EUROPA

Background Guide

SSI SIM

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- Contact your Faculty Advisor/Head Delegate to inform them of your request if you are a part of a delegation

AIDAN THOMPSON (HE/HIM)
DEPUTY SECRETARY-GENERAL

LETTER FROM THE DIRECTOR

Dear Delegates,

My name is Alison Chan and it is my honour to welcome you to SSICsim 2023! I am a second-year Computer Engineering student at the University of Toronto and this is my fifth year in the Model UN circuit. The dias and I are thrilled for you to join us on our journey hundreds of years into the future, where a world of ice and water awaits us!

Since its discovery in 1610 and its subsequent spacecraft flybys, Europa has been an object of speculation and of the cultural imagination. It is finally the year 2300, and in this alternate universe, after centuries of toil and research, humans have finally achieved their dream of stepping foot on the most famed of Jupiter's moons.

However, in addition to its precious resources - among which, an energy absorbing mineral - is our discovery of a race of mysterious, technologically advanced extraterrestrial beings.

To complicate matters, the quality of life on Earth has been in slow decline for decades due to overpopulation, pollution, and economic disparity. As a result, some on Earth see Europa as a last-ditch resource bank to save Earth in its dire state, while others caution about the dangers of facing an alien species.

Your current challenge demands wise collaboration and responsibility. As eminent scientists, CEOs, and world leaders, you have been invited by the UN to join the Europa United Strategic Initiative (EUSI) to discuss and execute your next steps. Will this be a precious opportunity or spell destructive consequences for humanity?

The fate of Earth and Europa lies in your hands.

Best of luck!

ALISON CHAN (SHE/HER)
DIRECTOR, EUROPA

INTRODUCTION

Office of the Secretary-General
United Nations
New York, NY

To the Members of the Europa United Strategic Initiative,

I extend to you my sincere gratitude for accepting your pivotal role as a member of the EUSI.

This year, we have discovered not just Europa's unique resources but also the existence of extraterrestrials on this moon. Having made such momentous discoveries, we must take our next steps with the current socioeconomic and environmental challenges in mind.

As well, the allure of our progress is tempered by the fact that these extraterrestrials have likely been present in our solar system for decades without revealing themselves.

Your expertise is indispensable as we navigate new territories in space and thought.

With hope and appreciation,
Secretary General
United Nations

DEFINITIONS

Astrobiology

What is humanity's future beyond Earth? To what extremes can life survive? Is there life in our solar system? Astrobiology, the study of life in the universe, attempts to answer these questions. It involves understanding the formation of, and the sustainability of life in different environments, as well as the environments that support it. One must have a thorough understanding of planetary interactions, stellar systems, as well as different astronomical phenomena. This field includes knowledge of biology, chemistry, astrophysics, and aeronautical engineering, among many other subjects.

Convection

Convection is the movement within a fluid caused by the tendency for the hotter and less dense portions of the fluid to rise, while cooler and dense portions sink.

Core

The core is the innermost layer of a planet. It can be entirely liquid, entirely solid, or both. For example, Earth has a core of Iron and Nickel, while Europa is speculated to have an iron core.

Crust

The crust is the outermost shell of a planet, made of solid rock and minerals. The crust is defined by its unique chemical makeup, and may be modified by processes such as erosion and impact cratering.

Hydrothermal Vents

Hydrothermal Vents are fissures along the ocean floor caused by the movement of the

planet's crust. As the crust moves, it stretches and breaks in places, causing cracks in the ocean floor. Seawater comes into contact with these cracks and becomes heated to high temperatures after being in contact with the mantle. As the newly heated seawater picks up minerals from the mantle, it is expelled out of vents. Thus, the heated seawater, carrying minerals, then rises through the ocean, enriching surrounding areas.

Mantle

Similar to the crust, the mantle is made of solid rock and minerals. However, it has soft areas where semi-solid magma emerges.

Moon

A moon is a celestial object which orbits a planet or another body that is not a star, such as dwarf planets or asteroids. Moons are usually formed at the same time as their primary body. When gravity pulls dust and gas into clumps of materials, a smaller clump of material may form around a larger clump, forming a moon. Other moons may be formed by asteroids, or debris caused by planetary collisions. For example, Europa is a moon of Jupiter, and Titan is a moon of Saturn. Moons can be made of ice, gas, and other chemicals depending on their formation.

HISTORY

4.5 Billion Years Ago: Europa is formed

Europa is speculated to have formed through leftover material from Jupiter's formation.

1610: Humans discover Europa

Italian astronomer Galileo Galilei discovered Europa, as well as several other moons of Jupiter.

1973-1974: Pioneer 10's Flyby

NASA's Pioneer 10 was the first spacecraft to fly by Jupiter and its moons, obtaining photos of Europa.

1995 - 2003: Galileo Spacecraft Missions

Through flybys of Jupiter, the spacecraft gathered more images of Europa as well as information about its magnetic field and evidence of its subsurface ocean.

2028: NASA's Clipper Mission

The NASA Clipper mission further investigates Europa, gathering information about its potential habitability, geology, and subsurface ocean.

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2070 Humans conduct on-surface robotic exploration

Due to advances in technology, humans conduct on-surface robotic missions to study

geological samples on Europa. They discover subterranean cavern-like structures as well as microbial fossils, as well as Caeruluxite, a fascinating mineral capable of storing energy.

2072: Microbial communities and biosignatures are discovered

Humans' robotic explorers detect complex organic molecules as well as sulfur and salt compounds on Europa. Scientists confirm the existence of microbial communities within Europa's subsurface ocean, leading to speculation of higher-level intelligent life forms.

2090: Humans detect an intelligent signal

Radio telescopes from Earth discover a signal from Europa. Upon further study, this signal contains intricate patterns and complex mathematics, causing an international interest in potential intelligent life.

2150: Development of manned spacecraft to Europa

Humanity begins to invest substantial resources to build a spacecraft capable of bringing humans to Europa. They plan to use an antimatter powered spacecraft and advanced shielding technologies to protect humans from harmful radiation in space.

2250: First Manned Mission: "Frontier"

Humans are finally able to send an international crew to Europa's surface in the Frontier mission. Beneath the moon's crust, they discover advanced technologies created by extraterrestrials who they named "Electrosynths". As well, they bring home more samples of native algae and minerals.

2251-Present: The Europa United Strategic Initiative (EUSI) forms

The discoveries on Europa have become an international phenomenon, causing governments, scientists, and corporations alike to vie for influence on the subject. Thus, a committee of world leaders and experts from various fields, the EUSI, is formed to plan and execute the next steps.

CONTEXT

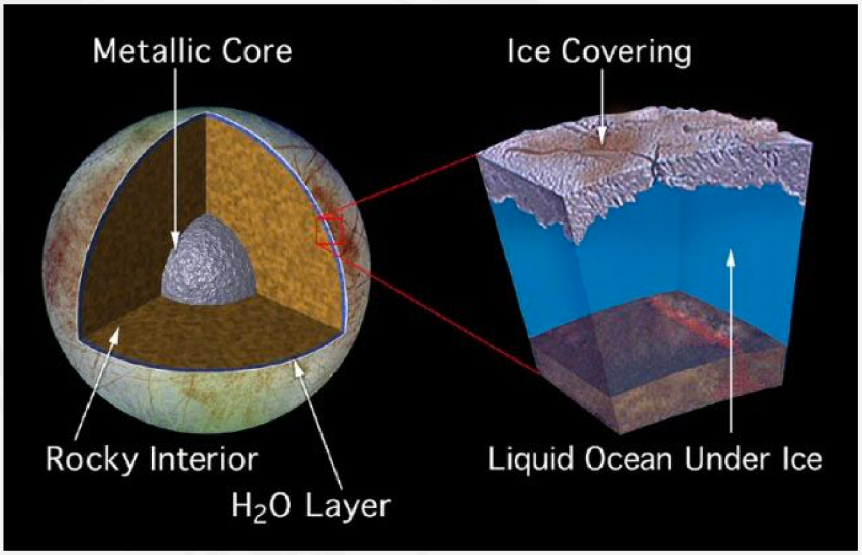
Europa

Size, Location, Orbit

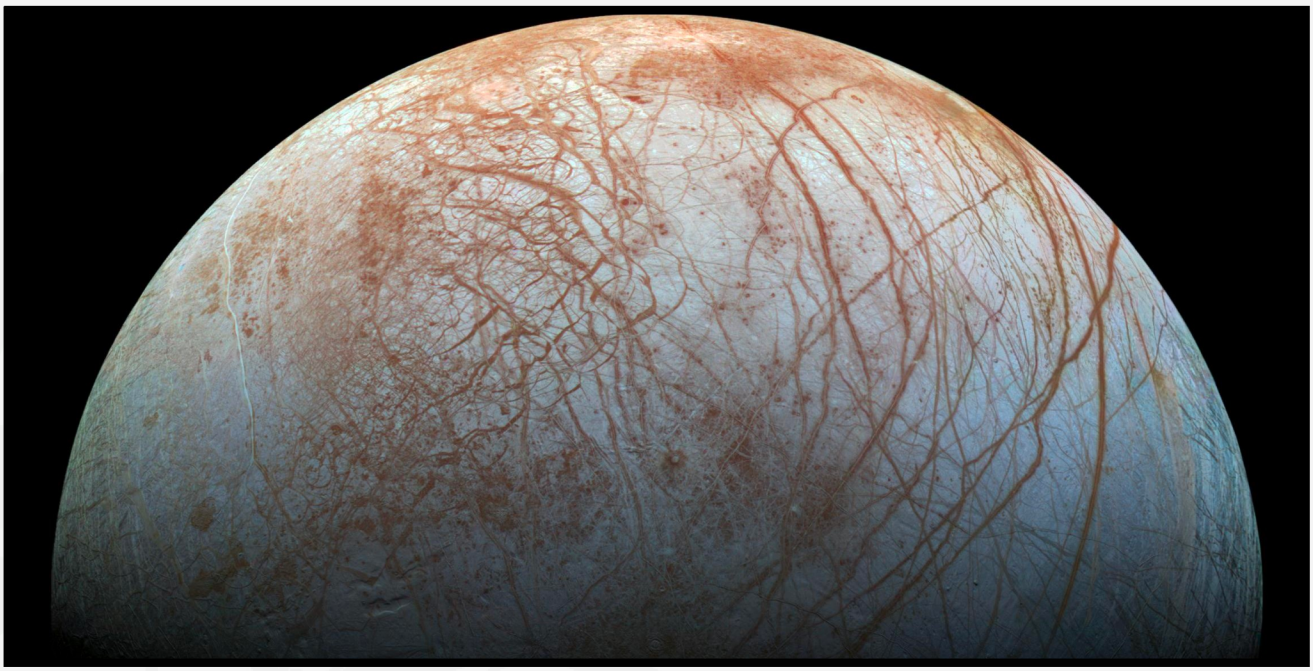
Europa, one of the 90 moons of Jupiter, lies approximately 5.2 AU (Astronomical Units) away from the Sun, where one AU is the distance from Earth the the sun. It is approximately 90% of the size of the Earth's moon and orbits Jupiter in an ellipse once every 3.5 Earth days. As it is locked by gravity to Jupiter, one side of the moon always faces the planet, thus inducing no seasons, unlike Earth.

Geography

Europa is composed of leftover material from Jupiter's creation. Currently, it is believed to have an iron core, rocky mantle, and a salty ocean about 60 to 150 kilometers beneath 15 to 25 kilometers of an icy shell. In addition, it contains a thin atmosphere of oxygen with traces of water vapor possibly from ocean water plumes spraying into space.



From space, its surface is crisscrossed with reddish brown marks believed to be sulfur and salt compounds mixed with ice. NASA flybys have discovered patterns of domes and pits, suggesting that Europa's icy surface is convecting, where cooler ice sinks and warmer ice rises, due to heat from below. In addition, Europa's surface consists of fractures thousands of kilometers long, some of which formed into ridges hundreds of meters tall.



A Mysterious Mineral

From Earth's robotic expedition to Europa in 2070, humans have obtained samples of the mineral Caeruluxite from Europa. Knowledge about this mineral was increased through large-scale harvesting efforts from the 2250 Frontier mission.

Caeruluxite

Caeruluxite is a unique mineral found on Europa with a blue, crystalline exterior. Formed under the harsh and icy conditions of the moon, it has been infused with many fascinating geological properties.

Properties: Caeruluxite is able to store and harness vast amounts of energy from various sources including sunlight, heat, and electric currents. In addition, it can charge itself naturally without external help or complex equipment.

Location: The mineral is located within the hydrothermal vents of the ocean and is disseminated throughout the ocean from these vents. Through oceanic convection, it rises to the surface of the ocean, on the underside of the ice crust. Next, it is either expelled through surface water plumes, or remains in underground water reservoirs.

How it works: Chemical compounds within the mineral allow it to store and release energy repeatedly. When exposed to a power source such as sunlight, the chemical reaction is triggered, and the energy storing process is initiated. When energy is needed, it can be extracted from the mineral by a device.

Potential: Human technological devices are able to harness its stored power and output its energy in different forms, for example, electricity energy. This could reform the transportation, agricultural, and power industry on Earth. With virtually limitless amounts of energy provided it surpasses traditional energy sources, such as fossil fuels, in orders of magnitude.

Europa's Found Flora and Fauna

Some of the most fascinating observations revealed from the Frontier mission were of Europa's flora and fauna, the most mysterious of which was the Electrosynths, a seemingly intelligent alien species.

Ice Algae

The algae consist of millions of single celled organisms which can merge and separate freely with fellow single celled organisms.

Abilities: This species possesses the ability to automatically assign themselves to specific roles based on the needs of the group, for example, reproduction, defense, or healing. In addition, it can regenerate and regrow its own cells with a fast reproductive rate.

Location: Ice Algae grows on the roots of the crystal spires, on the surface of the moon, near water plumes exposed to underwater sources, as well as under the crust of Europa,

exposed to the underground ocean. They have a symbiotic relationship with the crystal spires, absorbing caeruluxite for the benefit of powering the spires.

Potential: Humans are interested in the properties of Ice Algae and wish to grow them on Earth's surface. Ice Algae is biocompatible with human tissue and has the ability to assign itself to different functions of the human body. They could be used in the medical and cosmetic industry, as well as in stem cell research. In addition, given its ability to be differentiated into specific types of cells or tissues, this organism could be an aid in regenerative medicine and tissue engineering.

Crystal Spires

Crystal Spires are mysterious organisms which exist in the boundary between flora and fauna on Europa. They appear to be luminous, icelike spires about 60 meters tall, 2.5 meters in diameter, and with roots approximately 3 meters deep. Scientists are yet unsure of much of their purpose and properties.

Abilities: Crystal Spires emit a glow through energy absorbed from the Sun's radiation, and radiation from other celestial bodies.

Communication: They communicate by resonating harmonics through their crystalline structures, and are able to manipulate and re-direct energy flows.

Location: Crystal Spires are located throughout Europa, especially near surface water plumes and above underground reservoirs close to the surface. Due to its proximity to these caeruluxite-rich locations, Crystal Spires are theorized to be powered by the mineral.

Potential: Crystal spires contain Caeruluxite, and have a tendency to attract these minerals, as they help the spires maintain structural integrity. They may be a reliable source to harvest the mineral.

Electrosynths

Based on scant evidence from the expedition, Electrosynths are amphibious, seemingly

intelligent beings residing on Europa with potential advanced technology powered by energy-trapping Caeruluxite. Other than these observations, little is known about the Electrosynths.

Symbiosis between Flora and Fauna

The Ice Algae, Crystal Spires, and Electrosynths have a seemingly symbiotic relationship reliant on Caeruluxite. When Caeruluxite particles are disseminated throughout the ocean through currents, some particles are released to the surface ice through water plumes, or remain in underground reservoirs. Ice Algae, located on the roots of the Crystal Spires and near water plumes, help absorb the mineral for the benefit of the spires. The Electrosynths protect the spires and, in turn, harvest Caeruluxite from them, seemingly to power the Electrosynths' own technologies.

PRESENT ISSUES

Earth's Environment

With the development of the new and shining technologies of the past centuries comes a steep price. Given the virtually unchecked use of fossil fuel and increases in industrial activities, the once clear skies of Earth have been blanketed by constant smog. To make issues worse, diseases have become rampant due to the severe air and water pollution. Extreme weather events such as hurricanes and shifting weather patterns have wreaked havoc on infrastructure and have affected global food distribution systems. With rising temperatures, several major coastal cities and island nations have been severely threatened.

Socio-Economic Issues

With rising sea levels, citizens of coastal communities have been forced to move inland, causing mass migrations and resource conflicts. The desertification of formerly fertile lands as well as extreme weather events have disrupted supply chains, hampering global trade and creating economic upheaval. With such land and trade disputes, economic disparities have widened, with the wealthy elite controlling the dwindling resources and marginalized populations bearing the brunt of the economic repercussions.

Current Technology

The development of inter-solar system spaceflight technology has allowed manned missions to Europa. Currently, humans use antimatter powered spacecraft to journey to Europa, which are powered through the collision of antimatter and matter. During the journey, the crew is able to experience 1g acceleration to simulate Earth-like gravity, in addition to life support systems using recycled air, water, and nutrients. With current technologies, a journey to Europa would take about 9 months. In addition, humans are

dcapable of creating habitats or “bases” with advanced life-support systems using recyclable technologies and 3D printers capable of using minerals found on Europa.

Earth Citizens

As news of the discovery of Electrosynths spread on Earth, humanity has split into two major factions: the Collaborators who want humanity to cooperate with aliens, and the Moonkeepers who want humanity to have complete control over the moon.

The Collaborators

With the decline of Earth's economic situation and the untouched state of Europa in mind, this faction believes that humanity should cooperate with the extraterrestrials. Currently, they believe that Earth’s technology is not up to par with the demands of the potential danger the aliens pose. Thus they believe that, in engaging in diplomacy with aliens, humanity will glean new knowledge of the solar system and Europa as well as gain new technologies. This faction consists of scientists, conservationists and environmentalists who wish to preserve Europa’s ecosystem and minimize human impact there while learning what they can about the moon.

The Moonkeepers

Upon the discovery of useful materials such as Caeruluxite and Ice Algae on Europa, this faction formed as many believed that using Europa as a resource bank could solve most of humanity’s most pressing issues. However, given the extraterrestrial presence on Europa, this faction believes that conquering the extraterrestrials may be necessary. This faction asserts humanity’s self reliance, security, and independent technological development. The Moonkeepers consist of military leaders and strategists responsible for executing potential strategies to control and stabilize Europa. As well, it contains corporations hoping to monopolize Europa’s resources for financial gain and national governments aiming to secure geopolitical influence by controlling Europa.

STATE OF AFFAIRS

In the year 2250, humanity invested decades of hopes, finances, and resources into the Frontier mission to Europa, and their triumphant return home came with a significant caveat. Since their return, their perception of solitude within the solar system has shifted dramatically, sending Earth into a state of turmoil as it grapples with deciding its next steps.

Our current predicament traces its roots back centuries. Long before the year 2000, humans had been burning fossil fuels, resulting in an exponential increase in greenhouse gasses in our atmosphere after years of relentless use. By 2250, this issue had escalated to a point of no return. In addition, the destruction of once-arable land and the subsequent displacement of people have led to economic disparities and disruptions in the supply chain.

A glimmer of hope emerged in the form of the Pioneer flyby mission in 2070. It revealed the presence of Caeruluxite, a remarkable energy-absorbing mineral tantalizingly close to our grasp, offering a potential solution to our energy problems. However, Earth's technology at that time was insufficient for harvesting large quantities of Caeruluxite. It wasn't until 2250 that humanity embarked on the Frontier mission to address this challenge.

Humanity was impressed by the great potential of Caerulixite in conjunction with their ability to harvest it in large quantities. Furthermore the discovery of Ice Algae, an organism capable of regenerating into different cell types, promised innovations in medicine.

However, these newfound benefits came with a significant drawback—the discovery of an extraterrestrial species on Europa, dubbed Electrosynths. These beings have been seen harvesting large amounts of Caeruluxite, seemingly for powering their own technology. This revelation raised concerns about potential conflicts of interest and interactions between the two species.

In response, the Frontier mission team chose to depart Europa, leaving no one behind but securing substantial samples of Caeruluxite and Ice Algae. As this discovery spread globally, humanity faced the prospect of a future conflict with the Electrosynths, with no established mode of communication or clear understanding of their interests.

Simultaneously, concerns loomed regarding Earth's environmental and economic challenges, with Europa's resources potentially serving as a last-ditch lifeline for humanity. This division led to the emergence of two opposing factions: the Moonkeepers and the Collaborators. Political tensions escalated as they debated whether to assert full control over the moon and its resources or to collaborate with the Electrosynths.

In the midst of these pressing issues, a group comprising leading scientists, diplomats, business leaders, and others formed the Europa United Strategic Initiative (EUSI). Their mission was to plan humanity's next steps, with the overarching goal of prioritizing humanity's needs.

Each EUSI member brought their unique objectives to the table. Balancing their diverse goals, which ranged from land stewardship to resource exploitation, became even more challenging due to the conflicting interests of the Moonkeepers and the Collaborators.

Among the many critical issues at hand, one stood out—the need for Earth to establish communication with the Electrosynths. Currently, EUSI delegates possessed only rudimentary knowledge of the Electrosynths' communication methods and cognitive capabilities. Understanding Electrosynth culture was crucial to minimize misunderstandings and prevent unintentional conflicts. As Earth faced potential threats from the presence of the Electrosynths, a delicate balance had to be struck between exploratory pursuits and essential security measures.

This situation was further complicated by the puzzling fact that the Electrosynths had seemingly coexisted with Earth unnoticed until now. Had they lacked the technology to discover our existence, or did they choose to remain undetectable out of fear of Earth posing a threat to their civilization?

Another pressing concern centered on the absence of regulations for interspace politics and sustainable resource harvesting. These challenges were exacerbated by differences in international opinions, forcing delegates to navigate the complex task of balancing exploration and exploitation while extracting resources from Europa. These complexities were compounded by the conflicting goals of Earth's various factions and individual interests.

In terms of spaceflight capabilities, Earth has the technology to create manned antimatter ships and probes. However, the timing and decision to establish bases on Europa were left in the hands of EUSI delegates. Currently, all members of EUSI are located on Earth, though delegates harbor the power to arrange spaceflight missions to Europa.

Should we communicate and how? With this question and these serious matters in mind, the delegates of the EUSI mark the beginning of their inaugural conference.

GUIDING QUESTIONS

Should humanity take full control of the moon's resources or collaborate with the extraterrestrials: which option will yield a greater risk and/or reward?

What are the potential risks associated with associating with this alien civilization?

What are the long term consequences of our actions moving forward towards both Earth and Europa?

Is there a solution where we can address the concerns and interests of all factions? If so, how?

What diplomatic or communication strategies can we use to effectively interact with these extraterrestrials?

What are some reasons why these extraterrestrials have chosen to remain hidden from humanity?

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