

Foreword

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Ecological equilibrium of the planet depends on the physical, chemical and biological interactions established between continents, atmosphere and the surface of the oceans.

We have to increase our knowledge in each of these three fields, because, as other living organisms, we, men, are belonging to all the biogeochemical cycles who exist in the planet.

One of the most important field where we need better knowledge is the ocean because it regulates all the life of the planet, directly and indirectly, by the way of water, carbon dioxide, methane, oxygen, salts, dusts, etc.

Future mankind cannot survive without a good knowledge of these exchanges, because the number of men is increasing progressively, exponentially and their consumption of natural elements increases in the same time. On the other hand, the surface of the planet becomes more and more artificial, and we need to know the normal processes linked to the natural life, as well as possible.

One of the first problems to be resolved by the scientists is to know if the sea water composition have a stable composition at a historical scale, or even at a geological scale, or if its composition varies, following what rules.

Continental erosion represents the main source of mineral matter contained and dissolved in natural sea water. Other sources are the particles transported by the wind, the ashes produced by volcanoes and the submarine hydrothermalism.

Generally, one considers the oceans as a system in dynamic equilibrium, where the input of foreign substances is compensated by the sedimentation processes. Ocean

constitutes a natural reservoir well mixed if one considers its renewal at the scale of one million years.

The deepest water masses reached roughly an age of 1600 years. This means that the renewal of water have been realized 600 times within the last million years.

There is a dynamic equilibrium of all elements dissolved in the sea water masses, each element staying a certain period of time into the sea water.

This observation leads us to the concept of *residence time* of the elements in the sea water.

All our mesures seem to indicate that the mean composition of the sea water have not varied too much since the origin of the ocean. Biogeochemical processes have not varied to a large extent. Some living phylums exist without change since very long periods.

But when the life appears within the ocean, the living organisms have used the most abundant elements who were present into the sea; and these elements played a fundamental role on the marine life.

Salinity of sea water seems to have not evolved very much since a very long time, as the marine organisms does not survive very long when the salinity increases beyond the actual normal salinity of sea water.

On the other hand, we have shown that the residence time of different elements in the sea depends on their position in the Mendeliev Table; and also that the elements contained in the living matter of the marine organisms have also a proportional repartition and a proportional biological residence time of the elements constituting the total salinity of the oceans.

Lastly, it is absolutely necessary that de-

tailed researches will be developed in the study on natural fluxes of all elements, especially the metallic ones, in order to begin to understand the true impact of pollutions, and their role within the natural marine environment. From a dynamic point of view, the huge increase of number of mondial population, as well as the great increase in the use of the coastal areas lead us to acquire fundamental data in that field.

The major aim of the reseach program on oceanic flux consisits to understand the main factors directing carbon and other element fluxes playing a specfic role in natural waters, where living organims are present.

Among the most important countries dealing with oceanographic researches, France and Japan are between the most concerned by the results of such a program.

A privileged cooperation has been organised in that field, between French scientists and Japanese specialists, in the frame of cooperative scientific meetings of Maison franco-japonaise. Several scientific meetings occurs, almost every year, in different fields: aquaculture, artificial reefs, red tides, physical oceanography, microbiology, quality of coastal waters, resource management, use and conflicts of coastal areas, remote sensing, biological recruitment among the most important topics.

This meeting on Ocean Fluxes gathered the most promient specialists on the subject, on the French side as well as on Japanese side. It has been really fruitful, as the national programs of the two countries have been ex-amined and studied in detail, as the level of the exchanges has been very high, and as the planning of the future meetings has been decided.

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I am very confident that the future cooperation between the two delegations will be very fruitful, at sea as well as in laboratories especially if they are integrated in larger international terms.

I am proud that Maison franco-japonaise and the two Sociétés franco-japonaises d'Océanographie, in France as well as in Japan, have played a significant role in the organization of such an efficient meeting.

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