

國立中山大學 102 學年度碩士暨碩士專班招生考試試題

科目名稱：科學英文【海科系碩士班乙組、丙組】

題號：458001

※本科目依簡章規定「不可以」使用計算機

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A. 閱讀能力測驗：每一題僅有一個正確或最佳答案；請於答案卷作答(每題 4 分，共 40 分)。

(1). Answer questions 1-5 according to the abstract of the following article:

Thomas Jacob, John Wahr, W. Tad Pfeffer & Sean Swenson, 2012. Nature, vol. 498, 514-518.

Glaciers and ice caps (GICs) are important contributors to present day global mean sea level rise¹. Most previous global mass balance estimates for GICs rely on extrapolation of sparse mass balance measurements representing only a small fraction of the GIC area, leaving their overall contribution to sea level rise unclear. Here we show that GICs, excluding the Greenland and Antarctic peripheral GICs, lost mass at a rate of 148 ± 30 Gt yr⁻¹ from January 2003 to December 2010, contributing 0.41 ± 0.08 mm yr⁻¹ to sea level rise. Our results are based on a global, simultaneous inversion of monthly GRACE-derived satellite gravity fields, from which we calculate the mass change over all ice-covered regions greater in area than 100 km². The GIC rate for 2003–2010 is about 30 per cent smaller than the previous mass balance estimate that most closely matches our study period. The high mountains of Asia, in particular, show a mass loss of only 4 ± 20 Gt yr⁻¹ for 2003–2010, compared with 47–55 Gt yr⁻¹ in previously published estimates. For completeness, we also estimate that the Greenland and Antarctic ice sheets, including their peripheral GICs, contributed 1.0 ± 0.19 mm yr⁻¹ to sea level rise over the same time period. The total contribution to sea level rise from all ice-covered regions is thus 1.48 ± 0.26 mm yr⁻¹, which agrees well with independent estimates of sea level rise originating from land ice loss and other terrestrial sources.

1. What is GIC?
(A) Global Information Commission. (B) Geographic Information Certificate.
(C) Glaciers and Ice Caps. (D) Generalized Information Change.
2. According to this passage, which place may have the least contribution to sea level rise?
(A) The high mountains of Asia. (B) Greenland.
(C) Alaska. (D) Antarctica.
3. Which instrument may be used in this research?
(A) Water level indicator. (B) Depth measuring instrument.
(C) In-situ pressure meter. (D) Satellite.
4. How many data sets in one study area can the author get?
(A) 8. (B) 96. (C) 192. (D) 768.
5. What is the best title for this article?
(A) Estimating earth variations from a combination of GRACE and ocean model output.
(B) Recent contributions of glaciers and ice caps to sea level rise.
(C) Global sea level rise, recent progress and challenges for the decade to come.
(D) Icefield melting observed by gravity recovery and climate experiment (GRACE).

(2). Answer questions 6-10 according to the abstract of the following article:

Huber, M. and Knutti, R., 2011. Nature Geoscience, vol. 5, 31-36.

The Earth's energy balance is key to understanding climate and climate variations that are caused by natural and anthropogenic changes in the atmospheric composition. Despite abundant observational evidence for changes in the energy balance over the past decades, the formal detection of climate warming and its attribution to human influence has so far relied mostly on the difference between spatio-temporal warming patterns of natural and anthropogenic origin. Here we present an alternative attribution method that relies on the principle of conservation of energy, without assumptions about spatial warming patterns. Based on a massive ensemble of simulations with an intermediate-complexity climate model we demonstrate that known changes in the global energy balance and in radiative forcing tightly constrain the magnitude of anthropogenic warming. We find that since the mid-twentieth century, greenhouse gases contributed 0.85 °C of warming (5–95% uncertainty: 0.6–1.1 °C), about half of which was offset by the cooling effects of aerosols, with a total observed change in global temperature of about 0.56 °C.

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The observed trends are extremely unlikely (<5%) to be caused by internal variability, even if current models were found to strongly underestimate it. Our method is complementary to optimal fingerprinting attribution and produces fully consistent results, thus suggesting an even higher confidence that human-induced causes dominate the observed warming.

6. According to the passage, the best way to understand climate is to study what?
(A) Natural and anthropogenic changes. (B) Spatial warming patterns.
(C) The Earth's energy balance. (D) Climate variations.
7. What method is unlikely to be used in the research?
(A) Climate simulation. (B) Statistical analysis.
(C) Model computation. (D) Field trip.
8. What is the best title for this article?
(A) Anthropogenic and natural warming inferred from changes in Earth's energy balance.
(B) The signal of ocean global warming.
(C) Greenhouse-gas emission targets for global warming.
(D) The detection and attribution of climate change.
9. About half of the earth can be neutralized by what?
(A) Carbon dioxide. (B) Aerosols. (C) Organic carbon. (D) Radiative forcings.
10. Which forcing contributes the most to global temperature change?
(A) Natural forcing. (B) Greenhouse gases.
(C) anthropogenic forcing. (D) Aerosols.

B. 基本字彙測驗：寫出下列各英文名詞的中文(每題 3 分，共 15 分)。

1. Kuroshio
2. Tidal flat
3. Subduction
4. Overfishing
5. Carbon emission

C. 基本字彙測驗：寫出下列各中文名詞的英文(每題 3 分，共 15 分)。

1. 轉型斷層
2. 富營養鹽
3. 光合作用
4. 天然氣水合物
5. 海岸帶

D. 英文表達測驗：將下列段落文字以大意(非逐字)方式翻寫成英文，評分以文法和拼字的正確及文句通順程度為標準(每題 15 分，共 30 分)。

1. 由於全球的暖化造成極地冰蓋和高山、高原區的冰川融解，使得全球的海平面上升，嚴重的威脅到沿著海岸居住的人類，特別是沿海的超級城市，如紐約和上海。
2. 由於歐亞板塊和菲律賓海板塊的碰撞和擠壓，形成了台灣多山的陡峭地形，也造成了台灣地震的頻繁。台灣又位於西太平洋颱風的走廊上，每年平均有四次颱風的襲擊。陡峭地形，地震造成的山崩，再加上颱風帶來的強降雨，使得台灣河川單位流域的輸砂量在全球名列前茅。