



DRAFT Programme

Main Talks:

- Samantha Cristoforetti, Astronaut, ESA
- Christophe Lasseur, MELiSSA Project, ESA
- Toru Shimazu, JAXA
- Mark Kliss, NASA

Note: abstract with a* will be presented by a 5 min flash presentation and a poster

Session 1: Terrestrial applications

Keynote by Massimiano Tellini, Intesa Sanpaolo Group, Chief Innovation Officer Area, Head - Circular Economy Project

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

Sustainable indoor horticultural systems of the future
Volkmar Keuter, Fraunhofer-Institute for Environmental, Safety and Energy Technology UMSICHT,
Department Photonics and Environment, Germany

Valeratic acid assimilation, photoacclimation and production of polyhydroxyalkanoates by the non-sulphur purple bacterium *Rhodospirillum rubrum* S1H
Guillaume Bayon-Vicente, University of Mons

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

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

Grey water recycling and energy recovery
Philippe Fiani, Sherpa Engineering

implementation of space technologies into sustainable and smart buildings
Bruno Renders, NEOBUILD

CAPTURE: a resource recovery centre with opportunities for the MELiSSA programme
Korneel Rabaey, University of Gent

***Sealed sterile computerized hydroponic greenhouses**
Giorgia Pontetti, FERRARI FARM SOCIETA AGRICOLA S.R.L.

Poster:

-  **Impact of carbon source on the PHA quantity and quality in *Rhodospirillum rubrum***
Paloma Cabecas Segura, Department of Proteomics and Microbiology, University of Mons

Session 2: Flight experiments and space technology demonstrators

Keynote by Cesare Lobascio, Thales Alenia Space Italy, Space Infrastructure Systems Innovation Lead and Expert Life Support and Habitability

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

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

MULTITROP: AN EXPERIMENT FOR THE ISS
Giovanna Aronne, Department of Agricultural Sciences, University of Naples Federico II

Model analysis of an Arthrospira photobioreactor running in ISS
Laurent Poughon, Université Clermont-Auvergne, CNRS, Institut Pascal, Clermont-Ferrand, France

MOREBAC - A biological nano-laboratory in orbit
Christer Fuglesang, KTH Royal Institute of Technology

Results of the organic waste biotransformation processes studies on satellites "BION-M" №1 and "PHOTON-M" №4
Korshunov Denis, Institute for Biomedical Problems, Moscow, Russia

Veggie at the Forefront of NASA Food Production
Gioia Massa, NASA Kennedy Space Center

PBR@LSR – A Hybrid Life Support System Experiment and Technology Demonstrator at the ISS
Gisela Detrell, University of Stuttgart

BIORAT1: Oxygen Recycling between an Algae Photo-bioreactor and a Consumer
Samuel Gass, RUAG Space

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

Poster:

 ***Design of a Microgravity Aeroponics Root Chamber Tray***
Aditya Pande, German Aerospace Centre, Bremen

Session 3 : Yellow and grey waters treatment and recycling

Keynote on yellow water by Bastian Etter, Vuna Ltd



Keynote on grey water by Prof. Amit Gross, Ben Gurion University of the Negev

Nitrogen recovery from urine in Space: a case for nitrification
Peter Clauwaert, Universiteit Gent

A technique of water vapor recovery through the characterization of condensation phenomena
Akhilesh Tiwari, Indian Institute of Information Technology Allahabad (IIIT A)

Bio-electrochemical pre-treatment and membrane aeration to intensify full nitrogen recovery for Spaceflight urine nitrification
Jolien De Paepe, Ghent University

Posters:

-  **Continuous nitrification of artificial urine with a bacterial co-culture in a packed-bed bioreactor**
Justyna Barys, MELiSSA Pilot Plant – Laboratory Claude Chipaux, Universitat Autònoma de Barcelona, Spain; Laboratory of Microbial Ecology and Technology, Faculty of Bioscience Engineering, Universiteit Gent, Belgium
-  **Internal and external stressors to the MELiSSA loop**
Tom Sassen, SCKCEN / UCC

Session 4: Edible biomass production

Keynote by Dr Mark Lefsrud, McGill University

Effects of White LEDs on Growth and Phytonutrients of 'Outredgeous' Romaine Lettuce when supplemented with Various Monochromatic Wavelengths
Matthew Mickens, NASA Kennedy Space Center

Transplantation of soil microbiota to hydroponically grown strawberry
Danny Geelen, Ghent University

Impact of Nutrient availability on wheat root plasticity for higher plant root modelling
Seher Bahar Aciksöz, ESTEE-Earth Space Technical Ecosystem Enterprises

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

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

Biomass characterization using advanced plant growth chamber technology.
Mike Dixon, University of Guelph

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, Portici, Italy and Sebastian Colleoni, EnginSoft

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

Dimensioning and planning crop production in a simulated space expedition
Esther Meinen, Wageningen University & Research

Light quality influences differently green- and red-leaf plant growth
Luigi Gennaro Izzo, University of Naples 'Federico II'

PRELIMINARY STUDIES ON THE TREATMENTS OF HYDROPONIC WATER FROM SPACE GREENHOUSES
Franco Cataldo, AresCosmo spa

Effects of simulated space radiations on plant roots investigated by proteomic analysis

Angiola Desiderio, **ENEA**

****Radiation resistance in the cyanobacterium Arthrospira***

Anu Yadav, **SCK-CEN**

****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**

****Effect of Earthworms, pig slurry and organic matter on plant growth on Mars soil simulant.***

Wieger Wamelink, **Wageningen University & Research**

****Microgreens: A Phytochemical Factory in Space (only flash presentation)***

Youssef Roupheal, **University of Naples Federico II**

Posters:

- ✚ High throughput based analysis of Chlorella vulgaris associated bacterial diversity***
Iris Haberkorn, **ETH Zurich**
- ✚ Influence of long term exposure to enhanced gamma radiation levels on biomass production, physiological health and antioxidative status of Arabidopsis thaliana and of Oryza sativa***
Nele Horemans, **Belgian Nuclear research center**
- ✚ Increasing the oxygen productivity of Arthrospira sp. PCC 8005 using alternative nitrogen sources: A bioengineering and proteomic outlook.***
Neha Sachdeva, **University of Mons, Belgium**
- ✚ A study of plant cultivation for space exploration in JAXA***
Tomomi Suzuki, **Japan Aerospace Exploration Agency**
- ✚ A new concept field simulator to grow plants in unconventional sites***
Luigi d'Aquino, **ENEA**
- ✚ A simple mechanistic model of higher plant gas exchanges in a reduced gravity environment***
Lucie Poulet, **Université Clermont Auvergne**
- ✚ Splendid Spirulina***
Siegfried Vlaeminck, **University of Antwerp**
- ✚ Superb purple non-sulfur bacteria***
Siegfried Vlaeminck, **University of Antwerp**
- ✚ Photosynthetic microalgae as a sustainable platform for the production of high quality edible biomass***
Matteo Ballotari, **University of Verona**

Session 5: Modelling and system design

Keynote by Prof. Orkun Soyer, University of Warwick

Atmospheric subsystem engineering for the Melissa program

Claudia Quadri, **EnginSoft**

WORKING MODEL OF A CLOSED ECOSYSTEM FOR TESTING BTSS TECHNOLOGIES

Alexander Tikhomirov, **Institute of Biophysics of the Siberian Branch of Russian Academy of Sciences**

Modeling 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

Big data in controlled environment agriculture for improving the nutritional factors of the plants
Rares Nistor, UASVM Cluj-Napoca, Romania

ALiSSE: a multi-criteria tool for life support system evaluation and comparison
Philippe Fiani, Sherpa Engineering

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

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



LIVING ARCHITECTURE: METABOLIC PROGRAMMABLE APPS AS PART OF LIFE SUPPORT SYSTEMS
Barbara IMHOF, LIQUIFER Systems Group

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

****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

Posters:

-  ***New generation photobioreactor characterization***
CREULY Catherine, Université Clermont-Auvergne, CNRS, Institut Pascal, Clermont-Ferrand, France
-  ***Comparison of simulation results with measurements in case of a bio-contamination in a closed habitat***
Aku Karvinen, VTT Technical Research Centre of Finland Ltd

Session 6: Physical, chemical and microbial contaminants

Keynote by Dr Christine Rozand, bioMérieux, Research and Development Senior Doctor Novel Analytical Development

Novel bioinformatics tools to assess microbial diversity in life support systems
Mohamed Mysara, the Belgian nuclear research centre (SCK•CEN)

Biocontamination Integrated Control of Wet Systems for Space Exploration (BLOWYSE)
Emmanuel Detsis, European Science Foundation

MATISS-1 et -2: Microbial aerosol tethering on innovative surfaces in the international space station
Laurence Lemelle, Ecole Normale Supérieure de Lyon, CNRS

Anti-Microbial Surface for Manned Space Flight Application: Highlight of the Matiss Project

Cécile Thevenot, MEDES IMPS

Application of melanized fungi for the removal of complex mixtures of volatile organic compounds in totally confined indoor environments

Francesc Prenafeta-Boldú, IRTA

Single-cell based monitoring of microbial communities in aqueous environments.

Pieter Monsieurs, SCK-CEN

ON THE CHEMICAL NATURE OF THE BIOCIDES IN THE FLIGHT WATER AND ITS INTERACTION WITH THE STAINLESS STEEL SURFACE

Franco Cataldo, AresCosmo spa, Actinium Chemical Research srl

Poster:

Effect of Flow on Formation, Morphology and Wetting Properties of Pseudomonas fluorescens Biofilms

Federica Recupido, Aristotle University of Thessaloniki

Session 7: Ground demonstration and analogue testing

Keynote by Prof. Francesc Gòdia, University Autònoma de Barcelona, Head of the MELiSSA Pilot Plant

Ground-based Analogue Testing: Status of the EDEN ISS Greenhouse System after a Successful Deployment Phase in Antarctica

Daniel Schubert, DLR

Plant cultivation experiments for design and testing of TIME SCALE Crop Cultivation System breadboard

Øyvind Mejdell Jakobsen, CIRiS, NTNU Social Research

System design and hardware development of TIME SCALE Crop Cultivation System breadboard

Manuel Hempel, CMR Prototech

Continuous and controlled oxygen production in an air-lift photobioreactor to sustain the activity of an animal crew

Laura Alemany, MELiSSA Pilot Plant – Claude Chipaux Laboratory.

Space Flight Analogues as Test Bed for Food Production and Life Support Systems

Viktor Fetter, Airbus DS

Remote monitoring of crop welfare and support to astronaut's crop handling

Cecilia Stanghellini, Wageningen University & Research




MELiSSA Pilot Plant – Development of a New Experimental Crew Compartment (C5)

Adam Harper, Hosokawa Micron Ltd

Posters:

HORTEXTREME - Protected HORTiculture in inflatable facilities, resistant to EXTREME conditions, for the production of high nutritional value plants: a field experiment in the AMADEE-18 mission

Sara Piccirillo, Italian Space Agency (ASI)

-  **New Material Surface for Water Condensate**
Thomas Pottage, Public Health England
-  **Antarctica analogue test campaign preliminary result of RUCOLA, the EDEN ISS rack like plant production unit for microgravity applications**
Giorgio Boscheri, Thales Alenia Space Italia
-  **Continuous operation of interconnected packed-bed nitrifying bioreactor and an external loop air-lift photobioreactor at pilot scale**
David Garcia, MELiSSA Pilot Plant – Claude Chipaux Laboratory.

Session 8: Organic wastes processing and refinery

Keynote by Dr Joël Doré, INRA France , research director in the Joint Research Unit for Food and Gut Microbiology for Human Health and scientific director of the MetaGenoPolis

Identification of the microbial core community in the MELiSSA C1 thermophilic acidogenic reactor compartment.

Vimac Nolla Ardevol, KU Leuven

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

Characterization of the process of household waste processing in the optimized wet combustion reactor

Sergey Trifonov, Institute of Biophysics SB RAS

Productivity and stability of different methanogenesis routes in synthetic microbial communities

Jing Chen, School of Life Sciences, The University of Warwick

Coupling bioelectrochemical oxidation and fermentation in the MELiSSA loop

Amanda Luther, Gent University

Pyrolysis of human Waste in a Biochar based Life Support System

Mira Bleuler, Zürcher Hochschule für Angewandte Wissenschaften (ZHAW)


***Resource recovery from organic waste by microalgae global sustainability and space exploration**

Stefan Leu, Ben Gurion University of the Negev, Israel

***Carbon and nitrogen recovery by hydrothermal oxidation**

Dongdong zhang, Ghent university

Poster:

-  **Manganese bio-oxidation relaxes nitrite growth inhibition of Roseobacter sp. AzwK-3b**
Christian Zerfaß, University of Warwick (School of Life Sciences)

Session 9: Societal impacts and education

Keynote by Prof. Valerie Olson, UC Irvine, Department of Anthropology

AstroPlant: Engaging a New Generation of Urban and Space Farmers

Thieme Hennis, Border Labs

Biosphere2 STEM Education Collaborative Opportunities

Gene Giacomelli, The University of Arizona

Mission to Mars inspires food project in Congo

Felice Mastroleo, SCK-CEN

Arthrospira, from Tchad to Mars: an encounter between native knowledge and western science

Ségolène Guinard, Université Paris 8 Vincennes-Saint Denis

Turning Urban Organic Waste into Food in Anderlecht, Brussels

Alexander van Tuyl, Association for Vertical Farming

FUNCTIONAL ECOLOGY TO REDUCE LAUNCHERS IMPACT ON DEEP SEA

Michele De Santis, Rina Consulting S.p.A.

Ecotoxicological evaluation of launcher debris on the deep sea ecology

Jehan-Hervé Lignot, University of Montpellier

Life Beyond – A Program to advance science education and space exploration through prisons

Charles Cockell, UK centre for Astrobiology

Poster:

 **THE BOTANIKA PROJECT**

Maria Rosello Petit, DLR

Session 10: Food quality, processing and human nutrition

Keynote by Prof. Vincenzo Fogliano, Chair of the Food Quality and Design Group, University of Wageningen

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

Food quality and safety activities in the EDEN ISS project – Pre mission results.

Simona Proietti, Institute of Agro-environmental and Forest Biology-CNR

Variability in nutritional value and safety of Arthrospira and Chlorella biomass necessitates smart production of microalgae for human spaceflight

Siegfried Vlaeminck, University of Antwerp

Metabolic, transcriptional and proteomic changes of the probiotic Lactobacillus reuteri DSM17938 under simulated microgravity

Giuliana Senatore, University of Naples



****Are fishes good candidate for the space colonization***

Cyrille Przybyla, Ifremer

****Simulation of bread baking on planet Mars***

Serge Ameye, The Planet Mars Baking Society

Posters:

-  ***Advantages of crop production in a controlled environment with a LED sole sources of lighting***
Grazyna Bochenek, Heliospectra AB
-  ***Does simulated microgravity affect root cell cycle in tomato ? A flow cytometric study on DNA content variations in a "biofortified" tomato "MICROTOM"***
Luca Nardi, ENEA