

平成 21 年度 (2009 年度)

東北大学大学院理学研究科 地学専攻

博士課程前期 2 年の課程 入試問題

英語

平成 20 年 9 月 2 日 9 : 30 ~ 11 : 30 実施

注 意 事 項

1. 机の上には受験票、筆記用具、時計以外は置いてはいけません。
2. 合図があるまで問題冊子を開いてはいけません。
試験時間は 9 : 30 から 11 : 30 までです。
3. 問題は I、II の 2 問で、受験者全員に共通の問題です。
4. 解答はすべて解答用紙に記入します。解答は大問 1 題毎に 1 枚の解答用紙を使います。表に書ききれないときは裏も使います。解答用紙の所定の欄に受験番号・氏名・志望分野および問題番号を記入します。

問題 I 以下の英文を全訳せよ。

Although relatively recent climate changes can be studied in archives such as ice cores, tree rings, and corals, sediments are the major climate archive on Earth for over 99% of geologic time, primarily as continuous sequences deposited by water.

The sediments are eventually deposited in receptive environments, mainly quieter waters where layer upon layer of sediment can be laid down in undisturbed succession. Most sediment is carried to the ocean, either right after it is first eroded or later, after temporary deposition on land followed by one or more cycles of reerosion and redeposition. Sediment delivered to the seafloor may be quickly dragged down beneath the continental margin by plate tectonic processes and destroyed, or it may persist for tens of millions of years on the seafloor. The relentless action of these two processes, erosion and tectonic activity, decreases the likelihood that older sedimentary records will be preserved as time passes.

For intervals before the last 170 million years, all surviving sedimentary records come from continents. Under favorable conditions, sediments may be preserved there for a long time in the deposits: thick sequences in deep continental basins that contain large lakes; thinner sequences in shallow interior seas during times when the ocean floods lowlying land; and thick lens-shaped piles of sediment along continental shelves and on the steeper continental slopes leading down to the deep ocean.

Sediments are useful climate archives to the extent that their deposition is uninterrupted. Major disturbances during and just after deposition come from wave action reaching several meters below sea level and from occasional large storms that produce turbulent disturbances that may reach tens of meters deep in the water column and erode previously deposited layers. These problems affect shallow marine regions. In addition, sediments deposited on the steep continental slope margins are vulnerable to dislodgement down into the deeper ocean by disturbances such as earthquakes.

(出典 : W. F. Ruddimann, Earth's Climate Past and Future, 2000, W. H. Freeman and Company, N.Y.)

(参考) sediments:堆積物
relentless:きびしい

問題Ⅱ 炭田火災に関する次の文章を読み、英文部分を参考にして日本語の下線部(a)～(c)を英訳せよ。

Coal fires occurred naturally in the geologic past, dating as far back, for example, as the Pliocene in the Powder River basin of the United States and the Pleistocene in northwest China.

(a)炭田火災に関する文字による記録は、少なくともアレキサンダー大王の時代までさかのぼるけれども、炭田火災が世界中の主な石炭産出国で劇的に急増するようになったのは産業革命以降である。現在では、全世界で数千の炭田火災が発生しており、その中には数百年にわたって燃え続けているものもある。

Field measurements and laboratory analyses reveal that during burning, these fires spew carbon monoxide, benzene, toluene, and dozens of other toxins into the atmosphere and soil, along with the greenhouse gases methane (during heating of the coal) and carbon dioxide. (b)炭田火災によって発生するガス成分の全世界での年間放出量は見積られていない。しかし有毒な成分は、人々を一酸化炭素中毒や肺ガンなど、時に命に関わる病におとしいれる。

(c)炭田火災から発生した酸やエアロゾル、有害な粒子状物質は長距離を運ばれることがある。たとえば中国では、このような汚染物質は88の都市に悪影響を及ぼし、日本や韓国、フィリピンに酸性雨をまき散らすことになる。

(参考) アレキサンダー大王 : Alexander the Great

肺ガン : lung cancer