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PRELIMINARY STUDIES ON DIVERSE THEMES

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PRELIMINARY STUDY ON THE CURRENT OVERVIEW OF THE ACCUMULATED KNOWLEDGE ON THE EDGEWORTH-KUIPER BELT IN THE SOLAR SYSTEM.

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Abstract

After a short time since Pluto's discovery in 1930, astronomers began to model theories that this new planet was not alone in the outer limits of the solar system. After some time these same astronomers postulated the existence of other objects in the region. These objects were only discovered from the year of 1992 and were denominated like Edgeworth-Kuipier Belt.

Keywords: Edgeworth-Kuipier; Belt; Pluto

I - Introduction

The Edgeworth-Kuiper Belt is a region of the solar system that is beyond the boundary of the eight planets, and extends from the orbit of Neptune (the 30 astronomical unit (AU) to about 50 AU away from the sun. (united astronomical) is a unit equivalent to 149,597,871 kilometers.

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It is a natural structure similar to the asteroid belt (positioned between Mars and Jupiter), as it contains many small bodies remaining from the formation of the solar system, but it has a larger dimension: 20 times wider and 20 to 200 times more massive.

This houses a set of bodies that probably would not exist if Neptune had not formed. Without the planet Neptune, these small bodies would probably clump together into one, forming a new planet for the solar system.

This structure is vast and unexplored, and is also the source of many comets. Calculations made in mathematical models predict that comets have an orbit that lasts 200 years or less originates from this belt. The most famous comet originally from Edgeworth-Kuiper is the Halley Comet, active in the last 200,000 years.

II – How the belt was discovered.

After the discovery of Pluto, astronomers of the time began to speculate on the possibility of a population of objects beyond Neptune (UCLA - Freckrick C. Leonard 2017). Kenneth Edgeworth then stated that the material within the primordial solar nebula beyond Neptune was widely spaced and should be inhabited by a multitude of smaller bodies, not planets. In 1951, the Dutch astronomer Gerard Kuiper speculated a disk from which objects could loosen and wander through the solar system (Kuiper Belt). The idea made sense to astronomers. (Figure 1) The existence of such a belt in the region not only helped to explain why there were no large planets in the outer limits of the solar system, but also solved the mystery about the origin of comets.

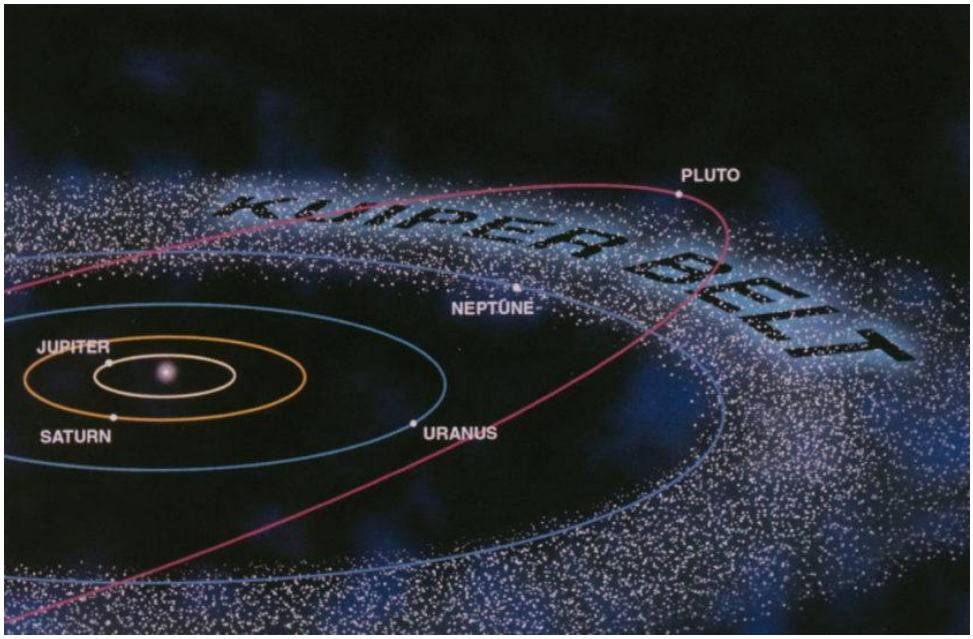

Figure 1: Schematic diagram of the probable orbit of the Edgeworth-Kuipier belt in the solar system (ROMANZOTI 2015)

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Who finally confirmed the existence of the belt were the researchers David Jewitt and Jane Luu. Using the observatory at Mauna Kea University in Hawaii, they announced the discovery of a candidate for the Edgeworth-Kuipier Belt object on August 30, 1992. Six months later, they found a second object in the region. Many more followed. It can now be said that there are thousands of objects discovered in Edgeworth-Kuipier, where about 100,000 of them have a diameter greater than 100 km.

Today we also know that this type of structure is not the only one in the solar system. According to research in the infrared spectrum, it is estimated that 15 to 20% of stars like the sun have huge structures like the Edgeworth-Kuipier Belt in their systems. Most appear to be quite young, but two stellar systems named HD 139664 and HD 53143, observed by the Hubble Space Telescope in 2006, are more than 300 million years old.

III – Belt composition

Due to its small diameters and extreme distance from Earth, the chemical composition of Edgeworth-Kuipier objects is difficult to determine.

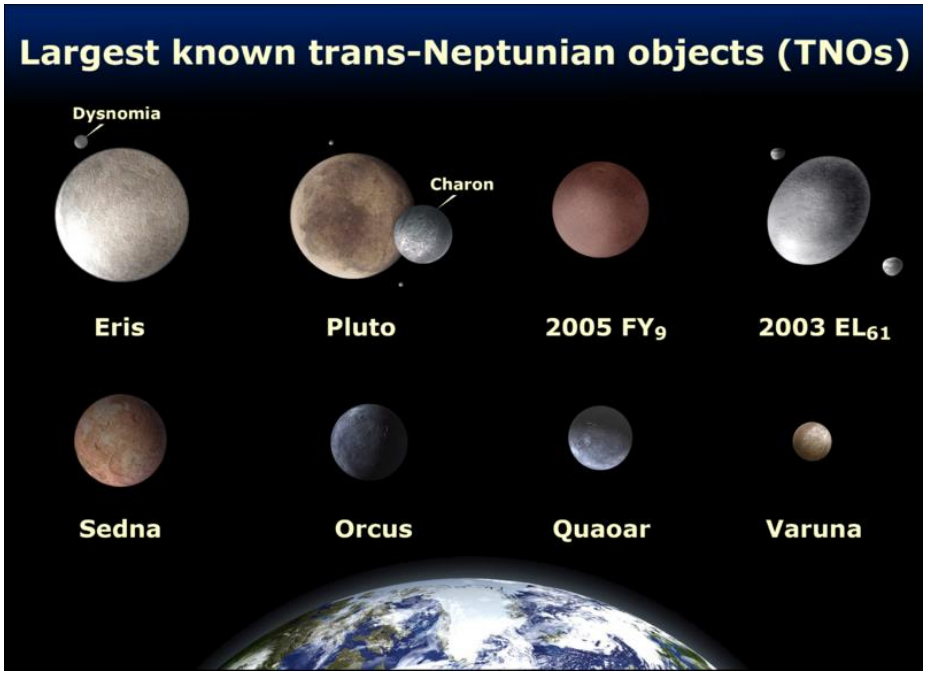

Figure 2: Size relationship between Earth and the largest known trans-netunian objects (TNOs) (ROMANZOTI 2015).

However, spectrographic studies of the region generally indicate that its members are made primarily of ice: a mixture of light hydrocarbons (such as methane), ammonia and water in a solid state (a composition similar to that shared by comets).

Initial studies also confirmed a wide range of colors between the bodies, ranging from neutral gray to intense red. In addition to Pluto, many other Kuiper objects are noteworthy, such as

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Quaoar, Makemake, Haumea, Orcus, and Eris (Figure 2). These are great bodies of the belt, and many of the largest objects in the region have their own moons.

IV – In a place far from the belt of Edgeworth-Kuipier there is a new planet.

Astronomers discovered in 2015 another planetoid in the Edgeworth-Kuipier Belt, and was renamed the 2015 RR245 (figure 3), the new world is much more distant than Pluto and orbits the sun in a period of once every 700 years terrestrial (Pluto completes one revolution around the sun every 248 terrestrial years).

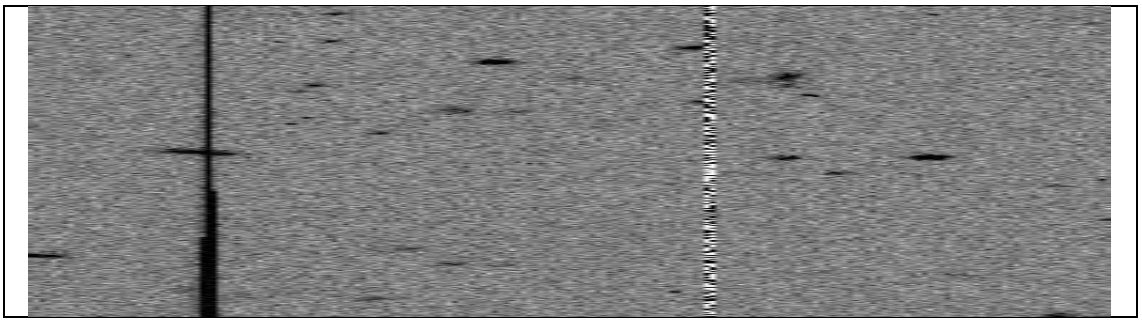

Figure 3: Images of the planetoid discovery showing the object in the sky over a three hour exposure. (ROMANZOTI 2016).

The team of astronomers first noticed the object in February 2015 in images made by a telescope in Hawaii. The exact size of the RR245 2015 object is not yet known, but the researchers believe it is about 700 kilometers in diameter. Pluto is the largest planetoid of the Edgeworth-Kuipier Belt, and has a diameter of 2,371 kilometers.

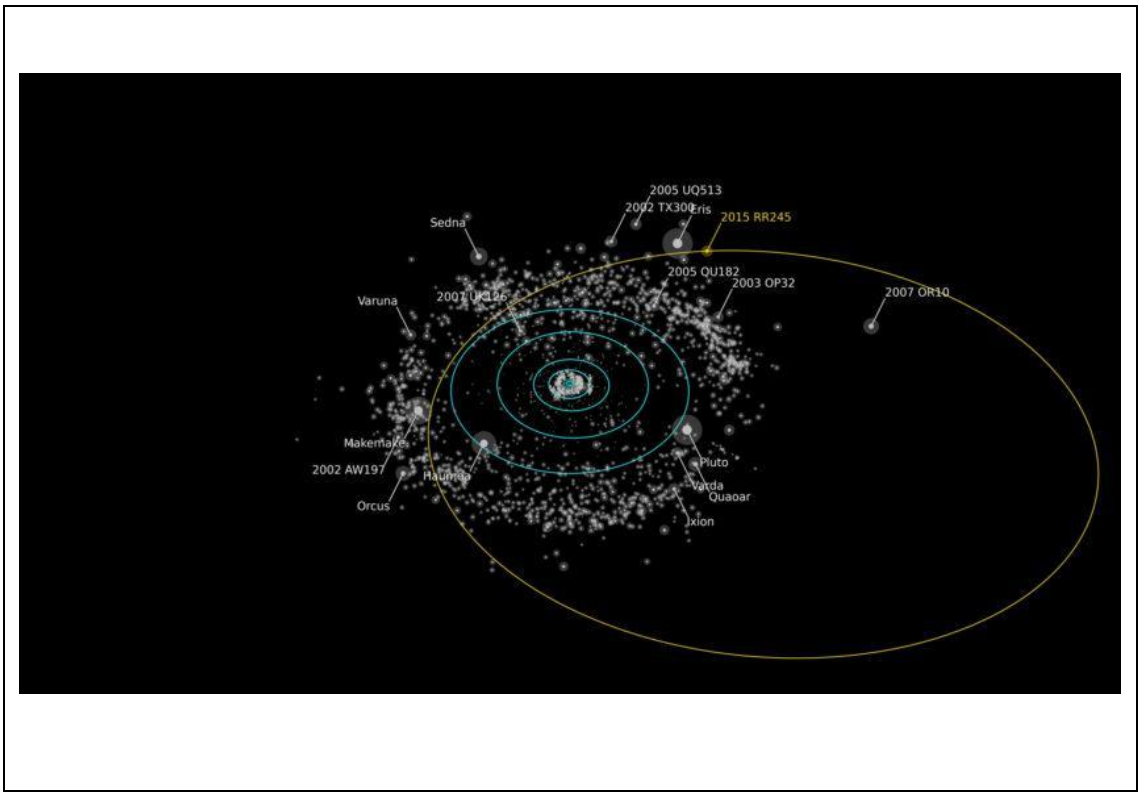

Figure 4: The orange line represents the orbit of the new planetoid (dwarf planet) (ROMANZOTI 2016).

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The 2015 RR245 object was identified as part of the "Outer Solar System Origins Survey" (BONES). This group has already discovered more than 500 objects beyond the orbit of Neptune, but 2015 RR245 is the first planetoid (dwarf planet) that the research identifies.

Studies and modeling still in progress show the details of the highly elliptical orbit of the RR245 2015 (figure 4), but the object seems to get as close to the sun as 34 astronomical units (AU), and as far as 120 AU. It is understood as a UA the average distance between Earth and Sun, which is equivalent to about 150 million kilometers. It is predicted that it will make its closest approach to the sun in 2096.

It is possible that in the future the 2015 RR245 object will have a less complex official name at some point.

V – New Horizons probe: A closer look.

On January 19, 2006, NASA launched the New Horizons spacecraft to study Pluto, its moons, and one or two other objects from the Edgeworth-Kuipier Belt.
As of January 15, 2015, the spacecraft began to approach the dwarf planet, and made a fluttering flight for it on July 14, 2015. From this approach several images were obtained and are still study material.

VI - Conclusions

It is possible to conclude after the exposed and discussed panorama that more and more of the detailed information possible is necessary, because in this belt instead of being created bigger bodies, the objects of the region are undergoing a continuous process of collision, and thus slowly dismantling and turning into powder. It is likely that in the next hundred million years, the Edgeworth-Kuipier Belt ceased to exist.

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