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# Space weathering on near-Earth objects investigated by neutral-particle detection

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The ion-sputtering (IS) process is active in many planetary environments in the solar system where plasma precipitates directly on the surface (for instance, Mercury, Moon and Europa). In particular, solar wind sputtering is one of the most important agents for the surface erosion of a near-Earth object (NEO), acting together with other surface release processes, such as photon stimulated desorption (PSD), thermal desorption (TD) and micrometeoroid impact vaporization (MIV). The energy distribution of the IS-released neutrals peaks at a few eVs and extends up to hundreds of eVs. Since all other release processes produce particles of lower energies, the presence of neutral atoms in the energy range above 10 eV and below a few keVs (sputtered high-energy atoms (SHEA)) identifies the IS process. SHEA easily escape from the NEO, due to NEO's extremely weak gravity. Detection and analysis of SHEA will give important information on surface-loss processes as well as on surface elemental composition. The investigation of the active release processes, as a function of the external conditions and the NEO surface properties, is crucial for obtaining a clear view of the body's present loss rate as well as for getting clues on its evolution, which depends significantly on space weather. In this work, an attempt to analyze processes that take place on the surface of these small airless bodies, as a result of their exposure to the space environment, has been realized. For this reason, a new space weathering model (space weathering on NEO-SPAWN) is presented. Moreover, an instrument concept of a neutral-particle analyzer specifically designed for the measurement of neutral density and the detection of SHEA from a NEO is proposed.