Concerns about the biological effects of space radiation are increasing rapidly due to the perspective of long-duration manned missions, both in relation to the International Space Station (ISS) and to manned interplanetary missions to Moon and Mars in the future. As a preparation for these long duration space missions it is important to ensure an excellent capability to evaluate the impact of space radiation on human health in order to secure the safety of the astronauts/cosmonauts and minimize their risks. It is therefore necessary to measure the radiation load on the personnel both inside and outside the space vehicles and certify that organ and tissue equivalent doses can be simulated as accurate as possible. In this paper we will present simulations using the three-dimensional Monte Carlo Particle and Heavy Ion Transport code System (PHITS) of long term dose measurements performed with the ESA supported experiment MATROSHKA (MTR), which is an anthropomorphic phantom containing over 6000 radiation detectors, mimicking a human head and torso. The MTR experiment, led by the German Aerospace Center (DLR), was launched in January 2004 and has measured the absorbed dose from space radiation both inside and outside the ISS. In this paper preliminary comparisons of measured and calculated dose and organ doses in the MTR located outside the ISS will be presented. The results confirm previous calculations and measurements which indicate that PHITS is a suitable tool for estimations of dose received from cosmic radiation and when performing shielding design studies of spacecraft.

Acknowledgement: The research leading to these results has received funding from the European Commission in the frame of the FP7 HAMLET project (Project 218817).