

平成 19 年度（2007 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 18 年 9 月 12 日 9 : 00 ~ 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 : 00 から 11 : 30 までです。
3. 問題は I、II、III の 3 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 題毎に解答用紙を別に
します。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1 次の英文を読み、下の問(問1、問2)に答えよ。

Disasters happen when nature's extreme forces strike exposed people and property. These recurring natural phenomena, such as floods, hurricanes, and earthquakes, are known as natural hazard events. When natural hazard events take place in unpopulated areas, no disaster occurs, when they take place in developed areas, damaging life and property, they are called natural disasters. ⁽¹⁾The magnitude of a disaster depends on the intensity of the natural hazard event, the number of people and structures exposed to it, and the effectiveness of pre-event mitigation actions in protecting people and property from hazard forces.

⁽²⁾Natural disasters have grown larger as more people and property have become exposed to natural hazards. Unfortunately, the places where hazards occur are often the same places where people want to live - along ocean shores and riverfronts or near earthquake faults. As more urban development takes place in such high-hazard areas, the risk of damage and injury from disasters multiplies. During the first half of the 1990s, the United States suffered unparalleled damage from natural disasters. Hurricanes, floods, earthquakes, and other natural disasters caused billions of dollars in damage, destroyed homes and businesses, and cut off roads, bridges, water systems, and other public infrastructure.

⁽³⁾Yet much of the damage and suffering from natural disasters can be prevented. Natural hazard events cannot be prevented from occurring, but their impacts on people and property can be reduced if advance action is taken to mitigate risks and minimize vulnerability to natural disasters.

出典: D. Godschalk et al. (1999) Natural hazard mitigation: recasting disaster policy and planning, Island Press から抜粋

参考 vulnerability: 脆弱性 mitigate: 軽減する

問1 下線部(1)~(3)を和訳せよ。なお、disaster(s)と hazard(s)は、それぞれディザスター、ハザードとすること。

問2 ディザスターとハザードの違いを、本文に即して3行程度で説明せよ。

問題Ⅱ 以下の英文の下線部(1)～(3)を和訳せよ。

The evolution of the Earth's climate is related very much to the history of the development of the sun and the degassing of the Earth. (1) The sun 4.6 billion years ago was 25-30% dimmer than it is now. Since then, it has progressively increased its radiation output. If the Earth's atmosphere had had the same composition then as now, this lower solar radiation output would have allowed the Earth to be covered in ice for the first two billion years of its existence. But the geological record indicates that the Earth had liquid oceans as early as 3.8 billion years ago, and no glaciation until 2.7 billion years ago. This dichotomy is known as the 'faint sun' paradox. At present the Earth's surface receives only half of the solar radiation impinging upon its disk as it orbits the sun. Reflectance and atmospheric interference account for the rest. (2) If the Earth was not ice-locked in its early history, then its surface would have needed to receive most of the solar radiation emanating from a fainter sun. This could have been possible only if there were unrealistically fewer clouds and less moisture in the atmosphere than at present. So the only viable mechanism to negate the consequences of a 'faint sun' had to be a global warming caused by an enhanced 'greenhouse' effect that was dependent upon large amounts of carbon dioxide in the Earth's early atmosphere.

Geological evidence supports this enhanced carbon dioxide-induced 'greenhouse' effect. The amount of carbon dioxide (CO₂) present in carbonate rocks in the Earth's crust is equivalent to sixty times (60 bars) present atmospheric pressure. At present the partial pressure of carbon dioxide in the atmosphere is only 0.0003 bars. Only a few tenths of a bar would have been needed to compensate for the 'faint sun' paradox. (3) However the carbon dioxide in the Earth's atmosphere must have decreased at just the right rate over time to compensate for the steadily increasing radiation output of the sun. Such a delicate balance was not easily maintained for long periods. A mechanism was needed to modulate periods of excessive carbon dioxide in the atmosphere and variability in solar activity.

出典: E. Bryant (1997) CLIMATE, PROCESS & CHANGE, Cambridge Press から
抜粋

参考 negate: 否定する

問題Ⅲ 以下の文章の下線部(1)～(3)を英訳せよ。

水は異なる3つの状態(固体・液体・気体)として存在する。(1)液体の水はどこにでもあり、水道の蛇口をひねればでてくるし、雨として降ってきたり、川を流れていたりする。純粋な液体の水は、塩分も瓦礫も土砂も、またごみもはっていない。(2)氷や雪、霜は水が固体状態になった例である。液体の水は摂氏0度で凍り、冬は固体の水がいくらでも見られる季節である。そのほか固体の水の例としては角氷やつらら、スケートリンクの氷などがある。水は蒸発して気体になり、その気体は色もなければにおいもない。(3)固体から液体、液体から気体へと変化すること、またはその逆の過程を相変化という。水のような物質は相変化をおこしても、化学的な変化はおきない。融解や凍結、凝縮、蒸発は相変化の例である。物質がどのような相になるかは温度と圧力で決まる。

参考 蛇口: faucet 相: phase