



Impact Effects











Background

Meteorite impacts are devastating events, but it is not only the impact itself, which causes destruction, but the effects of these phenomena are just as catastrophic. From stratigraphic records and accounts of recent impact events, we can build up a picture of the various resulting disasters encountered when these space rocks collide with the Earth.

One of the first effects felt during an impact are immense blast waves. An asteroid colliding with the Earth is travelling at a speed between 15 and 30 km/s when it arrives at the top of the Earth's atmosphere. A comet is much faster, up to about 75km/s, Concorde travels at about 0.6km/s. Whether, or not an object reaches the surface, its energy is released as an explosion, which causes a blast wave. This wave represents an abrupt change in pressure that generates a high-speed wind, and it is this wind and the debris it carries which cause most destruction. These winds are much greater than hurricane force wind. The airburst caused by the impact of an object of around 50m in diameter at Tunguska in Siberia in 1908 flattened some 2,000km2 of forest. Had it struck an urban area, there would have been an enormous death toll.

If a large object were to impact the Earth on land, massive earthquakes-up to 13 on the Richter scale would be produced, along with numerous large magnitude aftershocks (the earthquake that triggered the Boxing Day tsunami of 2004 was of Richter value 9.3). If the impact occurred in the oceans, then huge tsunamis would be generated. For an object of 10km in diameter, similar to that which caused the Vredefort crater in South Africa, the leading edge would hit the sea floor of deep ocean basins before the top of the object had even reached sea level. The immense waves resulting from such an impact are thought to reach heights of between 1 and 3km high (the waves recorded in the Indian ocean tsunami of 2004 reached heights of up to 30m). These waves could easily flood the interior of contents found far from the coast and the 'splash' from these could reach heights able to disturb jumbo jets.

Contrary to the large tsunamis, a major effect of a meteorite impact on Earth is global wildfires or firestorms. Firestorms are created by massive amounts of methane gas that are released into the air from the Earth in a collision. Methane is an extremely flammable substance and therefore lightning can ignite this released gas. The fire burns close to the ground and quite high up into the atmosphere. As extraordinary levels of the organic gas fuel the fire, the atmosphere itself would also be alight. The blaze would decrease O_2 supplies and increase the levels of CO_2 creating a runaway greenhouse effect.