

Space Object Re-Entry

Overview

- Space objects are man-made objects which include satellites and space junk. Space junk can be abandoned satellites, broken pieces or parts of rockets, all vary in size.
- All space objects launched into Earth orbit will return although orbital lifetimes can vary from hours to hundreds of thousands of years.
- Since the beginning of the space age, objects have returned to Earth on a daily basis. Many objects burn up completely as they pass through the upper atmosphere or fall into the sea unobserved.
- Controlled re-entries into targeted areas occur for space systems with significant propulsive capability. Most objects return in an uncontrolled manner which can pose a risk under the ground track if a significant proportion of the in-orbit mass survives.

Space objects re-entry in the UK

Although the UK's land mass is a relatively small target from space, its latitude is similar to launch sites such as Kennedy Space Centre (USA) and Baikonur Cosmodrome (Russia), and hence many ground tracks pass over the UK with increased likelihood of re-entry.

Space object re-entry is monitored by RAF Fylingdales and the UK Space Operations Control Centre at RAF High Wycombe. High risk events where the re-entering object represents a significant on-ground threat due to its mass or intrinsic hazard (e.g. contamination) are coordinated via the Cabinet Office Civil Contingencies Unit, with support from the UK Space Agency and the Ministry of Defence.

Impacts

Space object re-entry impacts include:

Damage on the ground, including buildings and infrastructure caused by the object striking the ground.

Damage to *aircrafts* in flight caused by the object colliding with the aircraft.

Health impacts directly from being hit by an object.

Notable space object re-entry events

2008 - Missile intercept of USA 193 to prevent the intact satellite re-entering potentially contaminating the ground with toxic fuel.

1979, 1991, 2001 and 2011 - Return of Skylab, Salyut 7, Mir space stations and UARS observatory (respectively) caused by approximate 11 year solar cycle increasing solar activity increasing drag on the objects causing them to descend towards Earth.

1978 - Uncontrolled re-entry of Cosmos 954 nuclear reactor which dispersed plutonium over the Canadian tundra.



More information can be found at: www.naturalhazardspartnership.org.uk/hazards/near-earth-objects