



# PROGRAMME

Wednesday, May 16, 2018

08.00 Registration

09.00 Welcome and introduction (Sala Convegni)

- Dr Alberto Battistelli, CNR
- Prof. Roberto Battiston, President of the Italian Space Agency
- City of Rome (TBC)
- Lazio Region (TBC)
- Dr Silvio Rossignoli, ARESCOSMO
- Dr Franco Ongaro ,ESTEC Director, ESA/TEC Directorate Director

10.30 Main talk (Sala Convegni), Dr Christophe Lasseur (ESA): Regenerative Life Support Systems: Status, and challenges.

11.10 Main talk (Sala Convegni), Dr Mark H. Kliss (NASA): Understanding the NASA TA6: Human Health, Life Support, and Habitation Systems Technology Roadmap, with Emphasis on Life Support

*11.50 Lunch*

<p><b>Session 1: Terrestrial applications (Sala Marconi)</b></p> <p><i>Chair: LLMS Rob Suters (IPStar , MELiSSA Foundation)</i> <i>Co-chair : Mrs Aude de Clerq (ESA)</i></p> <p>12.50 Keynote: Circular Future: the spaceship economy, Massimiano Tellini, Intesa San Paolo</p> <p>13.20 Sustainable indoor horticultural systems of the future, Volkmar Keuter, Fraunhofer-Institute for Environmental, Safety and Energy Technology UMSICHT, Department Photonics and Environment, Germany</p> <p>13.40 Valeratic acid assimilation, photoacclimation and production of polyhydroxyalkanoates by the non-sulphur purple bacterium Rhodospirillum rubrum S1H, Guillaume Bayon-Vicente, University of Mons</p> <p>14.00 Detecting Toxic Substances in Water by Chlorophyll Fluorescence, Ann Delahaye, QinetiQ Space</p> <p>14.20 Grey water recycling and energy recovery, Philippe Fiani, Sherpa Engineering</p> <p>14.40 Automated multi-ion measurement for space and land, Roy OMahony, CleanGrow</p> <p>15.00 From waste to taste - Closing the MELiSSA Loop at the 40 feet Container level, for Earth Applications, Radu Mircea Giurgiu, MELiSSA Foundation / UASVM Cluj-Napoca</p> <p>15.20 Implementation of space technologies into sustainable and smart buildings, Bruno Renders, NEOBUILD</p>	<p><b>Session 2: Flight experiments and space technology demonstrators (Sala Convegni)</b></p> <p><i>Chair: Dr Samuel Gass (RUAG)</i> <i>Co-Chair: Dr Dries Demey (QinetiQ Space)</i></p> <p>12.50 Keynote: Regenerative Life Support Systems validation: from space to ground, and back, Cesare Lobascio, Thales Alenia Space</p> <p>13.20 Results of the organic waste biotransformation processes studies on satellites "BION-M" №1 AND "PHOTON-M" №4, Denis Korshunov, Institute for Biomedical Problems, Moscow, Russia</p> <p>13.40 Cubesat Cultivation System for the growth of a fortified "MicroTom", Luca Gugliermetti, La Sapienza</p> <p>14.00 Biotechnological studies on automatic biological satellite BION M2, Ilyin Viacheslav, Institute for Biomedical Problems, Moscow, Russia</p> <p>14.20 MULTITROP: an experiment for the ISS, Giovanna Aronne, Department of Agricultural Sciences, University of Naples Federico II</p> <p>14.40 PBR@LSR – A Hybrid Life Support System Experiment and Technology Demonstrator at the ISS, Gisela Detrell, University of Stuttgart</p> <p>15.00 Veggie at the Forefront of NASA Food Production, Gioia Massa, NASA Kennedy Space Center</p> <p>15.20 Arthrospira-B: the first bioreactor in space for the production of oxygen and edible biomass as sustainable resources for space travelers, Natalie Leys, Belgian Nuclear Research Center SCKCEN</p>
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<p>15.40 CAPTURE: a resource recovery centre with opportunities for the MELISSA programme, Korneel Rabaey, University of Gent</p> <p>16.00 !Flash! Sealed sterile computerized hydroponic greenhouses, Giorgia Pontetti, FERRARI FARM SOCIETA AGRICOLA S.R.L.</p> <p><b>16.05 Coffee break</b></p> <p><b>Session 3: Yellow and grey waters treatment and recycling</b></p> <p><i>Chair: Prof. Siegfried Vlaeminck (UAntwerpen)</i> <i>Co-Chair : Prof. Claude-Gilles Dussap (UCA- Université Clermont-Auvergne)</i></p> <p>16.30 Keynote: Nutrient and Water Recovery from Urine: A Technology Takes Off, Bastian Etter, Eawag/Vuna</p> <p>17.00 Keynote: Greywater reuse in space: benefits, challenges and means for safe reuse, Amit Gross, Zuckerberg Institute for Water Research, Jacob Blaustein Institutes for Desert Research, Ben Gurion University of the Negev, Israel</p> <p>17.30 Nitrogen recovery from urine in Space: a case for nitrification, Peter Clauwaert, Universiteit Gent</p> <p>17.50 A technique of water vapor recovery through the characterization of condensation phenomena, Akhilesh Tiwari, Indian Institute of Information Technology Allahabad (IIIT A)</p> <p>18.10 Bio-electrochemical pre-treatment and membrane aeration to intensify full nitrogen recovery for Spaceflight urine nitrification, Jolien De Paepe, Ghent University</p>	<p>15.40 Model analysis of an Arthrospira photobioreactor running in ISS, Laurent Poughon, Université Clermont-Auvergne, CNRS, Institut Pascal, Clermont-Ferrand, France</p> <p><b>16.00 Coffee break</b></p> <p>16.30 BIORAT1: Oxygen Recycling between an Algae Photo-bioreactor and a Consumer, Samuel Gass, RUAG Space</p> <p><b>Session 4: Edible biomass production</b></p> <p><i>Chair: Prof. Gene Giacomelli (University of Arizona)</i> <i>Co-Chair: Dr Gioia Massa (NASA)</i></p> <p>16.50 Keynote: Using Space Based Controlled Environment Plant Growth Technology for Earth Based Production, Mark Lefsrud, McGill University</p> <p>17.20 Light quality alters the response to ionizing radiation in seedlings of legume species in terms of development and nutritional traits, Veronica De Micco, University of Naples Federico II, Dept. Agricultural Sciences</p> <p>17.40 Effects of White LEDs on Growth and Phytonutrients of 'Outredgeous' Romaine Lettuce when supplemented with Various Monochromatic Wavelengths, Matthew Mickens, NASA Kennedy Space Center</p> <p>18.00 Influence of air distribution system on hydroponically-grown lettuce crop performance in the higher plant compartment at MELISSA Pilot Plant facilities, Antonio Pannico (Department of Agricultural Sciences, University of Naples Federico II) and Sebastian Colleoni (EnginSoft), Italy</p>
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Thursday, May 17, 2018

08.30 registration	
09.00 Main talk (Sala Convegni), Dr Sogo Nakanoya (JAXA): An overview of JAXA R&D in Regenerative life support system	
<b>Session 5: Modelling and system design (Sala Marconi)</b>  <i>Chair: Dr Alberto Bemporad (IMT School for Advanced Studies Lucca)</i> <i>Co-Chair: Dr Samir Bennani (ESA)</i>  09.40 Keynote: Understanding/engineering cell and community metabolism, Orkun Soyer, University of Warwick  10.10 ALiSSE: a multi-criteria tool for life support system evaluation and comparison, Philippe Fiani, Sherpa Engineering  10.30 HVP-photobioreactor for intensified microalgal culture: influence of low culture thickness and high biomass concentration on hydrodynamics, gas-liquid mass transfer and biofilm development, Jeremy Pruvost, University of Nantes  10.50 !Flash!  Synergetic Interactions between Space and Process Systems Engineering Enhancing Reactor Design, Dries Demey, QinetiQ Space nv  MetQy: an R package to aid the design of synthetic microbial communities, Andrea Martinez-Vernon, University of Warwick	<b>Session 4: Edible biomass production (Sala Convegni)</b>  <i>Chair: Prof. Gene Giacomelli (University of Arizona)</i> <i>Co-Chair: Dr Gioia Massa (NASA)</i>  09.40 Light spectral composition is a key factor in controlling plant growth and tuber quality of potato in controlled environments, Roberta Paradiso, University of Naples Federico II  10.00 Transplantation of soil microbiota to hydroponically grown strawberry, Danny Geelen, Ghent University  10.20 Impact of Nutrient availability on wheat root plasticity for higher plant root modelling, Seher Bahar Aciksöz, ETH Zurich Group of Plant Nutrition  10.40 Biomass characterization using advanced plant growth chamber technology, Mike Dixon, University of Guelph
11.00 Coffee break	11.00 Coffee break

<p>11.20 Living architecture: metabolic programmable Apps as part of Life Support Systems, Barbara IMHOF, LIQUIFER Systems Group</p> <p>11.40 Working model of a closed ecosystem for testing BTLSS technologies, Alexander Tikhomirov, Institute of Biophysics of the Siberian Branch of Russian Academy of Sciences</p> <p>12.00 Big data in controlled environment agriculture for improving the nutritional factors of the plants, Rares Nistor, UASVM Cluj-Napoca, Romania</p> <p>12.20 Cultivating micro-algae at high density in animal tissues: the feat of a photosynthetic marine flatworm model, Xavier Bailly, Station Biologique de Roscoff / CNRS / Sorbonne Université</p>	<p>11.20 Screening purple bacteria for their growth kinetics on volatile fatty acids: paving the way for efficient production of edible biomass on fermented waste, Siegfried Vlaeminck, University of Antwerp</p> <p>11.40 Dimensioning and planning crop production in a simulated space expedition, Esther Meinen, Wageningen University &amp; Research</p> <p>12.00 Light quality influences differently green- and red-leaf plant growth, Luigi Gennaro Izzo, University of Naples 'Federico II'</p> <p>12.20 Effects of simulated space radiations on plant roots investigated by proteomic analysis, Angiola Desiderio, ENEA</p>
<b>12.40 Lunch</b>	
<p><b>13.40</b></p> <p><b>Poster session (ground floor and Corridoio Digitale)</b></p> <p><b>Contest (sala Convegni):</b></p> <p><b>Circular Economy: Bioregenerative Environmental Control Technologies</b></p> <p><b>Ideas, solutions and innovative proposals</b></p>	

<p>14.40 Atmospheric subsystem engineering for the Melissa program, Claudia Quadri, EnginSoft</p> <p>15.00 Benefits of MELISSA loop project for microalgae industry, from the optimization of solar culture to the design of innovative intensified photobioreactor technologies, Jeremy Pruvost, University of Nantes</p> <p>15.20 Modelling and simulating the MELISSA loop to understand the effects of system interaction on survivability during long-duration interstellar missions: an agent-based approach, Angelo Vermeulen, Delft University of Technology</p> <p><b>15.40 Coffee break</b></p> <p><b>Session 6: Physical, chemical and microbial contaminants</b></p> <p><i>Chair: Dr Natalie Leys (SCK-CEN)</i> <i>Co-chair: Mrs Audrey Berthier (MEDES)</i></p> <p>16.00 Keynote: New tools for water microbial monitoring during long duration manned spaceflight, Christine Rozand, bioMerieux</p> <p>16.30 Novel bioinformatics tools to assess microbial diversity in life support systems, Mohamed Mysara, the Belgian nuclear research centre (SCK•CEN)</p> <p>16.50 Biocontamination Integrated Control of Wet Systems for Space Exploration (BIOWYSE), Vincenzo Guarnieri, Thales Alenia Space- Italy</p> <p>17.10 Anti-Microbial Surface for Manned Space Flight Application: Highlight of the Matiss Project, Cécile Thevenot, MEDES IMPS</p>	<p>14.40 Preliminary studies on the treatments of hydroponic water from space greenhouses, Franco Cataldo, AresCosmo spa</p> <p>15.00 !Flash!</p> <p>Effects of heavy ions on development, photosynthesis and fruit antioxidant production in <i>Solanum lycopersicum</i> L. 'Microtom' plants: a space perspective, Carmen Arena, University of Naples Federico II, Department of Biology</p> <p>Radiation Resistance in the cyanobacterium <i>Arthrospira</i>, Anu Yadav, SCK-CEN</p> <p>Effect of Earthworms, pig slurry and organic matter on plant growth on Mars soil simulant., Wieger Wamelink, Wageningen University &amp; Research</p> <p><b>15.20 Coffee break</b></p> <p><b>Session 7: Ground demonstration and analogue testing</b></p> <p><i>Chair: Mr Daniel Schubert (DLR)</i> <i>Co-Chair: Mrs Brigitte Lamaze (ESA/ATG-Europe)</i></p> <p>15.40 Keynote: Characterization and Integration of compartments at the MELISSA Pilot Plant, Francesc Gòdia, Universitat Autònoma de Barcelona</p> <p>16.10 Ground-based Analogue Testing: Status of the EDEN ISS Greenhouse System after a Successful Deployment Phase in Antarctica, Daniel Schubert, DLR</p> <p>16.30 MELISSA Pilot Plant – Development of a New Experimental Crew Compartment (C5), Adam Harper, Hosokawa Micron Ltd</p>
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<p>17.30 MATISS-1 et -2: Microbial aerosol tethering on innovative surfaces in the international space station, Laurence Lemelle, Ecole Normale Supérieure de Lyon, CNRS</p> <p>17.50 Single-cell based monitoring of microbial communities in aqueous environments., Pieter Monsieurs, SCK-CEN</p> <p>18.10 Application of melanized fungi for the removal of complex mixtures of volatile organic compounds in totally confined indoor environments, Francesc Prenafeta-Boldú, IRTA</p> <p>18.30 On the chemical nature of the biocide in the flight water and its interaction with the stainless steel surface, Franco Cataldo, AresCosmo spa, Actinium Chemical Research srl</p>	<p>16.50 Continuous and controlled oxygen production in an air-lift photobioreactor to sustain the activity of an animal crew, Enrique Peiro, MELISSA Pilot Plant – Claude Chipaux Laboratory.</p> <p>17.10 Plant cultivation experiments for design and testing of TIME SCALE Crop Cultivation System breadboard, Øyvind Mejdell Jakobsen, CIRiS, NTNU Social Research</p> <p>17.30 System design and hardware development of TIME SCALE Crop Cultivation System breadboard, Manuel Hempel, CMR Prototech</p> <p>17.50 Space Flight Analogues as Test Bed for Food Production and Life Support Systems, Viktor Fetter, Airbus DS</p> <p>18.10 Remote monitoring of crop welfare and support to astronaut's crop handling, Cecilia Stanghellini, Wageningen University &amp; Research</p>
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**20.30 Social Dinner**

**Location: Palazzo delle Esposizioni's restaurant**

**Via Nazionale, 194**

**00184 Roma**

**Call center 06 39967500**

**Entrance restaurant : via Milano 9A**

**<https://www.palazzoesposizioni.it/pagine/homepage-plan-your-visit-how-to-reach-us>**



Friday, May 18, 2018

<p><b>Session 8: Organic wastes processing and refinery (Sala Marconi)</b></p> <p><i>Chair: Prof. Dirk Springael (KU Leuven)</i> <i>Co-Chair: Dr Heleen de Wever (VITO)</i></p> <p>09.00 Keynote: A metagenomic scan of the human intestinal microbiota, Joël Doré, INRA</p> <p>09.30 Identification of the microbial core community in the MELISSA C1 thermophilic acidogenic reactor compartment., Vimal Nolla Ardevol, KU Leuven</p> <p>09.50 PTR-MS-TOF and <math>^1\text{H}</math>, <math>^{13}\text{C}</math> MAS NMR in the determination of volatile organic compounds produced by fibre degradation in the MELISSA project, Paolo Ciccio, IMC-CNR</p> <p>10.10 Characterization of the process of household waste processing in the optimized wet combustion reactor, Sergey Trifonov, Institute of Biophysics SB RAS</p> <p><b>10.30 Coffee break</b></p> <p>10.50 !Flash!</p> <p>Resource recovery from organic waste by microalgae global sustainability and space exploration, Stefan Leu, Ben Gurion University of the Negev, Israel</p> <p>Carbon and nitrogen recovery by hydrothermal oxidation, Dongdong Zhang, Ghent university</p>	<p><b>Session 9: Societal impacts and education (Sala Convegna)</b></p> <p><i>Chair: Prof. Suren Erkman (UNIL – University of Lausanne)</i> <i>Co-Chair: Mrs Ségolène Guinard (Université Paris 8)</i></p> <p>09.00 Keynote: Closed or Open? The Values and Challenges of Systems-building Work as a Social and Educational Process, Valerie Olson, UC Irvine Department of Anthropology</p> <p>09.30 Biosphere2 STEM Education Collaborative Opportunities, Gene Giacomelli, The University of Arizona</p> <p>09.50 Functional Ecology to reduce launchers impact on deep sea, Michele De Santis, Rina Consulting S.p.A.</p> <p>10.10 Turning Urban Organic Waste into Food in Anderlecht, Brussels, Alexander van Tuyl, Association for Vertical Farming</p> <p><b>10.30 Coffee break</b></p> <p>10.50 AstroPlant: Engaging a New Generation of Urban and Space Farmers, Thieme Hennis, Border Labs</p> <p>11.10 Ecotoxicological evaluation of launcher debris on the deep sea ecology, Jehan-Hervé Lignot, University of Montpellier</p> <p>11.30 Mission to Mars inspires food project in Congo, Natalie Leys, SCK-CEN</p> <p><b>11.50 lunch break</b></p>
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<p>Manganese bio-oxidation relaxes nitrite growth inhibition of <i>Roseobacter</i> sp. AzwK-3b, Christian Zerfaß, University of Warwick (School of Life Sciences)</p> <p>11.05 Productivity and stability of different methanogenesis routes in synthetic microbial communities, Jing Chen, School of Life Sciences, The University of Warwick</p> <p>11.25 Coupling bioelectrochemical oxidation and fermentation in the MELISSA loop, Amanda Luther, Gent University</p> <p><b>11.45 lunch break</b></p> <p><b>Session 10: Food quality, processing and human nutrition</b></p> <p><i>Chair: Prof. Benedikt Sas (UGent)</i> <i>Co-Chair: Dr Alberto Battistelli (CNR-IBAF)</i></p> <p>12.45 Keynote: Strategies to design healthy processed foods in space, Vincenzo Fogliano, Food Quality &amp; Design group Wageningen University, The Netherlands</p> <p>13.15 !Flash!</p> <p>Are fishes good candidate for the space colonization, Cyrille Przybyla, Ifremer</p> <p>Simulation of bread baking on planet Mars, Serge Ameye, The Planet Mars Baking Society</p> <p>13.25 Metabolic, transcriptional and proteomic changes of the probiotic <i>Lactobacillus reuteri</i> DSM17938 under simulated microgravity, Giuliana Senatore, University of Naples</p>	<p>13.00 <i>Arthrospira</i>, from Chad to Mars: an encounter between native knowledge and western science, Wafik Ghommidh (ReDaelim) and Ségolène Guinard (Université Paris 8)</p> <p>13.20 Hidden figures of Space exploration: from Mars to its Chadian roots, how could spatial technologies/research improve the knowledge of that ecosystem? Round table moderated by Ségolène Guinard and Wafik Ghommidh</p> <p>Experts will address challenges and opportunities of international collaborations between the MELISSA communities and Chadian communities interacting with spirulina as a mean of sustenance. Debates will focus on the ethical questions raised by the societal applications of MELISSA and on the comparison between engineered life support systems (MELISSA) and natural ecosystems (The Kanem area around Lake Chad) in terms of both biological and human complexity.</p> <p>With Jacques Falquet</p>
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<p>13.45 Engineering Tomato as a “space biofactory on demand” fortified in anti-oxidants content and endowed with free radical scavenging activity, Silvia Massa, ENEA - Italian National Agency for New Technologies, Energy and Sustainable Economic Development</p> <p>14.05 Food quality and safety activities in the EDEN ISS project – Pre mission results, Simona Proietti, Institute of Agro-environmental and Forest Biology-CNR</p> <p>14.25 Variability in nutritional value and safety of Arthrospira and Chlorella biomass necessitates smart production of microalgae for human spaceflight, Siegfried Vlaeminck, University of Antwerp</p>	
<p><b>14.45 Key outcomes of the workshop, prospects for future Closed Life Support developments – the view of preeminent experts (Sala Convegni)</b></p> <p><b>16.00 closure of the workshop</b></p>	