



# DRAFT PROGRAMME

24/04/2018

### Wednesday, May 16, 2018

08.00 Registration

09.00 Welcome and introduction (Sala Convegni)

- CNR
- City of Rome
- D Silvio Rossignoli, ARES-COSMO
- Dr Franco Ongaro, ESTEC Director, ESA/TEC Directorate Director
- Prof. Roberto Battiston, President of the Italian Space Agency
- Lazio Region

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**

**Session 1: Terrestrial applications (Sala Marconi)**

*Chair: LLMS Rob Suters (IPStar , MELISSA Foundation)*

*Co-chair : Mrs Aude de Clerq (ESA)*

12.50 Keynote: Circular Future: the spaceship economy, Massimiano Tellini, Intesa San Paolo

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

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

14.00 Detecting Toxic Substances in Water by Chlorophyll Fluorescence, Ann Delahaye, QinetiQ Space

14.20 Grey water recycling and energy recovery, Philippe Fiani, Sherpa Engineering

14.40 Automated multi-ion measurement for space and land, Roy OMahony, CleanGrow

**Session 2: Flight experiments and space technology demonstrators (Sala Convegni)**

*Chair: Dr Samuel Gass (RUAG)*

*Co-Chair: Dr Dries Demey (QinetiQ Space)*

12.50 Keynote: Regenerative Life Support Systems validation: from space to ground, and back, Cesare Lobascio, Thales Alenia Space

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

13.40 Cubesat Cultivation System for the growth of a fortified "MicroTom", Luca Gugliermetti, La Sapienza

14.00 Biotechnological studies on automatic biological satellite BION M2, Ilyin Viacheslav, Institute for Biomedical Problems, Moscow, Russia

14.20 MULTITROP: an experiment for the ISS, Giovanna Aronne, Department of Agricultural Sciences, University of Naples Federico II

<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>14.40 PBR@LSR – A Hybrid Life Support System Experiment and Technology Demonstrator at the ISS, Gisela Detrell, University of Stuttgart</p>
<p>15.20 Implementation of space technologies into sustainable and smart buildings, Bruno Renders, NEOBUILD</p>	<p>15.00 Veggie at the Forefront of NASA Food Production, Gioia Massa, NASA Kennedy Space Center</p>
<p>15.40 CAPTURE: a resource recovery centre with opportunities for the MELISSA programme, Korneel Rabaey, University of Gent</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>
<p>16.00 !Flash ! Sealed sterile computerized hydroponic greenhouses, Giorgia Pontetti, FERRARI FARM SOCIETA AGRICOLA S.R.L.</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>16.05 Coffee break</b></p>	<p><b>16.00 Coffee break</b></p>
<p><b>Session 3: Yellow and grey waters treatment and recycling</b></p>	<p>16.30 BIORAT1: Oxygen Recycling between an Algae Photo-bioreactor and a Consumer, Samuel Gass, RUAG Space</p>
<p><i>Chair: Prof. Siegfried Vlaeminck (UAntwerpen)</i> <i>Co-Chair : Prof. Claude-Gilles Dussap (UCA- Université Clermont-Auvergne)</i></p>	<p><b>Session 4: Edible biomass production</b></p>
<p>16.30 Keynote: Nutrient and Water Recovery from Urine: A Technology Takes Off, Bastian Etter, Eawag/Vuna</p>	<p><i>Chair: Prof. Gene Giacomelli (University of Arizona)</i> <i>Co-Chair: Dr Gioia Massa (NASA)</i></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>16.50 Keynote: Using Space Based Controlled Environment Plant Growth Technology for Earth Based Production, Mark Lefsrud, McGill University</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>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**

<p>08.30 registration</p> <p>09.00 Main talk (Sala Convegni), Dr Sogo Nakanoya (JAXA): An overview of JAXA R&amp;D in Regenerative life support system</p>
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<p><b>Session 5: Modelling and system design (Sala Marconi)</b></p>	<p><b>Session 4: Edible biomass production (Sala Convegni)</b></p>
<p><i>Chair: Dr Alberto Bemporad (IMT School for Advanced Studies Lucca)</i> <i>Co-Chair: Dr Samir Bennani (ESA)</i></p> <p>09.40 Keynote: Understanding/engineering cell and community metabolism, Orkun Soyer, University of Warwick</p> <p>10.10 ALISSE: a multi-criteria tool for life support system evaluation and comparison, Philippe Fiani, Sherpa Engineering</p> <p>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</p> <p>10.50 ! Flash!</p> <p>Synergetic Interactions between Space and Process Systems Engineering Enhancing Reactor Design, Dries Demey, QinetiQ Space nv</p> <p>MetQy: an R package to aid the design of synthetic microbial communities, Andrea Martinez-Vernon, University of Warwick</p>	<p><i>Chair: Prof. Gene Giacomelli (University of Arizona)</i> <i>Co-Chair: Dr Gioia Massa (NASA)</i></p> <p>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</p> <p>10.00 Transplantation of soil microbiota to hydroponically grown strawberry, Danny Geelen, Ghent University</p> <p>10.20 Impact of Nutrient availability on wheat root plasticity for higher plant root modelling, Seher Bahar Aciksöz, ETH Zurich Group of Plant Nutrition</p> <p>10.40 Biomass characterization using advanced plant growth chamber technology, Mike Dixon, University of Guelph</p>
<p><b>11.00 Coffee break</b></p>	<p><b>11.00 Coffee break</b></p>

<p>11.20 Living architecture: metabolic programmable Apps as part of Life Support Systems, Barbara IMHOF, LIQUIFER Systems Group</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 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>11.40 Dimensioning and planning crop production in a simulated space expedition, Esther Meinen, Wageningen University &amp; Research</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>12.00 Light quality influences differently green- and red-leaf plant growth, Luigi Gennaro Izzo, University of Naples 'Federico II'</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>12.20 Effects of simulated space radiations on plant roots investigated by proteomic analysis, Angiola Desiderio, ENEA</p>

**12.40 Lunch**

**13.40**

**Poster session (ground floor and Corridoio Digitale)**

**Contest (sala Convegni):**

**Circular Economy: Bioregenerative Environmental Control Technologies**

**Ideas, solutions and innovative proposals**

<p>14.40 Atmospheric subsystem engineering for the Melissa program, Claudia Quadri, EnginSoft</p>	<p>14.40 Preliminary studies on the treatments of hydroponic water from space greenhouses, Franco Cataldo, AresCosmo spa</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>15.00 !Flash! Effects of heavy ions on development, photosynthesis and fruit antioxidant production in Solanum lycopersicum L. 'Microtom' plants: a space perspective, Carmen Arena, University of Naples Federico II, Department of Biology</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>Radiation Resistance in the cyanobacterium Arthrospira, Anu Yadav, SCK-CEN</p>
<p><b>15.40 Coffee break</b></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>Session 6: Physical, chemical and microbial contaminants</b></p>	<p><b>15.20 Coffee break</b></p>
<p><i>Chair: Dr Natalie Leys (SCK-CEN)</i> <i>Co-chair: Mrs Audrey Berthier (MEDES)</i></p>	<p><b>Session 7: Ground demonstration and analogue testing</b></p>
<p>16.00 Keynote: New tools for water microbial monitoring during long duration manned spaceflight, Christine Rozand, bioMerieux</p>	<p><i>Chair: Mr Daniel Schubert (DLR)</i> <i>Co-Chair: Mrs Brigitte Lamaze (ESA/ATG-Europe)</i></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>15.40 Keynote: Characterization and Integration of compartments at the MELiSSA Pilot Plant, Francesc Gòdia, Universitat Autònoma de Barcelona</p>
<p>16.50 Biocontamination Integrated Control of Wet Systems for Space Exploration (BIOWYSE), Vincenzo Guarnieri, Thales Alenia Space- Italy</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>17.10 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>16.30 MELiSSA Pilot Plant – Development of a New Experimental Crew Compartment (C5), Adam Harper, Hosokawa Micron Ltd</p>
<p>17.30 Anti-Microbial Surface for Manned Space Flight Application: Highlight of the Matiss Project, Cécile Thevenot, MEDES IMPS</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>17.50 Single-cell based monitoring of microbial communities in aqueous environments., Pieter Monsieurs, SCK-CEN</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>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>17.30 System design and hardware development of TIME SCALE Crop Cultivation System breadboard, Manuel Hempel, CMR Prototech</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>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>

***20.30 Social Dinner***

***Location: Tempio di Adriano, Piazza di Pietra, Roma***

**Friday, May 18, 2018**

<p><b>Session 8: Organic wastes processing and refinery (Sala Marconi)</b></p> <p><i>Chair: Prof. Ruddy Wattiez (UMONS)</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 1H, 24C MAS NMR in the determination of volatile organic compounds produced by fibre degradation in the MELISSA project, Paolo Ciccioli, 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><b>Session 9: Societal impacts and education(Sala Convegni)</b></p> <p><i>Chair: Prof. Suren Erman (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>
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<p>Resource recovery from organic waste by microalgae global sustainability and space exploration, Stefan Leu, Ben Gurion University of the Negev, Israel</p>	<p>11.30 Mission to Mars inspires food project in Congo, Natalie Leys, SCK-CEN</p>
<p>Carbon and nitrogen recovery by hydrothermal oxidation, Dongdong Zhang, Ghent university</p>	<p><b>11.50 lunch break</b></p>
<p>Manganese bio-oxidation relaxes nitrite growth inhibition of Roseobacter sp. AzwK-3b, Christian Zerfaß, University of Warwick (School of Life Sciences)</p>	<p>13.00 Arthrospira, from Chad to Mars: an encounter between native knowledge and western science, Ségolène Guinard (Université Paris 8) and Wafik Ghommidh (ReDaelim)</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>13.20 Hidden figures of Space exploration, discussion led by Ségolène Guinard and Wafik Ghommidh (TBC)</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></p>	
<p><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>13.45 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 <i>Arthrospira</i> and <i>Chlorella</i> 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>	

**16.00 closure of the workshop**