Astronomer discusses what New Horizons could tell us about Pluto and the Kuiper Belt

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Credit: NASA

On July 14, 2015 the space probe New Horizons will fly roughly 12,500 kilometres above the surface of Pluto, the closest we have ever been to the dwarf planet. The probe will snap photos and gather data that astronomers hope will yield valuable clues about the formation of the Solar System four and a half billion years ago.

Dr. Brett Gladman is the Canada Research Chair in planetary astronomy at the University of British Columbia. His research focuses on the

Kuiper Belt, of which Pluto is a member, and here he talks about some of the things we may learn from the New Horizons Pluto flyby.

What is the significance of the Pluto flyby?

Pluto is interesting because unlike the giant Jovian planets that we've previously explored – Jupiter, Saturn, Uranus and Neptune – which are heavily evolved, probably don't have surfaces and may be gas all the way through, Pluto is an actual large solid body that was formed in the protosolar nebula four and a half billion years ago. It's the first object we have access to that's like that.

The reason that planetary scientists are so interested in these small bodies in the Kuiper belt is because big things like the Earth are far too evolved to conclude things about what it was like when they were very young; it's like going into an elder's retirement home to find out about babies. These smaller bodies which are likely to be more pristine are much better windows into the early solar system than the more evolved bodies.

What are scientists hoping to learn?

Pluto is probably going to be a very interesting surface. We know that Pluto has an atmosphere and a little about it – that it's thin and probably a lot of nitrogen, but thick enough that we still don't know the exact size of the planet. The flyby will give us more details of the composition and allow us to determine the exact size of Pluto.

Also, because of Pluto's long, elliptical orbit, the gases cool down when it goes further away from the Sun so it's quite possible that during this circuit the atmosphere completely freezes up. We do expect the surface of Pluto to be quite young because of these possible atmospheric

processes, and because we can see a lot of light and dark patterns which is likely ice. Of course, this far from the Sun, we have to use the word "ice" cautiously. We're used to water ice, but on Pluto it could be nitrogen ice or methane ice because the temperature could be only forty degrees above absolute zero.

What else will New Horizons be exploring?

We will also be able to learn more about Charon, the largest of Pluto's five moons, which relative to the size of the planet, is the largest moon in the Solar System. Astronomers think that Pluto and Charon, like the Earth and the Moon, were the result of a giant impact a long time ago.

There is also a lot of debate over how Pluto's smaller moon system – Nyx, Styx, Hydra and Kerberos – formed on those orbits. This is the only system that we're going to explore where we think that these are solid objects that formed in orbit around the Sun independent of another massive planet. So the properties of this system give you a window into processes that were happening during the accretion of the planets. In nature, in that fundamental aspect, it's different than the gas giant systems we've explored.

What are you most curious about?

I am involved in a large international campaign to find objects in the Kuiper belt but we can only see objects that are at least fifty kilometers across. Any smaller than that and they're so faint we can't pick up their reflected light from Earth. I'll be very interested to see the crater densities on Pluto and its moons including Charon because you can get an indirect look at objects in the Kuiper Belt by looking at crater impacts on other objects in the system. The distribution of the sizes of the craters tell you what the distribution of the sizes of the projectiles were, so we'll

be able to see ones that would have otherwise been too small to see from Earth.

Provided by University of British Columbia