

Marine and Underwater Cities 1960-1975

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Of the techno-utopian schemes for new cities developed by architects in the post Team X climate the sporadic emergence of the marine city, either fully or partially immersed is one of the more curious minor architectural traditions of the 1960's. Considering the marine city highlights the ways in which architectural neo avant-gardes sought to locate, explore, spatialise, extend and re-territorialise, what Deleuze and Guattari have described as the smooth space of the sea.

Polemicists and promoters of underwater technologies in the architectural press such as Hussein, Banham, Jencks, McHale and Cook will be discussed. In tandem projects for marine cities by the Metabolists, Archigram, Fuller, Friedman, Dahinden, Rougerie, Maymont and others will be briefly presented and described. The Marine Cities produced by these architects utilised mimetic organic, archaic, and mechanistic metaphors to generate urban morphologies and forms isolated and physically separate from the land.

In explaining the desire for and production of marine cities between 1960 and 1975 an understanding of the relationships between modern architecture, capital flows, technology and popular culture is further developed.

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In 1964 the Archigram group published *Archigram 5* the Metropolis Issue of the group's magazine. The typewritten and roneoed pages of this issue were devoted to articulating and espousing new forms and techniques of city design. Included on one of the pages in the magazine is a curious montage of "Underwater Hardware" placed on a background of psychedelic wave patterns. On the page are examples of cold war underwater vehicles including Sealab, Alvin, Turtle, Aluminaut, Deepstar and Cousteau's vertically aligned

underwater house. In addition, there is an image of a bulky pressurised diving suit; exactly the same as an image included in the Independent Group's *Man, Machine and Motion* exhibition held at the ICA in 1955. On the following page we are presented with a number of marine and underwater projects: Kikutake's *Marine City*, Buckminster Fuller's *Underwater Island* from 1963, Warren Chalk's "Underwater City project of 1964" and a statement by Keith Critchlow outlining possibilities for mankind of the abundant resources of the oceans; a rhetoric borrowed from the oceanographic sciences and one that was to be reiterated and reproduced by architects during the next 10 years.¹

In the early 1960s Archigram was not alone in promoting underwater architecture; schemes for marine and underwater cities abounded in the architectural press of the 1960s to the mid 1970s. Yet despite many neo avant-garde architects producing schemes for these marine cities little is known about the milieu or context that conditioned the production of these schemes. In the first place this context is literally the sea itself; the 'archetype of smooth space' and the milieu where 'smooth space was first subjugated' as Deleuze and Guattari have noted. Given that marine and underwater cities also employed technologies to create immersive and partially immersive environments it is perhaps unfair they are now considered to be an embarrassment. Such embarrassment always intermingles itself with disgust and the relegation of an object to the category of kitsch – a category that seems to be reserved specifically for modernity's ephemeral and once fashionable moments.²

In this short chronological survey or overview of marine and underwater cities I wish to show how these cities are central to considering the modernist project in the 1960s to the mid 70s. Centrality may seem too strong a word, but the ideas of marine exploration, establishment, production and proposed industrialisation and exploitation inherent in these schemes are obviously inherent to modernity. Thus, the paper will firstly retrieve, locate and argue for the significance of this work in its historical context. Secondly, in this paper I will begin to discuss how the desire to produce marine utopias flowed between science, technology, culture and architecture. I will also outline in a suggestive fashion, the relationship of this work to the Modern architectural canon itself. Finally, I will all too briefly outline this body of work in relation to Deleuze and Guattari's maritime model of smooth space and suggest how this concept may relate to these underwater and marine cities as landscapes of production.

Archigram's *Metropolis* issue came a few years after Cousteau's *Precontinent* experiments beginning off the coast of Marseille in 1962. These experiments were critical in fostering a popular interest in underwater architecture. In the first experiment, *Precontinent 1*, two men lived underwater for seven days in a 25 cubic metre cylindrical habitat anchored to the seabed. In the second experiment *Precontinent 2*, using the Port of Sudan as a base, Cousteau's habitat housed 6 men underwater for a total of 6 days in an atmosphere of

helium and air. In this experiment these “aquanauts” dived from 3 to 5 hours a day on “various missions”. It was in fact the vertically aligned habitat from this experiment, which the Archigram group published in the Metropolis issue. Precontinent 3, taking place off the coast of Monaco in 1963, was perhaps Cousteau’s most ambitious and most architectural experiment. This habitat was notable for its unusual chequered patterned hemisphere and metallic interior resembling Buckminster Fuller’s Dymaxion house. Published in both the popular and architectural press this experiment was accompanied by photographs of the “aquanauts” inside the habitat at work; we see them working on electronic equipment, playing chess and in one striking photo, an aquanaut is undergoing psychological tests with electrodes attached to his head.³

Funding for oceanography from national military agencies since the early to the mid 1950s ensured that oceanography was by the early 1960s, a “dynamic growth industry.” Notably, during this time the American Office of the Navy fueled this growth by funding institutions such as the Scripps and Woods Hole Oceanographic Institutions. Scientists entering these institutions and originally trained in physics and geology quickly began to describe themselves as oceanographers. This growing and relatively new science grew to the point where by the late 1960s the number of scientists working in the discipline had been doubled every four or five years. These new oceanographers claimed that the rapid expansion of the discipline was due primarily to the emergence of innovations in technology rather than military capital driving innovation. This was because at the same time, innovations in instruments, navigation systems, computing and transistors all enabled data from research ships to be gathered in real time and analysed more efficiently. The associated infrastructure of ships, docks, laboratories, scientists and students ensured that the goals of exploring and mapping the oceans, defense, mineral exploration and aquaculture continued until American funding for research was cut at end of the 1960s.⁴

Banham published two well known Japanese marine cities of the early 1960s along with a large photo of Sealab in his 1976 book *Megastructures*. Employing these schemes to establish an origin to the megastructure movement itself Banham proclaimed Tange’s floating MIT Boston Harbour development project of 1959 “as the first real megastructure”. Banham then went on to praise Tange’s famous Tokyo Bay project of 1960 as a project that “looked like remaining the movement’s major masterpiece”. Tange’s project was unique as it proposed that the flows and movement present in metropolitan Tokyo could be redirected and channelled into the adjacent bay. Despite establishing these marine projects as the basis for the megastructure movement both Banham and Tafuri, nonetheless, recognised that both of these projects combined elements from the so called heroic urban projects of the 1920s; Corbusier’s Obus plan for Algiers and the Gropius Wohnberg project of 1928.⁵

Whilst Tange was teaching at MIT in 1959, his young protégés formed the Japanese Metabolism group. In his Marine Civilisation project of 1959 Kikutake, one of the group's most prolific members, aimed to "re-shape the relationship man to man and to his environment". Kikutake's marine civilisation consisted of "artificial towns with production wombs under the sea and space above to live in the sun." Kikutake developed these ideas in his Unabara project a marine new town; an "industrial ocean cluster" of 500,000 inhabitants designed as a marine garden city planned around functionally zoned concentric rings. The global vision of Unabara was to "free mankind from 5000 years of civilization on continents." For Kikutake these projects were the beginning of a career in which he would continue to produce proposals for marine cities culminating in the construction of the Aquaopolis platform at Expo 75 of the coast of Okinawa.⁶

For commentators writing in the west, such as Banham and Tarfuri, it was all too easy to read the Metabolist group as optimistic technophiles and as agents of an increasingly global modernity. In the 1960s Japan's industrial innovations included undersea observation towers, semi submersible construction platforms, research submersibles and even a remote controlled underwater bulldozer. For the Metabolists themselves, Japan's population density, land area, chaotic urban development and obvious connection to the sea drove the group's desire to escape Tokyo's anarchy. By escaping from the city the group was thus able to start afresh, capitalise on Japan's island geography and reinforce the Japanese nation state as an industrial nation aligned with the western project of modernity. In this context it is easy to see why western commentators largely ignored the Japanese political and cultural context that determined these schemes. In these schemes the Metabolists were clearly reacting to Japan's cultural past, a past conditioned by lost imperialism, nuclear holocaust and tradition. But it is thus difficult to know which aspects of Japan's past the Metabolists reacted to or retained. Tange's Tokyo bay project may well have been derived from direct relationship Tokyo's mediaeval street patterns. Kikutake's schemes, on the other hand, may well have been inspired more by a technocratic Marxism than anything else.⁷

In contrast, in Warren Chalk's Underwater City of 1964 it is hard to discern an interplay between ideology and traditional cultural traditions. Clearly inspired by Cousteau's experiments, the Metabolists and the ack-ack forts built in the Thames Estuary, the scheme is also not unlike the Atomium at the Brussels Expo of 1958. Like the Atomium, Chalk's Underwater City appears as a complete network of diagonal tubes and spheres. Unlike other projects published in the Archigram Metropolis issue, Chalk's scheme does not employ geological forms to reconcile landscapes with urbanism. In this underwater vision there is no sense of a relationship between this scheme and any pre existing topography or landscape. Submerged in a sea of ink lines; there are no aquatic forms mediating the extended striation of this underwater world. Chalk relentlessly presents us with a fragment of a city that conceivably could extend underwater indefinitely. It is a kind

of underwater panopticon. Of course, it is not exactly like Bentham's panopticon in which surveillance is controlled and finds expression in the plan drawing. Chalk's model is a different "panoptic" which finds the expression of surveillance and control in a three dimensional Piranesian view. Chalk's scheme exhibits a network modality. Inside this extensive scheme we would be under surveillance in a striated 3 dimensional network with no escape.⁸ Highlighting this sense of extension, Peter Cook compares Herron's Walking City to Chalk's scheme and writes that;

Ron Herron's Walking City whilst at first appearing impossible, is in fact the logical conclusion to the Interchange project (Archigram 4), which he designed with Warren Chalk. The latter is responsible for the assembly and design of much of the 'Underwater City' section of this magazine. Perhaps it is really here, at which the overriding environment is finally traversed, that we reach the true ultimate Metropolitan condition.⁹

In Chalk's underwater city the desire to escape has already been foreclosed because the scheme is a landscape which extends to the limits of our aquatic vision. This is a landscape of production which has reached its ultimate condition. Piranesi goes aquatic. Outside of this city we would drown. Later Archigram projects were to further develop the ideas inherent in Chalk's scheme: creating an all encompassing striated landscape, traversing existing environments and immersing either forms or bodies into various milieux.¹⁰

In 1966 Peter Cook, another member of Archigram, organised the Folkestone experimental architecture conference. Even though neo avant-garde architects were at that time experimenting with marine and underwater cities this new type was not explicitly on the conference agenda. The conference does however provide a background to the structure of neo avant-garde positions at that time: Cedric Price was applauded for his Potteries Thinkbelt project, Hans Hollein's Austrian experiments were also applauded, Buckminster Fuller revered, Quarmby's fantasies vilified, Claude Parent and Paul Virillio dismissed as being too theoretical by the English, and Banham claiming that architecture would soon cease to exist as technology overran it. The Smithsons did not attend. Whilst being just a weekend these geographical and ideological fault lines remained and to some extent still remain today. Parent and Virillio, who had completed a scheme for an oblique nautical city, were also associated with the Parisian based GIAP group which was formed in Paris in 1965. A number of its founding members, including Friedman, Jonas and Maymont had by the time of its formation, developed schemes for marine and floating cities. Cross-disciplinary in nature, one of the primary goals of the group was to gather "technicians" from various disciplines who were concerned with "futurology". Despite this few members of the group attended Folkestone and Cook gives the group scant attention in his 1970 book *Experimental Architecture*.¹¹

The marine cities which the group had developed in and around the time of its formation included projects by Friedman, Jonas and Maymont. Fascinated by the idea of globalisation, Friedman had in 1963, proposed a project entitled “Seven Bridge Towns to link four continents”. Proposing a network of railways and motorways extending over the 4 continents each “bridge town” over water, would be either attached to or suspended on pylons or floats similar in design to military pontoon bridges. Friedman expected that his scheme was to be constructed as a frame, which would unite and allow for flows between the “great industrial centers and consumer markets of the whole world”.¹²

Like Friedman, Maymont and Jonas had also by this time produced a number of schemes for floating and semi submerged cities to elucidate their own ideas of urbanism. Maymont, who was also associated with the Metabolists, produced a scheme in 1965 for a partially floating city off the coast of Monaco. Walter Jonas conceived of and designed “Intraopolis” the cyclone like form of which could be adapted to both land and sea. In the sea the ‘Intraopolis’ would resemble a series of floating circular dishes or amphitheatres clearly related to stepped modernist housing typologies. Jonas along with the notable Swiss architect Justus Dahinden, also entered ovoid or spherical shaped projects for the 1967 Swiss competition for a floating cultural centre on a lake near Zurich.¹³

Thus, by the mid to late 1960s, other continental architects were also actively producing schemes for Marine cities. Encouraged by Costeau, Eduard Albert’s 60,000 square metre floating island off Monte Carlo bay of 1966 was published in *Architectural Design* in 1967. Described as a “Leisure Island” the project employed both diatomic forms and crystalline structures as the source of its formal expression. Resembling the folded plans of a baroque ideal town the island enclosed a central yacht basin around which was a number of zones. The entire ensemble, now rusting offshore, was constructed from steel and weighing 13,000 tons also included 40 swimming pools, which supplied ballast and stability to the project.¹⁴

Many of these marine cities produced by the architects in the 1960s seemed to bear a remarkable resemblance to each other, circular or perimeter forms were common and it is possible that these formal devices were employed to both enclose space and to form a protective wall against waves. Exhibiting this urban morphology were the schemes by Jonas, Maymont, and Dahinden; Monuments in the smooth space of the sea. These architectural monuments either extended the striated metropolis into the sea, via roads, or striated the sea by being isolated and monumental outposts in the ocean. Marine cities were thus integral to modernity’s contemplation of the sea as a smooth space and thus a place of potential striation. As monuments the variations on the stepped typology of Corbusiers Algiers Durand Apartment project of 1933-1934 reappear in these schemes again and again. Presumably the terracing of the apartments was seen as an easy solution,

allowing inhabitants of marine cities all the advantages, and disadvantages, of a marine aspect.¹⁵

In 1967, John McHale, an acolyte of Fullers and former Independent Group group member, wrote an article on “Inner Space” in the 2000 plus edition of *Architectural Design*. In competition with other futurists, McHale, dismissed the ecological concerns of the emerging counter culture and continued to argue for the primacy of technological progress. In the article on “Inner Space”, amongst other things, he raised the feasibility of humans being able to breath underwater reproducing a photo of a rabbit in a Perspex box which he claimed was part of an experiment related to the ability of humans to breath underwater. It is difficult to know now if such gestures were simply naïve or extremely ironic conceptual art for our entertainment.¹⁶

In 1967 the *Architectural Association Quarterly* published the work of Glanfyll.R.Lewis an English architect who developed two underwater projects with the curious acronyms VUEC and SILK. VUEC stood for; Variable Underwater Experimental Community. VUEC was a “series of activity containers” connected in a way which resembled a motor mower engine. SILK stood for Submerged Inflatable Living Kit. This project in particular seemed to draw on the forms and experiments of systems building, prefabrication and inflatables, then popular with other English architects of the time.¹⁷

An underwater polemicist at work in the immediate post 1968 climate was Farooq Hussein. Hussain was a postgraduate student in the department of Arts and History at the AA school and described as an “authority on underwater living.” Hussein’s two articles on underwater living and submergence systems in the *Architectural Association Quarterly* bear witness to his strong association with Jacques Costeau. Hussain was a key figure in promoting and disseminating ideas about underwater living to architects. Hussain’s ideas integrated the new ecological and psychological concerns of the counter culture which he considered as being vital to underwater living proposals. Hussain himself, preached a curious mix of ideas based on ecological politics, insights into military experiment’s and technology driven utopias. There is a picture in *AAQ* of Hussain swimming with the two dolphins, which it is said that he owned. Nonetheless Hussain still enjoyed reporting about underwater hardware. Reporting from the Oceanology International Congress held at Brighton in early 1969 he wrote about BACCHUS, the British Aircraft Corporation Habitat under the sea, and Tektite 1 a four man laboratory sponsored by NASA. In the same report in *Architectural Design*, Hussain noted that American funding for undersea research was at that time, just prior to being cut, \$500 million per year.¹⁸

Critiques of the techno-romanticism and futuristic mysticism that drove the desire to live underwater developed slowly at first. In fact in the immediate post 1968 climate, activity in

the area seemed to only intensify becoming along one path of modernity more commercial and popular. In 1970 Justus Dahinden was to go on and design a “Seatel” for Athens in 1970. Circular in plan and dish like in section with an urban morphology related to an amphitheatre, the scheme sat on cylindrical pontoons with sails on top. A year later in 1971 just as Archigram was completing its underground scheme for Monte Carlo, situated, on the Monte Carlo seaside, the popular science magazine TV21 published a design sponsored by Pilkington for a city of 30,000 in the North Sea. This City also relied on a number of urban morphologies ranging from modernist housing, traditional water villages, and walled cities.¹⁹

By 1972, the critiques of the counter culture were beginning to have an effect. By this time Fuller had reportedly been picketed on a visit to London accused by student protesters of being an apolitical and amoral technocrat. Not deterred by such criticism, Fuller had by that time, in collaboration with the Japanese architect Soji designed the floating urban aggregate, Triton City. A scheme, which combined many elements of previous marine cities and which Fuller was actively promoting in 1972. Typically Fuller’s ideas for oceanic cities were also enunciated at a global scale. In a global scenario Fuller proposed that there should be three types of oceanic cities. Each type was to be located in relation to a particular geography: One type for protected harbour cities such as Triton City, another for Semi protected waters or deep sea types and yet another deep sea-spherical and cylindrical geodesic floating cities whose “hulls” were below the sea. Fuller postulated that such cities would be “serviced” by helicopters and below the water by a transport network of atomic powered submarines connecting the flow of goods and peoples between these cities.²⁰

In France, as a guest editor of an edition of *L’architecture D’aujourd’hui* in 1975 devoted to “Habiter La Mer”, the French architect Jacques Rougerie presented designs for a number of underwater and marine based projects. Like other architects, during the 1960s Rougerie, reiterated the idea that sea was “ no longer an impenetrable region “ but an entity that should be considered as a “6th continent” presumably to be colonised and exploited. Redeploying techniques and ideas from French ethnology, Rougerie’s Thallasopoli’s I was a scheme to develop floating villages in the Banda Sea, for indigenous people of the Indonesian archipelago. The rationale of these marine villages was to ease population pressures. Thallasopoli’s II, in contrast was a floating, seagoing and hence nomadic university situated in the North Atlantic. Rougerie stipulated that within its crystalline and diatomic forms the university of the sea should have a minimum population of 30% women and 70% men.²¹

Rougerie nonetheless argued in the 1975 article that ecological concerns should not be secondary to the economic. Claiming that in living in the sea man would clearly gain a new haptic awareness and that urbanism in its submerged form would link together both man

and the sea itself. Rougerie saw that both the continental shelves and ocean floors had a topography and geography, which offered “ a basic outline of possible development”. Rougerie as a committed underwater urbanist thus foresaw a striated outline of urban development which included semi urban, rural, industrial and residential zones.²²

Rougerie's urbanism is the ultimate escape from the terrestrial city into sea. In his vision the sea is now ready to become a landscape of production available to all of the forces and cycles of modernity. What then is the line of flight or geography of this escape from the city ? Such a geography would include firstly include the city, then its outskirts, the seaside or the littoral, then the partially littoral as in the pier, the floating or semi immersed city and then finally the underwater city. Also included in this geography would be the connections or potential voyages between these places. When considered in this fashion one realizes how central the littoral and the ocean are to formation of the Modern architectural canon. All of Corbusier's work is littered with notions of voyage, the nautical and projects whose sense of place derives from an adjacency to the ocean. The Unite at Marseille, Plan Obus and his own shack on Cap Martin. It was of course on the high seas that Corbusier loved that other great icon of modernity Josephine Baker. It was also in the sea that Corbusier died. Corbusier was not alone in this tendency to fold aspects of the marine universe into modern architecture. Even in the neo avant-garde polemics of the 1960s for example, we witness Peter Cook's constant fascination with the picturesque English seaside as well as the curious debate surrounding the location of James Stirling's conception in relation to the nautical motifs at St Andrews University., These are of course, merely a few suggestive instances of this tendency but I am sure the list could go on.²³

This geography of flight from the city to the sea, so evident in modern architecture, was of course only partially constructed and imagined by architects themselves. During the 1960s what really fueled the virtual and partial construction of this geography were the capital flows associated with modernity itself. At the time large quantities of capital flowed from the nation states into underwater and oceanographic research programs. In turn this capital, channeled through military agencies, fueled modernity's dreams of using the oceans for mineral extraction, aquaculture, desalination and harnessing energy form the oceans; contributing to the desire to colonise the sea. The results of these endeavors then flowed into and reverberated within the popular culture of the time. As the demarcation between architecture and popular cultures blurred; Warren Chalk could write in 1966 that the Beatle's yellow submarine would be “more prophetic than even the Beatles ever imagined”.²⁴

Images from popular culture such as the Yellow Submarine were both futuristic and seemingly prophetic. There is of course the potential for all such prophecies or futuristic schemes to be read mystically once they are located both within popular and architectural cultures. Acting as religious icons of popular culture perhaps these marine cities were

regarded as futuristic arks, a desire to escape extinction, and at the least the desire to escape the shipwreck of civilisation. Within the avant-garde there were also competing ideals and forms of this prophetic futurism. Archigrams transgressive utopias and aesthetic battle against English technocracy contrast with GIAP's interest in a grand synthesis of futuristic ideas. Other architects saw opportunities in developing prototype cities that anticipated the commodification of tourism. In any event, the desire to produce these prophetic schemes meant that the real mechanisms or assemblages of the modernist project in the mid twentieth century were obscured. As interceptors and relay points for popular culture; technologies surface and its future extrapolation was always of more interest to Banham, McHale and Jencks. The submersible thus supplanted Marinetti's automobiles. All that can be pointed to about this state of affairs, in this short paper, is Colin Rowe's point about Archigram; that there is always a hint of political fascism in futurism.²⁵

The widespread publication in the architectural press of the available technologies associated with marine engineering techniques also drove the desire for architects to construct marine cities. At the technological level schemes for marine and underwater cities positioned themselves between two poles of technology: The futuristic pole versus the pole of available technology. The pole of available technology was in specific terms closely related to the advances evident in North Sea oil rig engineering and also ship construction. This technology was easily appropriated into architectural schemes. In 1969 even students at the AA were producing schemes for seaborne research stations using the available marine engineering technologies. At the other pole, on the fringe, were practitioners such as Rudolf Doernach who were suggesting that the seas could be colonised by a "universal live building material that can grow a mobile urban system". In any event marine cities presumed a level of technology that did not exist or was too uneconomic to enable them to be built., Kikutake's Aquapolis of 1975 was only built as a result of intensive sponsorship from both the Japanese state and Mitsubishi.²⁶

Underwater towns and villages pose an obvious set of economic and technological problems for architects; But architects thought that these problems could be overcome; as suggested by Cousteau's experiments and the development of other underwater habitats. The problem was that these marine or underwater cities never really took off. Certainly a key aspect of architectural production in the 1960s was the advancement of the idea of the prototype. However as prototypes these projects now seem embarrassing and even kitsch. Perhaps this is because these schemes were never really became part of the channels of production and distribution that characterised modernity's ongoing development. Their geography, as I have suggested, was only partially imagined in constructed and schematic form; these marine and underwater cities only partially sketched an outline of a new network of production and distribution. Military agencies and minerals houses were much more successful in using technologies to striate the seas. Thus the attempted architectural

and urban striation of the seas was bypassed and made redundant. But architects still waited and hoped for the command.

Architects adapted their interests in the terrestrial city to the sea. The urban instruments of modern architecture and its revisionist tendencies were easily adapted to the marine landscape. The sea as a site of urbanism, a landscape of production, offered the hope of further developing the project of modernity fully integrated with technology and as far as possible separate and outside of the perceived urban constraints of existing 20th century cities. The smooth space of the sea was seen perhaps as a place where urban gestures and theories of the terrestrial city could, unfettered, play themselves out. This was because the sea offered a smooth space outside of an increasingly striated metropolis and also because these architects, encouraged by popular culture, felt and believed that living in the sea would be a reality. The marine or underwater city was thus easily envisaged as either a floating or underwater outpost for further exploration.; a staging post for expanding the new frontiers of the marine landscape.²⁷

The assemblage of capital, competing technologies, architecture, popular culture and the sea itself had the potential in the 1960s to be the ultimate landscape of production. In a recent article the French historian Antoine Picon argues that in traditional landscapes the works of man are nestled in the heart of nature. In the 20th century the city constitutes our primary landscape and has long stopped being a monument in nature, it is a city which encloses us and from which our eyes can no longer escape. It is perhaps a little too easy to say that these marine cities represent a desire on the part of architects to flee the anarchy of the city and to start afresh in the warm womb of the sea. But in many of the projects presented here there is nonetheless an attempt to recreate an arcadia in which the architectural monument is central in a landscape rather than one which is merely a part of the landscape. From this perspective these marine cities are thus central to the modernist project and if built they literally would have been outposts of the terrestrial city as it took lines of flight and extended itself into all that is around it, even the sea. Outposts which would act as points in space for the further colonisation of the seas. As has been suggested by Deleuze and Guattari even in their maritime model of smooth space, smooth and striated space intermingles and often the smooth re-imparts itself on the striated. If built the schemes outlined here would literally and quickly become smooth spaces as they rusted, leaked and their actual haptic reality overtook the senses.²⁸

But there is also another, less simplistic way in which, these schemes become smooth or holey spaces as Deleuze and Guattari define these categories. Perhaps these schemes create and allow a smooth space for architecture itself. A space of unfettered dreaming for architects where the technocratic striations of the post war metropolis could be avoided. As I have suggested the marine landscape was the perfect smooth or holey space in which architects could start afresh on a *tabula rasa* and mix, match, integrate and recycle all of

the remembered elements of the modernist project of the 1920s. More worrying is the idea that these marine and underwater cities, with their galleys, aquatic panoramas, crystalline chambers and exhibition of oceanic industry and technology recall the half forgotten elements of an even earlier time of modernity; the time of the Crystal Palace.

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¹ Archigram, *Archigram Magazine For New Ideas In Architecture*, 5th Issue, The Metropolis Issue, 1964.
 For details of the Independents Groups Man, Machine and Motion Exhibition see Anne Massey, *The Independent Group: Modernism and mass culture in Britain 1945-1959*, Manchester University Press, 1995, (pp. 82-87)

² My aim in mentioning this is in relation to Deleuze and Guattari's maritime model of smooth space is not to "ornament" this paper with theory but to suggest that perhaps in the rush by architects to assign Deleuze and Guattari's concept of smooth space to the technologies and infrastructure of cyberspace architects have, perhaps, lost sight of the potential of this concept to illuminate prior forms and patterns of neo avant-garde practice. Tracing the concept of smooth space in Deleuze and Guattari's work and its relationship to their notions of territorial representation, the civilised capitalist machine and the practices of neo avant-garde architects is clearly beyond the scope of this paper. However such a line of investigation could start with the following: For the maritime model of smooth space see *A thousand plateaus: capitalism and schizophrenia*, London: Athlone Press 1987 p478-482. Gilles Deleuze and Félix Guattari translated from the French by Hurley, Seem and Lane. *Anti-oedipus capitalism and schizophrenia*, University of Minnesota Press 1983. p184-262. Gilles Deleuze and Félix Guattari. translation and foreword by Brian Massumi. *A thousand plateaus: capitalism and schizophrenia* London: Athlone Press 1987 Chapter 12, 1227: The Treatise on Nomadology – The War Machine. Gilles Deleuze and Félix Guattari. translation and foreword by Brian Massumi. Gary Genosko 'A Bestiary of Territoriality and Expression: Poster Fish bower birds and spiny lobsters' in *A Shock of Thought: expression after Deleuze and Guattari*, edited by Brian Massumi Routledge, London and New York 2002. Paul Patton, *Deleuze and the Political*, Routledge, London and New York 2000 especially Chapter 5 p88-108.

³For publication of these experiments in the architectural press see Farooq Hussain Jean Michel Cousteau (eds), *'Inner Space'*, *Architectural Design* 1969 Apr., v. 39, n. 4, whole issue. For examples of the publication of these experiments in the popular press see Jacques Yves Cousteau, Edited by James Dugan, *'World Without Sun'* New York, Harper & Row 1965 and Jacques Yves Cousteau with Frédéric Dumas, *'The silent world London'*, Hamish Hamilton, 1953.

⁴ See *The Ocean : a Scientific American book*, San Francisco W.H. Freeman 1969 for a background to the growth of the oceanographic sciences. Popular ecological notions about the oceans perhaps began with Rachel Carson, *'The Sea Around us'*, London, Staples press 1951. For a further explanation of developments in oceanography in the early 1960s also see Robert.C.Cowen, *'Frontiers of the Sea The Story of Oceanographic Exploration'*, London Victor Gollancz 1960. For a commentary published in the Architectural press about the funding of oceanographic research and its demise at the end of the 1960s see Farooq Hussain, 'Homo Aquaticus', *Architectural Design* 1969 Apr., v. 39, n. 4, p180.

⁵ Renyer Banham, *'Megastructure: Urban Futures of the Recent Past'*, London: Thames and Hudson 1976
 Manfredo Tafuri Dal Co, *'Modern Architecture'*, New York: H. N. Abrams, 1979, pp383-390

⁶ Kiyonori Kikutake, 'The Approach of Kiyonori Kikutake', *Architectural Design* 1964 Dec., v. 34, pp507-509. For details of Kikutakes Aquapolis scheme see "Special Edition: International Ocean Exposition, Okinawa, Japan, 1975," *Japan architect* v. 50, whole issue 1975.

⁷ For a good summary of Japanese Innovations in the architectural press see, Raymond Lamont Brown, 'Undersea Japan: Japan's undersea architecture program', *Architectural Design* 44, 6 1974 pp 333-334
 For a discussion of the cultural and political context of the Metabolists see Cherie Wendelken, 'Putting Metabolism Back In Place : The making of a radically Decontextualized Architecture in Japan', in Sarah Goldhagen ed, *Anxious Modernisms* MIT press 2000.

⁸ Archigram, *The Metropolis Issue* 1964. For a recent discussion on the Atomium see Jean-Luc Delsaute, 'Atom=Hoffnung', *Bauwelt* 2000, June 30, v.91, n.24, p.78-81, The Brussels Atomium was also published by Banham, 'Megastructure: Urban Futures of the Recent Past London'

⁹ Archigram, *The Metropolis Issue* 1964.

¹⁰ Ron Herron's response to Chalk's scheme was to design the picturesque and partially submerged capsule pier of 1965 and Cook had also by 1968 produced a scheme for Sea Farming see Peter Cook et al, '*Archigram*', Studio Vista London 1972 p46 & p32

¹¹ On GIAP see Michel Ragon et al, 'Aventure De La Cite Future' *Urbanisme* 35 92 1966 pp12-81 Maymont's scheme for Monaco and a scheme for a floating nautical city by Virilio and Parent entitled Nauta-Cite can be found in Michel Ragon et al, 'Vers Un Urbanisme Spatia', *Architecture: formes et fonctions*, 12, 165 (pp55-65). See also, Nicholas Schoffer, 'The GIAP, website , < www.olats.org/schoffer/giap1.htm >

On Folkestone see, L' incontro a Folkestone, *Domus* 1966 Sept., n. 442, p. 60. and Robin Middleton, Folkestone IDEA, , *Architectural Design* , June 1966 , 36 1974 pp 313. Folkestone is also mentioned by Jencks as an event where Herrons walking cities were booed, Virillio mentions it recently as a place where he "met Archigram".

¹² See Helene Vlissingen and Sabine Lebesque, 'Yona Friedman, Structures Serving the Unpredictable' NAI Publishers 2000 and Yona Friedman, '*L'architecture mobile : vers une cite concue par ses habitants*', Tournai: Casterman, 1970. Other marine based projects by Friedman include a project at Monaco, a bridge town over the English Channel .

¹³ On Walter Jonas see: Walter Jonas, 'Intrapolis-Crater City', *Architecture : formes et fonctions* 1971, 16, p301-304. Walter Jonas, 'Trichterhaussiedlung', *aus Baumeister*, Nov 1962, p1158 – 1162. Walter Jonas, 'La maison "Intra" Proposition de construction urbaine' *Architecture, Formes + Fonctions*, Nr. 9, 1962, pp121 – 123. Walter Jonas, 'Das Trichterhaus, Vorschlag zu einer Massensiedlung', *Bauen + Wohnen*, März 1962, pp132-136. On Paul Maymont see: Paul Maymont , 'Floating City [off the coast of Monaco]', *Architektoniki*, 1965 July-Aug, 9, 38, p84-86. Paul Maymont. 'Recherches', *Architecture d'aujourd'hui* 1964 June-July, 34, 115, whole issue. For the Swiss Competition see, '16 projets pour un centre culturel flottant sur le lac de Zurich', *Architecture Française*, 1969 Sept.-Oct. p76-80. Justus Dahinden, 'Athens Seatel', *Architecture : formes et fonctions*, 1971, 16, 295-300.

¹⁴ Edouard Albert, 'Projet d'île artificielle au large de Monaco', *L'architecture D'aujourd'hui*, April-May 1967

¹⁵ Roger Sherwood, 'Modern Housing Prototypes', Cambridge: Harvard University Press 1978, p130

¹⁶ John McHale, 'Inner Space', *Architectural Design*, February 1967 pp 78-80. Much has been written about the independent group but what is of interest here is are the later careers and trajectories of the groups members.

¹⁷ Glanfyll Lewis, 'The future of man in hydrospace', *AAQ : Architectural Association quarterly*, 1969 Oct. 1, 4, p54-61.

¹⁸ Farooq Hussain, 'Ocean systems', *AAQ : Architectural Association quarterly* 1971 July-Sept. 3, 3 p17-21. Farooq Hussain , "Submergence hardware design: physiological, psychological and environmental Constraints", *AAQ : Architectural Association quarterly*, 1970 Jan.V 2N 1 [52]-57. Farooq Hussain, Homo Aquaticus, *Architectural Design*, 1969 Apr., v. 39, n. 4, p180

¹⁹ Justus Dahinden, 'Athens Seatel', *Architecture : formes et fonctions*, 1971, 16, 295-300. For details of Archigrams Monte Carlo scheme see Peter Cook et al, '*Archigram*', Studio Vista London 1972 and *Architectural Design* 1/70. Pilkington City see TV21 Annual 1971 UK Century 21 and the website <www.aiai.ed.ac.uk/~bat/sea-city.html>

²⁰ Buckminster Fuller, *Floating Cities*, *Architectural Design* 12/72 p762-764

²¹ Thallasopilis I Rougerie, Jacques ed, *Habiter La Mer*, *L'architecture D'aujourd'hui*, No. 175 September October 1974. Thallasopilis II Rougerie, Jacques ed, *Habiter La Mer*, *L'architecture D'aujourd'hui*, No. 175 September October 1974

²² In regards to Thallasopilis Rougerie states; “ Why do we speak at all of an Urban development of the seas ? It is a matter of providing man as an individual with all of the material and spiritual possibilities for integrating himself into a marine existence. The task is to create a new inhabitable space at his scale on the ocean floor. Man with a pioneering spirit will be able to attempt to live in harmony with the oceans. Human presence under the sea can only be achieved with permanent activities such as marine aquaculture , to which cultural sports and tourist activities could be appended. Within this perspective man will acquire new sensory awareness, tactile auditive and visual. “

²³ Le Corbusier, ‘*Ouvre Complete*’, Zurich : Verlag 1965. Ean Wood, ‘The Josephine Baker Story’, Peter Cook, *Experimental Architecture London*: Studio Vista 1970, Peter Arnell and Ted Bickford ed, ‘James Stirling Buildings and Projects James Stirling Michael Wilford and Associates’, New York: Rizzoli, 1984.

²⁴ Warren Chalk, ‘Hardware of a New World’ , *Architectural Forum* , October 1966 v125 no 3 p47-51.

²⁵ Colin Rowe and Fred Koetter, *Collage City*, Cambridge, Mass: MIT Press, 1978

²⁶ Eli, Haissman, Kuch, Seaborne Research Station *Architectural Design* 1969 Apr., v. 39, n. 4, p180.

1969 Rudolph Doernach Biotecture, *Architectural Design*, February 1966 p 95.

²⁷Gilles Deleuze and Félix Guattari. translation and foreword by Brian Massumi. *A thousand plateaus: capitalism and schizophrenia*, London : Athlone Press 1987 p478-482

²⁸ Gilles Deleuze and Félix ‘*A thousand plateaus : capitalism and schizophrenia*’, p478-482, Antoine Picon, ‘From Ruin to Rust’, Grey Room 01, Cambridge Massachusetts: MIT Press, 200. p 64-83