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Vicky,

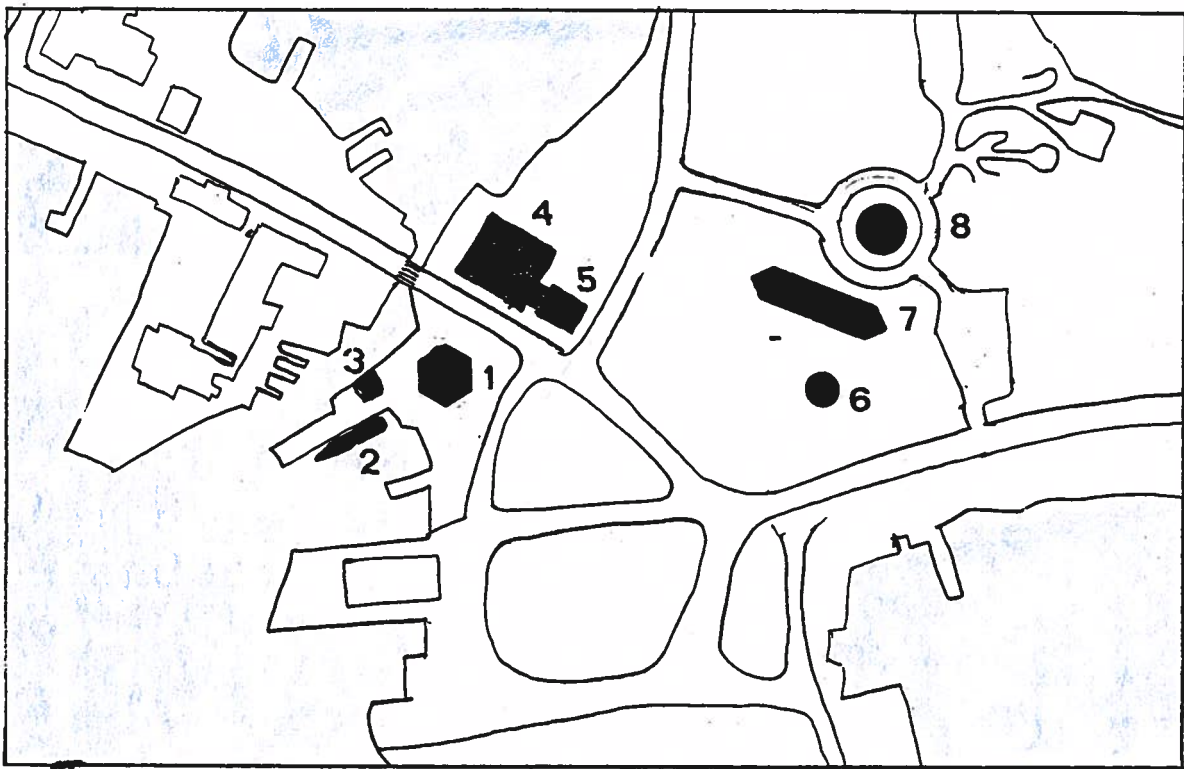
Here is a list of lunatics.

Do you suppose we could ever  
promote something like this in  
Woods Hole?

Paul

DRAFT

**The Woods Hole Marine Exhibit**



- 1 Information Center  
(gift shop, rest rooms)
- 2 R.V. *Oceanus*
- 3 D.S.R.V. *Alvin* (The Abyss)
- 4 Museum
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- 7 The Wave
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## Information Center

It is a good idea to start your tour of the Marine Exhibit at the Information Center, where you can obtain a free brochure and map of the exhibit. The center also has a gift/souvenir shop and rest room facilities.

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## R/V OCEANUS

The R/V OCEANUS was one of Woods Hole's most active research vessels. When it was retired, the OCEANUS was moored permanently along the dock at the point on the map indicated by the numeral 2. Visitors are welcome aboard, to inspect the laboratories, deck equipment, winches, living quarters, engine room and pilot house.

## The Abyss

On the dock, next to the RV Oceanus, there is a rather ordinary inconspicuous Cape Cod shingled shed. Inside you will find the widely known deep-sea submersible ALVIN, open for your inspection. This is the vehicle that enabled the discovery of the thermal vents along the deep crests of mid-ocean ridges.

The exhibit also includes a special chamber in which visitors can experience a simulated deep dive to view the one of these vents, with the flood lights of ALVIN illuminating a "black smoker" and the other-worldly life forms around it.

## The Redfield Marine Museum

The Redfield Marine Museum is housed in the remodelled Redfield Laboratory. The main building contains a wide variety of exhibits, such as the collection of historical instruments, models of research vessels, specimens of marine animals and plants, etc.

It also houses a lecture hall in which formal lectures for the public are regularly scheduled during the summer months.

## THE HYDROSPHERE

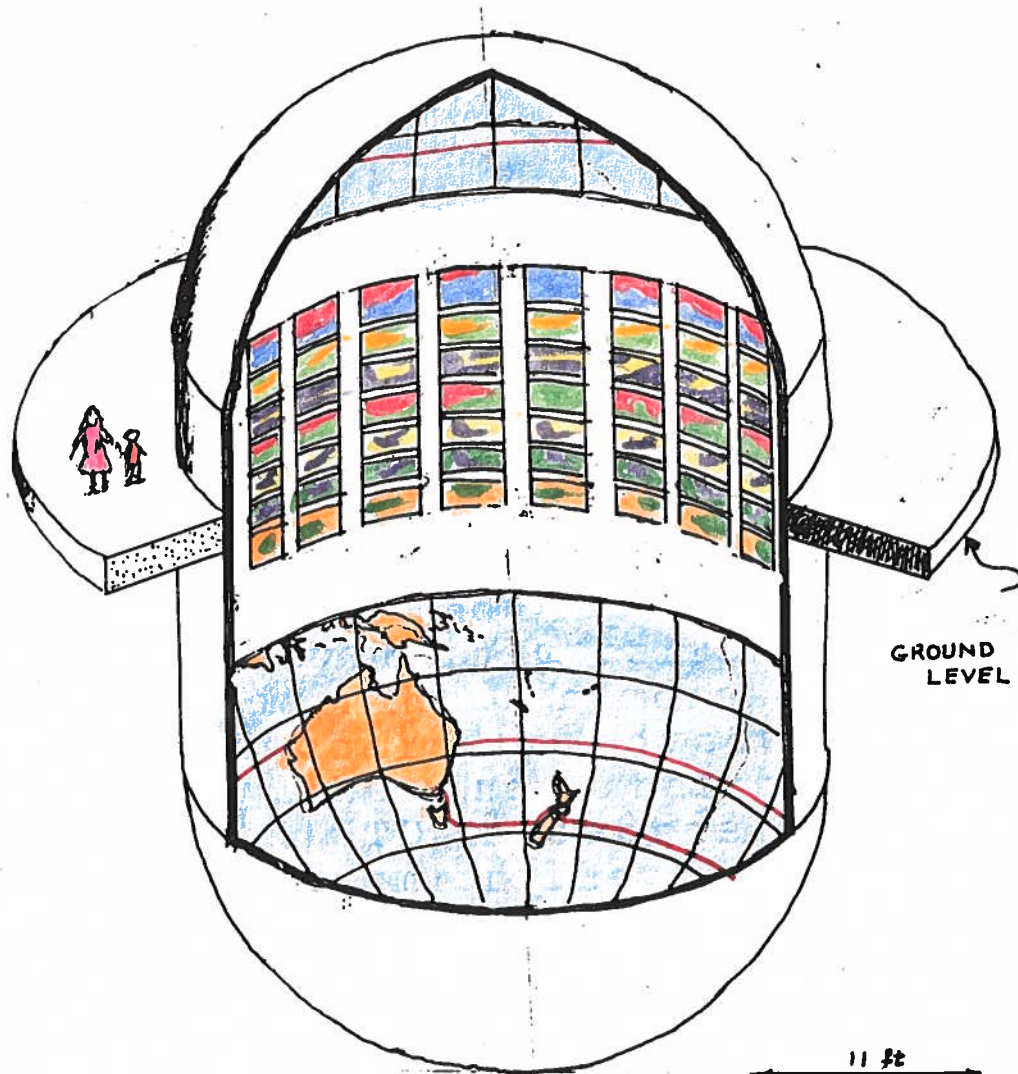
One of the main results of WOCE will be the series of hydrographic sections of the WHP. These are being prepared in the uniform style of the 1960 Fuglister IGY Atlas of the Atlantic, the Scorpio sections, the Warren and Toole sections of the Indian Ocean, and the forthcoming Atlantic sections by McCartney.

At the end of WHP there will be 30 modern sections in this color printed format, each section comprising 7 panels about 2'x3'. They could be mounted in 7 superposed horizontal rings within a cylindrical wall 30' in diameter, and 12' high. It would be an impressive and informative exhibit, rich in detail. It could give a good, accurate and positive picture of what we do at WHOI.

The exhibit could be presented inside a special building "The Hydrosphere", something like the display of the celestial sphere in a planetarium or the fish world in the Boston Aquarium.

The Hydrosphere is mostly under the ground level, only a spherical cap extending above the surface. The diameter is 30' (Figure 1). Under the ground there is a vertical cylinder some 16' high, and on the bottom is another spherical cap (Figure 2).

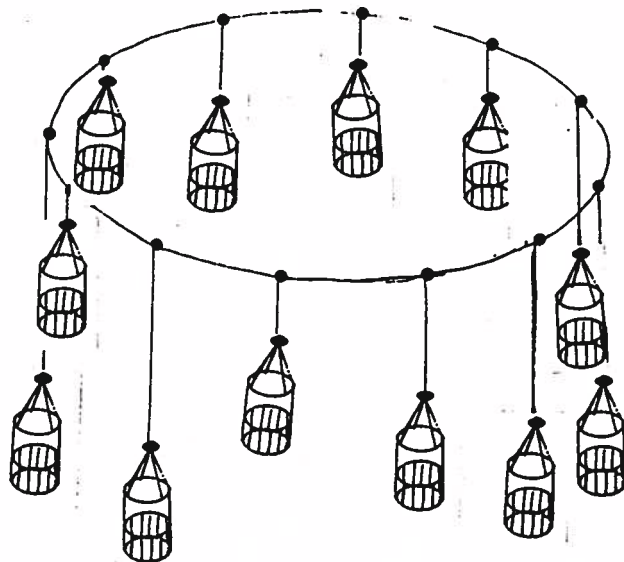




THE HYDROSPHERE

Suppose that you are suspended inside the building. If you look up or down you will see that inside the hemispherical ceiling and floor there are maps of submarine topography. The lines of the sections are clearly marked on these maps.

The color printed sections are mounted on the inside of the cylindrical walls.



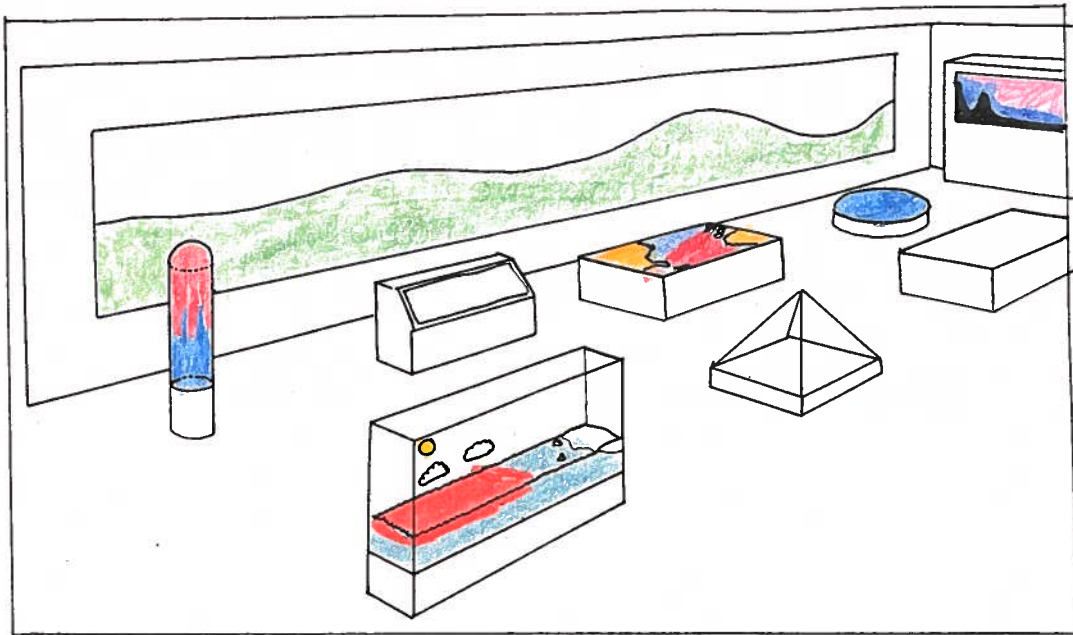
Access to the display might be made possible by fairly narrow balconies. However it might ~~be~~ more exciting if visitors could be moved about by a carousel like ring of baskets (made to resemble CTD rosettes) that are suspended from trolleys on a circular track around the ceiling (Figure 3). Winches raise or lower the baskets so that the various circles of panels can be viewed closely. The winch control can be controlled by the lecturer for formal presentations to groups, or can be run personally by the individual rider who is exploring the exhibit by himself.

One can think of various dramatic visual effects such as controllable spotlighting. Or some sense of the vertical distribution of temperature in the ocean could be imparted by strong thermal stratification of the temperature of the air within the building, so that one runs through a strong temperature change as the rosette ascends and descends.

## The Wave

The Wave houses several exhibits that illustrate various features of the ocean in motion. Among these is a working Air-Sea Climate Model that illustrates the complex interactions of the atmosphere and ocean as they absorb and reflect radiation energy from the sun, then are set in motion by buoyancy forces. The motions of air and ocean are the winds and currents that transport the heat to other geographical locations, from which the energy is all dispersed to space again by infra-red radiation. These processes are all simulated by the working model using real fluids. The physical principles are described and explained.

Another model shows the Gulf Stream, how it gathers up waters flowing around the subtropical gyre of mid-ocean, how it intensifies and channels the warm waters back towards the north, and fans out to modify the climate of Europe. This model also operates using real fluids. It illustrates the process of "ventilation".

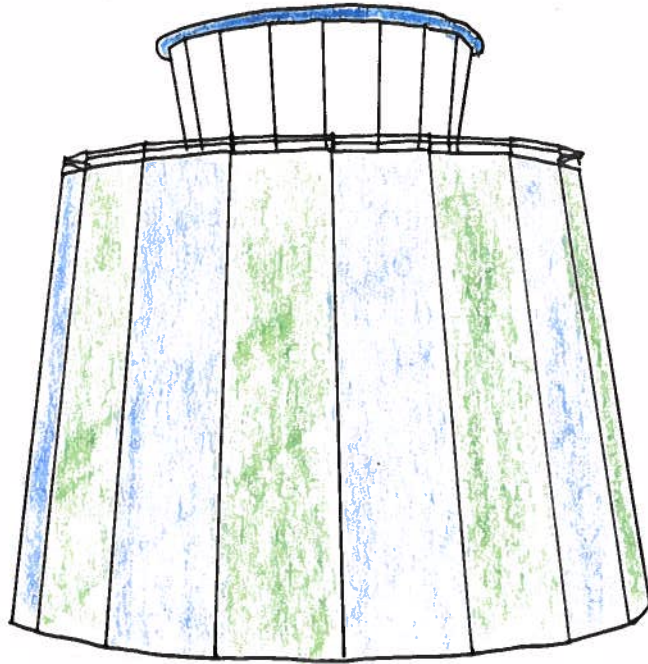


The Deep Ocean model shows how deep waters are formed by sinking in polar regions, and by overflows from adjacent seas such as the Norwegian Sea and the Mediterranean Sea. These waters have different colors in the model, and one can see how they make up different mixtures in each of the deep sea basins.

El Nino is an exhibit that describes the interannual fluctuations of temperature that occur in the equatorial Pacific Ocean. The idea of data assimilating dynamic modelling and prediction of El Nino is illustrated with an actual computer.

There are also some smaller exhibits that illustrate the physical ideas behind Coriolis Force, the reason for two simultaneous high waters of the semidiurnal tide, ideas about sea-ice, etc.

The building is a long rectangle in plan. It has a low profile. The south wall is a double thickness of heavy plate glass, extending the full length of the building. In the space between the two sheets of glass are two immiscible fluids of different density and color, in which a giant internal wave is maintained in motion.

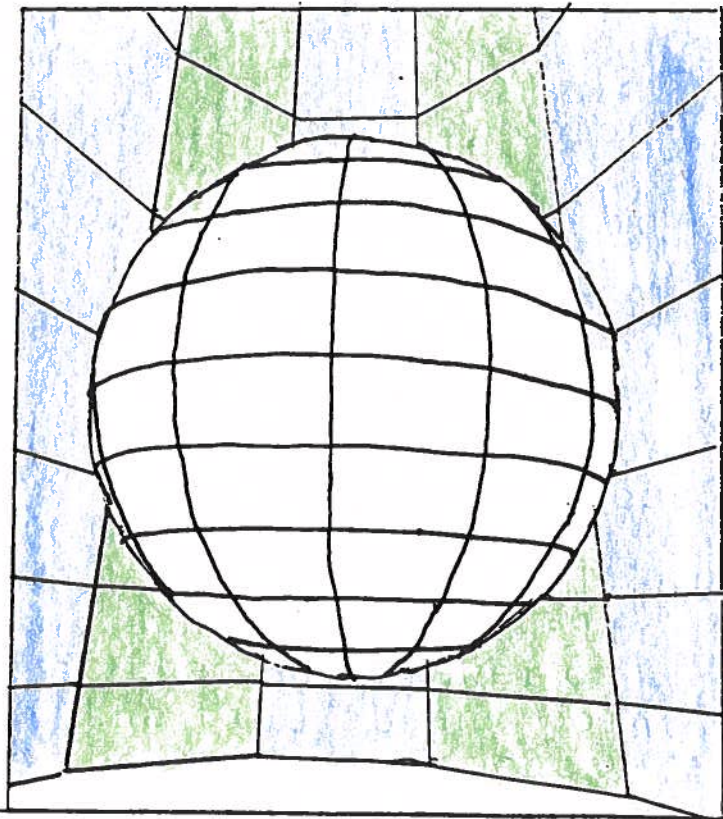


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### Operations Center

Built in the form of a rather broad lighthouse, sheathed with a dark blue-green glass exterior, this is an exhibit aimed at communicating the magnitude of past and ongoing efforts to gather data about the ocean. Upon entering visitors find themselves enveloped in a dim blue-green light on all sides, filtering through the outside walls, much as though they are standing at the bottom of a shallow sea. The light is brighter and yellower near the top. In the center of the tower is a nighttime globe of the world 15 feet in diameter. Images can be

projected onto the translucent surface of the globe from a computer controlled laser gun inside the globe to depict patterns of geographical distribution of stations, moorings, float tracks, XBT lines, etc. drawn from a complete and exhaustive data file of all historical data sets. In a sense this globe simulates the "card index" of a world-class library; it lists and locates both in space and time all the observational material that oceanographers have to work with. The display can be manipulated by the tour guide, or lecturer, to illustrate the entire history of scientific oceanic exploration, over the past century and a



half. In this sense it is something like a planetarium ( seen in this case from the outside rather than the inside of the globe): one views the evolving constellations of data records as patterns of bright colored dots over the surface of the ocean. The lecture begins in 1860 with the surface observations begun by Maury. We see how the data follows the shipping lanes up until our own time. The the lecture turns to deep sea hydrographic measurements, beginning with the historic cruise of HMS Challenger, and shows the routes of all the succeeding cruises over the world as the years roll by.

Next the lecturer shows, in more recent years how moorings have proliferated over the oceans, and the tracks of neutrally buoyant floats, whose depths are coded by color.

Next a composite cinematic view of satellite thermometric data is projected upon the globe.

Finally the actual tides over the whole globe are predicted using the Schwiderski model. The progress on the tide is followed from -24hrs to +24hrs of the actual time of the display, at which time the display halts for 30 desconds so that the viewer can find the height of the tide at any point in the world at the present moment. After the 30-second halt the displays repeats the two day cycle again.



Ascending to the top of the tower visitors enter the actual Operations Center. This room occupies what would ordinarily be the lantern of a lighthouse. Outside of it there a a surrounding broad railed platform with splendid views of the Hole, the Elizabeth Islands, the Vineyard, and the ocean beyond.

The Operations Center is in touch with all programs of oceanographic observation as they are occurring in real-time. There is a large map which locates the position of all research vessels, and indicates the nature of the measurements that they are engaged in making. It is up-dated daily by electronic mail. It also shows the status of major moored buoy arrays, such as the TOGA network in the equatorial Pacific. When a tsunami alert occurs the pertinent epicenter and times of arrival of the tsunami are plotted on this chart. The general effect is to emphasize the importance of the collecting of data from the ocean, and the magnitude of the effort required to do so.

Nantucket

Dear Aunt Anne,

We have arrived here at last, and the house seems to have survived the winter, so we are practically already settled in with the kids.

The ferry boat was delayed for two hours and we had some time to spare in Woods Hole. You would be amazed by the changes there.

The Oceanographic Institution has built a wonderful new exhibition center that gives a splendid overall view of its activities. There are so many different exhibits that I haven't the time to tell you about the Hydrosphere, or the Ocean Climate buildings. They have moored one of their retired research vessels at the little dock behind where the old drug store used to be; it is open to visitors and it is arranged to show how different equipment is used. I rather liked the wet lab with its arrays of reversing thermometers, the winches, various buoys and instruments cluttering the deck, and the kids loved the pilot house.

To my mind the best part of the exhibit is near the head of Little Harbor — the so-called Operations Center. It is a four-story structure sheathed entirely in translucent green and blue glass, shaded more lightly at

*the top than at the bottom. When you enter you get the impression of being at the bottom of the sea, with the sunlight filtering down from above. It is a little eerie and cool. Nested inside there is a second building with spiraling floors with various exhibits of which more later. At the top one emerges upon a large open roof with a railing around it, like the platform about the lantern of a great lighthouse, and splendid views of the Hole, the Elizabeth Islands extending down the Sound, and of the Vineyard.*

*In the center of the roof in the place of what would ordinarily be the lantern is a large hall that contains the Operations Center. I can best describe it as the brain of the Institution. The dominant feature is a great map of the world on which the locations of all the world's research vessels are marked by lights, and it is kept up to date by electronic mail, and the nature of the scientific work that they are doing is cleverly indicated. You can also see at a glance where major experiments are being conducted. I was impressed to see the extent of ship-borne research activity being carried out around Japan. Also I was unaware of such enterprises as the arrays of moorings set out along the Pacific equator. They have hundreds of free-floating instrument packages in the ocean too. The complexity of the tracks that they follow is intriguing, and I*

wonder that the scientists can make any sense of them. One cannot come away from this exhibit without being impressed by the global nature of ocean research that these people are attempting to conduct.

There is a great deal else to see, and it was wonderful for keeping the children occupied during our brief lay-over. Jimmy was thrilled by *The Abyss* — a simulation of a deep sea dive down to the mid-ocean ridge to see a thermal vent. Quite spooky with the black smoke and other-worldly (plastic I think) animals.

Jimmy says he wants to be an oceanographer. Joyce, all eight years of her, is now going to become a maritime lawyer.

When you come to visit us this summer be sure to allow enough time to have a look for yourself. It is very much worth arriving in Woods Hole well ahead of the departure time of the ferry.

Your loving nephew,

*John*