

SPACE DEBRIS SYMPOSIUM (A6)  
Modelling and Risk Analysis (2)

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ORDEM2010 AND MASTER-2009 MODELED SMALL DEBRIS POPULATION COMPARISON

**Abstract**

The latest versions of the two premier orbital debris engineering models, NASA's ORDEM2010 and ESA's MASTER-2009, have been publically released. Both models have gone through significant advancements since inception, and now represent the state-of-the-art in orbital debris knowledge of their respective agencies. The purpose of these models is to provide satellite designers/operators and debris researchers with reliable estimates of the artificial debris environment in near-Earth orbit. The small debris environment within the size range of 1 mm to 1 cm is of particular interest to both human and robotic spacecraft programs. These objects are much more numerous than larger trackable debris but are still large enough to cause significant, if not catastrophic, damage to spacecraft upon impact. They are also small enough to elude routine detection by existing observation systems (radar and telescope). Without reliable detection the modeling of these populations has always coupled theoretical origins with supporting observational data in different degrees.

This paper details the 1 mm to 1 cm orbital debris populations of both ORDEM2010 and MASTER-2009; their sources (both known and presumed), current supporting data and theory, and methods of population analysis. Fluxes on spacecraft for chosen orbits are also presented and discussed within the context of each model.