

Comet ISON — from cradle to grave

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Comet ISON came from the Oort Cloud (10,000–100,000 au), the outermost region of the Solar System, where the debris from the formation of giant planets and possible extrasolar comets are stored since the early days of the Sun's existence. The overall chemistry of the comet appears to be normal suggesting a solar origin. During its approach to the Sun, it was active at least since it passed 9.4 au, displaying enhanced activity most likely driven by CO₂ and CO ice sublimation. From about 2.5 au inwards, water-ice sublimation dominated the activity of the km-size nucleus, producing a gas and dust coma of 100,000 km in extension and several million km long plasma and dust tails, most of which were seen overlapping from the Earth. The comet approached the Sun within 0.012 au on 28 Nov. 2013. The fatal disintegration of the nucleus occurred close to the Sun in two steps: About 1.5–0.5 days before perihelion, an extraordinary brightening occurred that may indicate an explosion of the nucleus producing an armada of fragments that continued on the track of the comet with fading activity. The subnuclei exhausted their icy fuel shortly before reaching perihelion and dissolved in a cloud of dust. This cloud and some solid material from the nucleus explosion escaped the Sun and witness the death of the nucleus of comet ISON.