The European Underwater Research Station
Proposal Information File

Updates:
15.06.2023: version shorted for media purposes
28.04.2023: addressing the space sector
13.01.2023: Redesign; adding phases section and cost estimation

“We have to maintain a human presence on the seafloor”

Dr. Sylvia Earle

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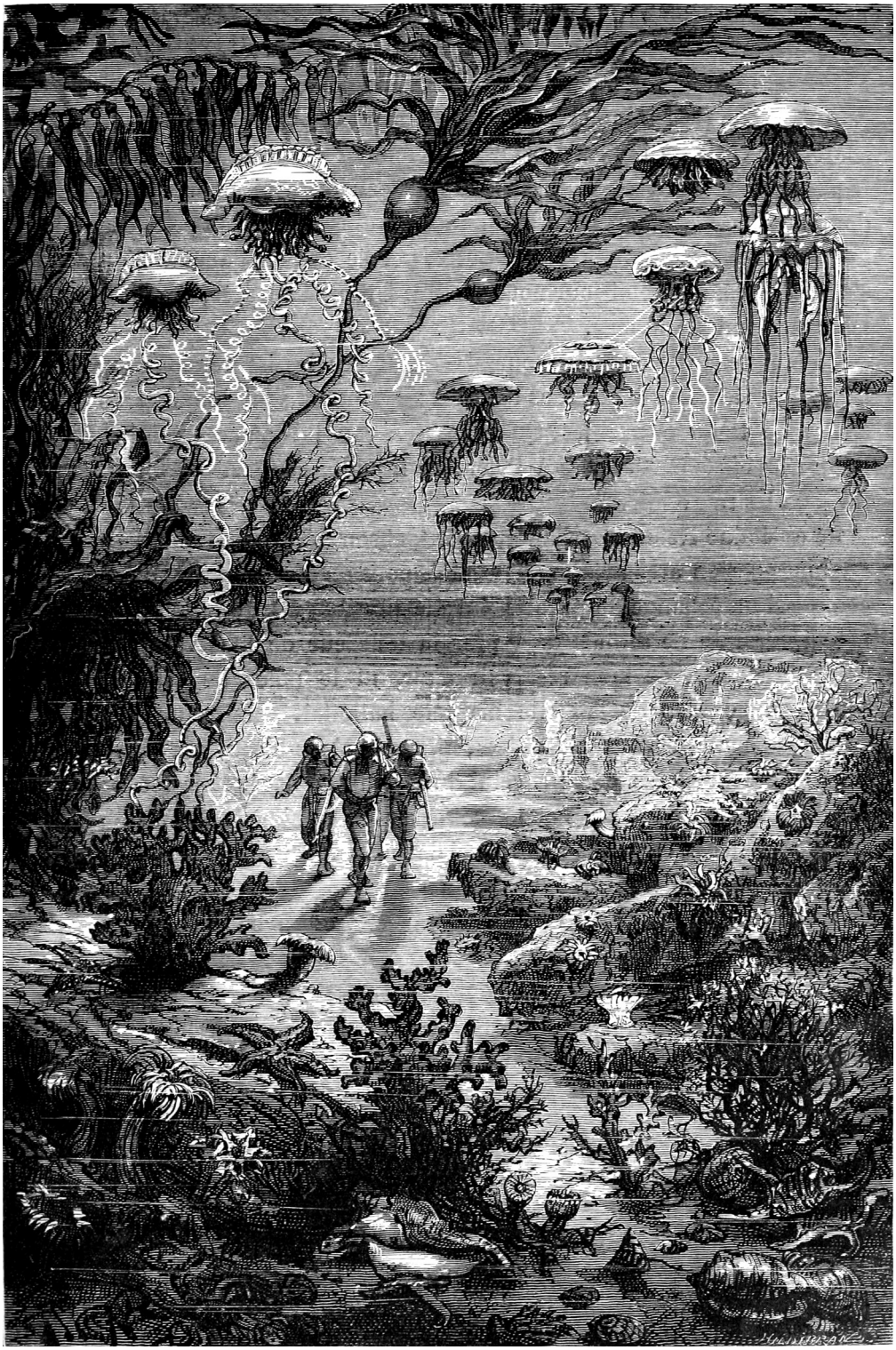


Image by Alphonse de Neuville
for Jules Verne's "Vingt mille lieues sous les mers", 1869

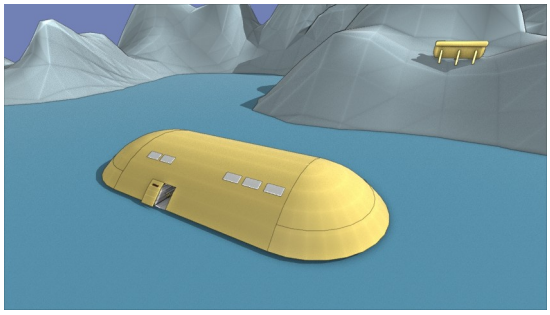
Introduction

Goal

Building a new generation of modular, serial underwater habitats for human occupation with emphasis on the human factor and habitability consisting of

- a development park with land and underwater facilities
- a mobile habitat (incl. mobile infrastructure: buoy, land base, transport devices)
- a large, semi-mobile habitat complex

mobile maintenance habitat



Module 1

About CalamarPark

CalamarPark (a branch of Cabrito Consulting) is located in Germany. It is an independent '**Initiative for Studies on Aquanautic**' founded in 2006. Its aim is to develop a new generation of modular, serial underwater habitats for human occupation with emphasis on the human factor and habitability. The main facility and its mobile module will be open to several inter-/multidisciplinary application types to maintain sustainable funding. *CalamarPark* has extended experience in several corresponding sectors and established a large network of underwater specialists. Based on this network *CalamarPark* will act as an agency to bring together the best manufacturers for the different components of the habitat.

Technical Background of Underwater Habitation

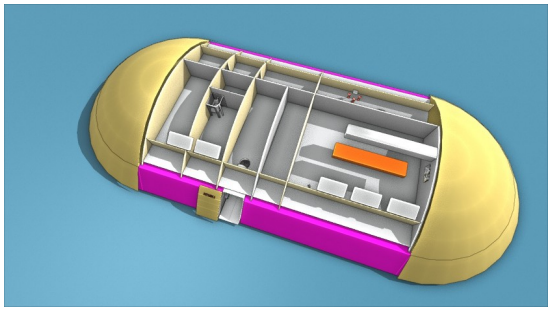
The subject of underwater habitation is closely related to saturation diving. A body is saturated with inert gas during a stay of several hours at a certain depth, so its decompression time from that depth does not increase further. The inhabitant of an underwater station is thus automatically in a saturated state, so that a sudden emergence to the surface is no longer an option. This final decompression time can be very long depending on the depth. Divers of *Aquarius Reef Base* in Florida at a depth of 19m decompress for 15 hours and 45 minutes in the end of a mission. They spend this time within the closed habitat, while the pressure is slowly adjusted to that of the water surface. A short recompression follows at the end so that the divers can leave the habitat as after an ordinary dive and emerge to the surface.

CalamarPark's Proposal

CalamarPark has been working extensively on potential applications of underwater habitats for human occupation and came to numerous solutions regarding the question, why underwater habitats failed to increase in numbers and to provide adequate living spaces on the seafloor. Analysis of all previous habitats are incorporated into the design. This led to the configuration of a habitat complex that will offer ideal simulation conditions for humans and technology, especially in the space sector. The modular design will allow external institutions to dock their own modules and use the existing infrastructure such as energy, air and water. The central location in the European Mediterranean will reduce dependence on other states, strengthen cooperation between the individual member states and encourage other neighbouring states to become involved in the project themselves.

The habitat complex will also be opened to other sectors, which will lead to sustainable financing of the project and interdisciplinary cooperation. Therefore the following sectors were defined and surveyed as potential mission conducting parties:

- marine conservation
- space agency training
- tourism
- education (incl. citizen science)
- entertainment
- advertisement
- private civil participation
- arts & culture
- marine sciences / oceanography
- underwater archaeology
- space analog missions



Possible interior configuration of Module 1

The concept includes a small mobile habitat and a semi-permanent modular underwater habitat complex for the Mediterranean, which directly neighbors 42 countries of the EUROMED region, each with its own programs in the above-mentioned sectors. Depending on the individual mission goal it could be used at different depths.

It is intended that this habitat will serve as a precursor and first step of a larger structure providing large spaces for appropriate habitation. This habitat is to be extended with additional modules and will serve as the main base for other laboratories in the vicinity at various depths. It will be part of a development park that will be open to, assist and promote external ventures to develop new habitat concepts and their components in order to explore new living environments.

'realistic, cost effective and scaleable – trifecta of intelligent design'

Liz Taylor, President of DOER Marine,
on CalamarPark's *"Hangar II"* design

Summary of Key Properties

CalamarPark's manned habitat proposal intends to create useful space for **interdisciplinary** purposes on the seafloor. Therefore we defined nine potential mission conducting sectors as well as nine potential mission funding partners.

The first module of the large habitat complex will be fully functional and offers space for **4 inhabitants and 2 technicians**.

The preferred location is the **Mediterranean Sea**, covering 42 countries (including 27 EU countries) between Europe, the Middle East and Northern Africa (aka EUROMED) and their individual science and industrial programs.

The concept targets a corresponding **Development Park**, providing the infrastructure for its own and other seafloor habitat projects. External projects will have the possibility to dock onto the main structure.

Outstanding Design Features

- Modularity; each module includes standardized docking collars for docking and to-be-docked to other extensions
- Network Compatibility; the concept contains all prerequisites to be able to form a network with other habitats in the vicinity
- Habitability; emphasis on the human factor and potential long-term accommodation
- Serial Production Design; one fully approved static plan to be reused for future habitats
- Full Integration; ballast, trunk, pillars etc. are integrated into the main system
- Semi-Permanent Main Structure (able to change location after medium long periods)
- Mobile Maintenance Habitat; dockable to the main habitat
- Ability to float; the habitat is built on a floatable frame/barge
- Ability to be towed; the design allow the habitat to be towed to a different location
- Adjustable Pillars; hydraulic pillars allow alignment to uneven seafloor
- Drift Resistance
- Attractive Design to maintain public interest
- Mission-independent event plans to maintain constant financial sustainability

The feature "***Open Hatch***" will offer three uniquenesses:

- a standardized docking collar, which specifications will be publicly available and allow other institutions to develop their own habitat and dock it to the main structure
- special quotas for underserved communities and developing countries
- a special program to allow different enterprises to use its infrastructure for their purposes

Depth Range

- Rated for depths up to 50m (164 ft), covering 25% of the epipelagic zone / continental shelf
- Suited for operation in ambient pressure and surface pressure
- Deployable at any desired depth between 10m and 50m

Further Sources

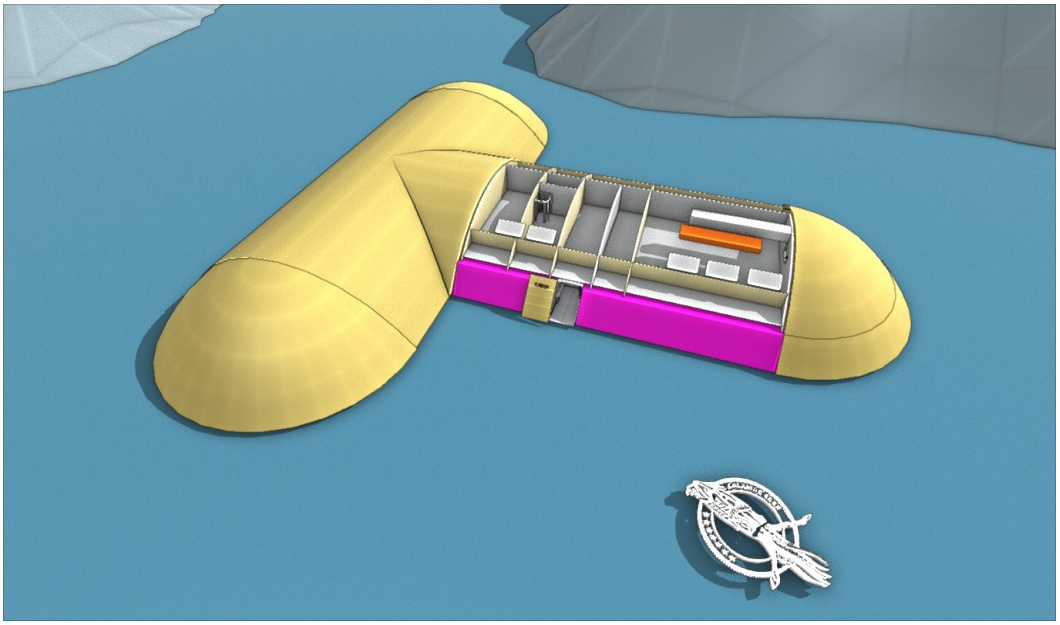
In 2018 Martin Henke proposed the concept of an International Underwater Station similar to the ISS on the *21. Underwater Science and Technology Meeting*. Several other endeavors started their venture to build a permanent living environment for human occupation under the sea.

In 2021 we started a cooperation with Michael Schutte, naval architect and designer of proposed *Poseidon Undersea Resorts*, and gained support from renowned underwater archaeologist Assoc. Prof. Dr. Hakan Öniz, (Head of the Department of Restoration and Conservation of Cultural Heritage, and Head of the Division of Mediterranean Underwater Cultural Heritage, Institute of Mediterranean Civilizations Research - Akdeniz University; Secretary of ICOMOS International Committee of Underwater Cultural Heritage) especially for the mobile module to be used in archaeology research projects.

In 2022 we called some of the senior names of the Hydrospace Technology sectors to the "*Seafloor Habitat 2.0 – Ignition Con*" to officially close the first generation of underwater habitats and open the second. Participants ranged from Sylvia Earle, Jacques Rougerie, Michael Schutte, Peter Weiss (Spartan Space), James W. Miller, Ian Koblick and many more. The conference was very successful and was belatedly endorsed as an official activity of the United Nations Ocean Decade. The common conclusion was, that there is no replacement for humans on the seafloor. (Recording available at: https://youtu.be/HhfShKtI66A)

A paper on the concept has been accepted for presentation at the International Astronautical Congress in Baku in October 2023, particularly in terms of its benefits to the space sector.

The project will be funded by sponsoring partners, as well as various supporters from academic and private sectors, and is scheduled to be officially launched in 2024.



A vision for an International Underwater Research Station

Core Team

- **Martin Henke** (D), Founder and Chief Concept Developer of Calamar Park. He holds a CAMAS M1 instructor and Technical Dive Master license with more than 1000 underwater hours and more than 500 diving educations, and has extended experience in corporate management
- **Frank Scharmann** (D), industrial product designer, mechanical engineer and a senior consultant in business and IT for several Forbes Top 500 corporations. His company Cabrito-Consulting in Germany is managing partner of CalamarPark providing the legal infrastructure.
- **Alan Allen** (USA), expert in oil spill removal and former aquanaut of Hydrolab
- **Michele Rosari** (I), product designer, space design researcher, project manager
- **Michael Schutte** (CAN), naval architect and designer of proposed *Poseidon Undersea Resorts*
- **Prof. Bob Stone**, (UK), former Director of the Human Interfaces Team, University of Birmingham
- **Dieter Heinz** (A), Regional Sales for MARES, SSI and HEAD Swimming, Austria; former GM of MARES SSI, Philippines

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