Uranus: Outer Space - The Cost of Scientific Progression

Humanity's interest in the skies has been universal and enduring. Mankind has always been driven to explore the unknown, discover new worlds, pushing the boundaries of our scientific and technical limits. The desire to explore and push the boundaries of what we know and where we have been has provided benefits to our society for centuries, and continues to advance throughout the future, but at what cost?

In the 1980s a space fleet named Voyager 2 made the first detailed viewing of the planets Uranus (flyby Jan. 24, 1986) and Neptune (flyby Aug. 25, 1989) as seen in Figure 1 [1]. Voyager 2 made new discoveries of the two “ice giant” planets, finding that Uranus has 10 new moons and two new rings, at Neptune Voyager 2 discovered five moons, four rings and what is known as a “Great Dark Spot”. This mission came at a cost of $895 million USD.

Figure 1 Solar system showing all the planets including the 'ice giants' Uranus and Neptune [2]

The term “ice giants” reflects that, by mass, they are predominantly made of water and other so called 'ices' such as methane and ammonia. These planets were likely in a solid (ice) phase during the early stages of solar system formation. Today, however, virtually all of the water in an ice giant is thought to be in fluid phases (figure 2) [3]. The ice giants are the least understood of the three planetary types found in our solar system [4]. With the other two types being the terrestrial planets (such as the Earth), are almost entirely made of rocky material. The gas giants, Jupiter and Saturn, are predominantly made of hydrogen and helium. Although both deemed “ice giants” the two planets are completely different

Since Voyager 2 not much has been discovered about the two “ice giants”, in 2024 - 2037 [5] a new mission is going to take off to discover more. However, there is disagreement on which planet is more important and will benefit the most with a mission to visit.

In 2012 the United Kingdom submitted to the European Space Agency (ESA) a mission to the planet Uranus (reaching the orbit of Uranus in 2037) [6], this mission would consist of a flyby of Uranus taking photos, scanning the planet and measuring temperatures and radio waves. This information would allow for the exploration of the origins and evolution of the “ice giants”, this would come at a cost of €470 million EUR.

In 2009 a mission to Neptune was discussed by NASA. However the mission eventually was scraped, according to “NASA's 2010 budget, funding to missions to the outer Solar System was aimed at the future Jupiter System Missions. The remaining budget was allocated to ongoing undertakings such as Cassini-Huygens, Juno and New Horizons, with the Neptune system not being part of any official considerations”. [7] This mission itself would cost around $300 Million USD. [8] Until 2015 Neptune was not discussed again by NASA as a possible mission.

Comparing the two missions to each other it is clear that the Neptune mission would have been the cheapest, however, these two planets although both considered “ice giants” they are remarkably different. Therefore visiting one planet would not necessarily give any information about the other planet. In 2015 a joint mission to visit both planets was suggested to NASA.

This would consist of a two-spacecraft, two-planet mission and would cost $2.5 – $3.6B USD [9], this mission would visit both planets gathering data.

Like stated previously, these two planets although both considered “ice giants” they are remarkably different so to send a mission to both planets it would benefit the scientific field equally, is the $2 billion USD price tag worth it though? We won’t find out until the data is collected from this mission.