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INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of Unesco)

Eleventh session of the Assembly

Preparatory Meetings, Paris, 15-20 October 1979
Plenary Sessions, Paris, 22 October - 3 November 1979

ANTON BRUUN MEMORIAL LECTURES 1979

Thursday, 1 November 1979, Unesco House, Salle II

The BRUUN Memorial Lectures were inaugurated in memory of Dr. Anton Frederick Bruun (Denmark), first Chairman of the Intergovernmental Oceanographic Commission who died on 13 December 1961 whilst holding this office.
The lectures are held biennially during the IOC Assembly and this year will be on the theme "Marine Environment and Resources in the Ocean".

14.30 - 14.40	Introduction	Dr. Neil J. Campbell (First Vice-Chairman)
14.40 - 15.20	Non-Living Marine Resources	Prof. Dr. E. Seibold (F.R.Germany)
15.20 - 16.00	Ocean Energy	Dr. Kenzo Takano (Japan)
16.00 - 16.10	Break	
16.10 - 16.50	A Short-term Climatic Change: A Physical Oceanographer's Point of View	Dr. J.S. Godfrey (Australia)
16.50 - 17.30	Living Marine Resources	Dr. D.H. Cushing (U.K.)

Texts of the lectures and a résumé of the discussions will be published in the IOC Technical Series.

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NON-LIVING MARINE RESOURCES

by Prof. Dr. Eugene Seibold
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ABSTRACT

At present, in huge areas of the oceans seafloor, morphology, sediment cover and sub-bottom structures are poorly known.
- Much more marine research is needed, but marine research is costly.
- Mineral resources, such as muds rich in metals, manganese nodules, placer deposits, oil and gas, are concentrations of economically important materials, originating from complex physical, chemical and biological processes interacting both in space and time. Therefore most of these resources have a small areal extent.
- Consequently strategies are needed to explore them effectively.

The concepts of Sea Floor Spreading and Plate Tectonics, developed during the last decade, help to eliminate unlikely areas for exploration and to concentrate research on promising ones. Oil and gas are the most important marine resources at the present time, and is likely to remain so for the next few decades. However, it is hopeless to explore at least 80% of the deep sea bottom for these hydrocarbons.

Manganese nodules - and locally metal-rich muds - may be valuable in the future, when economic collecting, hoisting and processing methods are devised, when legal problems are solved and when the metal prices increase as a result of exhaustion of more favourable land deposits.

On the shallow sea floor, not only now but during former low sea level stands, mechanical action of waves and currents has concentrated sand and gravel, two important building materials which are becoming increasingly more expensive on land, especially in densely populated areas. An even higher degree of mechanical sorting is seen in placer deposits of tin, iron minerals, diamonds and heavy minerals containing Titanium, Zirconium and Rare Earths. These mineral resources are exploited in near - and offshore regions, around the world. Offshore Phosphorites, which could be used as a base for fertilizers, originate from chemical/mechanical concentration processes, however at present they are not economically attractive.

As a consequence:

- we should not be too optimistic about marine mineral resources until much more basic and applied research is done;
- recovering deep sea manganese nodules and deep hydrocarbon deposits are technical and financial problems even for industrialised nations during the next decade;
- coastal and shallow sea mineral resources are promising targets for research in both developing and developed countries. Receiving new rights, as foreseen by the Sea Law Conference, also brings new duties and responsibilities, however. Therefore developing countries should continue to cooperate with scientists from abroad and should develop their own research in suitable fields.

OCEAN ENERGY

by Dr. Kenzo Takano
Rikagaku Kenkyusho
(The Institute of Physical and Chemical Research)

ABSTRACT

In this paper, a brief explanation is given of the energy which could be derived from waves, tides, currents and the thermal difference between the upper and deep layers of the ocean, and estimates are made of their maximum potential use. No attempt is made to assess the energy potential of mineral and other resources of the seabed or overlying water masses.

ENERGIES DE LA MER

EXTRAIT

Laissant de côté les énergies produites ou à produire par des matières premières du sous-sol océanique ou contenues dans la masse des eaux, je me borne à donner quelques brèves explications sur les énergies de la houle, des marées, des courants et de la différence thermique entre des couches superficielles et des couches profondes de l'océan. La limite supérieure de l'utilisation est estimée.

A SHORT-TERM CLIMATIC CHANGE: A PHYSICAL OCEANOGRAPHER'S POINT OF VIEW

by Dr. J.S. Godfrey

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ABSTRACT

In recent years, a number of examples have been found of weather anomalies (rainfall, sea level, pressure, etc.) being correlated significantly with sea surface temperature (SST) some distance away, and a month or more earlier. If meteorologists can refine such correlations to the point where they are operationally useful climate forecast tools, then the forecast can be extended further if the SST anomaly can itself be forecast from meteorological variables. Present knowledge of the various physical mechanisms likely to cause climatically interesting SST fluctuations is reviewed, and as assessment made of the possibilities for predicting SST fluctuations on an operational basis in coming decades".

PRODUCTION IN THE CENTRAL GYRES OF THE PACIFIC

by Dr. D.H. Cushing
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ABSTRACT

In the deep subtropical ocean, the cholorophyll maximum lies at the bottom of the euphotic layer maintained by low levels of nutrient and irradiance. At the same time there are two to three times as much weight of animals as plants, which means that the algal reproductive rates must be fairly high under low light and low nutrients.

With material from Climax II expedition algal reproductive rates and grazing rates were calculated. The quantity produced per day matched the quantity grazed per day in both the North and South Pacific, albeit at different levels in the two oceans. The quantity of soluble ammonium excreted per day was also estimated which again matched the quantity produced. Hence there would have been no need for immediate nutrient limitation. The estimates of algal reproductive rate were fitted to nutrient observations showing that most activity occurred well above the half saturation coefficient. The consequences of these arguments are pursued.