Eighty astronauts and cosmonauts from 16 nations gathered September 9-16 in Minsk, Belarus for the XXXI Planetary Congress of the Association of Space Explorers. Hosted by cosmonaut Vladimir Kovalyonok and organized by the National Academy of Sciences of Belarus under the patronage of the Republic of Belarus, the theme of the Congress was "Creating the Future of Space."

The Opening Ceremony of the XXXI Congress took place Monday, September 10 at the Belarus National Exhibition Hall. President Alexander Lukashenko welcomed the fliers, spouses and distinguished guests on behalf of the Republic of Belarus. He recognized the recent and growing successes of Belarus in developing space sectors and technologies and stated that only through cooperation and mutual trust can we advance our mission of cooperative space exploration. In her response, ASE President Dr. Bonnie Dunbar thanked the president for the warm hospitality of the Belarusian people and for the excellent organization of the Congress; she also reviewed ASE's plans for the upcoming week in Minsk and expressed her hope that the Congress would inspire Belarusian students to create their own futures in space. Dunbar concluded her remarks by remembering the many contributions of the eight recently deceased astronauts and cosmonauts and called for a moment of silence in their memory. The attendees then received a prerecorded greeting from the crew onboard the International Space Station.

After a light lunch at the National Exhibition Hall, the fliers reconvened for the Theme Session, chaired by Russian cosmonaut Oleg Novitskii and Vice Chairman of the National Academy of Sciences of Belarus Sergei Kilin. Kilin presented an overview of Belarusian activities in space and emphasized the importance of inspiring the next generation of explorers by creating the motivation for future exploration. The session concluded with a panel discussion featuring NASA astronaut Jeff Hoffman, Russian cosmonauts Sergei Krikalev and Viktor Savinykh, and Chinese astronaut Yang Liwei discussing a wide range of questions investigating the human challenges of lunar, Martian and deep space exploration

The first technical session was chaired by NASA astronaut Kate Rubins and Russian cosmonaut Yuri Usachev and featured crew reports on recent flights to the International Space Station. Italian astronaut Paolo Nespoli recapped his flight with Expedition 53 and presented a thoughtful video from recent ISS commander Randy Bresnik. Russian cosmonaut Anton Shkaplerov followed and shared his experiences from ISS Expedition 54/55. To conclude the session co-chair Kate Rubins led a panel discussion to answer questions from the audience.

On Tuesday morning the delegates visited the Victory Monument, which commemorates the Soviet Army soldiers and Belarusian partisans who perished in World War II, after which they moved a short distance to the National Academy of Sciences of Belarus for a two-part technical session on Future Plans for Exploration, co-chaired by ESA astronaut Gerhard Thiele and Russian cosmonaut Pavel Vinogradov.

In the first session of the day, Chinese astronaut Yang Liwei reported on future Chinese plans for exploration and presented a video about the Chinese Tiangong-2 space station, which is he stated was expected to be finished in 2022. Russian cosmonaut Sergei Krikalev followed with a discussion of the future goals of international human space exploration and presented the pros and cons of prioritizing lunar versus Martian exploration.

After lunch, NASA astronaut Kate Rubins opened the second session with a discussion of future U.S. programs and goals, she reported on the status of the commercial crew program, and also described her on-orbit successes with DNA sequencing and microbial sampling on the International Space Station. The session concluded with ESA representative Shahrzad Hosseini's report on future European plans for exploration. She discussed the "Moon Village", an ESA-supported effort to develop collaborative lunar access capabilities and a global roadmap for lunar utilization and exploitation.

Wednesday was the traditional Congress Community Day, and the astronauts and cosmonauts travelled to 53 different schools, universities, scientific institutions and factories to visit with over three thousand students, teachers and community leaders.

On Thursday, the fliers assembled in the Congress Hall in the President Hotel for the final technical session of the Congress. Co-chairs ESA astronaut Michel Tognini and Vice-Chairman of the National Academy Science of Belarus (NASB) Sergei Kilin welcomed the audience, which included members of the public. Tognini opened the session with a presentation and video about the Moon Village, then discussed Europe's near-term plans and prospects for returning to the Moon. He then introduced NASA astronaut Jeff Hoffman for his presentation on the Mars Oxygen In-Situ-Resource-Utilization Experiment (MOXIE), a joint effort between Massachusetts Institute of Technology (MIT) and the Jet Propulsion Laboratory (JPL), scheduled to launch with the Mars 2020 Rover.

Russian cosmonaut Alexander Kaleri followed with a update on the two-orbit rendezvous, the

fastest approach of a spacecraft with the International Space Station. He described the recent Russia launch of a Progress cargo vehicle, which rendezvoused with the ISS within four hours. Kaleri was followed by a presentation from the General Director of Peleng and 2018 ASE Crystal Helmet awardee Vladimir Pokryshkin, who described his company's work in the development of Belarus satellite payloads and subsystems.

Vladimir Kulchitsky from the NASB followed with a presentation on tumor cells and electronic microgravity. Oleg Penyazkov, also from the NASB, discussed the need to continue to explore and utilize space, and the Belarusian vision for space and space transportation such as plasma accelerators.

Following the technical session, fliers and spouses traveled to the nearby town of Niazvizh to visit the Niazvizh Castle. Thursday evening, the NASB hosted a Gala Reception at the Diplomatic Service Hall.

Friday morning, the fliers gathered for their respective regional chapter meetings. Following the regional business meetings, the delegates regrouped for the General Assembly where they approved two General Statements on International Lifetime Surveillance of Astronaut Health (iLSAH) and on Space Traffic Management & Orbital Debris; the delegates also voted on the Best Technical Presentation award (Perchatka), received updates from Reinhold Ewald on the 2019 European Astronaut Reunion and upcoming ASE events at IAC 2018 in Bremen, and elected Michael Lopez-Alegria, Yang Liwei, and Anton Shkaplerov to the international Executive Committee. Dick Richards and Bonnie Dunbar closed the General Assembly by inviting everyone to Houston, Texas for the XXXII Congress.

The Closing Ceremony and dinner took place Friday evening at the Belarus National Exhibition Hall. Vice Chairman of the NASB Sergei Kilin opened the ceremony and introduced ASE President Bonnie Dunbar, who invited the Executive Committee to join her on stage. Dunbar then presented the prestigious Crystal Helmet to Vladimir Pokryshkin, Director of Peleng. The Executive Committee then announced the recipient of the Perchatka (The Glove) - awarded by the vote of the membership for the best technical presentation of the Congress - to NASA astronaut Jeffrey Hoffman for his presentation, "Mars and MOXIE." Leonov Medallions were awarded to Russian cosmonaut Oleg Novitskii and to the National Academy of Sciences of Belarus. In the final official act of the XXXI Congress, the Belarusian cosmonauts passed the ASE flag to Bonnie Dunbar and newly-elected ASE president Michael Lopez-Alegria as a symbol of the transition from the XXXI Congress in Minsk to the XXXII Congress Houston in 2019.

General Statement on Longitudinal Surveillance of Astronaut Health

XXXI Planetary Congress
Minsk, Belarus
September 14, 2018

Nearly 70 years ago, the US and Soviet space programs initiated research on humans in space in order to determine whether or not space exploration was feasible. Incrementally, both nations extended the survival time in low earth orbit. Both short term and longer terms physiological effects were found. The short term effects included vestibular disturbances and shifts in the body fluids. As the length of low earth orbit stays were extended on Skylab, microgravity effects on bone density and muscle strength were also observed. Bioastronautics research continued on the Space Shuttle, Salyut, and Mir and today continues on the International Space Station. As we extend the flight durations nearer to Mars duration, we continue to learn more about the effects of the space environment on the human body, and to develop countermeasures where we understand both cause and effect.

Astronauts and Cosmonauts, while they are actively flying, are cared for by flight surgeons, and medical data continuously collected by human physiology researchers. However, the longer term effects on health, after astronauts/cosmonauts retire and leave their agencies, is not fully understood. As a result, NASA implemented the Longitudinal Surveillance of Astronaut Health (LSAH) program to annually collect health data during a physical at the NASA Johnson Space Center. This program was also extended to Canadian astronauts. Similar post retirement programs do not appear to be universally implemented by nations with flown astronauts and cosmonauts.

Of particular interest is the long term effect of the space radiation environment on human physiology. This includes Galactic Cosmic Rays (GCRs) which are pervasive throughout our galaxy, but rarely reach the surface of the earth, and so are difficult to replicate in Earth based test facilities. Exposure to GCRs and Solar Particle Events are carried as one of the highest risks to deep space missions for humans, but the exposure effects might not be observed for decades. Obtaining and understanding the long term effects of the space environment on retired astronauts/cosmonauts is critical to protecting the future crewmembers who will participate in future exploration missions, and could be critical to mission success.

Understanding the effects on health and developing countermeasures also requires a deep understanding of both the symptom as well as the cause. Statistically significant conclusions can only be calculated accurately with a sufficient number of astronaut/cosmonaut subjects. Unfortunately, the researchers do not have enough data from retired astronauts/cosmonauts to reliably determine these long term effects. There are three primary reasons for this: (1) while longitudinal data may be collected from US and Canadian astronauts and collected into a common data base, this does not include astronauts or cosmonauts from other nations, (This data excludes information from ESA, JAXA, and RSA) (2) although data may be collected during annual physicals, “end of life” data is generally not available so not all health data is included, and (3) with longer stays on ISS and fewer flyers on an annual bases, the US/Canadian sample size population, as well as for all nations on ISS, is decreasing. In a best case scenario, the NASA data base or the Russian data base might each collect long duration data on 4 crewmembers/year, involving research with a number of complex variables, such as age, ethnicity, and gender. These complex combinations of variables will require much larger population sizes to accurately evaluate.

Therefore, today at the 31st Planetary Congress of the Association of Space Explorers (ASE), the membership, representing astronauts and cosmonauts from 38 nations, unanimously approved the following sense of the organization regarding the collection and analyses of human physiological data important to space exploration: to safely leaving Low Earth Orbit (ELO) or to extending LEO mission duration.

(1) In order to mitigate health and mission success risks to future space explorers, especially with the Mars destination, the international ISS multilateral control boards involved in collecting astronaut health data during flight careers should consider how to implement a common data base for both career and post career data, including end of life data, at the discretion of the astronaut or cosmonaut. It is expected that an international process for selecting peer reviewed proposals for evaluating this data would also be developed.

(2) The ASE recognizes that post retirement participation by astronauts and cosmonauts is voluntary, and that applicable approvals and permissions may be nation dependent. Therefore, ASE requests that the appropriate ISS multilateral control boards develop an international process which relieves these administrative burdens from the flyers and facilitates exchange of data, with flyer release, directly between the attending physicians and the agency or groups responsible for assembling the information into a standard searchable data base.

General Statement on Space Traffic Management and Space Debris Objects

XXXI Planetary Congress
Minsk, Belarus
September 14, 2018

Since the beginning of space flight, the collision hazard in Earth orbit has significantly increased as the number of artificial objects orbiting the Earth has increased. Today, at the 31st Global Congress of the Association of Space Explorers (ASE), the membership, representing astronauts and cosmonauts from 38 nations, unanimously approved the following sense of the organization regarding the tracking and future management of space debris objects.

ASE works closely with other space organizations to expand and invigorate international dialogue on such issues as crew safety, operational compatibility, and the potential hazards of near earth objects. ASE regularly sponsors international discussions among astronauts and cosmonauts on operations challenges in space. Operations in earth orbit have dramatically increased over the years to where Space Traffic Management (STM) is now required to de-conflict the flight paths of over 1,900 satellites. In the early aviation environment and the growth of the airplane industry, it became necessary to develop international protocols and policies to manage the "air traffic" in order to promote safety and to bring order to the growing industry. But management of "space traffic" is complicated by the need to include space debris objects, which like the satellites themselves, are traveling at speeds measured in kilometers per second. Past efforts to track space debris objects focused on the largest objects in orbit which added about 27,000 items to the combined catalog. Recent studies suggest objects as small as a few millimeters should be considered "lethal" space debris to an active satellite. Taking all of these into consideration when performing conjunction analyses would involve a catalog of over 500,000 space debris objects.

Major space objects (functioning spacecraft as well as space debris objects) weighing 50-100 kilograms and more contain a bulk of material that can potentially lead to new space debris objects emerging in case of a collision. We should pay attention to the nearly exponential growth in space debris objects, small-sats, cubesats, and spent rocket bodies that without an international global management structure could result in inadvertent impacts to human missions, or even tragic accidents. The ASE supports and applauds the growth of the space enterprise as we use small-sats to study the Earth, Moon and Mars. However, collisions by uncontrolled and unmanaged space assets create space debris objects which can remain in orbit for years, travelling at many thousands of kilometers per hour. One could even imagine a time in which human launches could not be scheduled for fear of an impact. Even now, spaceflight launches are occasionally delayed due to the possibility of collision with space debris objects.

Because of possible negative impacts to space operations, space debris object discussions and decisions (such as active removal, orbital management, deflection, etc.) should be conducted within the framework of negotiated international regulations and procedures. For example, as a first step towards clearing space in the future, international procedures should be developed for classifying identified tracked space debris objects, both registered and unregistered, as space debris and for establishing a unified catalog of space debris objects.

The ASE urges the international spacefaring nations to rapidly develop policies, technologies, protocols and/or treaties on Space Traffic Management (STM) in Low Earth Orbit (LEO) that would assess impact risk from space debris objects. Development of a US Space Traffic Management (STM) structure is a first step, but the US is only one element of a growing international launch market. Space debris objects know no international boundaries, travelling around the planet in about 90 minutes each orbit (~17,500 mph or ~28,164 km/h). Similar to the history of aviation and maritime operations, the international space sector should collaborate in order to keep the doors of space open and safe for everyone.

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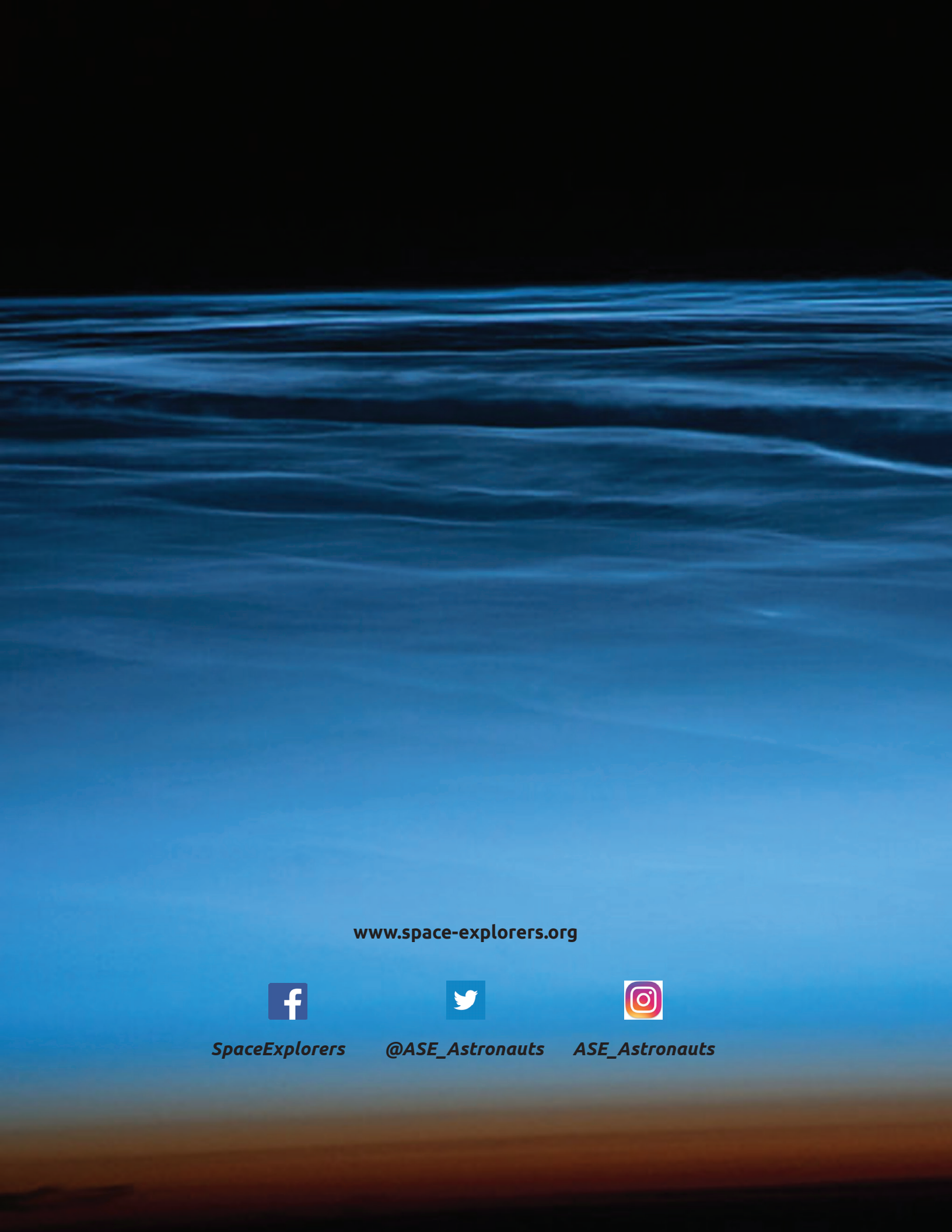

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