



MOONWALK Press Release

June 2016



Submerged at 1/6 gravity!

MOONWALK – Lunar EVA Simulation – subsea Marseille



Project Moonwalk: Dr. Sarah Jane Pell in the Gandolfi-2 EVA SIM Spacesuit egressing the Lunar Lander Mock-up during the Comex pool simulations as preparation for the upcoming sea trials, Marseille, Photo: Alexis Rosenfeld, 2016

2. June 2016

Final test period for project MOONWALK – subsea Simulations, Marseille

Moonwalk simulations in Marseilles are underway. Moonwalk, as an inspirational name, stands for Technologies and Human-Robot Collaborations for Surface EVA Exploration Activities and Training in European Analogue Environments in a EU co-funded space research and development project under the 7th Framework Programme.



MOONWALK Press Release

June 2016



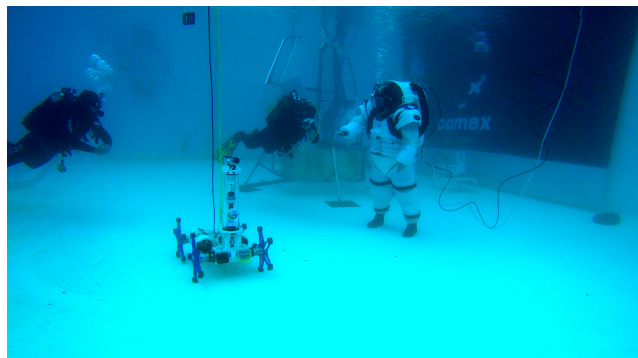
This week, the MOONWALK team has conducted pool tests for the simulation of mission-specific scenarios including human-robotic collaboration methodologies and systems for supporting future extravehicular activities (EVA) on planetary surfaces.

The pool trials at COMEX, Marseille are an opportunity for troubleshooting subsystems to ensure success for the subsea tests starting next Monday. Conducted off-shore, in Marseille bay, the subsea simulations pose a more volatile and challenging environment to demonstrate MOONWALK systems, technologies and procedures.

Subsea Marseille is the second simulation campaign related to the MOONWALK project. Terrestrial simulations in Rio Tinto were previously completed in April 2016.

The tests in Rio Tinto simulated Mars conditions. Scenarios using two team structures (astronaut-to-astronaut and astronaut-to-robot) focussed on geological field exploration, exobiology and time delay in communications.

Complimentarily, tests in Marseilles utilize an underwater site that resembles a lunar environment both in natural terrain and reduced gravity conditions.



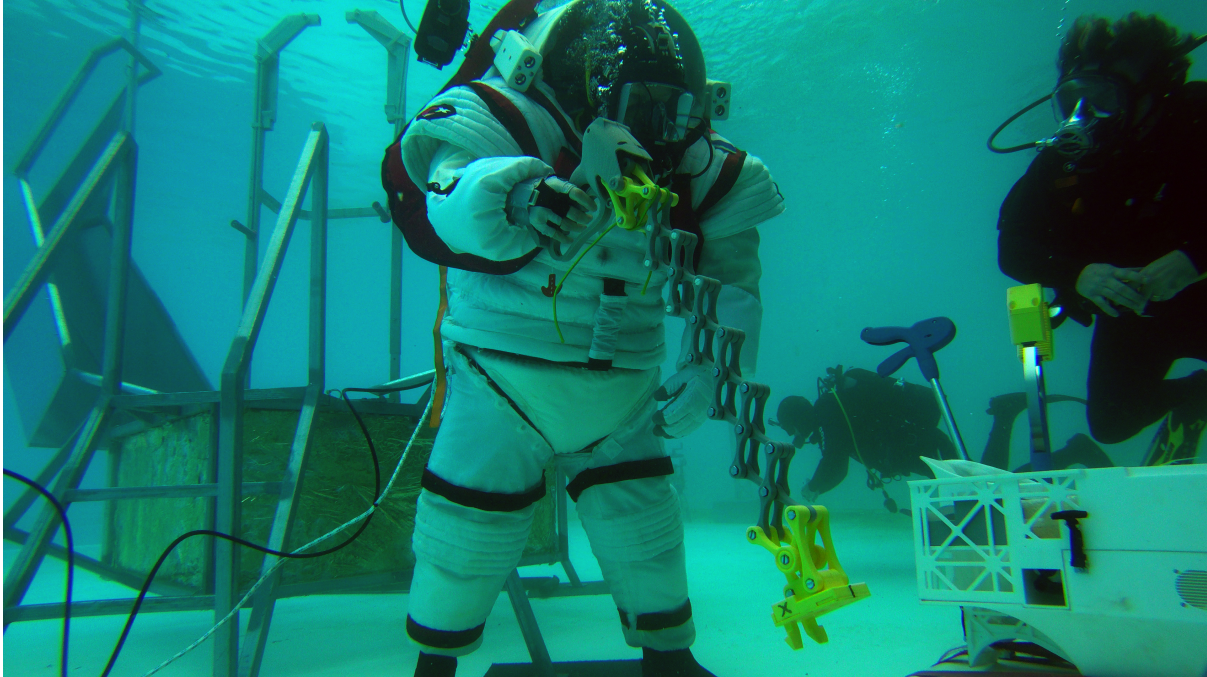
MOONWALK Simulation campaigns, Astronaut-Rover interaction through gesture control (left: Rio Tinto, photo: Bruno Stubenrauch, 2016; right: Marseille pool tests, photo: COMEX, 2016)

Testing MOONWALK systems, technologies and procedures in BOTH Rio Tinto and Marseille is important because each environment shares certain characteristics particular to extra-terrestrial planetary bodies, such as Mars or Moon. Together with pool tests that include all of the components above, the simulations provide important comparative data about technological components; including astronaut-to-robot scenarios, analog simulations and lessons learned for actual space operations.



MOONWALK Press Release

June 2016



MOONWALK Marseilles Pool Tests, Astronaut-Tool interaction, photo: Comex, 2016

In both simulations, the following MOONWALK components are tested:

1. EVA simulation spacesuit – “Gandolfi-2” designed for both (wet and dry) environments
2. Manual tools for EVA – include an Astronaut Rescue Tool, Astronaut Tether Control, Pantograph Sampling Tool, Foldable pick-up Claw
3. Small assistant-robot (scout rover) – “YEMO” can assist the astronaut in EVA
4. Man Machine Interface (MMI) – is a robot control sub-system (gesture control) and a data interface integrated in the EVA suit (tablet).
5. Bio-Monitoring – Astronaut stress levels are monitored by observing the heartbeat. Also, sensors determine if the astronaut is getting into a potentially dangerous position, for instance if they could fall over in the reduced gravity environment.
6. EVA Information System (EIS) – prototype computer installed on the EVA suit, allowing an Astronaut to visualize procedures, and Base and Mission Control to monitor their progress. It permits exchanging voice, text, live video, annotated imagery, telemetry, and a means to operate the Robot.
7. Mission Control Centre (MCC) – all communications and biofeedback data go to MOONWALK Mission Control Centre near Brussels (in subsea simulations information is simultaneously transmitted locally to the Minibex boat).



MOONWALK Press Release

June 2016



Pool tests (30 May – 3 June) were initiated at the Comex Pool to test individual subsystems in the reduced gravity environment and rehearse for the scenarios to be conducted subsea.

Sea Simulations (6 – 10 June) will begin on Monday. The MOONWALK teams will set-up workplaces on the COMEX Minibex boat and there will be a Sea Operations briefing held. Tuesday afternoon, following the safety procedure test scheduled in the morning and the installation of material underwater, project MOONWALK will begin its final demonstration campaign. Astronaut-to-Robot scenarios will be conducted for two days and on Thursday, the final day of subsea simulation, Astronaut-to-Astronaut scenarios will be carried forth as a comparison scenario.

External research partner experiments

ADAPA 360 - 360-Degree VR Video Camera System for Space Suit and Helmet

Team: Ali Zareiee, ADAPA, Norway

Lunar Lander Pivot Beam Support System

(Astronaut and Rover Construct a Tool Shed Together)

Team: Aedel Aerospace Unipessoal, Portugal

SCALE: Shared Cognitive Architecture for Long-term Exploration

Team: Leslie DeChurch (Georgia Tech), Noshir Contractor (Northwestern), Jeff Johnson (U. of Florida); United States (NASA Behavioral Health & Performance)

ARTi Aquabatics Research Team initiative

Dr. Sarah Jane Pell (Australia), Simulation Astronaut and Professional Diver researching human performance and interactions of the Artist-Astronaut. SkyCorp Inc. supports Dr. Pell's participation in the Project Moonwalk Human Robot Collaboration Mission Scenarios and Simulations in Marseille, 2016.

On Wednesday 8 June 2016, the undersea diver will plant the new Moon flag, as part of our **Children Competition**, at the seafloor, designed by 12-year old, Leo Benjamin from Estonia.

At the end of August, a summative evaluation of project MOONWALK will be delivered examining the project outcomes, including a goal-based evaluation.



MOONWALK Press Release

June 2016



MOONWALK is an exciting step further into the future of human space exploration, where humankind pairs with technology to transcend known boundaries.

Consortium	German Centre for Artificial Intelligence (DFKI) Bremen, Germany COMEX Marseilles, France Airbus Group Newport, UK LIQUIFER Systems Group Vienna, Austria Space Applications Services Zaventem, Belgium NTNU Centre for Interdisciplinary Research in Space Trondheim, Norway Instituto Nacional de Técnica Aeroespacial (INTA) - Centro de Astrobiological (INTA-CSIC) Madrid, Spain
Project Coordinator	Dr. Thomas Vögele DFKI, Bremen, Germany thomas.vogele@dfki.de
Technical Manager	Dr. Peter Weiss COMEX, France p.weiss@comex.fr Dr. Barbara Imhof LIQUIFER Systems Group, Vienna, Austria barbara.imhof@liquifer.com +43 1 218 85 05
PRESS RELEASE CONTACT	

Project **MOONWALK**, is a 3-year cooperative Research & Development project funded by the European Commission under the *Space* theme of the 7th Framework Programme and aims to compare the performance of different compositions of **astronaut-robot teams** over multiple tasks and operational scenarios, in two **Analogue environments**.
www.projectmoonwalk.net