Lunar Exploration (2)
Lunar Exploration (1) (1)

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50 YEARS OF LUNOKHOD-1: AT THE ORIGINS OF MOBILE SPACE ROBOTICS

Abstract

50 years ago, two pioneering lunar expeditions of Soviet robotic crafts took place. The crafts were created at the Lavochkin association (led by G.N. Babakin) in cooperation with hundreds of enterprises of the USSR. On September 9, 1970, for the rst time in history, the return capsule of the Luna-16 craft delivered sample of lunar soil to Earth. On November 17, 1970 the Luna-17 craft delivered to Mare Imbrium a mobile automatic laboratory Lunokhod-1, which on the same day put the rst track on the lunar surface. Self-propelled automatic chassis for Lunokhod-1 was created in VNIITransmash, under the leadership of A.L. Kemurdjian. On July 31, 1971, when Lunokhod-1 continued its research, the manned Lunar Roving Vehicle of the Apollo-15 mission joined it on the other end of Mare Imbrium. The studies carried out by Lunokhod-1 along the route of movement (10.5 km) covered an area of about 80,000 m and made it possible to raise the reliability of measurements by contact methods to a new level, in comparison with measurements of stationary crafts. Lunokhod-2 had moved for 40 km, and lunar soil samples from dierent regions of the Moon were delivered to Earth by Luna-20 and Luna-24 crafts. Thanks to this and the expeditions of the Apollo program, scientists had the opportunity to study the lunar soil in the laboratories and in-situ on the Moon. These achievements were far ahead of time. For example, the Chinese lunar rover Yutu-1 mastered a new route in Mare Imbrium already in the new century. The American rover Sojourner began its research on the Mars surface in 1997. Today, the list of unmanned planet rovers besides the mentioned ones includes the American rovers Spirit, Opportunity and Curiosity on Mars, the Chinese lunar rover Yutu-2, which for the rst time in history works on the back side of the Moon. In 2020, an American Mars rover based on the Curiosity chassis, the European rover Rosalinda Franklin of the ExoMars program and a Chinese rover are preparing to y to Mars. The co-authors of this talk were participating in the creation of the Lunokhod-1 and implementation of its scientic program and will summarize other technical and scientic results of the Lunokhod-1 expedition and discuss new routes and directions for improving mobile spacecrafts.