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**ASSIGN  
BUSTER**

SC/NATS1530M3. 0 Winter 2018 Science of Space Flight & Exploration

(Blended) MISSION REVIEW MISSION INFORMATION Space agency:

NASA (National Aeronautics and Space Administration) Mission name:

Europa Clipper Target: One of Jupiter's moons, Europa Proposed launch year:

2020's MISSION SUMMARY (350-400 words) The Europa Clipper mission plans

to send a vessel carrying nine scientific instruments into a wide orbit of the planet Jupiter in order to study one of Jupiter's nine moons, Europa. In 2013, scientists observed what is thought to be water vapour pluming from the moon out into space, leading them to believe that this moon could be currently geologically active.

1 The goal of the mission is to investigate whether these theories are true by performing close flybys of Europa, gathering and recording information on the far-off moon that is thought to have liquid water hidden beneath its icy shell.

1 The necessity for these flybys (as opposed to orbiting the moon itself) comes from the radiation emanating from Jupiter that surrounds Europa. If the orbiter were to orbit Europa instead of Jupiter, it would get "fried" by the high radiation levels.

3 This flyby method will allow the vessel to gain large quantities of information over the course of several years. One of the goals of the Europa Clipper is to attempt to fly the orbiter through the "plumes" of water vapour that were observed from the Hubble Space Telescope, and to test the properties of the particles it flies through. 3 The initial plan is to perform forty to forty-five flybys of Europa, getting as close as 25 kilometres and flying by as far as 2700 kilometres away from Europa's surface.

2 During these flybys, the Europa Clipper will take photos of the moon's surface with high-resolution cameras, use an ice-penetrating radar to determine how thick the ice is on the surface and use instruments to determine the strength and direction of Europa's magnetic field. 2 The mission also plans to measure the gravity on Europa which will help scientists confirm definitively that there is a liquid water ocean underneath its icy shell. Measuring the strength and direction of the magnetic field will help scientists know not only how deep the ocean is but also how much salt is in it. 2 The various instruments will work in tandem to paint a clearer picture of Europa, greatly helping scientists consider future missions to Europa and providing them with important information about this possibly geologically active moon that has the potential to be applied to missions outside of our solar system.

MISSION JUSTIFICATION (300-350 words) The Europa Clipper mission is in line with our organization's goals because it intends to investigate whether Europa has the conditions necessary to support life and to find out what natural resources (potentially water) could be available to us in the future.

2 Water is the main ingredient for life, whether that life is plant or animal; everything needs water to survive. 4 That's why discovering whether Europa has liquid water on it is so important, determining whether there is water on a planetary body is absolutely necessary when looking at the potential for habitability. With the help of the Europa Clipper, we will have a firmer grasp of what's on Jupiter's moon and we will be able to apply what we learn up there to what we know about earth and its beginnings.

2 Investigating the atmosphere and gravity of this far-off moon will help us plan future missions to further understand Europa and its secrets. Knowing more about its gravity and magnetosphere are important pieces in planning possible lander missions to Europa, which will give us even more information about the habitability and natural resources of Europa. There is so much knowledge to be gained from this mission, for example, by flying the Europa Clipper through the plumes of possible water vapour, we will be able to test the composition of the particles and hypothesize with more accuracy what forms of life could be on Europa or that could be there in the future. Europa could even be currently supporting life.

3 Previous missions in the area have observed shifts in the moon's icy shell and water vapour being released into space which leads us to believe that there is volcanic activity under the ice; volcanic activity that could be providing nutrients to tiny organisms right now. 3 This volcanic activity paired with the immense amount of water that is believed to be beneath the surface is a very good indicator that Europa has the potential to support life... whether that's alien life or human life of the future remains to be seen.

SOURCES "Europa - In Depth | Planets." Edited by Phillips Davis, NASA, NASA, Accessed 22 Jan. 2018, [solarsystem.nasa.gov/planets/europa/indepth](https://solarsystem.nasa.gov/planets/europa/indepth) "Europa Clipper." Edited by Jon Nelson, Europa Clipper, NASA, Accessed 22 Jan.

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