

熊本大学大学院自然科学研究科（博士前期課程）理学専攻地球環境科学講座入試問題（平成22年1月21日）
英語

次の問[I], [II], [III]に答えよ。解答には、設問ごとに1枚の解答用紙を用い、各解答用紙の左上の[]に、解答する設問番号を記入すること。

[I] 次の英文を読み、以下の問に答えよ。

(1)By dating samples of rocks from onshore lava flows where magnetic reversals had been identified, a time scale of magnetic reversals was gradually built up until eventually it became possible to ‘read’ the ages of the reversals on the sea floor. Immediately it became clear that the youngest rocks were nearest to the ridge, while the oldest were furthest away and adjacent to the continents. Either side of the ridge, stripes of exactly the same age could be matched up with one another. So the oceans really were opening, and the continents really were drifting apart. Wild miracle confirmed! Continental drift at long last became a reality.

Within a couple of years, and certainly by the end of 1960s, a revolution had occurred in the earth sciences, and there were only a handful of geologists left who still did not accept the ‘new’ ideas about sea-floor spreading and continental drift. The key to that revolution was development of a geological time scale.

(2)Today geology has its dates, just like history does. Time has become the framework onto which we hang all geological events and, as in our daily lives, it has become indispensable. We have learnt how to tell geological time from isotopic clocks, and we have developed a time scale for the evolution of life, and all that went before it. Using the clocks and the time scales we have discovered the true age of ‘Mother Earth’, revealed many of her internal mysteries and developed a unifying theory that explains all geological processes – just as Arthur Holmes’ vision of 1913 said we would:

With the acceptance of a reliable time-scale, geology will have gained an invaluable key to further discovery. In every branch of the science its mission will be to unify and correlate, and with its help a fresh light will be thrown on the more fascinating problems of the Earth and its Past.

Given enough time, everything possible happens.

（出典：“The Dating Game”, C. Lewis, Cambridge University Press）

(1) 下線部(1)から、海洋底拡大の証拠とされる事実を簡潔に述べよ。

(2) 下線部(2)を和訳せよ。

[II] 次の英文を読み、以下の問に答えよ。

The weathering of bedrock and the transport and deposition of the weathering products are continuous. Therefore, sediment is found almost everywhere. As piles of sediment accumulate, the materials near the bottom are compacted by the weight of the overlying layers. Over long periods, these sediments are cemented together by mineral matter deposited from water in the spaces between particles. This forms solid sedimentary rock.

Geologists estimate that sedimentary rocks account for only about 5 percent (by volume) of Earth's outer 16 kilometers. However, the importance of this group of rocks is far greater than this percentage implies. If you sampled the rocks exposed at Earth's surface, you would find that the great majority are sedimentary. Indeed, about 75 percent of all rock outcrops on the continents are sedimentary. Therefore, we can think of sedimentary rocks as comprising a relatively thin and somewhat discontinuous layer in the uppermost portion of the crust. This makes sense because sediment accumulates at the surface.

It is from sedimentary rocks that geologists reconstruct many details of Earth's history. Because sediments are deposited in a variety of different settings at the surface, the rock layers that they eventually form hold many clues to past surface environments. They may also exhibit characteristics that allow geologists to decipher information about the method and distance of sediment transport. Furthermore, it is sedimentary rocks that contain fossils, which are vital evidence in the study of the geologic past.

Finally many sedimentary rocks are important economically. Coal, which is burned to provide a significant portion of U.S. electrical energy, is classified as a sedimentary rock. Other major energy resources (petroleum and natural gas) occur in pores within sedimentary rocks. Other sedimentary rocks are major sources of iron, aluminum, manganese, and fertilizer, plus numerous materials essential to the construction industry.

(出典： “Foundations of Earth Science”, F. K. Lutgens and E. J. Tarbuck, Prentice Hall)

(1) 下線部を和訳せよ。

(2) “Sedimentary rocks”の持つ重要性について、2つの観点から簡潔に述べよ。

[III] 次の和文を英訳せよ。

地球環境科学コースの大学院修士プログラムでは、地球システムの構成要素である、岩石圏、生物圏、水圏、気圏等の成り立ちや変動の歴史を解明したり、サブシステム間の相互作用としての物質循環・環境変動の実態解明の研究に挑戦することとします。修士研究を通じて、皆さんが今日の地球が抱える様々な地球規模の環境問題に対する自分なりの考え方を見つけることに期待しています。