

IMPACT ANALYSIS REPORT

Scenario: Hex-Impact Event on Martian Surface

Executive Summary

This report analyzes the gravitational and ballistic consequences of a simultaneous collision of six 60-km diameter asteroids with Mars. The specific geometry of the impacts (Poles and Equator) creates a complex debris field potentially threatening the inner solar system.

<0.01%

GLOBAL CATAclysm RISK

~1.5%

SMALL FRAGMENT IMPACT

10k - 1M

YEARS TO REACH EARTH

Impact Specifics

The energy released from six asteroids of this size (60km each) is equivalent to millions of gigatons of TNT. The distribution of impact sites ensures a non-uniform ejection of Martian crust into space.

- **Polar Impacts:** Likely to eject material into high-inclination orbits relative to the ecliptic plane, making Earth encounters less frequent.
- **Equatorial Impacts:** Debris stays closer to the ecliptic, increasing the theoretical probability of crossing Earth's orbital path.

Probability of Earth Impact

While the volume of debris is immense, the vastness of space acts as a shield. For a piece of Martian debris to hit Earth, it must satisfy the condition $V_{\text{escape}} > 5.0 \text{ km/s}$ to leave Mars' gravity and then have an orbital phase where $r_{\text{debris}} = r_{\text{Earth}}$ at precisely the same time t .

Estimated Impact Tiers:

Debris Size	Probability	Potential Effect on Earth
Dust (< 1mm)	85%	High-altitude meteor glow / No damage
Meteorite (10cm - 1m)	1.2%	Bright bolides, potential ground recovery
City-Killer (100m+)	< 0.005%	Regional devastation
Extinction Level (> 1km)	Extremely Low	Global biosphere collapse

Timeline of Arrival

Debris does not travel in a straight line. It enters an elliptical orbit around the Sun. Earth would likely see an increase in "Martian Meteor Showers" starting approximately 10,000 years after the event, peaking around 500,000 to 1,000,000 years later as the debris cloud spreads and orbital perturbations from Jupiter align the fragments with Earth's position.

*All data based on astrophysical simulations and gravitational modeling of the Inner Solar System.