

SUMMARY OF THE ESA WORKSHOP ON NEO IMPACT EFFECTS AND MITIGATION MEASURES

The ESA Workshop on NEO Impact Effects and Threat Mitigation Measures was successfully carried out at DEIMOS Space premises in Tres Cantos (Spain) on the 7th and 8th of May 2013. About 40 European experts gathered to discuss medium and long-term plans for ESA's activities within the NEO branch of the Space Situational Awareness Programme (SSA-NEO). Key presentations were provided in the mornings by invited speakers from Europe and the United States, whereas roadmap discussions took place in both afternoons. Representatives from the media also attended the technical discussions.

During the first day the experts addressed the current state of the art in the simulation of impact effects (atmospheric, ground, water and socio-economical effects) and discussed the results drawn on the case of the Chelyabinsk event recently occurred in Russia. Several tools were found to be quite mature already and capable of realistic simulations of impact effects. It was agreed that further steps need to be taken to coordinate further development efforts for these tools, standardise formats for interchange of data and possibly develop a higher level tool to allow arriving to the provision of clear guidelines to decision makers whenever a NEO threat is identified. The web-based tool 'Impact Earth!' was seen as a good first step for such tool. However, recognising the large uncertainties present in the impact processes, measures need to be taken to improve its level of representation and accuracy. An improved 'Impact Earth!' like tool that is based on a large database of realistic reference impact cases could be a target. The importance of education of the general public on impact effects was also emphasized.

In the second day, experts discussed the maturity status of the different measures currently proposed to prevent the risk that NEOs could pose in the future. It was agreed that the methods closest to implementation are the kinetic impactor as an impulsive or short-time measure; and the gravity tractor, the ion-beam shepherd and the laser ablation as measures needing long actuation time intervals. A clear consensus exists on the need to increase our level of confidence in these methods by verifying these techniques. In some cases first steps of such verification can take place on ground. The main uncertainty was found to be in the response of the targeted asteroid under any of the deflection measures. The ongoing NEOShield study of the FP7 programme of the European Commission was welcomed in this context. It was also agreed that despite all simulations and ground tests a space based demonstration mission would eventually be required. To ensure an efficient approach of resources for this aspect, a demonstration in the Earth environment could be considered as a first step. An AIDA-type NEO deflection mission or parts thereof were seen as promising candidates for a true NEO deflection mission in the longer term. It was agreed that potential NEO deflection measures should also target relatively small asteroids (50 m - 300 m), as these are most abundant and could already be quite damaging.