

國立中山大學 106 學年度碩士暨碩士專班招生考試試題

科目名稱：科學英文【海科系碩士班甲組、乙組】

題號：458001

※本科目依簡章規定「不可以」使用計算機(混合題)

共 2 頁第 1 頁

I. 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 3 分，共 30 分）。

**Answer questions 1-5 according to abstract of the following article:**

Markus Huber and Reto Knutti, 2012. *Nature Geoscience* 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. 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.*

1. What do you think the title of this article is?  
(A) Comparing climatic models and their accuracy  
(B) Climatic warming and human influence  
(C) Anthropogenic and natural warming inferred from changes in Earth's energy balance  
(D) Application of the principle of conservation of energy on global warming
2. Which process contributed the most to global warming? (A) aerosols cooling (B) radiative forcing (C) internal variability (D) greenhouse gases
3. How was the formal detection of climatic changes based on in the past? (A) difference between spatio-temporal warming patterns (B) energy balance (C) conservation of energy (D) radiative forcing
4. What factors contributed to climatic changes and variations? (A) Earth energy (B) natural changes (C) conservation of energy (D) natural and anthropogenic changes
5. What is the contribution of this article? (A) using massive ensemble of simulations with an intermediate-complexity climate model (B) suggesting an even higher confidence that human-induced causes dominate the observed warming (C) relying on the principle of conservation of energy with assumptions about spatial warming patterns (D) all of the above

**Answer questions 6-10 according to abstract of the following article:**

Miquel Canals<sup>1</sup>, Pere Puig<sup>2</sup>, Xavier Durrieu de Madron<sup>3</sup>, Serge Heussner<sup>3</sup>, Albert Palanques<sup>2</sup> & Joan Fabres<sup>1</sup>, 2006. *Nature* 444, 354-357.

*The continental slope is a steep, narrow fringe separating the coastal zone from the deep ocean. During low sea-level stands, slides and dense, sediment-laden flows erode the outer continental shelf and the continental slope, leading to the formation of submarine canyons that funnel large volumes of sediment and organic matter from shallow regions to the deep ocean. During high sea-level stands, such as at present, these canyons still experience occasional sediment gravity flows, which are usually thought to be triggered by sediment failure or river flooding. Here we present observations from a submarine canyon on the Gulf of Lions margin, in the northwest Mediterranean Sea, that demonstrate that these flows can also be triggered by dense shelf water cascading (DSWC)—a type of current that is driven solely by seawater density contrast. Our results show that DSWC can transport large amounts of water and sediment, reshape submarine canyon floors and rapidly affect the deep-sea environment. This cascading is seasonal, resulting from the formation of dense water by cooling and/or evaporation, and*

# 國立中山大學 106 學年度碩士暨碩士專班招生考試試題

科目名稱：科學英文【海科系碩士班甲組、乙組】

題號：458001

※本科目依簡章規定「不可以」使用計算機(混合題)

共 2 頁第 2 頁

*occurs on both high- and low-latitude continental margins. DSWC may therefore transport large amounts of sediment and organic matter to the deep ocean. Furthermore, changes in the frequency and intensity of DSWC driven by future climate change may have a significant impact on the supply of organic matter to deep-sea ecosystems and on the amount of carbon stored on continental margins and in ocean basins.*

6. What do you think the title of this article is?
  - (A) Formation of submarine canyons
  - (B) Flushing submarine canyons
  - (C) Dense shelf water cascading in the Mediterranean Sea
  - (D) Transport of sediment and organic matter from shallow regions to the deep ocean
7. How was dense shelf water cascading formed? (A) rising sea surface temperature (B) dissipation of hurricane power (C) river flooding or sediment failure (D) seawater density contrast
8. What separates the coastal zone from the deep ocean? (A) continental shelf (B) continental slope (C) sediment gravity flows (D) submarine canyons
9. The dense shelf water cascading happens on what time scale? (A) yearly (B) episodic during storms (C) seasonal (D) unpredictable
10. How does future climate change affect dense shelf water cascading? (A) changes in its the frequency and intensity (B) impact on supply of organic matter to deep-sea ecosystems (C) amount of carbon stored on continental margins and in ocean basins (D) all of the above

II. 基本字彙測驗：寫出下列各英文名詞的中文(每題 2 分，共 20 分)。

1. Ocean circulation
2. Continental slope
3. Oceanic ridge
4. Water mass
5. Carbon cycle
6. Photosynthesis
7. Global climate change
8. Kuroshio intrusion
9. Isopycnal surface
10. Estuary

III. 基本字彙測驗：寫出下列各中文名詞的英文(每題 2 分，共 20 分)。

1. 海水表面溫度
2. 海洋浮游植物
3. 天然氣水合物
4. 海洋酸化
5. 板塊運動
6. 台灣海峽
7. 海槽
8. 溫-鹽圖
9. 沉積物
10. 海洋食物鏈

IV. 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. 人類排放的二氧化碳，平均每年有 35% 排到海裡，大量二氧化碳進入海洋，溶解後形成碳酸，過程中釋放氫離子，導致海水變酸。工業革命以來，海洋平均酸鹼值從 8.21 降到 8.10，並且以每年增加 0.02 的速度，持續酸化。酸化的海水會讓珊瑚白化，將熱鬧的珊瑚礁生態系統化為寂靜死城。
2. 全球暖化到底是人類所導致的，還是自然的變化，不同領域的科學家有不同的看法。古海洋和古環境學家認為是地球系統的自然變化，但是大氣、水文、海洋學家則認為主要是因人類活動而造成的。