

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. The symposium invites papers on all aspects of on-going 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.

- [Governmental Human Spaceflight Programmes \(Overview\)](#)
- [Commercial Human Spaceflight Programmes](#)
- [Utilization & Exploitation of Human Spaceflight Systems](#)
- [Flight & Ground Operations aspects of Human Spaceflight - Joint Session of the IAF Human Spaceflight and IAF Space Operations Symposia](#)
- [Astronaut Training, Accommodation, and Operations in Space](#)
- [Human and Robotic Partnerships in Exploration - Joint session of the IAF Human Spaceflight and IAF Exploration Symposia](#)
- [Advanced Systems, Technologies, and Innovations for Human Spaceflight](#)
- [Human Space & Exploration](#)
- [Human Spaceflight Global Technical Session](#)
- [Interactive Presentations - IAF HUMAN SPACEFLIGHT SYMPOSIUM](#)

2. Latest Developments

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

- A. A Plenary Event (category "Exploration") **Artemis: The New Era of Lunar Exploration has Begun** proposed by the IAF Human Spaceflight Committee was selected and accepted as a PE4 during the IAC 2023 in Baku, and will take place on 3 October 2023. (<https://www.iafastro.org/events/iac/iac-2023/plenary-programme/plenary-events/>).
- B. Artemis I mission was launched on November 16, 2022, at 06:47:44 UTC from Launch Complex 39B at the Kennedy Space Center, NASA. After reaching Earth orbit, the upper stage of SLS launcher carrying the Orion spacecraft separated and performed a trans-lunar injection before releasing Orion and deploying ten CubeSat satellites. Orion completed one flyby of the Moon on November 21, entered a distant retrograde orbit for six days, and completed a second flyby of the Moon on December 5.
The Orion spacecraft then returned and reentered the Earth's atmosphere with the protection of its heat shield, splashing down in the Pacific Ocean on December 11. The mission aims to certify Orion and the Space Launch System for crewed flights beginning with Artemis II, which is scheduled to perform a crewed lunar flyby in 2024.
- C. NASA announced on April 3, four astronauts who will venture around the Moon on Artemis II, the first crewed mission on NASA's path to establishing a long-term presence on the Moon for science and exploration through Artemis. Artemis II crew include CSA astronaut Jeremy

Hansen and NASA astronauts Victor Glover, Reid Wiseman, and Christina Koch.

- D. All the ISS Program partners decided to continue the station utilization until 2028 at least.
- E. A coolant leak from a Russian Soyuz MS-22 spacecraft attached to the International Space Station have been caused by a micrometeorite in December 2022. Initially, the Soyuz carried cosmonauts Sergey Prokopyev and Dmitry Petelin and NASA astronaut Frank Rubio up to the ISS in September 2022, has been scheduled to fly the trio back to Earth in March 2023.

After the investigation Roscosmos decided to send a rescue spacecraft to the International Space Station to bring home two cosmonauts and a NASA astronaut, which continued their duties onboard the ISS during the next expedition, targeting the record-breaking duration of cumulative stay at the ISS more than one year.

The damaged Soyuz MS-22 spacecraft undocked from the ISS without any crewmembers onboard and the capsule returned safely to the Earth in March 2023. But before this event an unmanned Soyuz MS-23 spacecraft was launched in February 2023 in order for the crew to return safely back to Earth in September 2023.

- F. The ISS *Nauka* module equipped with European Robotic Arm (ERA) and a lock-chamber for external payloads has become fully operational after a series of spacewalks made by Russian cosmonauts at the ISS from November 2022 till April 2023.
- G. China in October 2022 launched the third and final module to complete its permanent space station and realize a more than decade-long effort to maintain a constant crewed presence in orbit. Mengtian, also a laboratory module, lifted off aboard a Long March-5B Y4 carrier rocket from China's island province of Hainan and successfully docked with Tianhe core module.
- H. Starship Orbital Test Flight: on 20 April 2023 minutes after lifting off, SpaceX's Starship rocket exploded before reaching orbit. After several of the Super Heavy booster's 33 engines failed, the vehicle started tumbling, the Starship vehicle appears to have not separated, and the automated flight termination system destroyed

the rocket. However, the launch "provided important lessons" and "produced reams of data for engineers to understand how the vehicle performed." SpaceX believes it can repair the damaged launchpad used in its first Starship flight and prepare for a second Starship flight as soon as early summer, according to NASA Administrator Bill Nelson.

- I. China is targeting the development of a lunar science and research station by the end of the decade. NASA previously unveiled "*a goal of establishing its own Artemis Base Camp by the 2030s, a timeline which would put the two countries on a collision course and set up the mouth-watering prospect of an epic 21st century space race.*"

3. Breakthroughs

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

- A. Artemis I mission has been successfully implemented in November-December 2022
- B. All the ISS Program partners decided to continue the station utilization until 2028
- C. The ISS *Nauka* module equipped with European Robotic Arm (ERA) and a lock-chamber for external payloads has become fully operational in April 2023
- D. After launch and docking of *Mengtian* module, China completed the country's space station construction in October 2022

4. Action plan for the year

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

- A. Establishment of the subcommittee focused on Space Habitats.
- B. IAC 2024: PE, Special Sessions (SpS), and IAF GNF planning has been announced. Committee members will propose ideas and potential sponsors for a session.
- C. Establishment a Young professional working group to develop diversity, inclusion and the next generation of professionals for human spaceflight (chaired by Dr. Kavya Manyapu and co-chaired by Mr. Alex Karl).