How a sunset comet came to be

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Credit: NASA

(Phys.org) —For a comet, visiting the sun is risky business. Fierce solar heat vaporizes gases long frozen in the fragile nucleus, breaking up some comets and completely destroying others.

That's why astronomers weren't sure what would happen in early March when Comet Pan-STARRS, a first-time visitor to the inner solar system, dipped inside the orbit of Mercury. On March 10th, NASA's STEREO-B spacecraft watched as the comet made its closest approach to the sun

only 28 million miles away. At that distance, the sun loomed 3 times wider and felt more than 10 times hotter than it does on Earth.

The comet survived.

Still intact, Comet Pan-STARRS is emerging from the Sun's glare into the sunset skies of the northern hemisphere. Solar heating has caused the comet to glow brighter than a first magnitude star. Bright twilight sharply reduces visibility, but it is still an easy target for binoculars and small telescopes 1 and 2 hours after sunset. As of March 15th, people are beginning to report that they can see the comet with the unaided eye.

Discovered in June 2011 by astronomers using the Pan-STARRS survey telescope atop the Haleakala volcano in Hawaii, the comet is paying its first visit to the inner solar system. It hails from the Oort cloud, a deep space reservoir of comets far beyond the orbit of Pluto. Because Comet PanSTARRs is a newcomer, its potential brightness and ability to withstand solar heating was unknown.

Now we know. "It is a gorgeous comet—one of the brightest in years," says astronomer Matthew Knight of the Lowell Observatory.

Comet specialist Emmanuel Jehin of the European Southern Observatory has been monitoring Pan-STARRS using a remote-controlled telescope in Chile. Based on his data, Knight concludes that "Comet Pan-STARRS seems to be producing quite a bit of dust compared to an average comet. This is very good for its visibility, because the extra dust is reflecting sunlight and making Pan-STARRS appear brighter than it would otherwise."

The amount of dust and gas spewing from the comet implies a nucleus on the order of 1 km in diameter—in other words, neither unusually large nor small. Size-wise, it is a fairly typical comet.

The comet's tail is anything but typical. STEREO-B images processed by Karl Battams of the Naval Research Lab in Washington DC reveal many wild and ragged striations in the cloud of dust trailing behind Pan-STARRS. "Wow!" says Battams. "The fine-structure is breathtaking. We think this is caused by some fairly complex interaction between the solar wind and the comet's rotating nucleus. It's going to take computer models to figure this one out."

The comet is now receding from Earth. It will slowly dim as it heads back into deep space. Ironically, though, its visibility will improve for a while as it heads into darker skies away from the sun. In the last weeks of March it could become an easy naked-eye object.

Step outside after sunset, face west, and take a look.

Provided by NASA