U.S.A.
Nomination for the Federation Aeronautique Internationale
Korolev Diploma

Nominee: **The International Space Station Expedition 10 Crew**

Leroy Chiao, Ph.D.
Salizhan Shakirovich Sharipov

Affiliations: Leroy Chiao, Ph.D.: NASA Astronaut
Salizhan Shakirovich Sharipov: Russian Cosmonaut, Roscosmos - Gagarin Cosmonaut Training Center

Suggested Citation:

For the successful completion of the tenth expeditionary mission to the International Space Station (ISS), including unplanned operations with limited resources and continuation of the ISS mission with a two-person crew as a result of the Columbia Space Shuttle accident.

Justification:

The Expedition 10 crew launched to the ISS aboard Soyuz TMA-5, October 14, 2004, and returned to Earth on April 24, 2005, aboard the same Soyuz spacecraft, after having spent 193 days in space. Leroy and Salizhan conducted two space-walks during their mission, performed numerous in-flight repairs, and supported operational and logistical efforts required for the continuation of the ISS mission with a reduced crew complement.

During the course of the Expedition 10 mission, the crew supported the docking and unpacking of two Russian "Progress" resupply vehicles. Progress 16 (16P) arrived at the ISS on December 25 and delivered 2½ tons of food, water, fuel, clothing, and other supplies to the space station. In the event that 16P had not successfully docked to the ISS, consumables would have declined to the point where the Expedition 10 crew would have had to return to earth, leaving the ISS unattended. 17P arrived at the ISS on February 28, carrying more than 2 tons of food, fuel, oxygen, water, spare parts, and personal items for the crew. Among the items being carried on the Progress was a new heat exchanger device to replace a faulty component in the U.S. airlock. Leroy successfully installed this heat exchanger which allowed for the resumption of EVAs in U.S. space suits.

The crew also successfully relocated the Soyuz TMA-5 from the Pirs Docking Compartment to the Zarya module. The repositioning of the Soyuz made Pirs available for use as an airlock for the two Extravehicular Activities (EVAs) conducted by Chiao and Sharipov. The first of these EVAs occurred on January 26. The primary tasks included installation of a small German robotic experiment and associated cabling and an antenna. The crew also installed scientific experiments and inspected/photographed environmental control system vents, looking for any contamination that could cause irregular operation. The second EVA occurred on March 28. The primary tasks of this EVA included installation of the final pieces necessary for the arrival of the European Space Agency's Automated Transfer Vehicle (ATV) and installation of Global Positioning System (GPS) antenna units and cables. Salizhan also deployed a foot-long, 11-pound Nanosatellite toward the aft end of the Station,

while Leroy photographed its departure. During its time in space, this satellite is expected to help develop small satellite control techniques, monitor operations, and develop new attitude system sensors.

These two EVAs marked the fifth and sixth EVAs for Leroy. He completed two EVAs on STS-72 (12 hours, 57 minutes) and two on STS-92 (13 hours, 16 minutes). These EVAs were the first for Salizhan. The pair logged almost 10 hours of EVA time during the two Expedition 10 excursions.

Despite the limited ability to transfer experiment hardware and samples to and from the ISS, a significant amount of experiments were conducted during the course of Expedition 10, primarily by NASA Science Officer, Leroy Chiao. These included Life Sciences experiments such as, Advanced Diagnostic Ultrasound in Microgravity (ADUM), which has helped to develop strategies for diagnostic telemedicine, and acceleration experiments, including Space Acceleration Measurement System (SAMS) II, and Microgravity Acceleration Measurement System (MAMS), which help to characterize accelerations that may affect ISS experiments and lead to new methods of stabilization in future spacecraft. Leroy conducted the Dust and Aerosol Measurement Feasibility Test (DAFT), which is designed to test the effectiveness of a device that counts ultra-fine dust particles in a microgravity environment, and which may be a precursor to the next generation of fire detection equipment for space exploration vehicles. Leroy also photographed numerous sites that were scheduled as part of the Crew Earth Observations (CEO) experiments and participated in "EarthKAM" in which middle school students control a digital camera mounted in a window on ISS. Both crewmembers participated as subjects in numerous Life Sciences experiments which examine the effects of spaceflight on human physiology.

Dr. Chiao has flown three previous Shuttle flights, in addition to the Expedition 10 mission, and has an accumulated time in space of approximately 230 days. As ISS Commander, Leroy was responsible for the overall safety and mission operations of the crew, in addition to being responsible for the American systems and many of the scientific experiments performed during the increment.

Salizhan previously flew on one Shuttle flight, in addition to the Expedition 10 mission and has an accumulated time in space of approximately 200 days. He was responsible for the operation and maintenance of all Russian systems and payload experiments, and was also the commander of the Soyuz TMA-5 for the crew's launch to ISS and their safe return to Earth.

By their exemplary service as the ISS crew during a difficult and dynamic time for the ISS Program, the crew ensured the future of the ISS as a manned outpost in space. They demonstrated outstanding international cooperation, exhibited an incredibly high level of skill and productivity, and successfully completed their demanding mission. The Expedition 10 crewmembers are most highly deserving of the Korolev Diploma.