中國文化大學 101 學年度碩士班考試入學招生考試

系所組：地學研究所地質組碩士班

日期節次：101 年 3 月 17 日第 2 節 10:30~12:00

科目：科學論文閱讀

1.閱讀理解(40%):請寫出下列文章的主要論述為何，使用何種方法，在地質問題上有何重要貢獻等，每題不得少於50字。每題20分

(1). In an elegant analysis of landslides following the 2008 Wenchuan earthquake in Sichuan, China, Parker *et al.* showed that estimates of the mass of material in landslides exceeds by two to six times the mass of material that moved upwards during the earthquake. With the sensible logic that the material within the landslides soon will be transported out of the Longmen Shan Mountains, they use this discrepancy to argue that erosion seems to remove mass faster than geodynamic processes supply it to the Longmen Shan. I applaud their analysis, but I think that they overlooked an aspect that renders this deduction only plausible at best, and quite likely false. That aspect is isostasy, Archimedes' principle applied to the Earth, which, when generalized to include an elastic surface layer, calls for equal pressure at any depth in the underlying mantle beneath the elastic layer. (NATURE GEOSCIENCE | VOL 5 | FEBRUARY 2012)

(2). Between 488 and 444 million years ago, during the Ordovician period, the climate cooled gradually, culminating in the abrupt onset of periods of temporary glaciation. These Late Ordovician glaciations are puzzling, because they occurred when atmospheric CO_2 concentrations, as estimated by geochemical models and proxy data, were roughly 14–22 times present-day atmospheric levels (PAL). Yet complex climate models suggest atmospheric CO_2 levels had to drop to about 8 PAL to trigger glaciations at this time. The uncertainty in the proxy estimates allows for such a temporary reduction in atmospheric CO_2 levels during the Late Ordovician, but it is unclear which process (or processes) could have lowered these levels temporarily at the time.

The slow decline in CO_2 levels can be explained by invoking the drawdown of CO_2 by increased silicate weathering. The Taconic Orogeny led to extensive mountain building — and weathering — along what is now the mid-Atlantic and northeastern coast of the United States. The eruption rate of basalt, a relatively weatherable rock type, was also elevated during the Ordovician, according to seawater $^{87}Sr/^{86}Sr$ records. Finally, the movement of the continents through the intertropical convergence zone, where rainfall rates are exceptionally high, could also have enhanced weathering. Together with basalt production, this process could have lowered CO_2 to approximately 12 PAL from the Middle Ordovician to Early Silurian period. (NATURE GEOSCIENCE | VOL 5 | FEBRUARY 2012)

2.英文譯成中文(60%):每題20分

(1). Depleted oil and gas reservoirs or saline aquifers. CO_2 is pumped into depleted oil and gas reservoirs or saline aquifers at depths greater than 750 m where it is a relatively dense supercritical fluid. The supercritical $CO_2$is still less dense than formation brines and must be trapped by an impermeable cap rock. The technology for compressing and injecting CO_2 into geological formations is widely used for the enhancement of oil recovery. (NATURE GEOSCIENCE | VOL 2 | DECEMBER 2009)

(2). In the high Himalaya, rain, ice and snow are thought to control discharge of the large rivers. These streams flow across the Ganges plain south of the Himalaya and provide critical water resources for irrigation, hydropower, municipalities, recreation and habitat. Increasing irrigation demands and decreasing river water quality have led to significant depletion of groundwater resources throughout the plains in India, and adjacent countries, and have caused increased dependence on Himalayan water supplies. Yet our understanding of the timing and relative contribution of individual hydrologic components across the Himalaya is limited.(NATURE GEOSCIENCE | VOL 5 | FEBRUARY 2012)

(3). Flows of water and sediment sculpt river channels and floodplains. Traditionally, the assessment of these processes has formed the core of research seeking to explain the enormous variety of river landscapes on Earth. Vegetation has traditionally been relegated to a secondary role in this process, whereby plants were thought to colonize the relatively stable areas of land left by the interactions between water and sediment. However, more recently, many important contributions of vegetation — both dead and living — to river habitat mosaics have been discovered. (NATURE GEOSCIENCE | VOL 5 | FEBRUARY 2012)