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Radiation Fields, Effects and Risks in Human Space Missions (4)

Author: Prof. Tsvetan Dachev
Space Research and Technology Institute, Bulgarian Academy of Sciences, Bulgaria, tdachev@bas.bg

Dr. Gianni De Angelis
SERCO S.p.A, Italy, gianni.deangelis@serco.com
Dr. Borislav Tomov
Space and Solar-Terrestrial Research Institute, Bulgarian Academy of Sciences, Bulgaria, btomov@bas.bg
Mr. Plamen Dimitrov
Space and Solar-Terrestrial Research Institute, Bulgarian Academy of Sciences, Bulgaria, pdimitro@stil.bas.bg
Dr. Yury Matviichuk
Space and Solar-Terrestrial Research Institute, Bulgarian Academy of Sciences, Bulgaria, yumat@bas.bg
Dr. Jordanka Semkova
Space Research and Technologies Institute, Bulgarian Academy of Sciences, Bulgaria, jsemkova@stil.bas.bg
Mr. Nikolay Bankov
Space and Solar-Terrestrial Research Institute, Bulgarian Academy of Sciences, Bulgaria, ngb43@abv.bg
Dr. Guenther Reitz
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, Guenther.Reitz@dlr.de
Dr. Gerda Horneck
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, gerda.horneck@dlr.de
Prof. Donat-Peter Häder
Friedrich-Alexander-Universität, Institut für Botanik und Pharmazeutische Biologie, Germany, dphaeder@biologie.uni-erlangen.de
Dr. Victor Benghin
State Scientific Center of Russian Federation, Institute of Biomedical Problems, Russian Academy of Sciences, Russian Federation, benghin@pike.net.ru

FURTHER ANALYSIS OF THE SPACE SHUTTLE EFFECTS ON THE ISS SAA DOSES

Abstract

The data from the R3DE instrument outside the ISS at the European Technological Expose Facility (EuTEF) on the ESA Columbus module shows that the docking of Space Shuttle with ISS decrease the International Space Station (ISS) South-Atlantic Anomaly (SAA) dose rates from about 1500 μGy/h down to 600-700 μGy/h or by factor of 2. The new dose rate data in March 2009 from another Bulgarian build instrument (R3DR) outside Russian "Zvezda" module shows that: 1) SAA R3DR instrument dose rates before the Space Shuttle docking are higher (2500 μGy/h) than R3DE data; 2) The relative decrease after the shuttle docking is only by factor of 1.25. These differences are explained by the smaller shielding of R3DR from the body of ISS and with larger distance of it from the body of Space Shuttle. Very similar data, but with smaller dose rates shows third Bulgarian build instrument (Liulin-5) inside Russian "Pirs" module. The analysis of the ascending/descending SAA dose rate maximums of three instruments shows that effect can be simple explained with the additional shielding against the SAA 30 to 150 MeV protons, provided by the 78 tons Shuttle to the instruments and by changing of the ISS 3D mass distribution when

the ISS rotates.