GEOLOGY OF THE OCEANS

The Geology of the Oceans past and present (including plate tectonics, environments, and current/developing ideas on oceanography and marine geology). Often termed the last frontier to be explored on Earth, there have been great advances in our understanding of the oceanic realm over the past half century, though still more needs to be understood. Exploration of the oceans provided the evidence for the most fundamental revolution in our understanding of Geology – plate tectonics. The oceans are also a relatively unchanging arena for the deposition of sediments, providing (unlike the eroding continents) a source of continuous evidence for changes in earth's environment, such as ice ages. This course aims to study the main developments and what we might expect in the future, based on current research. The course starts on Monday 24th April, for 10 weeks, until 10th July (not 1st nor 29th May). Held at Wynstones School, Stroud Road, Whaddon, Gloucester from 7.30-9.30pm on Mondays. Cost £70.

Programme

1. Introduction: Definitions, dimensions, divisions, maps. Why are there continents and oceans on Earth? Sources of information
2. Tectonically "Quiet" areas of the oceans: Passive (Trailing Edge) continental margins, and abyssal plains. Detrital and Pelagic sediments and their controls
3. Mid Ocean Ridges: Topography, tectonics, rock types and layering. Is there such a thing as "Oceanic crust"? Fast and Slow spreading ridges. Mineralogy and Biology of ridges.
4. Hot Spots (Mantle Plumes). Evidence for and against. Hot Spot tracks and linear island chains. The D"' layer. Types of Hot Spot. Seamounts (Guyots).
5. Subduction Zones (1): Types of subduction and of subduction zones. Trench roll-back, Arc splitting, subduction erosion. Earthquakes and the Benioff Zone. Sedimentary basins (trench, forearc, backarc etc.), their deposits, and controls.
6. Subduction Zones (2): Igneous, metamorphic and mineralisation processes at subduction zones. Accretionary complexes and obduction of subducted material.
7. Oceanic water: its role in earth processes, its chemical and thermal structure. The circulation of surface and deep ocean water; its effects and its controls. El Nino and other phenomena
8. The Geology of the Oceans through time (1) the PreCambrian Ocean: the early ocean, the origin of life, iron, oxygen, calcium carbonate and calcium sulphate. Plate Tectonic (or other?) effects. Oceanic change at the PreCambrian-Cambrian boundary.
9. The Geology of the Oceans through time (2) the Phanerozoic Ocean: Unidirectional (e.g. CO_2 drawdown, biological evolution/extinction) and cyclic (e.g. supercontinent/Wilson, greenhouse/icehouse, aragonite/calcite) changes, effects and controls.
10. The future development of Oceans and human effects.

Useful Reading:

There are many useful publications on this subject: I enclose a dropbox link https://www.dropbox.com/sh/qi29j37xyhjtzcd/AAB7c8Hqc1cXz4sC1_GamDCua?dl=0 to a number of publications which fall into two main categories:

The tectonics and geology of the ocean floor is covered best by Geology books (especially Frisch et al and Kearey, Vine and Klepeis)

Oceanography is covered best by the specialist Marine Geology and Oceanography texts (which tend to have outdated views on the geological aspects of their subject!). In addition to the listed texts and articles (I have included a number of up to date specialist articles on marine pollution), I would recommend: "Introducing Oceanography" David Thomas and David Bowers Dunedin 2012

Oceanography: an Earth Science Perspective Steve Kershaw Stanley Thornes 2000