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Research & Development Proposal of OCEAN LAND (Ocean Station)

Ocean Republic Research Institute

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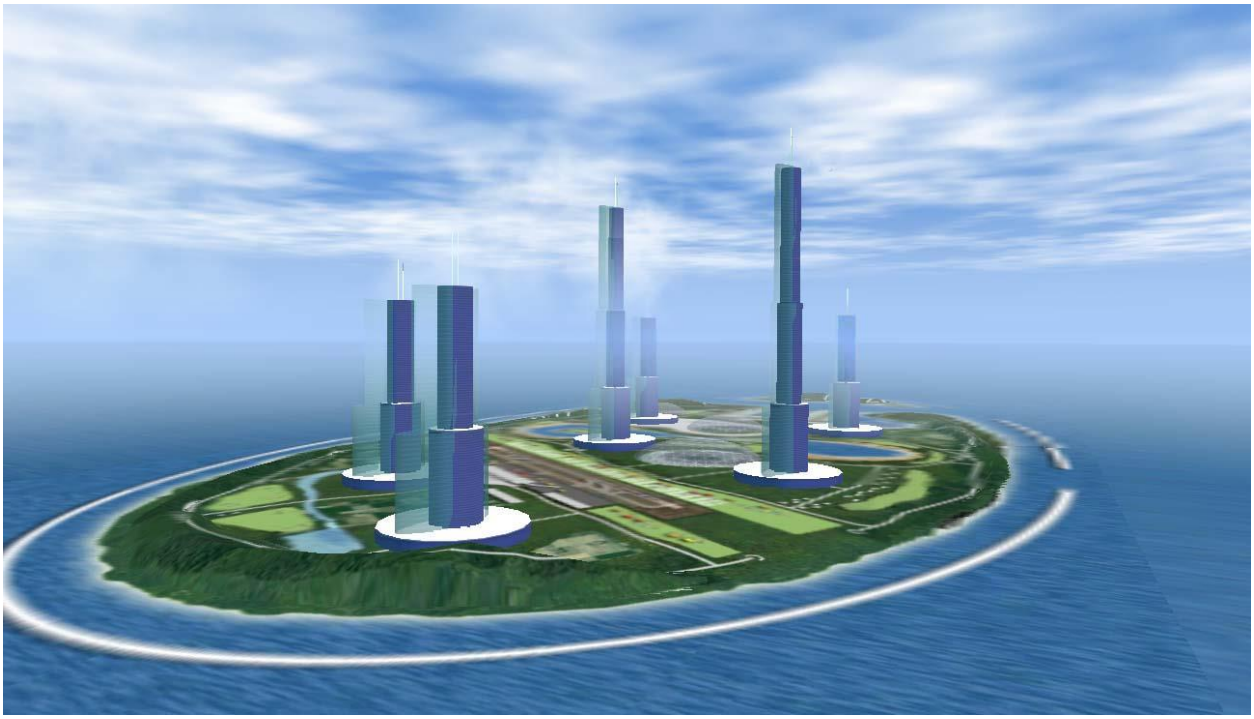
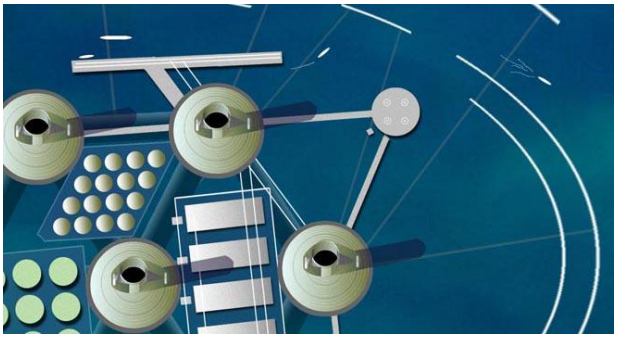
20220601





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1. Preface

In these days to marine resources much attention is increasing. It becomes more difficult to import or export resources, by the political and economic strategic relations between resource rich countries and resource poor countries. As for the rare earth elements or the the rare metal which will support science, engineering in the future, the fact is know that there is maldistribution in such as China. All the world countries make efforts in the exploration of the resources of an own country in the land and the developing countries. In addition, the exploration leaves the land and goes to the ocean now. In recent years there were such the resources of rare earth elements or the rare metal in the bottom of the Japanese sea near the shore abundantly in particular. In addition, the fossil fuel resources such as methane hydrate are discovered a lot in the Japanese sea near the shore, too. Besides, technology receives international attention that carbon dioxide which is told to be one of the causes of the global warming, be poured into the bottom of the deep sea.

It is important how you can build the base to be active in the ocean in the future. On the other hand, in recent years the big project that is going to make a big structure in the ocean is suggested in various organization. Such as "Green Float" of Shimizu Corporation or American Seasteading. In these days, various development is undergoing, being expected that a lot of changes would make useful for the future human life, distribution and production by constructing huge structure on the ocean. Here is the importance of the OCEAN LAND Project.

Fig.1-1 Green Float from the website of Shimizu Corporation

Fig.1-2 Seasteading from the website

2. Summary

“OCEAN LAND” is based on “Ocean Republic” which is published on the magazine of “Fune no Kagaku”(Ship Engineering) of March 1992 (Vol.45). “Ocean Republic” mentions not only a technological issue but also the political or economic issue. “OCEAN LAND” is the research and development project focuses on the technical scientific side.

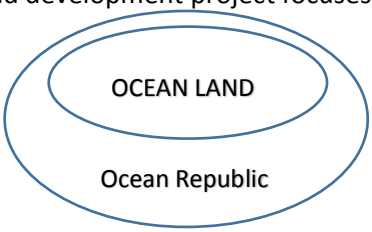


Fig. 2-1

Please access following site about “Ocean Republic”
http://oceanrepublic.org

“OCEAN LAND” is all of the terms which are technologies, operations and engineering about the mega float which is built from a few hundred meters length to a few kilo meters length on the ocean.

1) Global Ocean Current And Mega Float

The movement of ocean current on the earth is known to have complicated movement, but it is largely moving clockwise in the northern hemisphere and counterclockwise around the southern hemisphere. If you build a large float (mega float) on the ocean, that float can go around the ocean clockwise in the northern hemisphere and counterclockwise in the southern hemisphere. The mega float can be used for a variety of purposes.

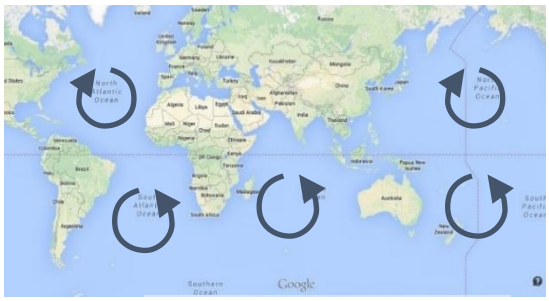


Fig.2-2 Ocean Current (On the Google Map）

2) Lift Force Generator

However, as it is, there is a possibility that the mega float will enter a watershed area where typhoons and hurricanes are occurring, raise it to a shallow area, or collide with the continent. So we will construct multiple structures that will act as "sails" on the mega float. By the force generated by the structure that plays the role of the sail, the mega float can move freely offshore. This will enable you to avoid typhoons and hurricanes' blowing waters and shallows. By obtaining this “Lift Force Generator”*) equivalent to the sail, this mega float no longer needs to go around the ocean.

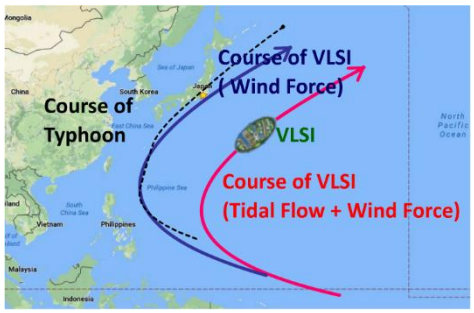


Fig.2-3 Typhoons and Mega Float Course
VLSI = Mega Float

By arranging many structures in the height direction on a huge float, and by using the wind on the ocean, lift force like a sail will be generated. This lift force allows the float to move offshore with some flexibility. The structure as a high-rise buildings can be used as a residential space, an office space, a plant factory, a fish farm, etc.

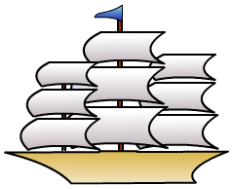


Fig.2-4 Sail Ship

Briefly, this float comes out in the OCEAN LAND has nothing different in principle from a sailing ship moving on the ocean using the wind from the beginning of BC. Float body plays a role of ship, lift generating device like high-rise buildings plays a role of sail.

*) In this proposal, it is expressed as "lift" instead of "thrust". This is because textbook such as a sailing yacht, many people describe it as "lift."

3) Atmospheric Flow And Mega Float

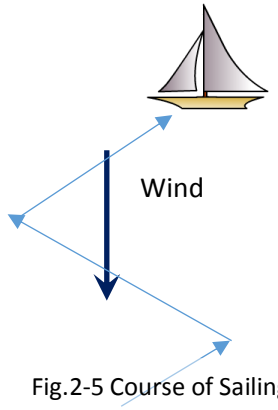


Fig.2-5 Course of Sailing Yacht

Under the technology of present, sailing yachts with advanced hydrodynamic performance can move upwind at an angle of about 45 degrees against the headwind. If the sailing yacht moves in the windward direction, it goes upwind by tacking the direction by 45 degrees at a time. When moving in the other direction, you can move by moderately changing the angle of the sail and the rudder of the ship. It is not able to be told how much a mega float like OCEAN LAND can go upwind unless we do experiment and research. However, it was possible for the sailing boat of the great voyage age to move 90 degrees against the windward direction though it could not go upwind. The ship at that time moved the ocean watching the wind direction and supported the maritime trade in the discovery of the Americas and during the great voyage.

4) About Mooring Of The Mega Float

Can't we moor and fix such a mega float on the ocean? Of course, if the mega float is close to the land you can fix the mega float to the quay or the bottom sinker with ropes, wires, chains etc. However, if the wind blows strongly due to a storm or the tide becomes strong due to a storm surge or the like, a great force is added to the rope, the wire, the chain, and the possibility of breakage comes out. Moreover, it is difficult to moor and fix it at that position no matter if it is several thousand meters in depth and hundreds of kilometers or thousands of kilometers away from the land. The mooring line becomes too long, there is a problem such as large tidal power is applied, the weight of the chain etc. becomes large and the buoyancy becomes small.

5) Dynamic Positioning

There are also ways to stop at the same position on the ocean using equipment such as propellers (dynamic positioning), but a lot of fuel and energy is needed to make mega float stay.

3. Application Of OCEAN LAND

So, what kind of things will benefit us for humanity by building such a mega float on the ocean?

1) Ocean Air Port, Ocean Port (Hub)

When traveling a long distance offshore by airplane, you have to stack more fuel on board. Therefore, it is possible to use OCEAN LAND as a mid-point (hub) offshore in the middle of transportation as an airport. I will call this Ocean Airport for convenience. If you can refuel with Ocean Airport in the middle of long journey, you do not have to load more fuel on your

flight when you leave and you can increase the load relatively. If fuel is supplied to the Ocean Airport from a nearby undersea oilfield, the overall efficiency further increases.

Also, as for cargo ships going between harbors and ports between continents, if there is a place (ocean port) where loads can be transferred to the ocean on the way, once anchored at the ocean port, you can distribute cargo to the ground, freedom is given to the pattern of transport for exporters and importers of cargo. We can make major changes to global logistics and transport cargo faster and cheaper.

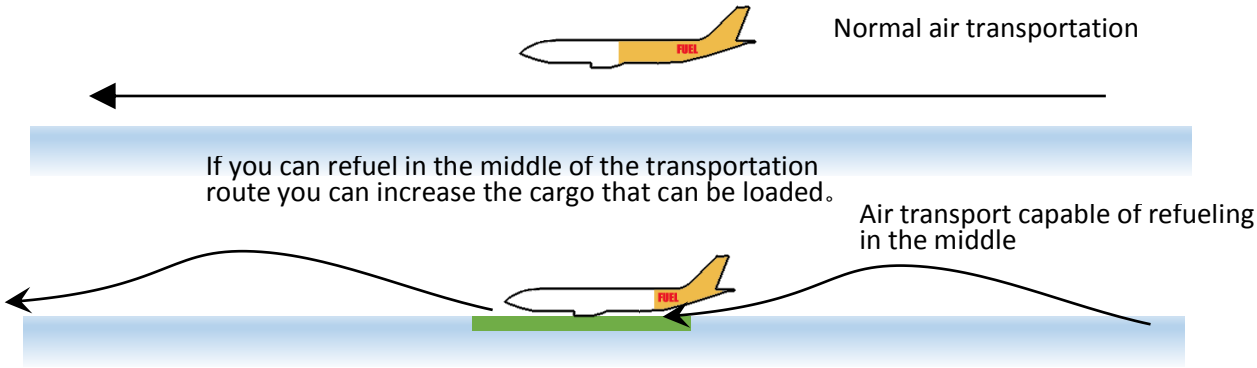


Fig.3-1 Long Distance Aircraft Transportation and Fuel

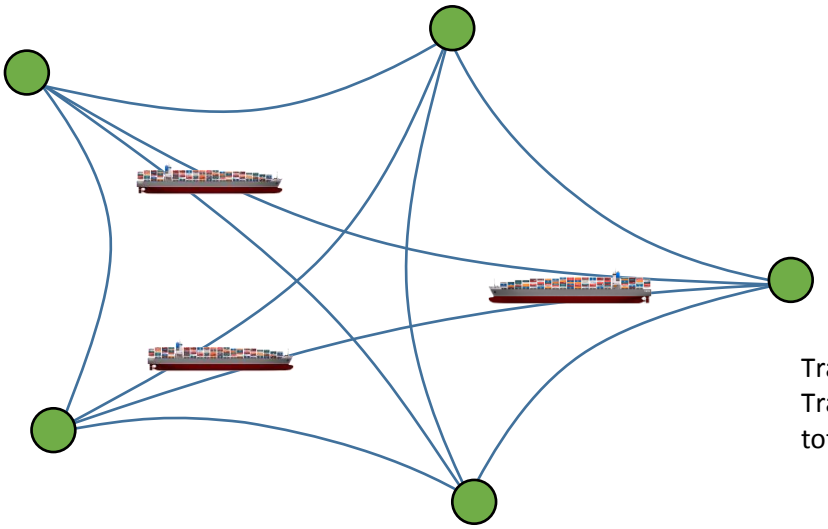
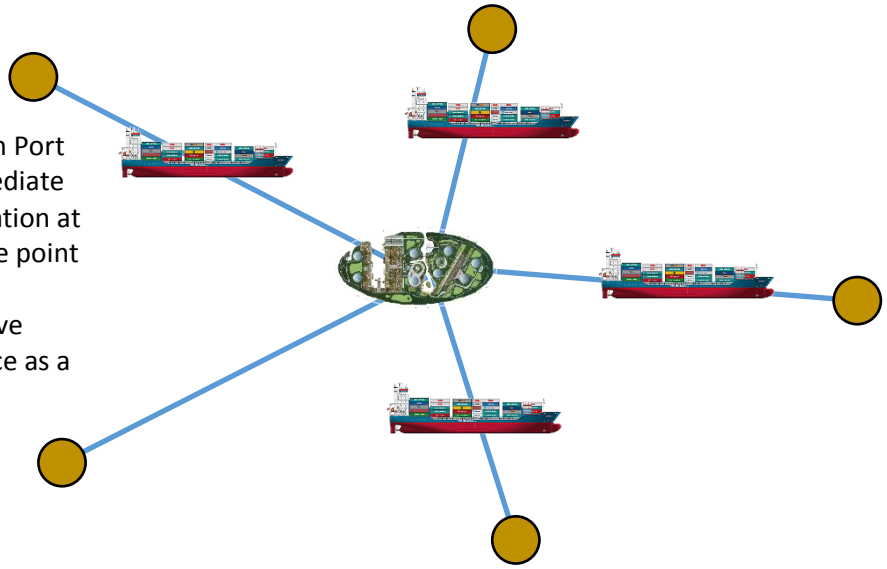


Fig.3-2

Transport from normal port to port. Transportation costs will increase as a total.

Transportation when the Ocean Port is at the transportation intermediate point. By integrating transportation at the transportation intermediate point and optimizing transshipment transfers it is possible to improve transportation cost performance as a total.

Fig.3-3



Specifically, for example, we could arrange this OCEAN LAND in the North Pacific, the North Atlantic, etc. and apply it as "Ocean Port". The North Pacific is connected to the North Atlantic and the Arctic Ocean, it is currently only around two months in the summer, it is known that the Arctic Ocean ice melts so that a general cargo ship can navigate. Passing from Asia to Malacca Strait, through the Suez Canal, to the Mediterranean, to the European route, the route leading from Asia to the Europe through the Bering Strait is now drawing much attention. It is expected to shorten the number of shipping days due to shorter route and to reduce fuel. Therefore we will place this OCEAN LAND in the North Pacific and the North Atlantic Ocean and operate as an Ocean Port. We will consolidate cargo from Asia and Oceania once into this Ocean Port, where it will be transferred to a cargo ship dedicated to the Arctic Ocean, which can navigate the Arctic Ocean, and will transport cargo to the Europe through the Arctic Ocean. It is currently two months in summer, but it is expected to be operated for a longer period of time in accordance with changes in the global environment. Moreover, if the ship type of a special Arctic navigable cargo ship is developed, it is possible to further extend the operation period.

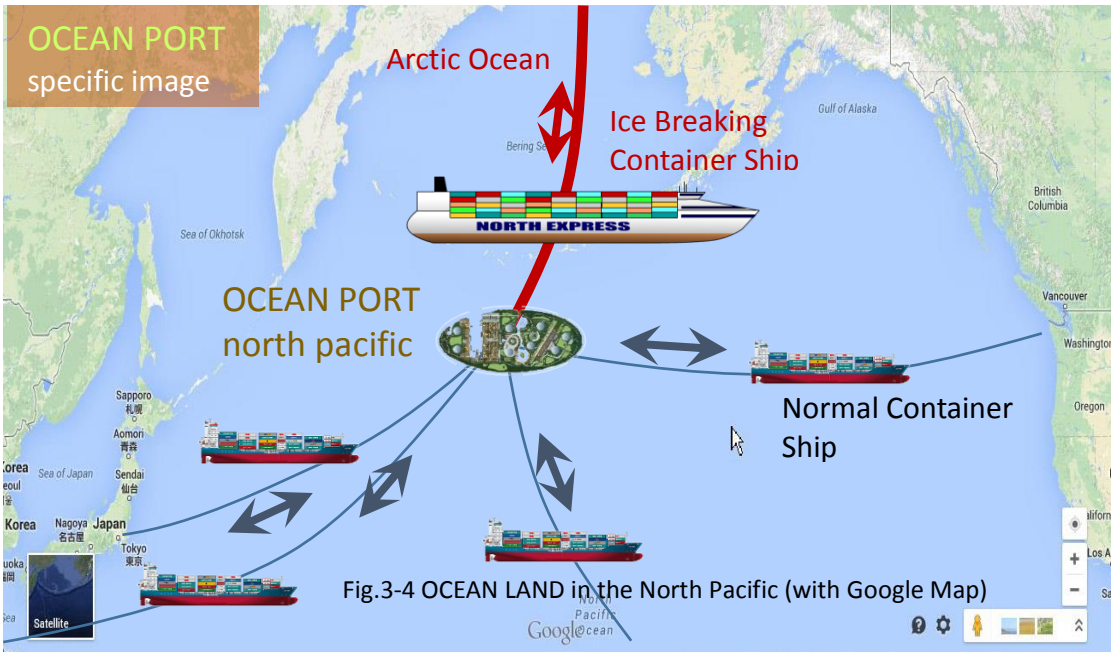


Fig.3-4 OCEAN LAND in the North Pacific (with Google Map)

Also, there is the way of an ocean port as a shipping port that can unload resources in undeveloped areas such as Africa, South American continent, and even Antarctica. For example, in Antarctica and elsewhere, even if resources useful for mankind are found, it can be said that it is very difficult to build a shipping port on Antarctica. So, instead of creating a shipping port of full specification on the site, we will place an ocean port on the ocean a bit far away. And we carry cargo (resource) from the small shipping port of the continent to the ocean port of the ocean with a small boat. On the other hand, we can establish a facility capable of anchoring large cargo ships at the Ocean Port. Between the continent and the Ocean Port is a practical small ship and carries resources of the continent, refining or storing the mining resources on the ocean port, processing it into cargo and loading it on a large ship. Doing so eliminates the need to build large-scale harbor facilities etc. on the continent being developed. And if the resources of the continent are exhausted and it is no longer necessary to ship more cargo, you can move the ocean port itself and move to other required areas. Investment to create large-scale port facilities on the continent from the beginning will not be needed.

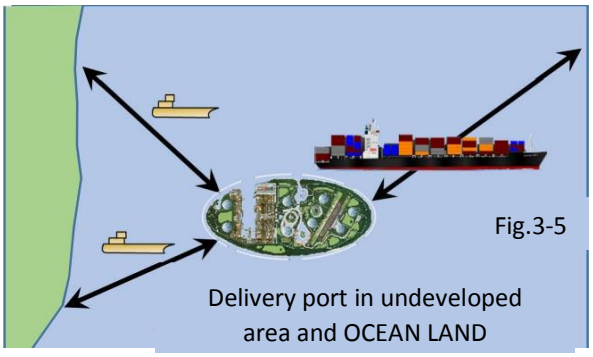


Fig.3-5
Delivery port in undeveloped area and OCEAN LAND

2) Ocean City As Resource Exploration

To the next, the most promising use is OCEAN LAND as a backward support city "Ocean City" for mining and exploration of marine resources. In the future, if resources such as rare metals, rare earths, methane hydrate, etc. of the seafloor are to be mined, it may be necessary to refine or stockpile them on the sea. This Ocean City can be operated as a city with the purpose of backward support of submarine mines and mining bases. There, it is possible to form a big city where not only those who work at submarine mines and mining bases, but also people related to that project, people related to any institution / company and their families live. In order to support the life of the city and people living there, it is also possible to develop industries such as aquaculture, agriculture, commerce and tourism on the ocean city. This Ocean City is operated so that the lift force generator (LFG) works efficiently so that it goes back and forth between the limited seas of the mining site.

Fig.3-6 Ocean City

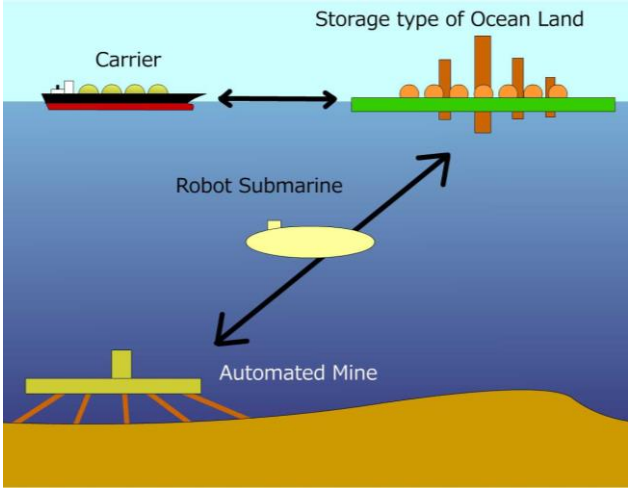


Fig.3-7 OCEAN LAND as a storage

Fig.3-8 OCEAN LAND as Resource Exploration (Submergible Style)

3) OCEAN LAND As A Space Port

Furthermore, there is a simple use as an ocean city as an offshore living space. Recently, various ideas for setting up a living space on the ocean are being announced. There are Green Float of Shimizu Corporation and the Seasteading plan to create a living space in the US offshore. (previous cited) Although each purpose is different, there is a point of agreement in seeking living space on the ocean.
Marine structures appearing at Green float and Seasteading are very difficult to move freely over the ocean. However, OCEAN LAND can be used as a living space on the ocean, and can also move by using the wind. It is possible to correct the movement of position by tidal current or wind etc.

4) Base For Space (Orbital Elevator)

In the future, the idea which not using a rocket to get into outer space, but using a vehicle that climbs a strong wire to the geostationary orbit(GSO) of the earth with a device called an “Space Elevator”. Hanging down a wire-like material from the geostationary orbit(GSO) of the earth to the nearby of the equator on the earth, so that we can go up from the earth to GSO or go down from GSO to the earth on the vehicle sliding on the wire like elevator. In the past, it was said that it was difficult to make such wires,

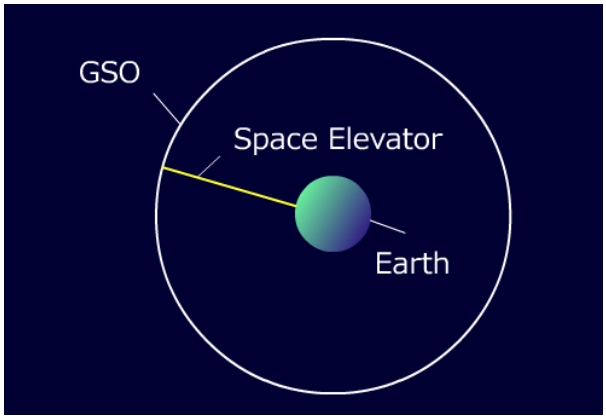


Fig.3-9 Space Elevator

Fig.3-10 OCEAN LAND for Space Elevator

but structural materials such as carbon nanotubes are said to be enough ideas even if there is still considerable room for development.
This space elevator is basically required to place its landing point on the equator on the earth. If according this theory it will be located only in limited places on the earth, such as the desert areas of Africa, and the outskirts of South America, or Singapore. However, if we use

OCEAN LAND as the terminal of the space elevator, you can set up this landing point offshore. In this case, the OCEAN LAND will move only within a certain range on the ocean.

It is said that it is more efficient to launch a satellite or space station near the equator of the earth in order to launch it into space orbit. You can use OCEANLAND as a launch vehicle for that.

5) OCEAN LAND As Disaster Countermeasures

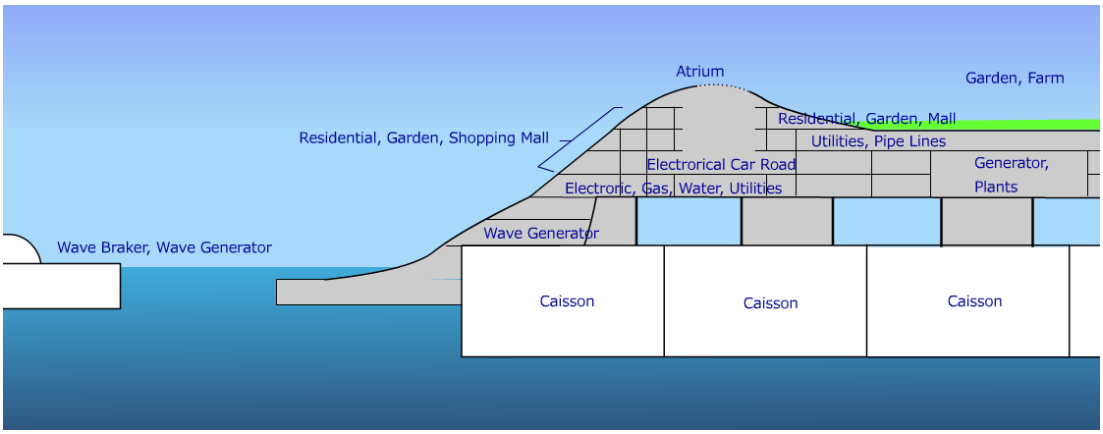
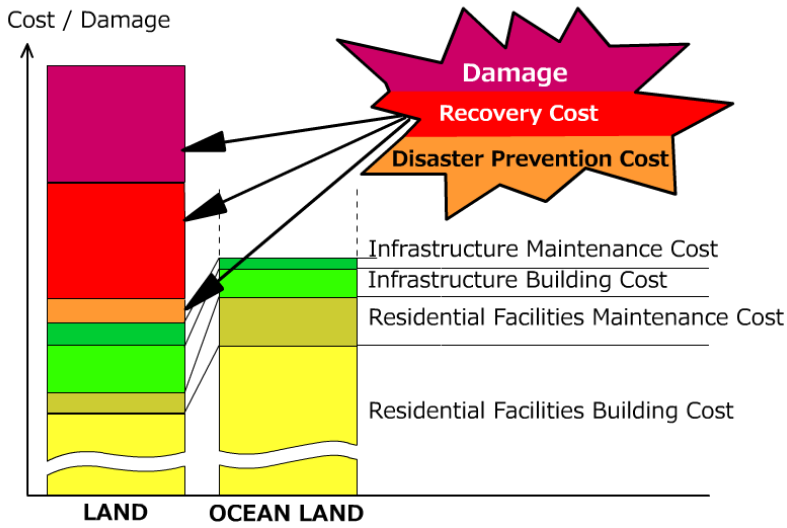


Fig.3-11 Structural section of an OCEAN LAND

Figure above shows structural section of an OCEAN LAND. OCEAN LAND is built having much space. Therefore, it is relatively easy to create a temporary housing facility if a large number of people have lost their place due to a disaster. In the future, many disasters due to abnormal weather may occur due to the effects of large earthquakes and global warming. In order to save many victims of such disasters, it is desirable to build houses on the ground. However, political or administrative procedures in each country have tendency of becoming complicated, and it will become difficult to provide housing immediately. On the other hand ,OCEAN LAND is structurally available, so it is possible to prepare such a residence relatively quickly.

The figure shows a comparison of costs for maintaining the living environment and damage at disaster on land and in the OCEAN LAND. OCEAN LAND is able to navigate the ocean freely, and disasters free. Therefore, there is no cost for disaster recovery or disaster prevention cost as shown at the top of the figure. They are not once at disaster. They are needed for every time at disasters. Japan has experienced major earthquakes such as the Great Hanshin-Awaji Earthquake and the Great East Japan Earthquake over the past 30 years, and in the near future, major damage is expected from the Tokyo metropolitan earthquake and the Nankai Trough earthquake. In recent years, many disasters have occurred not only in Japan but also around the world due to huge typhoons and hurricanes caused by changes in the global environment. Considering the cost of recovery to return to the previous state from the damage, OCEAN LAND is expected as an alternative living environment for humankind in the future.

Cost Comparison Of Living Environment Maintenance And Damage (Image)



Detail Of Related Cost Of Disaster And Damage

Damage	Damage To Agriculture, Forestry And Fisheries Damage To Industrial Products Production Equipment, Damage To Living Facilities
Recovery Cost	Removal of Debris Earth Sand,Garbage Disposal, Rebuild Of Houses,Repair Of Seawalls And Dikes, etc.
Disaster Prevention Cost	Snow Removal, Thinning, Dredging Of River Dam/ Sand Trap Dam/ Embankment Maintenance, etc.
Infrastracture Maintenance Cost	Wire/Gas Pipe/Water Pipe Replacement, etc.

Fig.3-12 Cost comparison for living environment maintenance

$$Cc = \frac{\text{For a certain year (tens to hundreds of years) per unit area Expenses for maintaining living environment}}{\text{Historical total population per unit area}}$$

$$Cc_{(Suburbs)} > Cc_{(City)} > Cc_{(OCEAN\ LAND)}$$

Fig.3-13 Between OCEAN LAND and LAND cost comparison formula for living environment maintenance

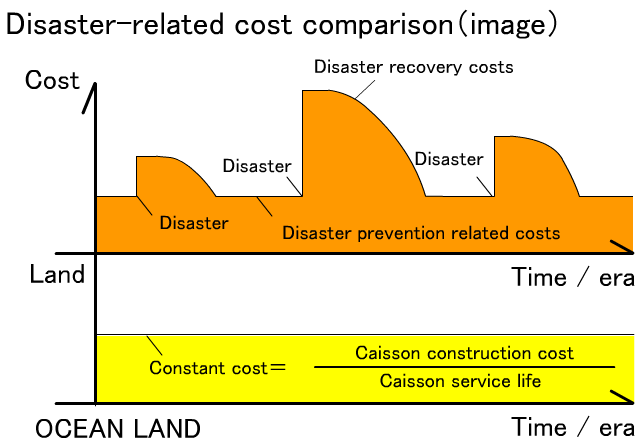


Fig.3-14 Disaster-related cost comparison (image)

In addition, research has been done to reduce the power of typhoons on land or eliminate typhoons themselves, and to study artificial rainfall to reduce drought damage, but it has not yet been put to practical use.

In the case of OCEAN LAND, typhoon damage can be prevented by deciding the course of OCEAN LAND in the direction to avoid the typhoon.

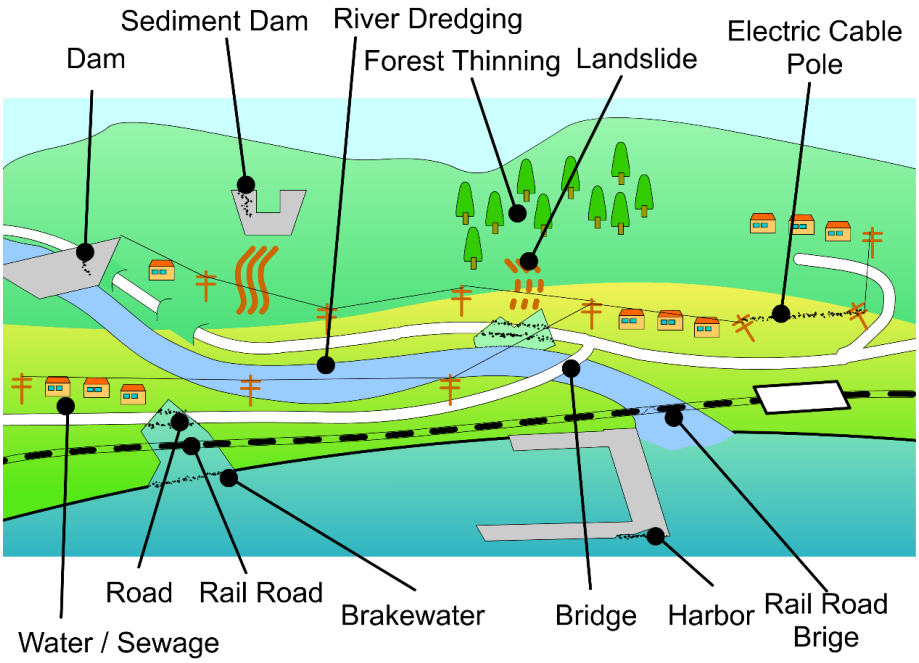


Fig.3-15 To maintain the main living environment on land
Infrastructure that requires maintenance and repair

In addition, if you decide the course of OCEAN LAND in the rainy area, you can secure the necessary fresh water for OCEAN LAND.

Pandemic disaster preparedness is also much easier to control than on land, as each is separated by sea. Furthermore, it is possible to respond to tsunamis and sudden changes in the natural environment caused by the collision of asteroids with the earth, which is said to occur once every tens of thousands of years. Asteroids colliding with the Earth are now fairly accurate, allowing us to determine when and where they will collide years or months later. With a few years or months to spare, OCEAN LAND can move to the other side of the globe to minimize its damage.

Fig.3-16 Difference between typhoon countermeasures and artificial rainfall on land and in OCEAN LAND

island states. For example, it is possible to travel around the remaining 200 nautical miles of the land carry people who moved from the mainland to the OCEAN LAND for a semi-permanent tour of the archipelago.

It also affects people near the coast on the continent. You can use OCEANLAND as a destination for these residents.

6) For Island Nations That Are Losing Their Land Due To Rising Sea Levels

In recent years, there are several island states that are rising in sea level and losing their land. In an island nation that is only a few meters above sea level, the land itself is almost lost. We can use OCEAN LAND for such

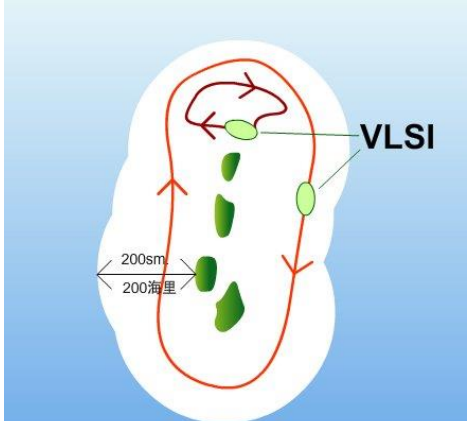


Fig.3-17 For island nations that are losing their land due to rising sea levels
(VLSI = OCEAN LAND)

Counterneasures	Earthquake	Tsunami	Flood	Sea Level Rise	Typhoon	Drought	Heavy Snow	Pandemic	Asteroid collision
Ocean Land	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Land	No	No	No	No	No	No	No	No	No

Fug 3-18 Difference between land and OCEAN LAND for disasters by summarizing 5),6)

7) OCEAN LAND As An Organization That Supplies Oxygen To The Earth

In August 2019, it is reported that large-scale fires in Amazon of Brazil have occurred more frequently than in the previous year. As you know, the Brazilian Amazon is said to be the "Lungs of the Earth" that supplies large amounts of oxygen, but the loss of the Amazon 's forested jungle has reduced the ability to supply oxygen to the Earth.

In OCEAN LAND, there is a plant factory in a LFG(high-rise buildings), and it is possible to plant plants on the flat place on OCEAN LAND. In the future, if hundreds or thousands of OCEAN LANDs are born on Earth, it is possible to help supply such oxygen.

8) OCEAN LAND As A Development Base For Agriculture, Forestry And Fisheries

Development in agriculture, forestry and fisheries is also possible even on land. However, OCEAN LAND will take advantage of the properties of the environment far away from the land, and in a good sense it will be possible to develop and improve Galapagos species that are independent of land species.
The development of agriculture, forestry and fisheries can be considered as follows.

a) Research and development for complete aquaculture of tuna(maguro) and eels(unagi)
b) Research and development of agriculture, forestry and fisheries species with high production volume in a small space
   This technology will be needed for future space travel and space migration.
c) Research and development of cereals, vegetables and fruits grown in seawater or saltwater

   In the future, cultivated land on land may decrease due to rising sea levels and floods. The development of cereals, vegetables and fruits that can grow in seawater or saltwater will make it possible to cultivate shores on land around the world.
d) Development of chicken raising and animal rearing methods that are close to the natural environment without stress by growing in a virtual environment using VR and display
e) Research and development of agro-forestry species that can grow in desert area of land
f) Research and development of insect food, development of an insect farm
   In the future, develop insect food, develop a nursery, and research and develop insect species in preparation for food shortages on a global scale
g) Research and development of tree species that grow on wetlands such as mangroves and coasts
   In the future, it will be a technology for the depletion of pulp and wood resources.
h) Research and development of coral cultivation and aquaculture, research and development as an alternative to concrete materials
   Research and development that enables the construction and repair of OCEAN LAND itself with artificial corals is the research and development of the technology required for the construction and repair of OCEAN LAND.
i) Research and development of methods that can synthesize and produce human food, that is, carbohydrates, fats, proteins, and vitamins, directly from elemental and molecular-level materials.

If this technology is developed, it will be able to cope with the future food shortage, and it will be a technology that will allow space migrants in the distant future to be considered.

9) OCEAN LAND As A Global Pandemic / Infectious Disease Countermeasure

In December 2019, the new coronavirus (COVID-19) originating in Wuhan, China, spread rapidly all over the world in 2020, and the Tokyo Olympic Games scheduled for 2020 were postponed. It is a global disaster.
OCEAN LAND is at least tens of kilometers away from the adjacent ocean land by sea. If mutual transportation is cut off, the spread of infection can be prevented. Of course, it is possible to spread the infection to some extent by insects and migratory birds, but human-to-human transmission is much easier to control than on land.

10) Other Uses

Other possible uses are as follows.

a) Hydrogen production plant
   A plant that produces hydrogen, the fuel of the future
b) Carbon dioxide compression storage plant
   It is said that the increase in carbon dioxide on the earth is accelerating global warming. So, the technology development (storage) to transfer and store the carbon dioxide to the seabed and its plant
c) Public ceremony center
   There is also a shortage of graveyards on the land to mourn the dead. It can be used in any religion. It may be possible to have a ceremony center and an offshore burial place.

11) Scale Of OCEAN LAND And Its Flexibility

The purpose of OCEAN LAND maneuvering is depend on its scale. OCEAN LAND must remain near a limited area as resource development bases. For this reason, small-sized ones with a small turn are suitable. Big OCEAN LAND is suitable for forestry and fisheries industry and residential purposes.

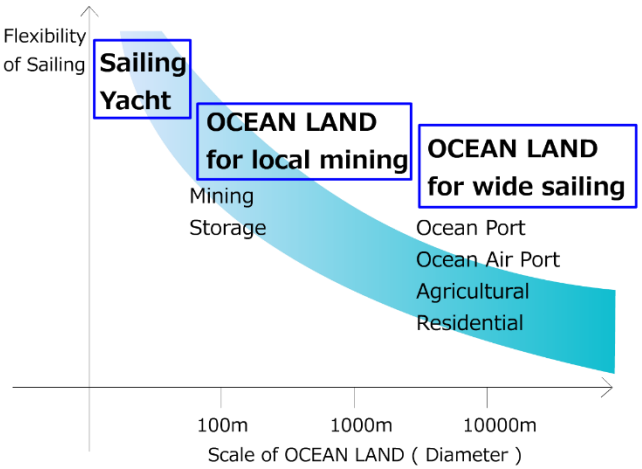


Fig.3-19 Scale of OCEAN LAND and its flexibility.

4. Safety Measures

1) Method For Emergency Escape

Are there any measures against tsunami and other things? The 2011 East Japan Great Earthquake Disaster caused Tohoku district to suffer great damage by tsunami exceeding

more than 20-30 meters in height. Will such a big tsunami wave hit OCEAN LAND? The tsunami is known to gradually shallow the water depth, and the waves will rise and overlap as the wave speed gradually slows down, and it becomes a mountain like a few tens of meters. In the East Japan Great Earthquake Disaster the fishing boats that escaped offshore were never caught in the tsunami. As such, at the center of the ocean the tsunami has a very long wavelength, it is not such a big force as to destroy the structure of OCEAN LAND. However, no matter what kind of measures are taken, it may be awaiting by disasters that human beings cannot infer. Considering the worst situation that OCEAN LAND's mega float itself will sink into the ocean, we must take measures for it. We can use dome garden or dome stadium as life boats in OCEAN LAND. It is possible to create a system in which the dome automatically floats even if the inhabitants retreat to the dome and the ocean land is submerged. OCEAN LAND has a harbor. Cargo ships carrying goods from the continent etc. enter this port on a regularly. So, at all times, we can use those ships as life boats.

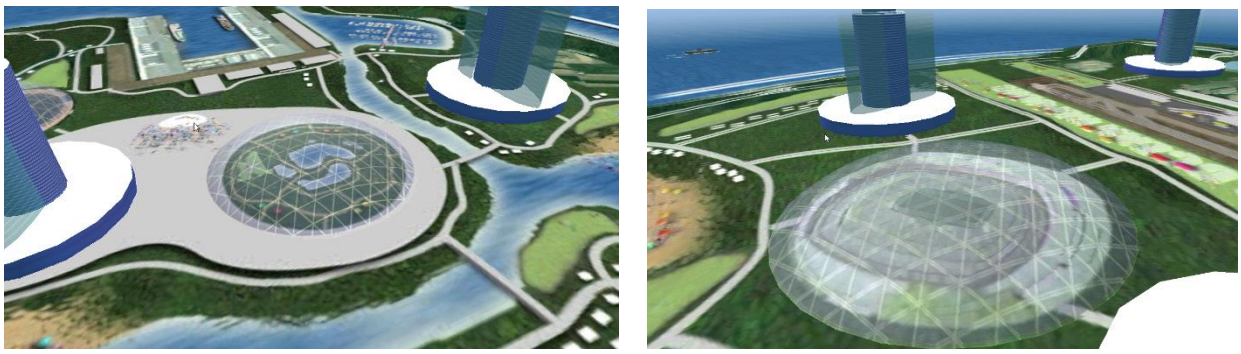


Fig.4-1 Dome Garden & Dome Stadium on the OCEAN LAND
(From The Flight Simulator “EZ FLIGHT”)

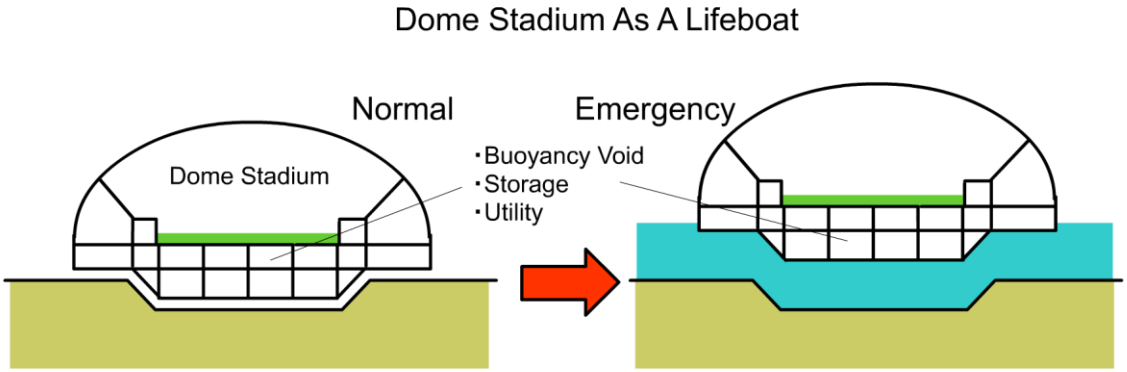


Fig.4-2 Dome Stadium As A Lifeboat

2) Method For Emergency Stop

The latter part of the document"8. Feasibility Calculation 2) Ability of Stop of a Mega Float (VLSI)" shows calculation detail, if there is 5m/s wind, OCEAN LAND can stop with in 600m and in one hour and half with make LFG as brake. And here, we want to propose for emergency stop.

Fig.4-3 Layout of OCEAN LAND

OCEAN LAND has sea water large tanks in the higher place. They will be arranged around of an OCEAN LAND.

By store sea water in those sea water tanks, we can use it for several purposes. For living water, industrial water, agricultural water.

If the OCEAN LAND gets too close to shallow water or islands, etc., OCEAN LAND will stop by temporarily opening the sluice gate in the direction of the obstacle. We can also change the direction of the water coming out of the sluice to avoid obstacles.

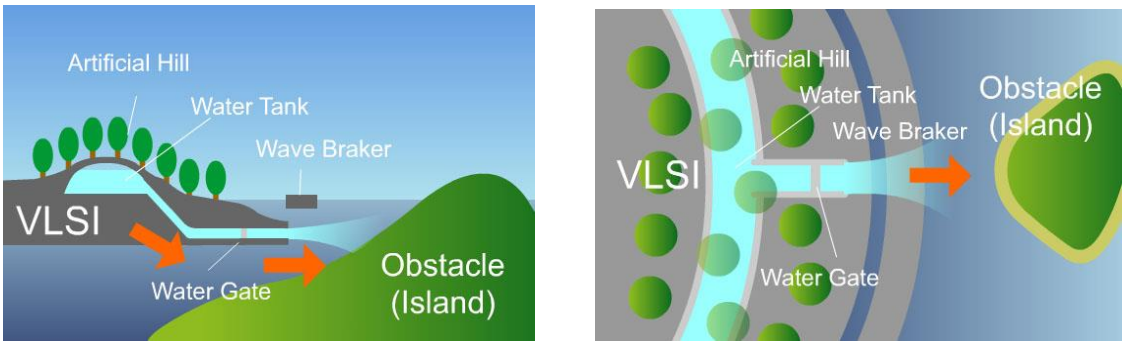


Fig.4-4 Sea Water Tanks and OCEAN LAND and obstacle (Island)

5. Operation System Of OCEAN LAND

1) How To Control OCEAN LAND

The course of OCEAN LAND is based on learning the past weather data by AI (Artificial Intelligence) and judging from what the current weather data is, what kind of weather sea area to go to as OCEAN LAND has the greatest gain, that is, the merit. Then operate each lift generator.

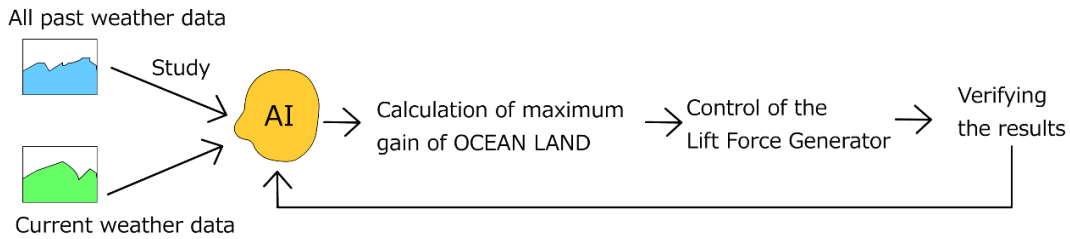


Fig 5-1 The way to control an OCEAN LAND

2) Control Method As A Group Of OCEAN LAND

Safety and utility will be increased by sailing over the ocean as a group with multiple OCEAN LANDs separated by several tens of kilograms at a time.

For example, suppose there were six OCEAN LANDs as shown. Each of them keeps their position in the ocean while moving in the same direction taking a safe distance of tens of kilometers. Each OCEAN LAND is devised to increase utilization efficiency by sharing the main role. The port and airport can be used one by one in six OCEAN LANDs and other OCEAN LANDs for other purposes. One OCEAN LAND is aquaculture center, One OCEAN LAND is an agricultural center and each OCEAN LAND can be divided into different roles for efficient operation.

Also, by navigating the ocean in an array like the archipelago like this, safety increases. Although it should not happen, for example, when there is a fear of collapse and sinking in one OCEAN LAND, the residents must evacuate from that OCEAN LAND. If OCEAN LANDs are being operated like this as an archipelago, all the residence can move instantly to the surrounding other OCEAN LAND. It will ensure the safety of the residents of each OCEAN LAND.

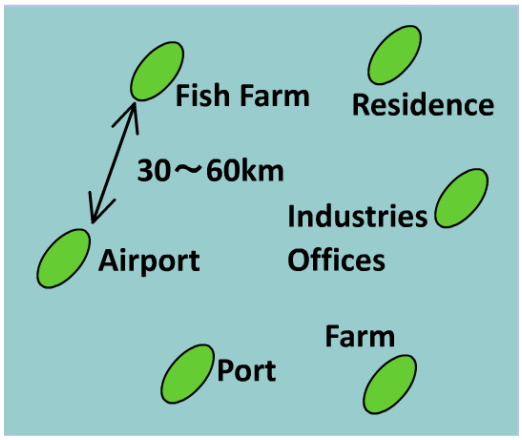


Fig.5-2 OCEAN LAND as an Archipelago

6. Construction Method And Maintaining Mega Float

1) How To Build Lift Force Generator

Describing the construction method. In order to build a huge float on the ocean, you can gradually connect a caisson that is split and constructed. The problem is how to build a high-rise building that will be a lift generator on the mega float. The higher the height of a high-rise building, the greater the load on the ground becomes. Therefore, by canceling the building in the height direction by the buoyancy of the float in the seawater, we make the shear force in the vertical direction with the float on the sea surface approach zero. You can gradually build a LFG(Lift force generator: high-rise building) so that the load from above and

the buoyancy below the water surface balance up and down in the place where the lift generating device opened on the float is made.

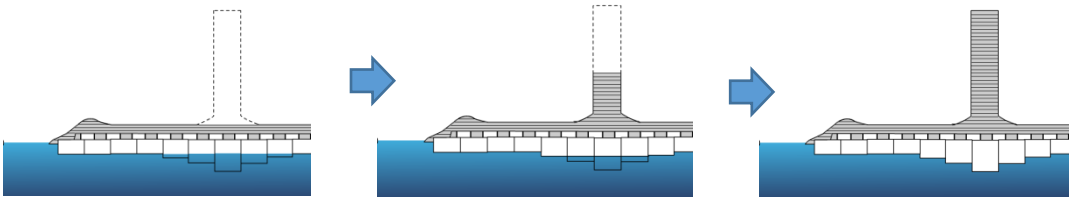


Fig.6-1 Construction method of the high-rise building

In addition, as we will discuss later, we believe that in the future we should do research to build marine microorganisms rather than human creation of mega floats themselves in OCEAN LAND. Artificial structures like OCEAN LAND have naturally a lifetime and require maintenance by humans. If you made a mega float using something like iron or concrete. Its lifetime is assumed to be one hundred years. A simple calculation, from the time of construction, every year one hundredth amount of the large float will be rebuilt, necessary for repair and maintenance. It is hard to build a mega float, but maintenance also costs a lot of expenses, physical quantity and cost. Can we make this using something like a marine microorganism? I think that such research should be done. If a mega float has some cracks in the main structure, for example. If it made of iron it is necessary to repair it with welding etc. If it is made of concrete, measures such as filling up cracks are necessary. On the other hand, it is known that in the human body, for example, if the bone does not completely fracture, but cracks are present, it is possible to self-heal to a certain extent without going through a doctor and treating it or performing surgery. I think that it is necessary to research whether the large float itself can be built by using marine microorganisms or not. Also it can be maintained or not.

2) How To Build Up An OCEAN LAND

OCEAN LAND will not be built offshore from the beginning, but gradually build caisson near the land, and build lift generators (high-rise buildings), after that, complete as close to the land as possible, and leave the land.

Fig.6-2-1,2,3,4 How to build up an OCEAN LAND

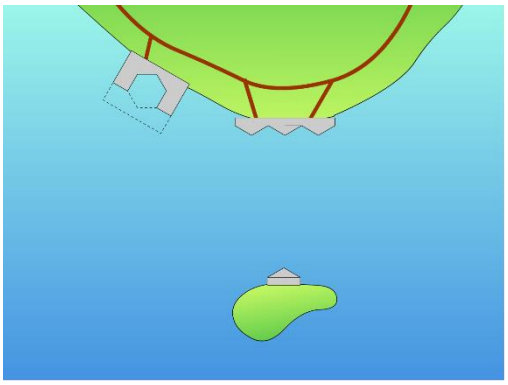


Fig.6-2-1 Prepare dock and building space near the land.

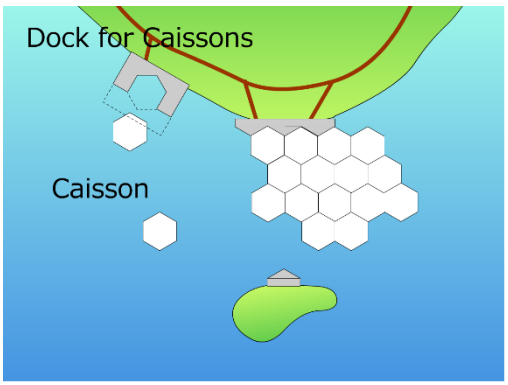


Fig.6-2-2 Building up an OCEAN LAND

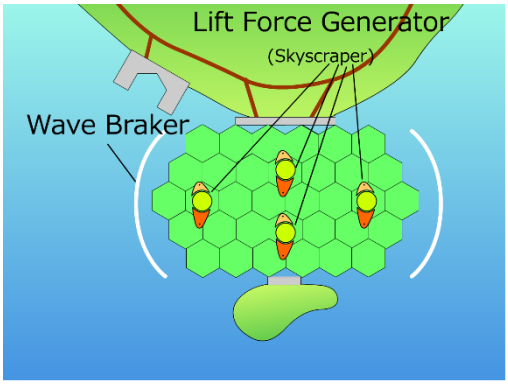


Fig.6-2-3 After completing a base of OCEAN LAND, also building up LFG(high-rise buildings) and other equipment.

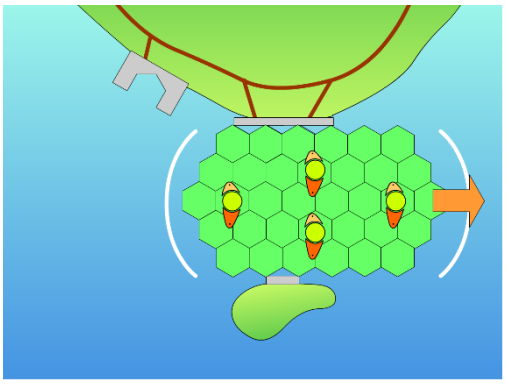


Fig.6-2-4 Operating LFG and leave for offshore, and then building other equipment of an OCEAN LAND.

3) Building Up By Biomechanical Method

The latter section of the document " 10. Typical Research Themes for OCEAN LAND Project "Research about Construction Method for Large Scale Structure" I will describe, There is a method that uses marine microorganisms to build the mega float that is the foundation of OCEAN LAND, rather than using an engineering method.

Fig.6-3-1 Lay down main frames of an OCEAN LAND

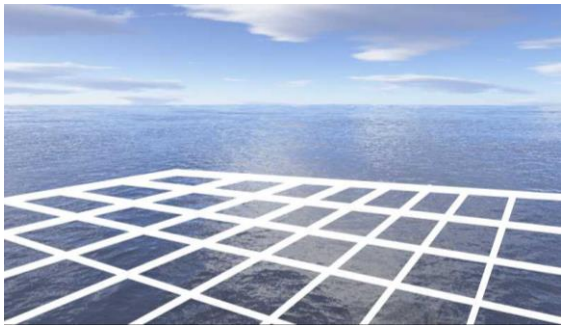


Fig.6-3-2 Make marine microorganisms with special properties to build a hard structure on the framework based on calcium, magnesium, etc.

Fig.6-3-3 After building up a mega float, other buildings such as LFG(high-rise buildings)will be made.

4) Build Up LFG On A Big Iceberg

If it is an OCEAN LAND operated near the ice sea, we can cut out the iceberg and use it as an OCEAN LAND.

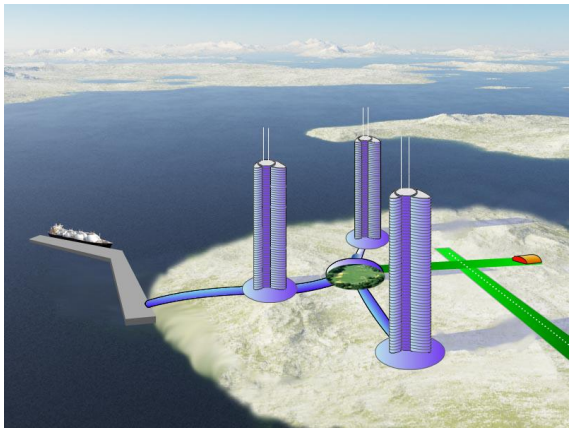


Fig.6-4-1,2 The iceberg is processed to create an OCEAN LAND base and LFG (high-rise buildings) will be installed. If it is in an ice sea, it is possible to travel without melting the OCEAN LAND. It is also possible to reinforce and spread the foundation by stretching the refrigerant pipe. Since the volume of icebergs and ice blocks below the surface of the water is larger than that above the surface of the water, the resistance due to seawater increases and the movement becomes slow.

5) How To Maintain A Mega Float And Replace A Caisson

Here how to maintain the Mega Float after building the Mega Float will be described, which is the foundation of OCEAN LAND.

Assuming that the life of the Mega Float is 100 years, 100 years later, rather than rebuilding a new Mega Float, if each caisson of the Mega Float is replaced one after another, the OCEAN LAND will be possible to operate the land without stopping functioning - permanently. How to replace the caisson, which is a part of the mega float, hear how to replace the caisson which seems to be the most difficult under the skyscraper will be explained with figures,

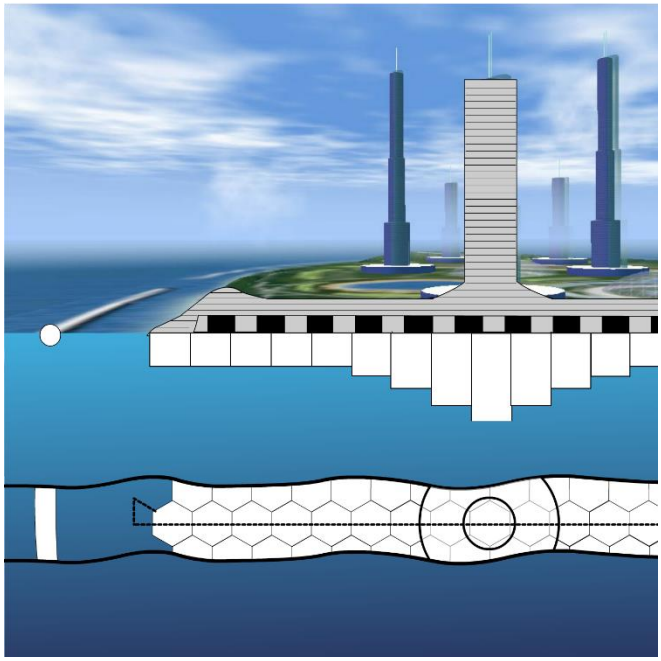


Fig. 6-5-1
On the left is a cross section of OCEAN LAND (top) and a plan view of the caisson (bottom).

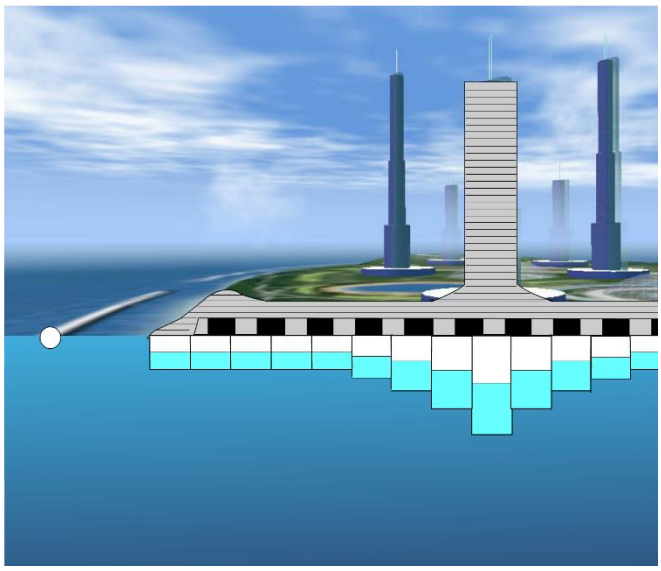


Fig. 6-5-2
Normally, OCEAN LAND stores seawater ballast in the caisson section so that the load of superstructures such as high-rise buildings and the buoyancy of the caisson should be balanced.

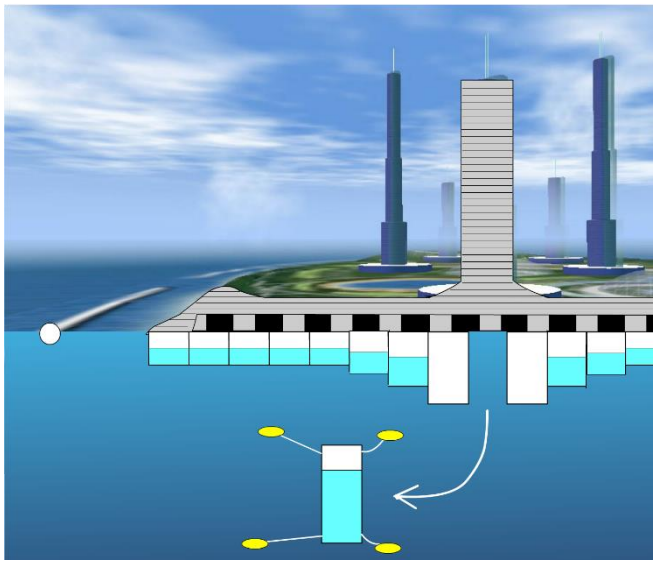
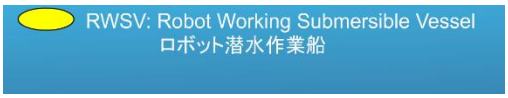


Fig. 6-5-3
First, replace the caisson directly under the skyscraper with a new one. Therefore, the seawater ballast water is adjusted to generate more buoyancy than usual in the caisson surrounding the caisson directly under the center of the skyscraper. After that, using RWSV(Robot Working Submergible Vessel) the caisson under the skyscrapers will be moved out of the OCEAN LAND.



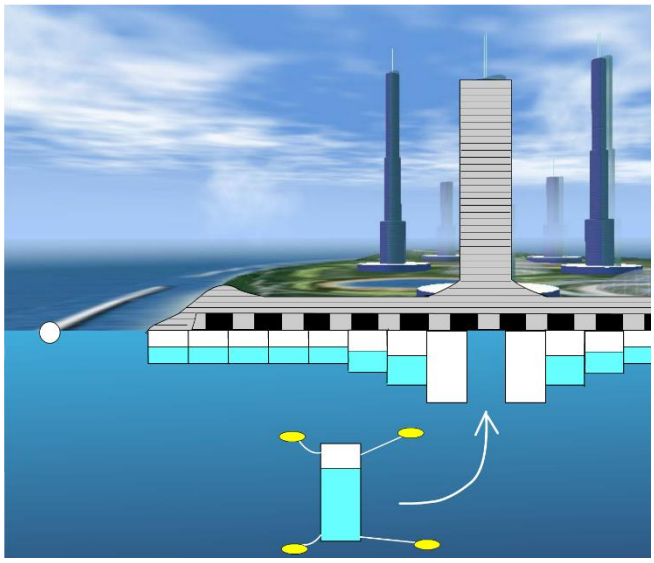


Fig. 6-5-4
Using RWSV,replace the caisson directly under the skyscraper with a new one.

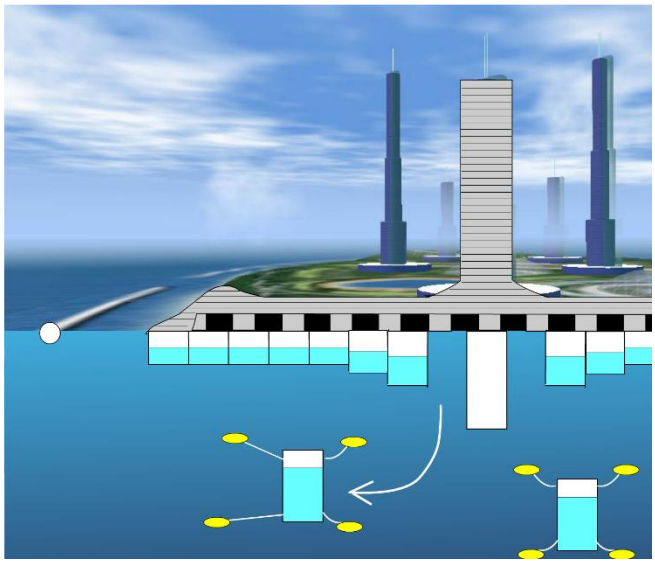


Fig. 6-5-5
Next, to keep balance between load of the skyscraper and the buoyancy of the caisson ballast water should be loaded in the caisson. After that, using RWSV the caisson will be moved out of the OCEAN LAND.

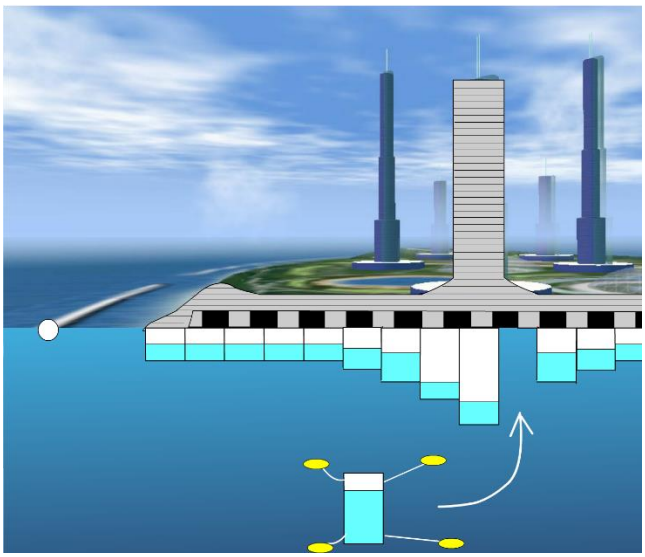


Fig. 6-5-6
Replace all caissons under and around the skyscrapers with new caissons.

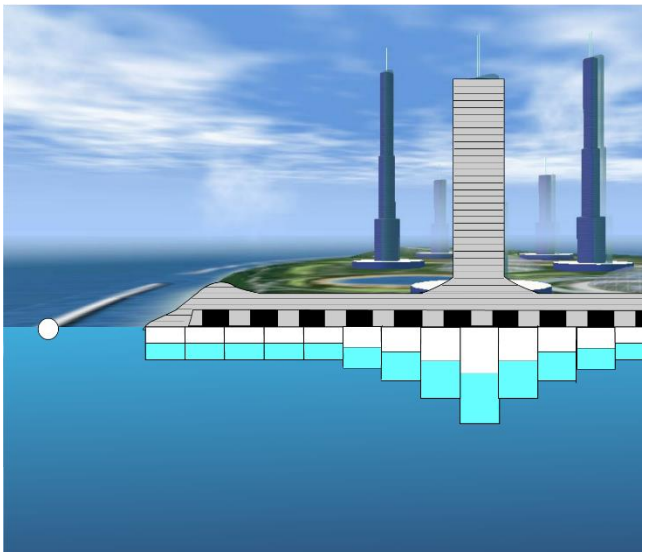


Fig. 6-5-7
Replace not only caissons under skyscrapers, but other caissons as well.

7. Lift Force Generator

The Lift Force Generator (LFG) plays a very important role in the OCEAN LAND project. In the Ocean Republic / OCEAN LAND, mega float is called SI (Sailing Island) or VLSI (Very Large Sailing Island) for convenience. The lift generator is mounted perpendicular to the sea surface on this mega float. From the wind blowing on the ocean it is possible to generate a lift, or thrust, laterally of the mega float.

Here I will present some ideas for such a lift generator (LFG).

Regarding patent applications for these devices, there are some that have been submitted and some have not been submitted. The "Ocean Republic" was announced in autumn 1991 at the in-house research presentation by electronic equipment manufacturer. The following year the paper was published in the “Fune no Kagaku”(Science of Ship) in March 1992. After

that, I filed a number of related patent applications, but since the sponsor was an electronic equipment maker, many patent applications were not allowed due to the management policy of the company, and only a few special cases were submitted.
In technology development, obtaining a patent is indispensable, but the expiration date of the patent is 20 years, and in the case of technology development that takes many years until completion, such as OCEAN LAND, many patents are filed It can be said that filing applications is disadvantageous from the patent strategy. I also think that it is important to first determine what kind of method and technology are necessary for patent acquisition and to determine what kind of technology to apply as a patent during research and development.

The lift force generator(LFG) is the largest possibility as a technical patent among OCEAN LAND. The idea as a lift force generator which I have now is roughly as follows.

1) Airfoil Lift Force Generator With 3 Or 4 Divided Buildings

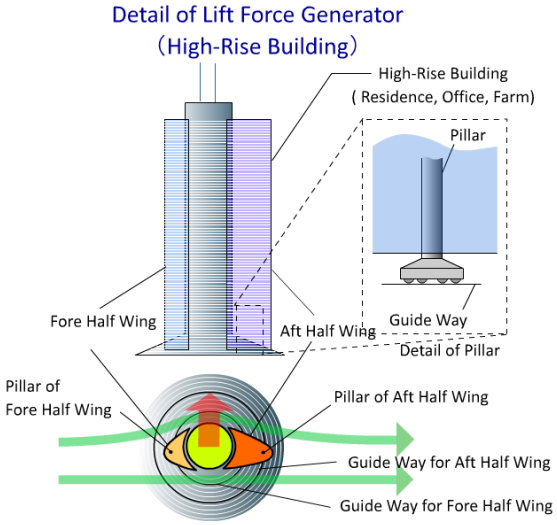


Fig.7-1

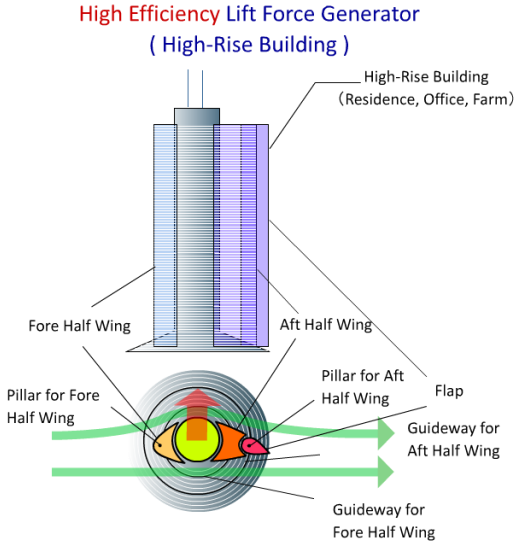
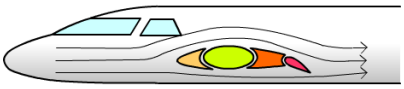


Fig.7-2



Aerofoil and air flow at takeoff and landing, low speed
(Actually more complicate)

This is a combination of moving parts having two or three cross sectional shapes in the front and back centered on a structure with a circular cross section in order to bring the sectional shape of a high-rise building closer to the aerofoil shape. Each structure has a structure that can move in the circumferential direction relative to the fixed center cylinder so that lift can be efficiently generated from the wind. It is a mechanism to obtain maximum efficiency lift by moving this divided part.

2) Symmetry Airfoil Lift Force Generator

This is a construction of a cross-sectional shape of a high-rise building as a lift force generating device as a symmetrical airfoil, and the high-rise building itself is formed so that the lift force occurs at right angles to the wind direction by adjusting the angle with respect to the wind direction .

Symmetry Airfoil Lift Force Generator

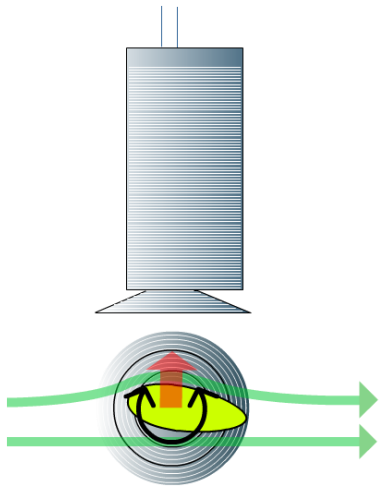


Fig.7-3

3) Lift Force Generator With Flexible Wall

A high-rise building is constructed as a building with a circular cross section and on the outside it is provided with an exterior wall close to the airfoil made of a flexible material. This outer wall is made to move freely around a high-rise building and the shape of its outer wall can be transformed into a wing shape by the hydraulic cylinder as a whole. In this way it is trying to obtain maximum and optimum lift.

Lift Force Generator with Flexible Wall

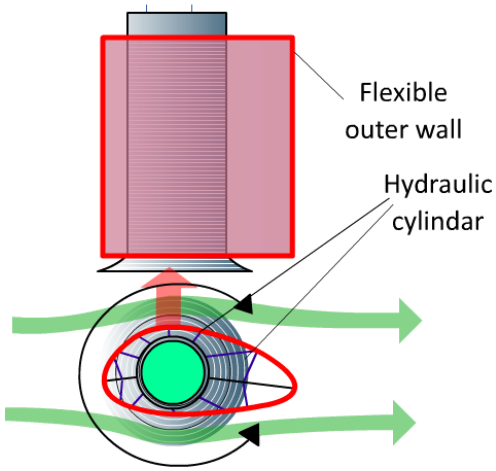


Fig.7-4

4) Lift Force Generator With Porous Wall

This is round sectional structure by making a series of holes through on the outer wall of a high-rise building with a fixed round cross section. By controlling the air flowing through the outer wall by closing or opening also volume, speed of air, we can get the lift by making virtual wing form.

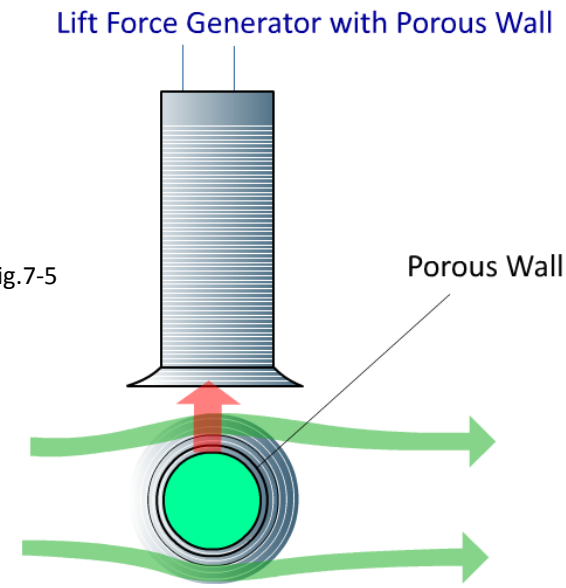


Fig.7-5

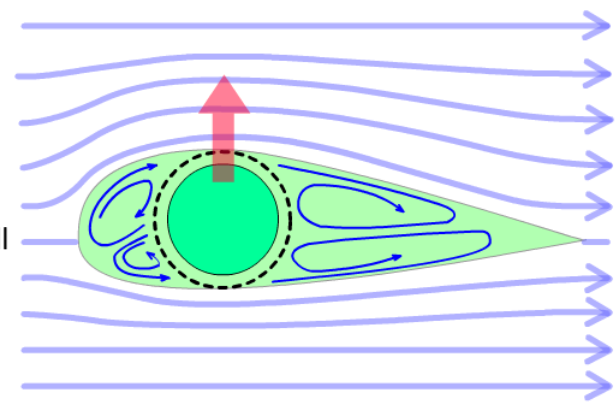


Fig.7-6

5) Lift Force Generator With Rotatable Wall

It has a cylindrical outer wall that can be rotated around a high-rise building. By changing the direction of the movable flap on this outer wall, the direction and strength of the rotation of the outer wall can be changed. Lift will be generated by Magnus effect by this rotating outer wall.

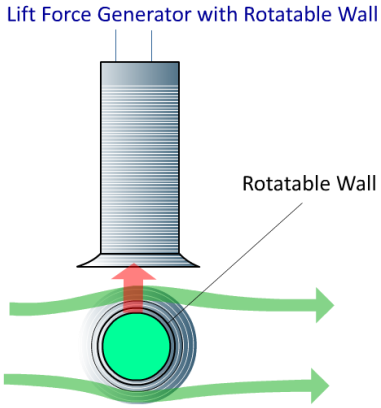


Fig.7-7

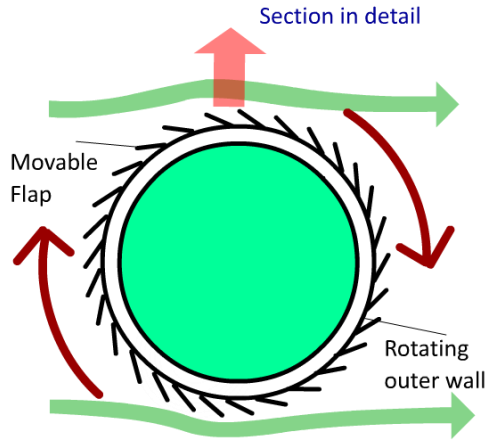


Fig.7-8

6) Lift Force Generator With Auto Gyro Turbine

The auto gyrocopter is a vehicle that rotates the upper rotor by the flow of air from the direction of travel to obtain lift. I filed several patents for applying this auto gyro to ships on the 1980's. We can apply the auto gyroscope attached to this ship to OCEAN LAND of this case and obtain lift for changing course.

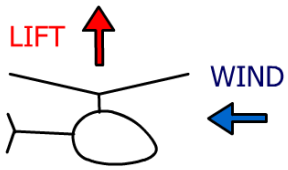
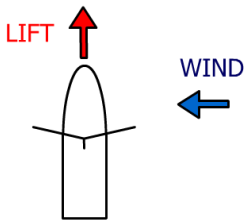


Fig.7-9 Auto gyrocopter & Auto gyro ship



The application of this auto gyro to ships has the following features.

a) It hardly hinders the visibility of the bridge of the ship.

b) If not used, the propeller blades can be folded so as not to disturb the propulsive force.

c) Auto gyro propellers can be used as wind power generators when there is no direct need to produce thrust, such as in tailwind mode or when harbored mooring.

a), b) If this auto gyro propeller can be unitized, it is possible to install the unit on the existing ship without developing a new ship type of the wind propulsion ship and to reconstruct it into an energy-saving vessel with a simple construction.

Fig.7-10 Ship with Auto Gyro Propellers

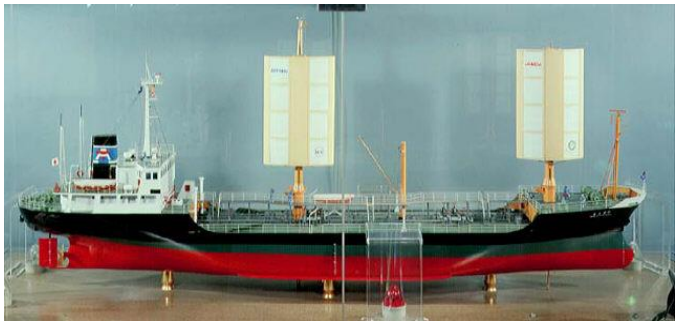


Fig.7-11 If Auto Gyro Propeller unit is developed, existing vessels can be converted to energy-saving vessels without developing a special ship form.
(Model of Shin Aitokumaru from Google Images)

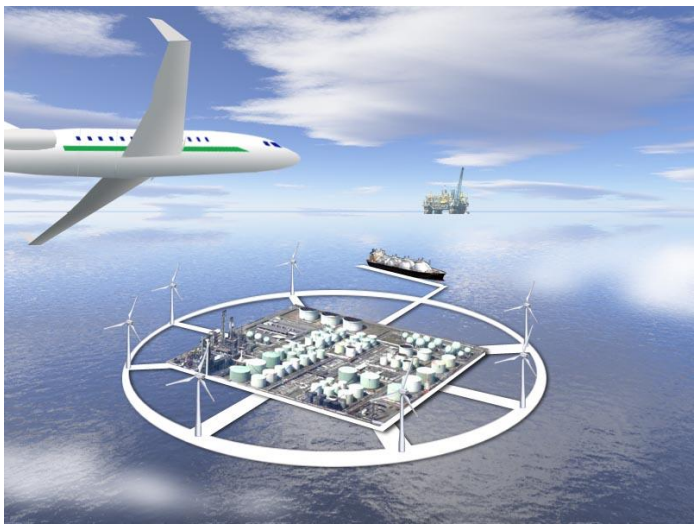


Fig.7-12 Ocean City with Auto Gyro Propellers

The image above is a composite image of Ocean City for marine capital development which installed this auto gyro propeller.

7) The Way To Combine Multiple Lift Force Generators

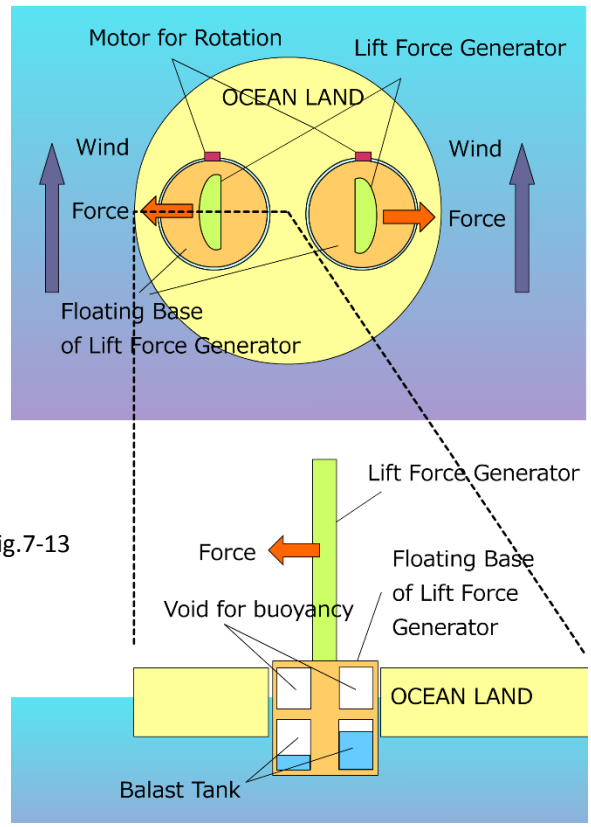


Fig.7-13

This is a method to control OCEAN LAND by the thrust of the entire lift generator. Fig7-13 shows an example with two lift generators on a circular OCEAN LAND to understand easily. The lift generator is installed along a hole made in OCEAN LAND and floats in seawater. In the case of this figure, the lift generating device built on the floating foundation is constructed so that the straight part and the arc part face each other, and when subjected to wind as shown in the figure, generates lift in opposite directions. Therefore, the effect of the wind is neutral, and the wind is swept away. On the other hand, the floating foundation can be changed in various directions with respect to the wind by the drive unit installed on OCEAN LAND. Fig.7-14 shows that when the force is generated in the direction perpendicular to the wind by aligning the directions of the lift generators, Fig.7-15 changes the direction of the lift generator so that the rotational force is generated.

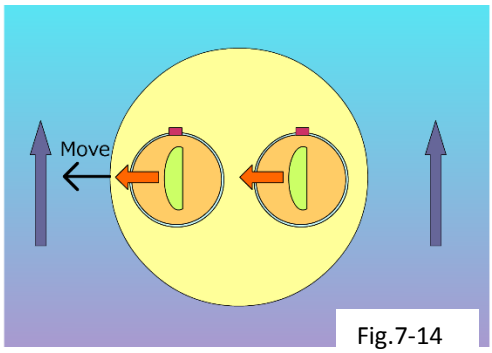


Fig.7-14

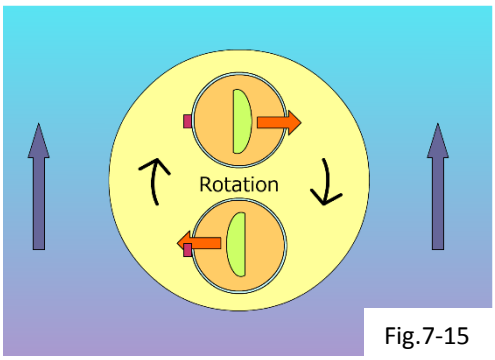


Fig.7-15

8) Method Of Using Tidal Flow

It is assumed that OCEAN LAND uses wind as an energy source for movement, but it is also possible to use VLSI with tidal flow for movement.

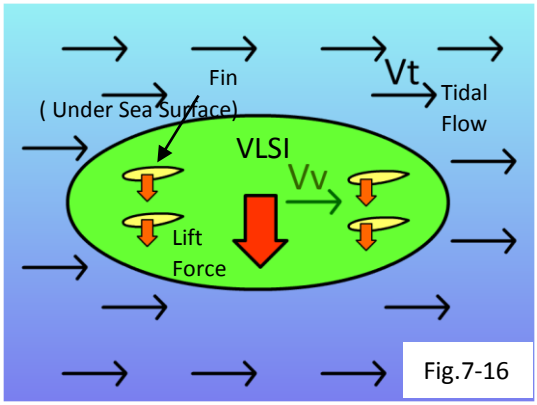


Fig.7-16

For example, suppose there is a VLSI as shown in figure. Under the water surface, the wing type airfoil structure (huge fin) as shown in the figure extends in the depth direction of the ocean. When this VLSI receives a tidal current from the left direction in the figure, the downward lift force of the figure works on the wing type fins, and the force moving downward in the figure as a whole acts on the VLSI.

By using this tidal power as well as Coriolis force, it is also possible to trap the VLSI at the part where the ocean current circulates. For example, suppose there is a VLSI at the part where the ocean current circulates as shown in figure. Let Vt be the speed of the current at this time, and Vv the speed of VLSI. The VLSI travels in the same direction as the tidal current while flowing to the tide current at a speed slower than this Vt. Vt> Vv will be obtained. The speed difference Vt - Vv becomes the velocity component acting on the fins below the surface of the VLSI, creating a force to move the VLSI in the direction of the arrow in the figure.

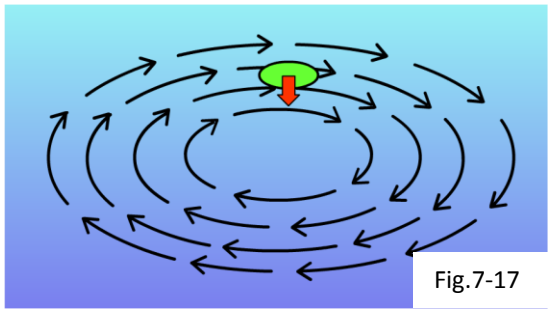


Fig.7-17

This force works as long as there is an ocean current. Theoretically, the VLSI stops (almost does not move) to the center part where this ocean current finally circulates. Therefore, if there are no other large floating bodies in the vicinity, this VLSI will be able to stay semi-permanently on the spot without worry of colliding with continents, islands and so on.

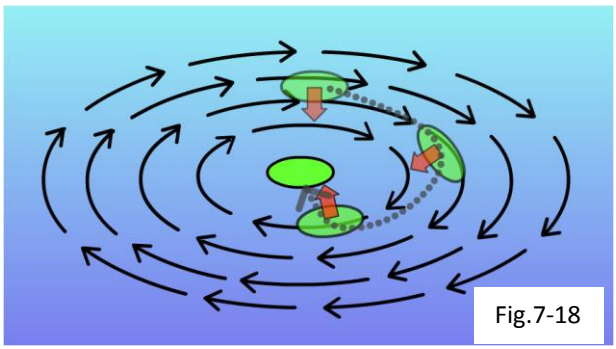


Fig.7-18

There are many parts of the Earth around which the ocean current circulates, so it is possible to apply to such a place.
Also, if you turn the fin below the water surface in the opposite direction as shown in figure, the opposite force will work, and if you turn each one in the reverse direction as shown in figure, you can also rotate the VLSI.

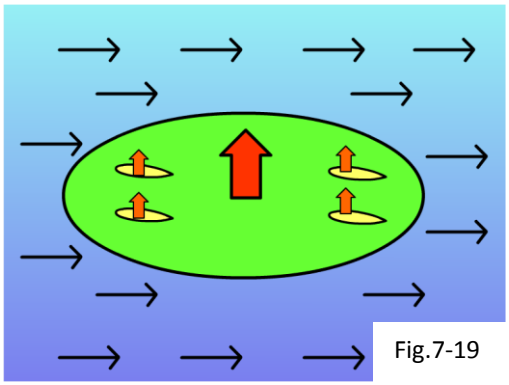


Fig.7-19

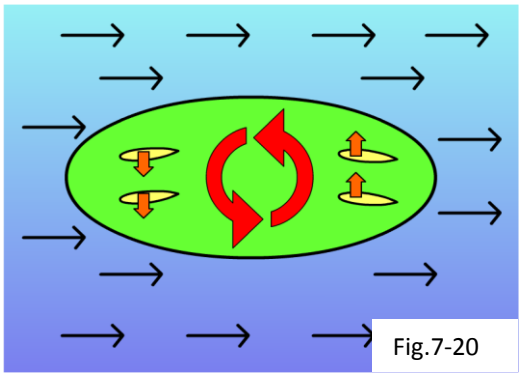


Fig.7-20

8. Feasibility Calculation

Here I will conduct an initial study of whether the lift of the high-rise building built on mega float (VLSI) can control the course of mega float in OCEAN LAND. As the contents of consideration 1) How fast can you move in the "lateral direction" with respect to the wind blowing direction? 2) If an obstacle is found forward, issue a stop order calculate how much time and distance you can stop at two distances?

1) Cruise Condition Speed Of A Mega Float (VLSI)

Regarding the position control of the mega float (VLSI) in the Ocean Republic / OCEAN LAND, the following conditions are required.

<u>To have some degree of control possibility by the action of wind and lift force generator (high-rise buildings) for the purpose of avoiding obstacles such as typhoons, reefs and islands.</u>

In this document I will consider the underlined part above.

Suppose now that a square VLSI with a side length of 1 km, as shown in figure, receives 5 m / s wind from the right direction in the figure. Calculate how much this VLSI can move in the right direction of the wind (upward direction in the figure) by the wind. There are 10 Lift Force Generators (high-rise buildings) in total. The draft of the float is supposed to be 10 m. Since the total weight is unknown, we calculate it as a temporary value, but we will ask how much the draft will change depending on the weight of the high-rise buildings.

Fig. 8-1 Shinjuku Center Building

Taisei's(General Contractor) website says that the total weight of Shinjuku Center Building (height 220 m) is 300,000 metric tons. Since the height of the high-rise building to be studied now is 100 m in height, we estimate totally 150,000 tons in total and 1.5 million tons in 10 bodies. Because this will sink the 1 kilometer mega float, if we set the specific gravity of seawater as 1, it will be 1,500,000 / (1000 x 1000) = 1.5, so the draft difference will be 1.5 m by the high-rise buildings as a whole. In addition to that, the float has weight due to the structure that supports the float itself, what is built on the float, weight due to trees and landscaping etc. However, it is said that it is a quotient enough estimate even if the draft is estimated at 10m.

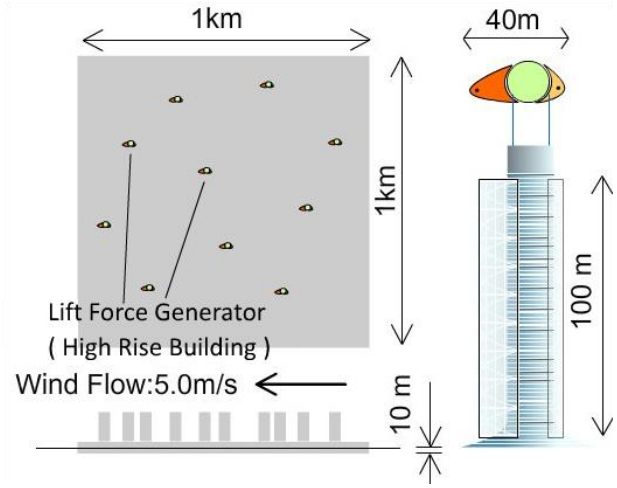


Fig.8-2

Length of the Mega Float:	1km
Draft of the Mega Float:	10m
Height of the High-Rise Building:	100m
Width of the High-Rise Building:	40m
Number of the High-Rise Buildings:	10
Estimated Wind Speed:	5.0m/s

The strength of the lift acting on the airfoil shape can be obtained by the following formula. Here I assume that force works ideally. If this L is viewed as an upward force acting on a lift generating device (high-rise building) for one body,

$$L = \frac{1}{2} \rho_a V_w^2 S_L C_L \quad \text{.....(1)}$$

L: Lift Force
ρ_a: Air Density(1.3 kg/m^3)
V_w: Wind Velocity(5 m/s)
S_L: Wing Area (40m x 100m =4000m^2)
C_L: Lift coefficient (Assumed 0.6)

By calculation, it becomes 39000 kgm/ s^2 per Lift Generator (high-rise building)
If there are ten high-rise buildings, it will be 390,000 kgm/s^2. You can see that this force hits the wind direction perpendicular direction (upward direction in the figure).

On the other hand, the resistance D_1 due to the water flow corresponding to the projected area of the submerged part of the VLSI in the direction of travel is obtained by the following equation (2). Also, a mega float of 1 km square gives rise to frictional resistance. The frictional resistance D_2 is given by the following equation (3). Since the sum of these D_1 and D_2 will compete with the force of the lift generator of 10 bodies obtained in (1), you can solve this equation and find the speed of VLSI.

$$D_1 = \frac{1}{2} \rho_w V_v^2 S_1 C_x \quad .....(2)$$

D_1: Resistance of Seawater (Downward in the Drawing)
ρ_w: Seawater Density (1025 kg/m^3)
V_v: VLSI speed (undefined)
S_1: Projected Area of Submerged Area (10m x 1000m =10000m^2)
C_x: Flat plate drag coefficient(Assumed as 1.5)

Here $D_1 = 7687500.0\ Vv^2$

$$D_2 = \frac{1}{2} \rho_w V_v^2 S_2 C_f \quad .....(3)$$

D_2: Frictional Resistance of VLSI by Seawater
ρ_w: Seawater Density (1025 kg/m^3)
V_v: VLSI speed (undefined)
S_2: VLSI Bottom Area (1000m x 1000m =1000000m^2)
C_f: Seawater Friction Coefficient
(Assumed as 1.492 x 10^{-3})

In equation (3), Cf was obtained from the following Hughes' equation.

$$C_f = 0.066 (-2.03 + \log_{10} R_n)^{-2} \quad .....(4)$$

$$R_n = \frac{VL}{\nu} \quad .....(5)$$

V: 0.5 m/s (Assumed)
L: 1000 m
ν: kinematic viscosity
1.054 x 10^{-6} m^2/sec

In the (3) $D_2 = 764650.0\ Vv^2$

Since Vv is not known from the following equation, it is assumed that 390000 kgm/s^2, which is ten times larger than Expression (1), is balanced with the sum of (2) (3) in steady state、

$$10 \times L = D_1 + D_2 = \frac{1}{2} \rho_w V_v^2 S_{v1} C_x + \frac{1}{2} \rho_w V_v^2 S_{v2} C_f \quad .....(6)$$

Solving this equation yields Vv and its magnitude is approximately calculated as Vv = 0.215 m/s.

If you calculate the amount of VLSI movement per day, you can get

$$0.215\text{m/s} \times 3600\text{sec.} \times 24\text{h} = 18.6\text{km} \qquad \ldots\ldots\ldots(7)$$

In this calculation, it was found that the distance that VLSI can travel in the direction perpendicular to the wind direction per day is 18.6 km.

The calculation above calculates the draft of the mega float as 10 m, but it is actually expected to be smaller than that. Calculate the same calculation as above, if the draft of the mega float is 5 m, calculate the case of 20 m respectively, the movable amount in one day when the draft is 5 m is 25.1 km, and the movable amount in one day when the draft is 20 m is It will be 13.4 km. As the draft becomes deep, the resistance of the water increases, and the movable amount becomes smaller. Here $D_1 >> D_2$ then, you may neglect $D_2$for the calculation.

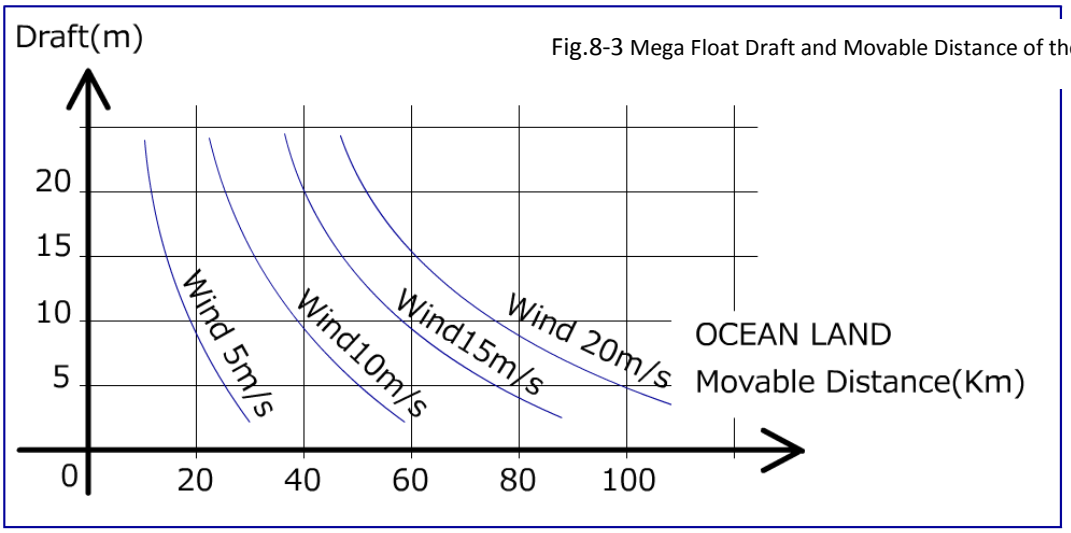


Fig.8-3 Mega Float Draft and Movable Distance of the Day

What is the speed of the tidal current in the Pacific Ocean? From Asakura Shoten ” Ocean Development Technology Handbook” It is written that the flow velocity of the north equatorial current is 0.25 m/s to 0.50 m/s. VLSI speed does not exceed this speed, and assuming that the VLSI is running at a speed of 0.20 m/s, balanced with ocean current, resistance of air resistance and water, the VLSI goes from directly in the direction of travel

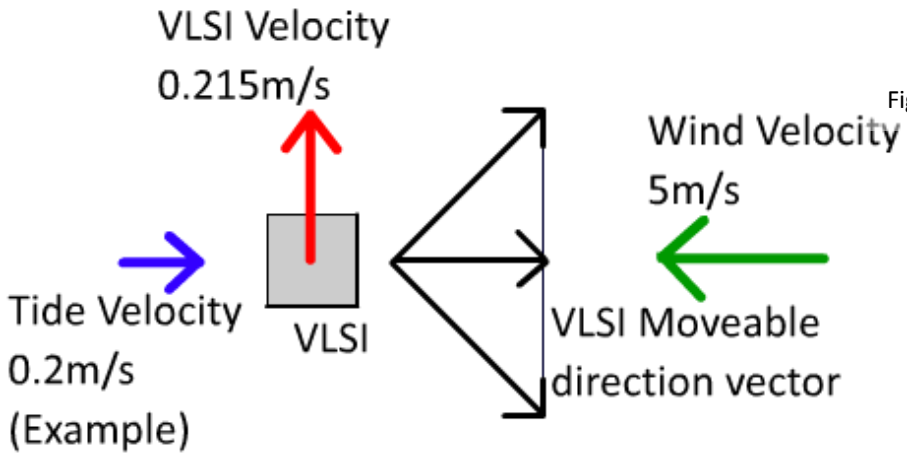


Fig.8-4

For the blowing wind, it is possible to control to move the VLSI at approximately 45 ° oblique angle and to avoid obstacles.
In fact how fast is the wind blowing in the Pacific and the Atlantic Ocean? If you refer to the JAMSTEC website, you can see that winds at least 5 m/s on average are blowing almost at sea. Therefore, as you can see from the above calculation, the range that VLSI can be controlled will be considerably wider than the previous calculation.

2) Ability Of Stop Of A Mega Float (VLSI)

According to the calculation of 1), VLSI found that it is possible to change the course in the direction perpendicular to the direction of travel, about 20 km per day if the wind of about 5 m/s is constantly a day .

Next, we will examine the approximate examination of how much time and distance are necessary to apply braking and stop from the state where the movement is continuing at the speed considered in summary consideration 1).

It is assumed that the VLSI continues to move upward in the drawing at the speed shown in the summary consideration 1) and wind at 5 m/s is blowing from the horizontal direction.

At that time, after we have issued a stop order, we will reversing the lift generator, how long it will take to brake, and calculate approximate how far you will travel the distance.

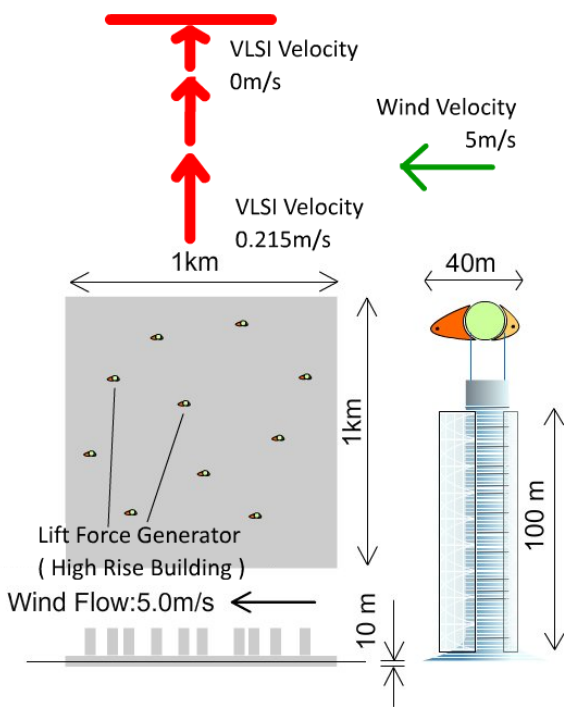


Fig.8-5

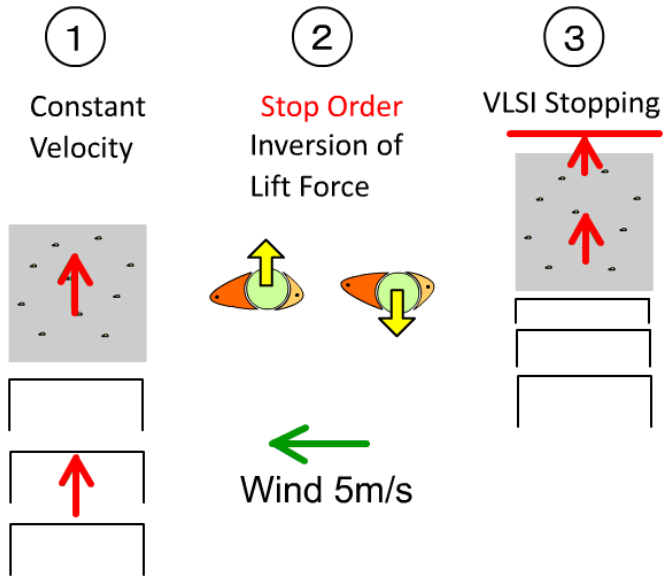


Fig.8-6

Height of Lift Force Generator:	100m	
Width of Lift Force Generator:	40m	.m/s^2)
Number of Lift Force Generator:	10	
(High-Rise Building)		)^{10}kg)
Assumed Wind Speed:	5.0 m/s	n (m/s^2)

Assuming that all the forces acting on the lift generator calculated in the outline 1) can be used for braking, it is possible to use 390000 kgm/s^2 of lift generator (High-Rise Building). Assuming that the mass of the VLSI is obtained from the drainage volume and is 10 m × 1000 m × 1000 m × 1.025 = 1.025 × 10^7 × 10^3 Kg

From this equation, the acceleration a is 38 × 10^{-6} m/s^2
The time until the VLSI speed becomes 0 can be obtained by the following formula.

$$V = a\,t \qquad \text{.....(9)}$$

V: Velocity (0.215 m/s)

a: Acceleration (38 x 10^{-6} m/s^2)

t : Time (sec)

From the formula above, t is required to be 5645 sec. It will take about an hour and a half until the speed becomes 0, and the distance traveled so far is

$$S = \frac{1}{2} a t^2 \quad .....(10)$$

S: Braking distance (m)

a: Acceleration (38×10^{-6} m/s^2)

t: Time (5646 sec)

S = 606 m is required for moving distance to rest.
The travel distance and time can be said to be the same as the time and distance required from stop to constant speed movement. The calculation above is calculated assuming that only wind force is used for braking. However, in reality there is water resistance against VLSI speed, the braking distance will be even smaller.

Since the calculation here uses VLSI of 1 km x 1 km as the standard of calculation, we will consider only the numerical order. Actually, these figures will change depending on the shape and size of the VLSI, how many and the size of the high-rise building that is the lift generator will be.

9. Trial Design For OCEAN LAND

1) Outline Of The General Structure

Here is a layout diagram of OCEAN LAND with the function of Ocean Port. This is only an example.
It becomes an island with the function of the city as a whole. It consists of ports, airports, residence facilities, offices, commercial areas, agricultural areas (in high-rise buildings), and so on. Also on the outermost side is a breakwater that protects the island from the waves.

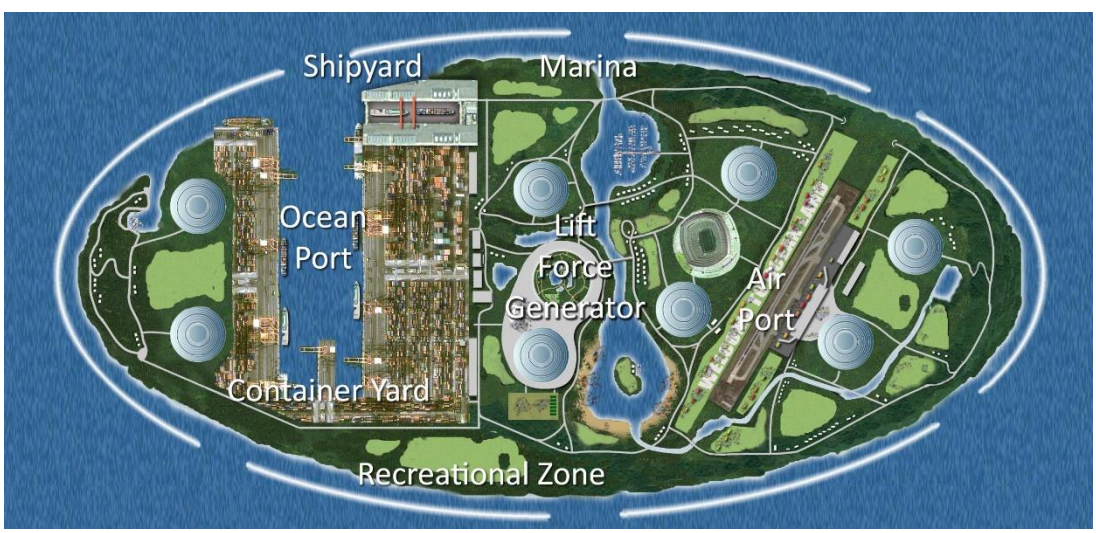


Fig.9-1 Layout of OCEAN LAND

The section is as shown below. The upper floors of high-rise buildings are arranged with orchards, vegetable farms and ranch. Farms and ranches do not require the work necessary for human living, interior necessary for living environment, etc. Currently I think that the place where people live will become the lower floor considering oscillation and safety.

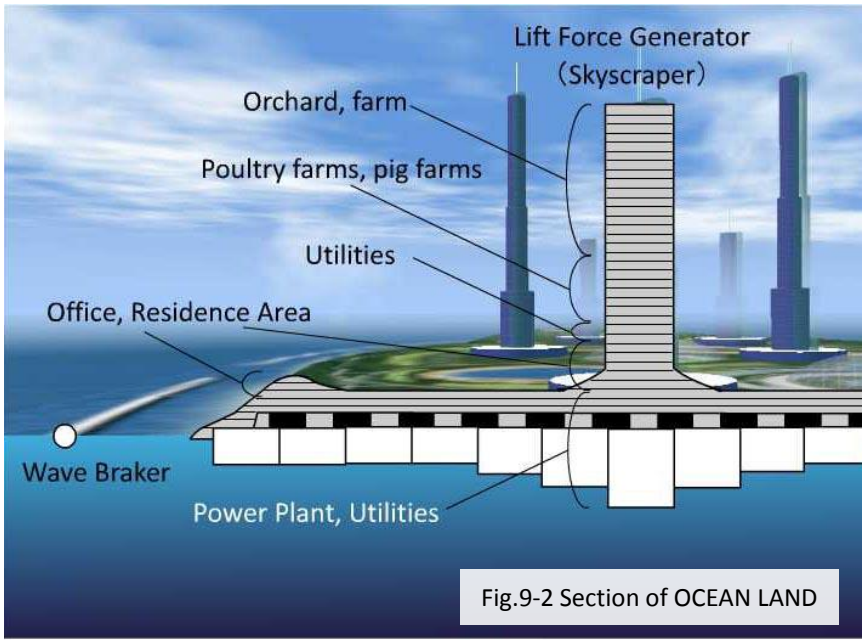


Fig.9-2 Section of OCEAN LAND

2) Power Supply

The power of OCEAN LAND is mainly supplied by the wave power generator attached to the surrounding breakwater. Wave power generation is being developed by the UK, but there is still room for development in terms of cost performance. It is also been considered operating hundreds of air turbine generators using the pressure difference caused by waves between hundreds of air chambers in the caisson. It is also possible to deploy photovoltaic(solar) panels on the outer walls of high-rise buildings.

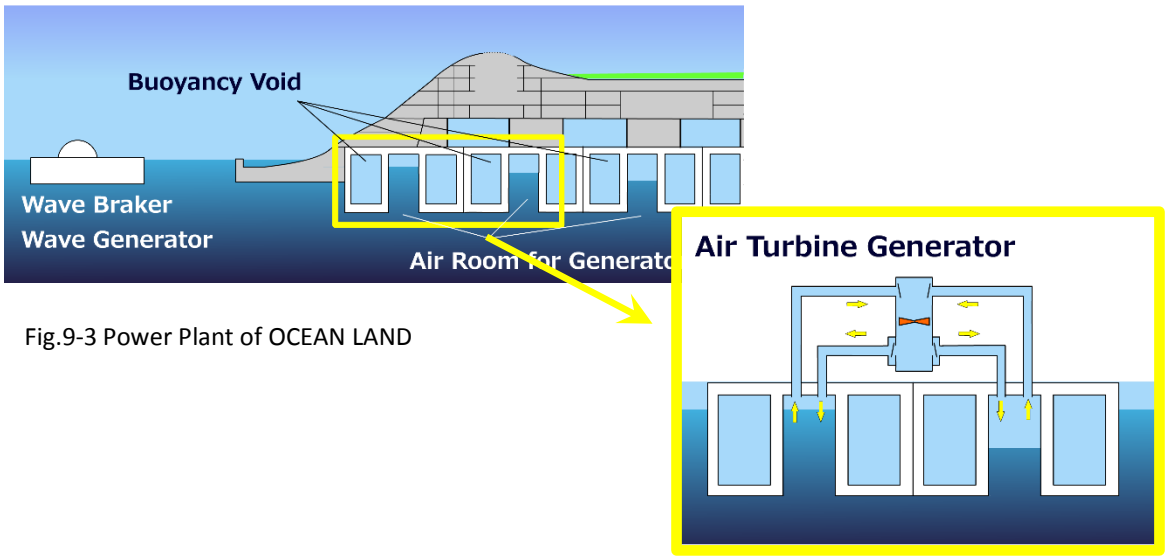


Fig.9-3 Power Plant of OCEAN LAND

3) Fresh Water Supply

Fresh water used in OCEAN LAND is obtained by desalinating seawater. There is almost no problem with seawater desalination technology because it is an established technology.
However what do you do if you live in OCEAN LAND and the animals and plants are running out of fresh water? As mentioned before, OCEAN LAND trains AI (Artificial Intelligence) with all the weather data in past, and calculates from which weather data the direction of OCEAN LAND's course will give the highest gain. Provides support to lift generators, etc. Therefore, when there is a shortage of water, we will take the course in the direction of the highest probability of rainfall, secure sufficient rainfall, and secure fresh water by collecting and purifying the rainfall that has fallen over all of the OCEAN LAND. There are studies that try to eliminate the water shortage by artificial rainfall, but in OCEAN LAND it is possible to navigate while selecting the required weather.

4) Characteristic Of Whole Structure

OCEAN LAND has a special structure called mega float and a complex of a high-rise building that is a lift generator. Specific structural characteristics are determined as research progresses, but the structural characteristics that we are currently considering are mainly high-rise buildings and rigid structures around them, while the flat parts of the mega float are flexible structures that can absorb wave energy.

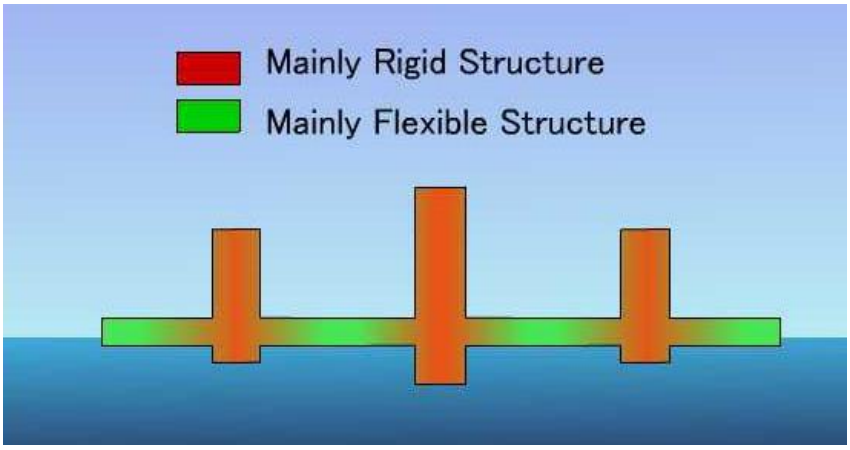


Fig.9-4 Structure Properties

5) OCEAN LAND Structure Having A Center Board

Sailing yachts have a structure in which a board called a “center board” is inserted into the vertical water from the surface of the water to prevent the sailing yacht from being flowed away by the wind. As well as, it is necessary for the OCEAN LAND to have a larger projected area of the grid cross section parallel to the traveling direction than the vertical section perpendicular to the traveling direction of the OCEAN LAND. This space can be assigned to utilities or fuel tanks.

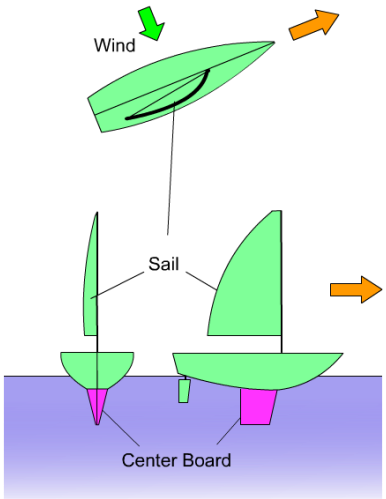


Fig.9-5 Center board of a sailing yacht

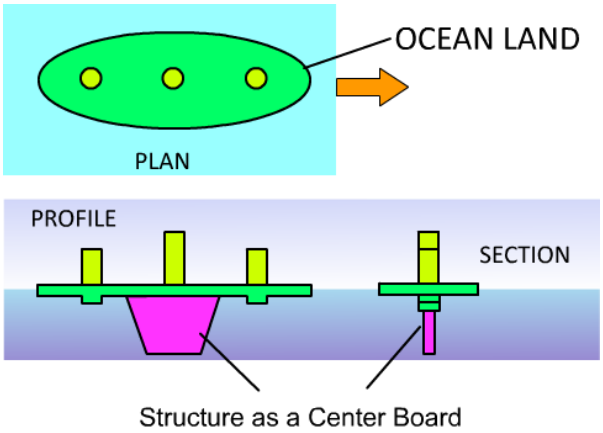
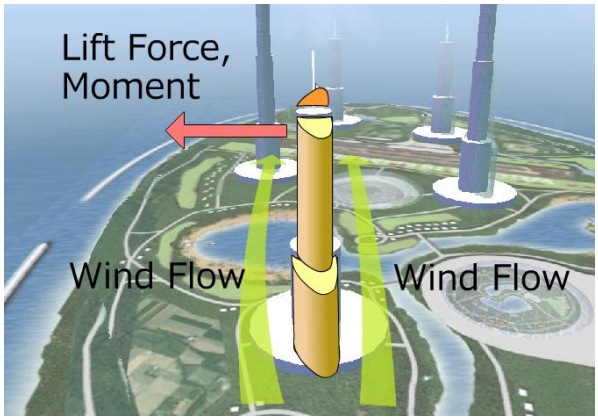


Fig.9-6 Center board of an OCEAN LAND

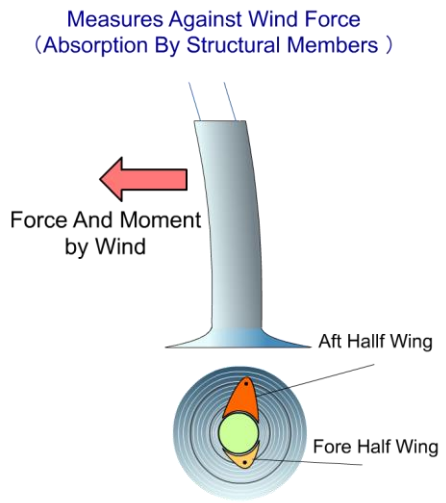
6) LFG (High-Rise Building) Structure



LFG (Lift Force Generators: high-rise buildings) are indispensable for Ocean Land, but large forces and bending moments are generated by the wind in the lateral direction of the high-rise buildings. This measure is necessary. The following figure shows how to deal with it.

Fig.9-7 Force and Moment on LFG(High-Rise Building) by wind

Fig.9-8 A method to absorb the force and moment generated by the wind with a flexible structural member.
The higher floors of high-rise buildings are allocated to vegetable factories and orchards, so people are not affected by the movement of high-rise buildings.



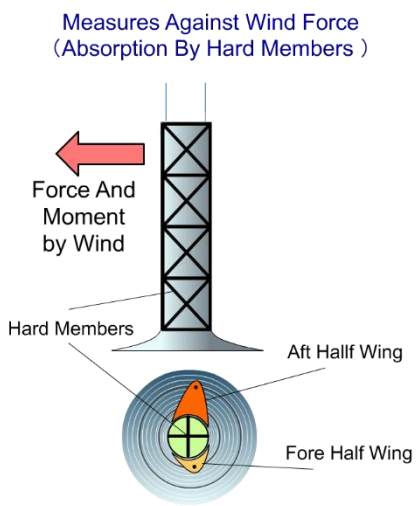


Fig.9-9 A method to keep the force and moment generated by wind with the strength of rigid structural members.

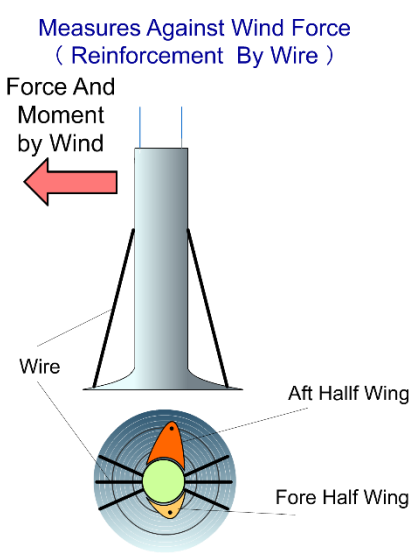


Fig. 9-10 A method of pressing the force and moment generated by the wind with a wire directly connected to a high-rise building. Similar to the wire of a suspension bridge.
In this case, the lower part of the wire will be movable around the building along with the wing shape deformation.
A fairing is attached around the wire to prevent wind noise and wind force.

10. Typical Research Themes For OCEAN LAND Project

The main research topics related to the OCEAN LAND program are as follows.
1) Trial Design Of SI(Sailing Island), VLSI(Very Large Sailing Island)

By designing a trial design, how much performance is required for mega float VLSI, how much quantity is needed, what kind of method can be considered for construction, etc. are subjects to be studied. We also need research to understand the structural characteristics of mega float.

2) Research About LFG (Lift Force Generator) System

It will be the main research content in research and development of OCEAN LAND. It is necessary to research and develop and investigate various methods, methods and performance of lift generator.

3) Research About Construction Method For Large Scale Structure

We will study whether mega float can be built using marine microorganisms etc. rather than using artificial structures. The goal is to build maintenance-free structures on the sea.

4) Scale Experiment In The Ocean

It is a demonstrative experiment proving that mega float by the lift generator which is basic technology of the OCEAN LAND plan is controllable. We will change various lift generator and operate in actual waters, we will acquire data such as ocean current, wind direction, wind power, tidal current, speed and direction of the experiment vessel.

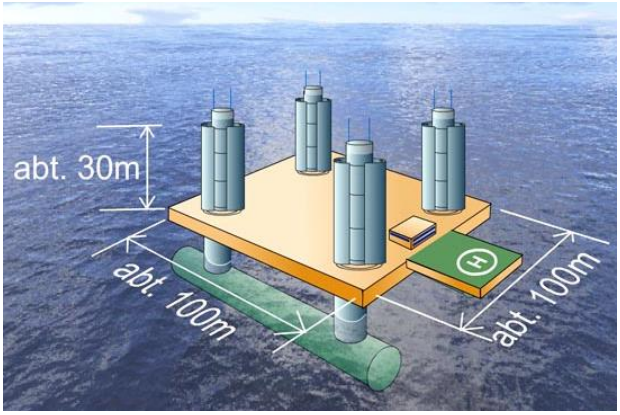


Fig.10-1 Demonstrative Experiment (Image)

11. Goal Of Research & Development

We will describe what kind of criteria should be the results of research and development.

d) Common Interests Of Mankind

To be able to explain that the human race of the world will lead to a common profit that can be convinced.

b) Technical Aspect

Explain that it can be realized technically and experimentally, numerical and logical backing.

c) Environmental Protection

It is a technology that does not destroy the global environment, but rather can contribute to preservation of the global environment.

12. OCEAN LAND From Planning To Construction

1) OCEAN LAND Model Selection And Research

The first thing to do before planning and building OCEAN LAND is selecting and studying existing model islands. For example, Tanegashima has a Japanese space rocket launch base. Japan's cutting-edge technology and human resources are gathered. On the other hand, there are people who run agriculture, forestry and fisheries on the island, and their families, that is, children and elderly people, so there will be elementary, junior high and high schools on the island, and facilities such as hospitals. In addition, various occupations such as commerce, industry, tourism, transportation and distribution industry, and life are mixed to form Tanegashima. In order to build OCEAN LAND, not only engineering solutions but also research, development and design of what kind of society must be realized in OCEAN LAND must be carried out.

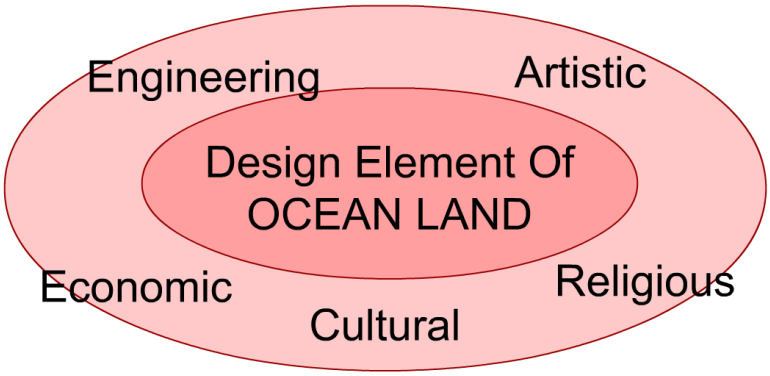


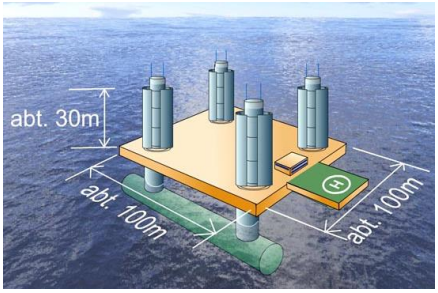
Fig 12-1 Design Element Of OCEAN LAND

2) Main Flow From Planning To Construction

Here are some suggestions on how to proceed when building OCEAN LAND.

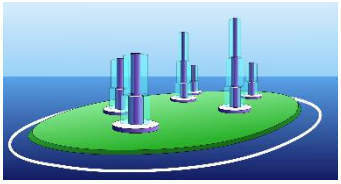
Development of LFG
Refine the method to about 3 methods through wind tunnel experiments from various LFG methods

Demonstrative Experiment
Through demonstrative Experiment, decide the actual LFG



Decide the Specifications and Plan of OCEAN LAND
Decide for what purpose and decide the specifications

Make an OCEAN LAND Scale Model



Numericalization Of Underwater Characteristics

Numericalization Of Overwater Characteristics By Wind Tunnel Experiment

Simulation By AI
Converts each numerical value of the model into full-scale data, performs an operation simulation by AI using all past weather data on the earth, and feeds back to the design.

Finalize The Specification And Design Of OCEAN LAND

Building Of OCEAN LAND

Fig 12-2 Planning Through Building Of OCEAN LAND

3) OCEAN LAND OL12100

Currently considering a plan for the Oceanland OL12100. The main items are as follows.

Length	12 kilo meters
Breadth	4 kilo meters
No. of Building	100 or more
Population	1,000,000
Main industries	Agriculture, Fishery, Marine Development

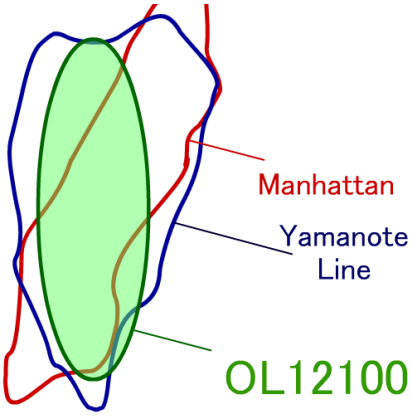


Fig 12-3 OCEAN LAND OL12100

13. OCEAN LAND And Natural Environment

Isn't there a big impact on the natural environment by creating a huge structure like OCEAN LAND?. The idea of "Protecting the Natural Environment" is very important. However, nature is not always calm and quiet. We must also consider the possibility of extinction of animals and plants due to pyroclastic flows and ash fall caused by volcanic explosions once every several hundred years, tsunamis caused by huge earthquakes, or collisions of asteroids with the earth, which are said to occur once every tens of thousands of years. It is said that if an asteroid collides with the Earth, dozens of percent of the species on the earth will be extinct. If humans are aware that they are at the top of the entire life pyramid on Earth, then they have obligation and responsibility to develop counter measures for the survival of them, plants, animals, and all living things.

14. OCEAN LAND And SDGs

Fig.14-1 SDGs

The Sustainable Development Goals (SDGs) or Global Goals are a collection of 17 interlinked global goals designed to be a "blueprint to achieve a better and more sustainable future for all.(SDGs from wikipedia) OCEAN LAND , to achieve the Goal 11) "Sustainable cities and communities", Goal 13) Climate action, Goal 14)Specific measures against climate change, and Goal 14) Life below water in main. We will continue to research and develop for this purpose.

15. Significance And Challenges Of OCEAN LAND

1) Significance

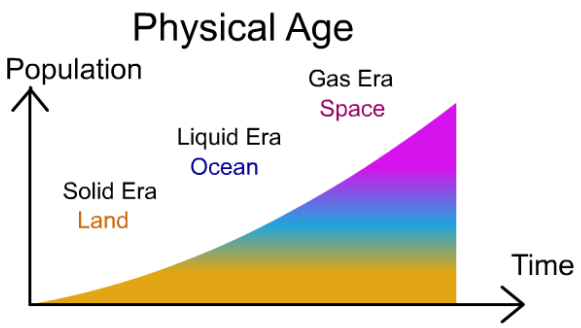


Fig.15-1 Physical age concept

I want to give another significance of OCEAN LAND as well as the preface of this document.

When we consider the “physical age”, we can say that the history of mankind so far is centered on land.

There are solids, liquids, and gases in the material, as well as the solid era centered on land, the liquid era centered on the ocean, and finally the human beings will emigrate to space colonies, the moon and Mars. I think there will be gas era.

Above the ocean land is a semi-closed space isolated from the land by the ocean. In the future, in order for people to go into outer space in the gas age, they will move together with animals and plants in the spacecraft, and will move while repeating the food chain in the spacecraft.

I think the liquid age can be said to be the time to prepare for the coming gas age.

In addition, as mentioned before, when the environment of the people living near the coast or on the islands is threatened due to rising sea levels on the whole earth, it becomes a candidate for migration to such people. OCEAN LAND can be said to be a Noah's Ark in the 21st century because it can avoid tsunami disasters and does not cause flood disasters.

2) Challenges

There are various challenges in realizing OCEAN LAND. The largest of them is the universality of the whole organism, " Except for some insects, fish and birds, all humans and all living things tend to select the place where they have survived and being grew up from generation to generation as the place of survival and breeding for themselves and for future generations." It is related to the law. Since the birth of the earth, all living things on the earth have been evolving repeatedly while applying to the environment, and finally the present place is the optimal place for survival and breeding.

Most people are born on land. People grow up there in their childhood, in relation to their parents, grandparents and siblings. During that time, they grow up while being familiar with the scenery, the four seasons, customs, and culture of the area, and their attachment to the area is born from festivals, local events, and food products.

And when it's time to grow up and become independent, it's time to choose to continue living in the area or move to another land. While you may choose to live in a land other than the one you were born in, such as because of a job, some people may continue to live there because of your relationships with your parents and family.

Even if OCEAN LAND has a disaster-resistant living environment and strengths, it may not be selected as a residence, and even if it is land-based land that is often exposed to disasters, it has a strong attachment to the land. In some cases, you may choose to live on land, in your own hometown.

In order to build an OCEAN LAND and make it an environment where many people can live, it is not just a matter of the length of the living environment, but something that can be chosen more than that.

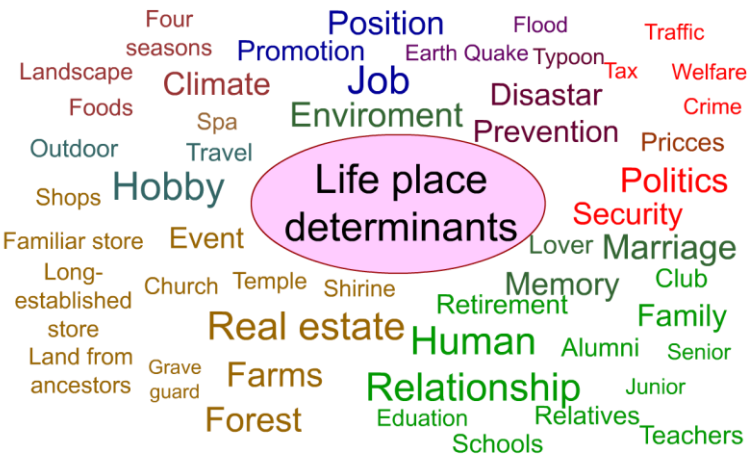


Fig.15-2 Life place determinants

Recently, the story of Mars migration has become more specific. However, migrating to Mars is a harsh environment that is incomparable to the global environment, and is probably a one-way ticket trip. However, some people are opting to move to Mars, albeit in the distant future.

16. Flight Simulator “EZ FLIGHT”

I will explain "EZ FLIGHT".
(EZ FLIGHT can be downloaded free from http://oceanrepublic.org/simulator/.)
By opening the website (http://oceanrepublic.org), we received opinions from various people. One opinion among them "There is an opinion that I think that it will be easier to understand if there are things that are easier to understand, such as models, although it can be understood as a concept." That's why Flight Simulator "EZ FLIGHT" was created. By software to fly over the OCEAN LAND in a virtual 3D flight simulator, or OCEAN LAND is what kind of things, to understand, I think you can feel.

Fig.16-1 Flight Simulator EZ FLIGHT

17. Conclusion

Masashi Sawada owns the copyright of the Ocean Republic concept, the OCEAN LAND program. Also, some of the documents quote images on the Internet.

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