA Activities Overview
 - Giuseppe Reibaldi (MVA) General MVA Activities overview
 - John Mankins (MVA) OASIS 2040, MVA architecture study
 - Nasr Alsahhaf (MVA) The International Moon Day importance for Global Lunar Cooperation
 - Short Video Presentation of MVA Activities
 - Rob Mueller (MVA) Exploration Analogues Working Group Present and Future Activities
 - Remo Rapetti, Arthur Woods (MVA Cultural Considerations Working Group) Past Activities and Future Projects
 - Ghanim Alotaibi (MVA PESC Project Manager) The Moon Village – Participation of Emerging Space Countries (PESC) Project Progress, Challenges and Future Prospective.
 - Surender Ponnalagar (United Arab Emirates) Towards Moon Village Generation
 - Christophe Bosquillon, Gidon Gautel & Yann Perrot, The Lunar Commerce and Economics WG: Main Results and Future Activities”
- 10:10 – 11:50 – Plenary Talks Chair: Yosuke Yamashiki (Kyoto Univ)
 - Koji Yamanaka (JAXA Space Exploration Center) JAXA Space Exploration Now and Beyond

- Bernard Foing (LUNEX EuroMoonMars, Eurospacehub, ILEWG, MVA and Intl Moonbase Alliance) European Lunar Science Activities and ILEWG LUNEX Euromoonmars Research Highlights
 - Bob Lamboray & Mathias Link (Luxembourg Space Agency) SpaceResources.lu - Recent Developments
 - Takeshi Kai (MHI) MHI's Lunar Society Concepts and Efforts for Implementation
 - Laura Champion (Lockheed Martin) "A Vision for the Lunar Surface Power Architecture"
 - Akio Saito (IHI AEROSPACE Co., Ltd.) Completely Closed Material Circulation System on the Moon
- 11:50 - 12:00 - MVA Award Ceremony
 - 12:00 - 13:00 - Luncheon
 - 13:00 – 14:25 Plenary Talks Chair: Giuseppe Reibaldi (MVA)
 - Masashi Sato (ispace) Transport Service to the Moon & Future Prospect of Moon Valley
 - Eizo Nakamura (Institute for Planetary Materials, Okayama Univ) Growing Vegetables Using Asteroid Materials to Address ISRU Challenges on the Moon
 - Eric Zhang (DoraHacks) Building space-based transaction settlement system on Earth Orbit and Beyond
 - Shinichiro Nakajima (Dymon) The World Smallest Lunar Rover: YAOKI
 - Hirokazu Mori (WarpSpace) Introduction to Commercial Cis-Lunar Optical Data Relay Architecture

Breakout sessions 1 - 4 in parallel (14:30-17:40)

The time for each talk is 15 min. (including discussion).

- Breakout Session 1 (Kurashiki City Art Museum Main Hall): 14:30 - 17:40
 - 1-1. Architecture Chair: Cathal Mooney (ESTEC)
 - Seiya Tanaka (Doshisha Univ) Electrochemical Extraction of Metals and Oxygen from Lunar Regolith
 - Katsushi Furutani (Toyota Technological Institute) End-effector for Machining of Rock with Saw-wire for Lunar and Planetary Explorations
 - Yoshiko Ogawa (Univ of Aizu) Plan to Build Telecommunication System for the RTF Ground Demonstration Field: Part of the Moon/Mars Garden (Hakoniwa) Project
 - Takashi Mizuguchi (Keio Univ) Towards a Lunar Architectural Paradigm: Tumbling Modular Construction
 - Patrick Collins (Astrostrom GmbH) The Greater Earth Lunar Power Station
 - L. Windisch (TU Braunschweig) "LUNAR ISLANDS: Modelling and Testing of Plume/Regolith, Interaction on Lunar Landing Pads and Berms"
 - Takeru Yamagami (JAXA) Safety & Mission Assurance Activity for Gateway
 - 1-2. Lunar Infrastructure Chair: John Mankins (MVA)

- Cathal Mooney (ESTEC) Materials Design Aspects for a Lunar Habitation
 - Yoji Ishikawa, Obayashi Corporation: Construction, Structure, Material, Energy, and Agriculture for the Moon
 - Kimitaka Watanabe, Soraki Akiyama, Yuma Ikeda, Yuki Miyashita, Shinnosuke Teramoto, Kazutaka Togashi, Yamato Ootani, Tomoki Horiguchi, Kouki Matsuo, Makoto Wakui (Doshisha Univ), Shunsuke Murata, Tomoki Aoyama (HORIBA, Ltd.), and Munetaka Ueno (JAXA), Development of a Small Module for Atomic Element Analysis for a Lunar Rover
 - Tatsuho Sato (TAKENAKA CORPORATION), The Lunar Tower for the Quality of Life “The Lunar Mother Tree”
 - Naohiro Uyama (Shimizu Corporation) Shimizu’s Research and Development Towards Lunar Construction and Long-term Habitation
- Breakout Session 2 (Kurashiki City Art Museum Room-A): 14:30 - 17:40

2-1. Human Factor/Radiation Chair: Munetaka Ueno (JAXA)

- Sayaka Wakayama (Univ of Yamanashi) For Humans to Reproduce in Space” Space Pup2 Project”
- Wakako Migaki (Graduate School of Comprehensive Human Sciences, Univ of Tsukuba) A Quantitative Study of Human Relation Change Using Sociometric Tests in the Space Analog SIRIUS-21
- Satoshi Sano (Institute of Humanities and Social Sciences for the Space, Space Anthropology) Minimum Population Size and Human Evolution in Space Settlement Based on Space Genetics
- Yumi Matsuzaki (JAXA) Ethics Review Process for Human Research and Ethics Education at JAXA
- Masayuki Naito (National Institutes for Quantum Science and Technology (QST/NIRS)) Development of Radiation Protection and Dose Assessment Strategies for Future Human Space Stays
- Akihisa Takahashi (Gunma Univ) Biological Combined Effects of Simultaneous Exposure to Low-dose-rate Radiation and Partial Gravity Simulating the Moon
- Emika Fujii (Graduate School of Kyoto Univ.) Assessment of the Space Radiation Exposure in Lunar Structures

2-2. Food Production/Science Chair: Ikko Funaki (ISAS/JAXA)

- Hayato Ohkuma, Ayako Iwasaki (JAXA/Tansa), Research and Development of Food Systems for Lunar Settlement ~Towards a Self-sufficient Life on the Moon~
- Manabu Sugimoto (Institute of Plant Science and Resources, Okayama Univ) Effect of Anthocyanin on Viability of Rice Seeds in Space
- Yusuke Nakauchi (Earth and Space Exploration Center (ESEC), Ritsumeikan Univ) Science Objectives and Observational Plan for a Future Sample Return Mission from the Moon

- Kato Claeys, Moonbasealliance (HI-SEAS), The Hawaii Space Exploration Analog and Simulation habitat and EMMIHS 2023 missions
- Breakout Session 3 (MASC Exhibition, Room-B): 14:30 - 17:40

3-1. Water Mining/Energy Architecture Chair: Atsushi Uchida (MRI)

- Kiho Fukaura, Takuya Yokoyama, Yoshitoki Tanaka, Soichi Mori (JGC Holdings) JGC's Vision for a Lunar Society ~ Lumarnity® (Lunar Smart Community®) ~
- Shingo Miyamoto, Yukitaka Matsumoto (Kurita Water Industries) Prediction of Properties of Water Extracted from Lunar Regolith and Its Purification for Propellant Generation
- H. Uchida et.al. (Takasago Thermal Engineering) Thermal Mining for Lunar Icy Regolith: Heat Transfer Analysis
- Mayuko Shinohara (Chiyoda Corporation) Water Analysis Module with Direct Measurement
- Hidehito Shiratsu (Yokogawa Electric.) Control systems for plants on the Moon
- Koichi Ijichi et.al (Japan Space System) Introduction of the Electric Power Infrastructure Feasibility Study Activities for the Moon

3-2. Technical Issues Chair: Hidehito Shiratsu (Yokogawa Electric)

- Tomomichi Fujita (Hokkaido Univ) Mosses: Pioneering Plants for Lunar Agriculture in Space Settlements
- Yoshiaki Kitaya (Osaka Metropolitan Univ) The Sweet Potato Culture System for Supporting Human Habitation on the Moon
- David Augusto Galvan Alvarado (Mayan Space) Finding Solutions for Water and Resource Mapping on the Moon: The SPACE ANTS Initiative
- Toshihiro Shibukawa (ArkEdge Space Inc.) Lunar Communication and Navigation Infrastructure and Lunar Navigation Satellite System Demonstration Mission
- Chisato Hondou (KDDI Corporation) Simulation Study on Deployment of Mobile Communications in Mountainous Regions Around the Lunar South Pole
- Jun Sato (The Univ of Tokyo) Quick Setup Mechanism for Lunar Base Camp in the Pit / on the Pole

- Breakout Session 4 (Room-C, TBD): 14:30 - 17:40

4-1 Culture Chair: Yosuke Yamashiki (Kyoto Univ)

- Jasmin Della Guardia and Koji Tachibana (Chiba Univ) "Cosmic home"
- Atsushi Heki (Production Koroencyo) <1G Art: Spherical Theater in Space
- Tsubasa Sato (Okayama Hakuryo High School) Survivability and Life Support in Sealed Mini-Ecosystems with Simulated Planetary Soils
- Makiko Ohtake (The Univ of Aizu) Overview of Moon/Mars Garden (Hakoniwa) Project

- Thais Zuchetti (Lunex EuroMoonMars EuroSpaceHub, Amsterdam Univ of Arts, Lunar habitat design) Crew Well-being and Happiness

4-2. Underground Cave Utilization Chair: Junichi Haruyama (ISAS/JAXA)

- Nao Hoshinouchi (JAXA) A Study on Unmanned Ground Penetrating Radar Search in Vertical Pits and Lava Tubes on the Moon and Mars
- Hitoshi Nozawa (The Graduate Univ for Advanced Studies) Scientific Findings Expected from the Exploration of the Vertical Hole and the Subsurface Cavity in the Mare Tranquillitatis
- Yuhei Oishi (TAISEI Corporation) Living Environment Construction Plan in Lunar Underground Space
- Takuya Ono (Kajima Corporation) Lunar Glass, an Artificial Gravity Facility in a Lunar Lava Tube to Protect those Born on the Moon
- Akira Akasaka (KDDI Corporation) Communications and Related Technologies for Lunar Cave Exploration
- Yasuharu Kunii (Chuo Univ) “Project Astro LavaXtubers” Toward Architecture by Swarm AI Robots in Lunar Lava-Tube
- Takao Maeda (Tokyo Univ of Agriculture and Technology) Mission Design Concept of the First Japanese Lunar Underground Exploration

Banquet (18:00-20:00)

Ohara Museum of Art Main Gallery <https://www.ohara.or.jp/en/>

Day 2 (December 8)

Workshop & Symposium @ Kurashiki City Art Museum Main Hall

- Plenary Talks (9:00-10:20) Chair: Bob Lamboray (Luxemburg Space Agency)
 - Dai Asoh (JAXA Lunar Polar Exploration Project) Lunar Polar Exploration (LUPEX) Mission and Beyond
 - Fumiya Tsutsui (JAXA) Japan's Challenge: Living and Driving on the Lunar Surface
 - Hiridy Miyamoto (Tokyo Univ) et.al.; Science Objectives of the TSUKIMI Lunar Mission
 - Ikkoh Funaki, Hiroyuki Sugita and Yosuke Kaneko (JAXA), JAXA’s Open Innovation Platform for Future Space Explorations
- Plenary Talks (10:30-12:10) Chair: Satoru Kurosu (Yokogawa Electric)
 - Munetaka Ueno, Masaki Yamazaki, Mio Matsui, Naoki Ishihama (JAXA), Natsuki Yamanobe (National Institute of Advanced Industrial Science and Technology), Shin-ichi Kimura (Tokyo Univ of Science), Kimitaka Watanabe (Doshisha Univ): RHEA (Robotic Habitation Enhanced by AI) Project *New Life Spheres Opened up by AI Robots

- Junichi Haruyama (ISAS/JAXA) Lunar Underground Caves and their Skylight Vertical Holes as Resources for Humankind's Expansion into Space
 - Francois Dubrulle, F. Marchis, G. Appelhans (Qosmosys) Unveiling Lunar Riches: A Quantitative Framework for Profitable Moon Missions and Beyond
 - F.Fazel (EuroSpaceHub Academy & Lunex), B.Foing (Leiden Univ), Sustainable Development of the Lunar Moon Market
 - Taizo Kobayashi (Ristumeikan Univ.) Development of an Unmanned Exploration Robot for Topographic Survey and Geotechnical Investigation on the Lunar Surface
 - Raymond S. Clinton (NASA / MSFC) NASA Research and Development for Lunar Construction and Development (TBD)
- 12:10 - 13:00 - Luncheon
- 13:00 - 13:30 - Special Guest Talk Chair: Giuseppe Reibaldi (MVA)
 - Norishige Kanai, JAXA astronaut: “Let Us Go to the Moon”
- 13:30 - 14:45 - Moon Village Reference Model Study: building a society of a thousand habitants on the Moon Chair: Yoshifumi Inatani (MVA)
 - Yuki Sakamoto (ISAS/JAXA) Architecture Considerations for the Lunar Society
 - Issei Mamiya, Atsushi Uchida (Mitsubishi Research Institute, Inc.) Taro Asazuma, (ispace), Misuzu Onuki (SPARX Innovation for Future Co., Ltd.) Business Modeling for Mining and Tourism
 - Tetsuji Odan (Mori Hamada & Matsumoto/Japan Space Law Association) Legal & Institutional Consideration in Building a Society on the Moon
 - Ryutaro Izumi (Nihon Univ) Medical/Life Science Issues for a Society on the Moon
 - Hiroki Okada (Kobe Univ) Anthropological Considerations for Creating a Society on the Moon
- 15:00 - 15:50 - Panel Discussion 1
New Lunar/Planetary Science Spurs Sustainable Human Activity on the Moon?
 - Moderator/chair: John Mankins
 - Panelists (TBC): Bernard Foing (LUNEX EuroMoonMars), Hirdy Miyamoto (Tokyo Univ), Yuichi Tsuda (ISAS/JAXA)
- 16:00 - 16:50 Panel Discussion 2
What Are the Issues for Startups and Commercial Sectors Towards a Good Business Opportunity & Environment on the Moon?
 - Moderator/chair: Misuzu Onuki (SPARX Innovation for Future Co., Ltd.)
 - Panelists (TBC): Taro Asazuma (ispace), Eric Zhang (DoraHacks), Hirokazu Mori (Blue Abyss), Takayoshi Fukuyo (ArkEdge space), Satoru Kurosu (Yokogawa Electric),
- 17:00 - 17:30 - Wrap-up & Closing of MVA Workshop & Symposium 2023 Kurashiki-part, Introduction of Tottori Special Symposium and Awarding Organizing Body of 8th MVA Workshop & Symposium 2024

Day 3 (December 9)

Transport to Tottori

Transport to hotels in Tottori by chartered bus for MVA-registered attendants who participate in MVA Special Symposium in Tottori on 10. Dec. (Departure time and place(s) to be announced on site)

Excursion Kurashiki Historic Area & traditional Lunch with English guide

(10:00-13:00, TBC)

English-speaking guided walking tour of Kurashiki preservation of culture, tradition and historic buildings (Kurashiki Bikan-Area in Japanese). Japanese style Lunch will also be served. We will organize the tour upon request, and we will prepare tour-registration desk at the name badge collection reception of the workshop main venue (Kurashiki City Art Museum 3rd Floor) on 7. & 8. Dec. Limited number of places will be available.

Outreach Event

Two outreach events will be held. Since these events are for the local general public, the working language is Japanese. Most of talks in these events are those from symposium talks. Therefore, it is not necessary and mandatory for symposium-registered participants to join.

Kurashiki Outreach Event in Japanese

@Mabi Fureai Center in Kurahsiki, 10:00-13:00

- MVA introduction: John Mankins
- Koji Yamanaka (Director, JAXA Space Exploration Center) JAXA Lunar-Exploration Program Overview
- Atsushi Uchida (Lunar Business Consortium) Lunar Business Promotion
- Taro Asazuma (ispace) Commercially Driven Lunar Transport Service & CIS Lunar Economy
- Hiroshi Sakanoue (MASC) Kurashiki Aerospace Industrial Promotion

Special Lectures

- Yuichi Tsuda (ISAS/JAXA) Hayabusa2 and ISRU Materials in the Solar System
- Norishige Kanai (JAXA astronaut) "Let Us Go to the Moon"

Okayama Outreach Event in Japanese

@Mori-no-machi grace in Okayama, 9:00-17:00

- Opening Remarks Yasutomo Nasu (President, Okayama Univ), Mitsunobu Kojima (Representative of Ryobi Group), Kanji Fujiki (President, Japan Space Forum)
- Keynote talk: Eizo Nakamura (Okayama Univ) "Let's Have Salad on the Moon"
- Makoto Yoshikawa (ISAS/JAXA) "Let's Catch an Asteroid"
- Takao Doi (Kyoto Univ, former astronaut) "Forests on the Moon and Mars"
- Junichi Haruyama (ISAS/JAXA) "Characteristics and Utilization of Lunar Lava Tunnels"
- Ken Shoji (Taisei Corporation) "Ecosystem Concept and Architecture in Lava Tunnels"

- Panel Discussion “Frontier: People Dream in the Forest of the Moon”

Exhibit & Demonstration

- Wooden artificial satellite
- Visitors remotely operate the electron microscope to observe Ryugu sample
- Plant cultivation experiment with Ryugu composition soil & Martian environment

Day 4 (December 10)

Tottori Special Symposium and Outreach Event

Tottori opening session: Chair: Masashi Miura (ISAS/JAXA)

- 9:00 - 9:20 - Opening Address:
 - Hisashi Tsujimoto, (Arid Land Research Center, Tottori Univ)
- 9:20-9:40
 - MVA introduction: Giuseppe Reibaldi
 - Katsuaki Tanaka (AMULAPO Co.) Commercially Driven & Startup Activities in Tottori
- 9:40-10:00 Co Host speech & Session Introduction:
 - Yosuke A. Yamashiki (Director, SIC Human Spaceology Center, Department Head of GSAIS, Kyoto Univ) Three Essential “Core” Concepts and Establishment of “Terra Windows” for Space Migration
- 10:00-12:00 Core-biome session Part 1 Chairs : Masato Sakurai (JAXA) & Yosuke A. Yamashiki (Kyoto Univ)
 - John Adams (Univ of Arizona Deputy Director, Biosphere 2) Challenges in Biosphere 2 as Earth Analogue in Space
 - Reiji Masuda (Maizuru Fisheries Research Station, Kyoto Univ) Ocean Environment and space
 - Masato Endo (Tokyo Univ of Marine Science & Technology) Aquaculture in Space
 - Masato Sakurai (JAXA) Physico-chemical Environmental Control Life Support System (ECLSS) for Manned Space Exploration
 - Takaaki Fujinaga (AquaNaut & JAUS) The Simulated Moon Exploration Recreation Program UnderWater,
 - Shuichi Ichimura, Yosuke A. Yamashiki (GSAIS Kyoto Univ) Assessment of the Current Recycling System on the ISS and Potential Issues for the Future of Human Space Explorataion
- 12:00-13:30 Special Demonstration Field at Lunar Terrace & Luncheon
 - Demonstration/Exhibit of Rover Driving and wheels for Lunar Vehicles
- 13:30-14:50 Core-biome session Part 2 Chairs: Masashi Miura (JAXA/ISAS) & Hisashi Tsujimoto (Tottori univ.)
 - Munemasa Teramoto (Tottori Univ) Material Circulation in a Small Ecosystem
 - Tamotsu Kuroda, Tottori Univ: TBD
 - Takeshi Taniguchi (Tottori Univ) Soil Microorganism and Plants

- Kazumi Muraki (President CRRA) Development of Small DAC Devices for Educational Use in Preparation for the Development of a CO₂ Removal System for ECLSS, and CRRA's Attempt to Raise Awareness of CCUS
- 14:50-17:30 Visit to Tottori Sand Dune (Umanose Area) and Sand Museum
- 17:30-19:00 Farewell Cocktail
- 19:00-21:00 Simulated Astronaut Activity via AR Glasses on Virtual Moon at Night (optional)

Tottori Outreach Event in Japanese @ Sakyu center (16:30-18:30)

This event will be held in parallel with the Tottori Special Symposium. Since it is for the local general public, the working language is Japanese.

Special Lectures

- Noriaki Inami (CEO, INAMI Space Laboratory)
- Ai Tonomoto (Vice Representative, Cosmos girl)
- Hirokazu Mori (CEO, WARPSPACE USA)
- Takuya Ono (KAJIMA Corporation / Kyoto Univ)

Talk & Discussion

- Yosuke A. Yamashiki (Director, SIC Human Spaceology Center, GSAIS, Kyoto Univ)
- Masashi Miura (JAXA/ISAS)
- Katsuaki Tanaka (CEO, amulapo)
- Hiroyuki Ida (Tottori Prefecture)

Facilitated by Arisa Kuroda (Space personality)