

# IAF Committee Briefs

Winter 2022

## IAF HUMAN SPACEFLIGHT (HSF) COMMITTEE

### 1. Introduction

The IAF Human Spaceflight (HSF) Committee organizes the Human Spaceflight Symposium (B3) comprising a total of ten sessions. These sessions include the Overview session (B3.1) and multiple sessions focusing on relevant human spaceflight topics:

- B3.1 Governmental Human Spaceflight Programmes (Overview)
- B3.2 Commercial Human Spaceflight Programmes
- B3.3 Utilization & Exploitation of Human Spaceflight Systems
- B3.4 & B6.4 Flight & Ground Operations aspects of Human Spaceflight - Joint Session of the IAF Human Spaceflight and IAF Space Operations Symposia
- B3.5 Astronaut Training, Accommodation, and Operations in Space
- B3.6 & A5.3 Human and Robotic Partnerships in Exploration - Joint session of the IAF Human Spaceflight and IAF Exploration Symposia
- B3.7 Advanced Systems, Technologies, and Innovations for Human Spaceflight
- B3.8 Human Space & Exploration

The symposium invites papers on all aspects of ongoing and planned human spaceflight including the design, development, operations, utilization and future plans of space missions involving humans. The scope covers private and government past, present and planned space missions and programmes in LEO and beyond. The Symposium also features discussions on preparations for the launch of new HSF capabilities and collaborative efforts of human and robotic systems and technologies. Special emphasis is applied to the peaceful use of HSF, fostering international cooperation, and the socio-economic benefit for all mankind.

### 2. Latest Developments

Within the domain of Human Spaceflight the following developments are worth mentioning:

- A. The Plenary 3 which took place on September 19<sup>th</sup>, 2022, entitled “[\*Value of LEO in the Next Decade\*](#)” was very successful, highlighting a panel of distinguished colleagues including Mary Lynne Ditmar, Olivia Holzaus, Robyn Gatens, Shawna Pandya, and Iwao Igarashi addressing perspectives and insights on plans for future exploration and value of LEO activities.



*Images: Panel after and during their plenary session in Paris.*

- B. 2022 introduced a total of 3 commercial crewed suborbital spaceflights aboard Blue Origin’s New Shepard.
- C. 2022 saw 2 crewed civilian orbital missions: Ax-1 and Soyuz MS-20.

- D. 2022 saw a total of 4 orbital crewed spaceflights:
  - a. 2 NASA commercial crewed spaceflights (Crew 4 and Crew 5)
  - b. 2 Soyuz crewed spaceflights: Soyuz MS-21 and Soyuz MS-22
- E. On April 9, 2022 NASA Astronaut Mark Vande Hei returned to Earth after a record-breaking 355 days in LEO.
- F. On September 12, 2022, Blue Origin experienced a booster failure during launch of their uncrewed New Shepard spacecraft, resulting in an FAA investigation to determine whether any system, process, or procedure related to the incident affected public safety. The New Shepard spacecraft is grounded until the FAA determines flight can resume.
- G. The United States, in coordination with its International Partners, is extending the operational lifetime of the ISS through 2030. Confirmed decommission into Point Nemo.
- H. China Manned Space Program (CMSP):
  - a. Launched the Wentian module on 24 July 2022
  - b. The Mengtian Module should fly in October 2022. Date is still TBD
  - c. Chinese astronauts performed their 1<sup>st</sup> EVA working on Tiangong's new Wentian module. They completed 2 EVAs in total.
- I. Commercial Space Stations
  - a. As early as 2027 Axiom Space will lead private operational management beginning with new modules.
  - b. Nanoracks, Blue Origin, and Northrop Grumman are working towards their NASA Space Act Agreements for orbital modules.
  - c. Orbital Assembly Corporation has furthered progress on its commercial and research artificial gravity platforms
- J. The Canadian Space Agency (CSA) is establishing lunar surface exploration infrastructure, and commits to work to enhance lunar scientific return plans, and plans to send an astronaut to the Moon with Artemis, fund and build CanadArm3 for lunar exploration, and take a lead in space medicine and health.
- K. In 2022 the third edition of the International Space Exploration Coordination Group "Global Exploration Roadmap" was updated after rapid advances in agency lunar planning for human exploration, corresponding science goals and technology development strategies which included:
  - a. lunar surface exploration objectives have been refined and aligned with current agency goals and new agency aspirations.
  - b. A sustainable operation on and around the Moon is recognized as a shared goal directly

contributing to enabling human missions to Mars.

- c. Key elements for achieving higher levels of sustainability are longer surface missions by surviving the lunar night, and the introduction of reusable elements.
- d. Analysis related to the potential of In-Situ Resource Utilization, including the use of regolith and water ice on the lunar surface, which may create opportunities in the coming decades.
- H. In orbit, an international coalition of partners will start assembly of the lunar orbiting Gateway. Gateway major components include progress on the Power and Propulsion Element; Habitation and Logistics Outpost (HALO); Deep Space Logistics; International Habitation module; European System Providing Refueling, Infrastructure, and Telecommunications (ESPRIT); External Robotics System; and Airlock with both science and crew capabilities.
- I. The Space Launch System was unable to launch for the Artemis 1 mission due to technical challenges. It is scheduled for a launch window of November 2022. This mission is to demonstrate the launcher and the Orion spacecraft.

### 3. Breakthroughs

As the major "breakthroughs" in the field the following can be considered:

- A. Frequent launch of crewed commercial suborbital missions.
- B. Announcement of up to 3 additional crewed orbital free flier missions through SpaceX beginning with Polaris Dawn first quarter 2023.
- C. China Space Station expansion with 2<sup>nd</sup> and planned 3<sup>rd</sup> modules.
- D. Announcement of Axiom Space and Collins Aerospace who will be responsible for design, development, qualification, certification, and production of spacesuits and support equipment for space station and Artemis missions

### 4. Action plan for the year

In addition to the Technical Symposium the Committee is organizing for:

- A. Establishment of the subcommittees focused on Space Habitats, Young Professionals, and Plenary Events.
- B. IAC 2023: GNF planning has been announced. Committee members will propose ideas and potential sponsors for a session.