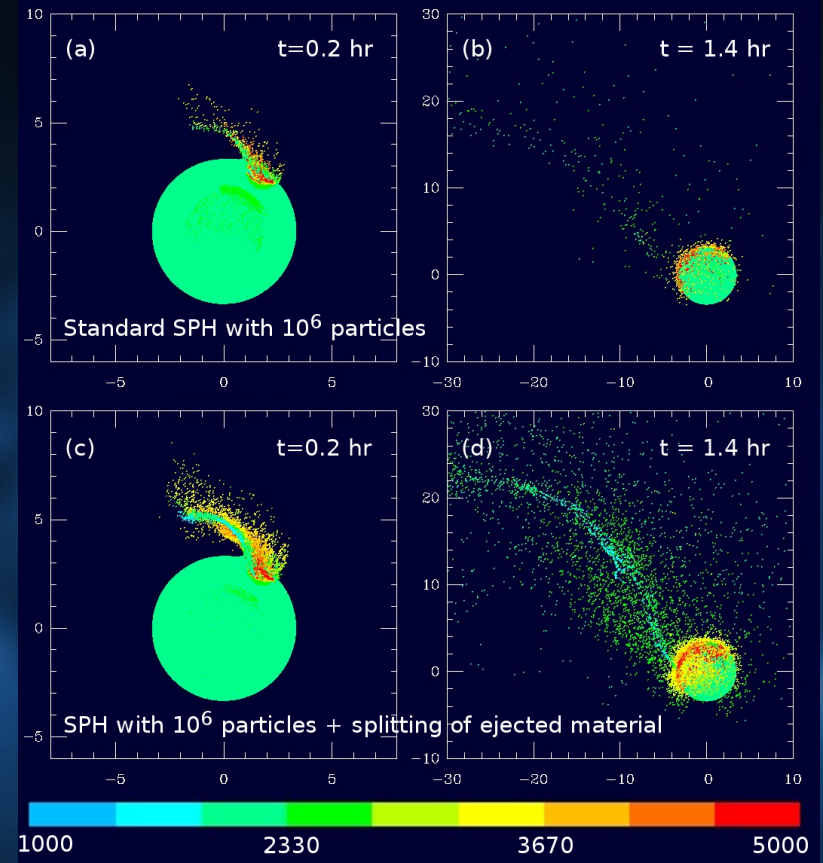


Impact Origin for Phobos and Deimos

Phobos and Deimos have been proposed to have been formed from a disk from a large impact with the planet, and new modeling suggests a potential size for this impactor.

- Modeling the accretion of Phobos and Deimos from an impact-generated disk using Smooth Particle Hydrodynamics showed that survival of the moons requires a disk mass $\leq 3 \times 10^{-5} M_{Mars}$, vastly smaller than estimated previously. This study also developed a “particle splitting” technique to increase disk resolution by an order-of-magnitude.
- After the initial impact, tidal dissipation in Mars would lead to inward migration and loss of large inner moons.
- In order to form a disk with this mass and an outer edge near 6 Mars radii requires a Vesta-to-Ceres mass impactor (with $\sim 10^{-3} M_{Mars}$). An impactor of this size may have formed a basin the size of Borealis, or one of the other largest Martian basins.



Simulations of the impact of a Vesta-mass body with Mars. Color scales with temperature in kelvin; distances shown in units of 10^3 km. Top row: 10^6 -particle simulation with standard SPH. Bottom row: Same impact modeled with SPH + particle splitting.