

APR08-2007-000027

Abstract for an Invited Paper
for the APR08 Meeting of
the American Physical Society

An Introduction to Space Debris

DAVID WRIGHT, Union of Concerned Scientists

Space debris is any human-made object in orbit that no longer serves a useful purpose, including defunct satellites, discarded equipment and rocket stages, and fragments from the breakup of satellites and rocket stages. It is a concern because—due to its very high speed in orbit—even relatively small pieces can damage or destroy satellites in a collision. Since debris at high altitudes can stay in orbit for decades or longer, it accumulates as more is produced and the risk of collisions with satellites grows. Since there is currently no effective way to remove large amounts of debris from orbit, controlling the production of debris is essential for preserving the long-term use of space. Today there are 860 active satellites in orbit, supporting a wide range of civil and military uses. The 50 years of space activity since the launch of Sputnik 1 has also resulted in well over half a million pieces of orbiting debris larger than 1 cm in size. There are two main sources of space debris: (1) routine space activity and the accidental breakup of satellites and stages placed in orbit by such activity, and (2) the testing or use of destructive anti-satellite (ASAT) weapons that physically collide with satellites at high speed. The international community is attempting to reduce the first category by developing strict guidelines to limit the debris created as a result of routine space activities. However, the destruction of a single large spy satellite by an ASAT weapon could double the total amount of large debris in low earth orbit, and there are currently no international restrictions on these systems. This talk will give an introduction to what's in space, the origins of space debris, efforts to stem its growth, the threat it poses to satellites in orbit, and the long-term evolution of the debris population.