20th Century Oceanography

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Oceanography in the Twentieth Century

- Many agency supported by wealthy individual for ocean studies in USA

- Alexander Agassiz (1835-1910) Mining engineer, Marine Scientist Harvard University – Financed Deep sea Biology research, designed many instrument for sampling

- William E. Ritter student of Agassiz joined University of California (1892-1903)
  - He was invited by Business & Professional people started Marine Biological Association, at San Diego
  - Also Scripps family supported him

- Scripps Institute of Oceanography
- National Academy of Science Committee (NASC)

NASC – want to establish marine Science research at east coast

created Woods Hole Oceanographic institute (1930)

formed University courses 1942

consolidated reading materials and

Published book for ocean science *The Oceans* by Sverdrup

World war – II Military

1950 oceanographic research blossomed

Office of Naval Research (ONR) and National Science Foundation (NSF) funding

- IGY (1957-58) International Geophysical Year
- IOE 1963-64
- DSDP 1968
- Electronic – space program
- Computer went aboard
- NOAA 1970 (National Oceanic and Atmospheric Administration)
- Later part of the 1970s development become slow, still hot water vent research was in progress
- Instrument continued to become sophisticated
- DSDP to ODP 1983
- NASA – NIMBUS – 7 1978 had Coastal Zone Color Scanner (CZCS)

- World Ocean Circulation Experiment (WOCE)
  1990 – 2002

  was a component of the international World Climate Research Program, and aimed to establish the role of the World Ocean in the Earth's climate system.

  Computer and chemical tracers to model present state and evolution of ocean
- JGOFS (Joint Global Ocean Flux)
  - Carbon cycle and other biologically active elements interaction between ocean and atmosphere, Climate Change
  - 3000 days of Shiptime
  - 16 Time around the world

- GOALS – Global Ocean Atmosphere Land System
  - Climate prediction on seasonal-to-interannual time scales is the focused objective of the GOALS program

- DODP (Deep Ocean Drilling Program),
- RIDGE (Ridge interdisciplinary Global Experiment)
  - The goal of the RIDGE program is to understand the physical, chemical, and biological causes and consequences of the energy transfer through time and space between the global mid-ocean ridge volcanic system and the ocean environment.
- TOPEX satellite (1992) Joined venture program US- French (Satellite which had 10 days cycle) Ocean Currents, Atmosphere, 10 cm height variation
- In 1991 the international Oceanographic Commission developed GOOS programme
  - GOOS – Global Ocean Observing System (3000 array of Argo)
  - Monitor, understand and predict weather and climate
  - Describe and forecast the state of the ocean, including living resources
  - Improve management of marine and coastal ecosystems and resources
  - Mitigate damage from natural hazards and pollution
  - Protect life and property on coasts and at sea
  - Enable scientific research

Figure 2.4 Example from the era of international cooperation. The sections in the International Geophysical Year Atlantic Program 1957-1959. From Wust (1964).