II.2. RESEARCH OF THE EARTH AND NEAR-EARTH SPACE

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Introduction. For the present and the future there are, at least, three basic factors lending impetus to an orbital ISS-crew-aided research of near-Earth space:

a) planning of long-term operation of a manned orbital vehicle requires investigation and prediction of the influence of space factors on the functioning of the life support system, service lines, guidance, navigation systems, research complex, power supply, etc.;

b) operation of a manned vehicle is based on a long-term stay of numerous crew of cosmonauts and astronauts. Their functionability and psycho-visual condition are in many respects determined by the influence of space factors: by corpuscular and radiation activity of the Sun, magnetic field disturbance, etc.;

c) prospect of participation of numerous competent international teams of researchers in solving the problems of diagnostics of near-Earth space allowing performance of the sounding data analysis and interpretation directly on-board the ISS, that, in turn, opens possibilities for adaptation of experiments and development of a «Space Weather» system.

The proposed Ukrainian experiments concerning the diagnostics of the near-Earth space and Earth's surface are classified into the following 5 groups:

— contact diagnostics of the plasma and gaseous environment of the ISS;
— study of the Earth's upper atmosphere by the optical and millimeter-wave technique;
— study of the Earth's ionosphere;
— remote sounding of the surface and water area of Earth;
— active experiments in space and on the Earth's surface.

Analysis of the experiments allows us to propose a program of a permanently working laboratory of integrated near-Earth space research with active participation of a crew.