

### Offered Title: Amazing Pluto

Our ninth planet...oh wait, we don't have a ninth planet anymore.

OK, Pluto hasn't been a full-fledged planet since the 2006 IAU criteria for planetary status was published. Its minor planet 134340 Pluto now. But that fact doesn't take away Pluto's fascinating characteristics. Now that we humans have seen it clearly, thanks to the New Horizons spacecraft flyby in 2015, we understand.

As a Kuiper belt object, Pluto represents our early solar system. The Kuiper belt contains ancient objects, remnants of the outer protoplanetary disk, the disk of stuff that became planets after our Sun became a star. They provide us a way to look at the past, at our beginnings.

But this doesn't mean they aren't actively changing on their own. The Pluto system is a case in point. Pluto is a dynamic world, and along with its large satellite Charon form a pair of objects orbiting a center of gravity, an area of space.

Imagine a world with a daily high temperature of minus 388 degrees F, just 72 degrees F above absolute zero. In spite of this, Pluto exhibits evidence of surface activity. A huge glacier of frozen nitrogen and water called Sputnik Planitia (SP) shows changes similar to water ice on Earth such as cracking, ridges, and cellular formations. A lack of cratering in SP also indicates a surface that is active. This resurfacing activity is consistent with a fluid subsurface. Other evidence for subsurface liquid is that Pluto and Charon are tidally locked, that is, they face each other with the same surface all the time. This is very unusual and indicates an anomaly in Pluto's or Charon's mass. A subsurface liquid ocean under SP would explain this anomaly as well as the resurfacing activity of SP. It appears that any subsurface liquid in Charon has frozen, and is evidenced by an equatorial tectonic crack encircling the satellite.

The surface activity mentioned above is incredible, but get this, methane freezes here too and forms widespread narrow ridges called blades up to 1,000 feet tall. We don't know how they form and they must be fantastic to see, but you'll have to wait until space ships go way faster before booking your tour group.

Another feature is unusual dark reddish regions that appear to be caused by a tar of tholins covering its surface. Similar to the atmospheric tholins of Saturn's satellite Titan, they are polymers of nitrogen and methane produced by exposure to ultraviolet radiation. Sounds interesting but kind of nasty.

Pluto has five satellites that appear to have been formed after Pluto collided with another body. Charon, at over half of Pluto's size, is the only one to coalesce into a spherical body and shares many of Pluto's characteristics.

### What's in the Sky?

Getting up before sunrise to go fishing on September 4 – 6? If so, check out Mars and bright star Regulus (in Leo) close together low in the east. Use binoculars.