北京市高等教育精品教材立项项目

地质学专业英语

English for Geology

主编 张翼翼 阴家润

高等教育出版社
HIGHER EDUCATION PRESS

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序

随着我国大学本科教育的日益普及，社会对于大学毕业生的培养质量有了更高的期待；随着国际交流的增多，一些领域，例如地质矿产领域，对地质学专业本科生英语水平的要求也不断提高，因此，当前地质学教育的大事之一就是大力加强地质学专业学生的英语教育，提高他们的英语水平。大量具有良好专业英语基础的毕业生可以为培养地学领域高端人才提供更为广阔的空间。具备较好的地质学专业英语基础的学生更加有兴趣参与国际学术会议并直接与国外同行进行面对面的交流，通常会更加主动地追踪地质学研究领域的新信息。

多年的实践表明，仅仅凭借大学基础英语的学习难以使学生达到上述要求。有鉴于此，国内的一些院校先后开设了地质学类的专业英语课程，然而在实际教学过程中，教材方面存在一定的不足：比如形式不够规范，内容不够系统等。这种情况在很大程度上影响了地质学专业英语教学的效果，也不利于学生专业英语水平的提高。

《地质学专业英语》是中国地质大学（北京）自1989年在国内开展地质学领域的专业英语教学以来，地质专业和大学英语教师通力合作的成果。这本教材改变了传统的专业英语教材的做法，具有新颖的形式和内容。它以基础地质为内容重点，涉及古气候学、古海洋学、古地理学、大地构造演化、地质灾害、地球环境和地质思维方法等方面。教材具有较强的实用性和前瞻性，能够基本满足教与学双方的最新期望，符合英语语言和地质学专业的认知特点和规律，适合高等院校地质学及相关专业高年级本科生使用。

我谨在此为这本教材作为“北京市高等教育精品教材立项项目”的公开出版，向编者们致以衷心的祝贺，并希望更多学科之间进行交叉协作，有更好的教材继续面世。

殷鸿福

2008年8月

前　言

上世纪80年代末，我国一些地质类院校先后开设了地质英语课程。当时没有固定的教材，大多是教师自己准备的讲义，而且多半只是收集到的地质类文献，少有书面的课后练习，这对于提高学生的阅读能力有一定的帮助，但是课堂上的教、学实践却因此受到局限，进而影响到了教学效果。高等学校本科用《大学英语教学大纲》（修订本）中明确了教材在大学英语教学中的重要作用：教材是实现教学大纲确定的教学目标的重要保证。为了打好语言基础，培养语言应用能力，提高文化素养，教材应为课堂教学提供最佳的语言样本和有系统性、有针对性的语言实践活动的材料。根据这一宗旨，编者总结了近年来大学英语和地质英语的教学经验，编写了《地质学专业英语》，以满足教、学双方对于相关教材的迫切需求。

《地质学专业英语》是“北京市高等教育精品教材立项项目”（2007年）。教材的内容、体系和篇幅是根据教育部“普通高等学校本科专业目录”的要求，并结合了中国地质大学（北京）最新修订的“本科生培养方案”进行编写。教材初稿于2006年初完成，曾作为校内教材试用两年，并经多次修改和补充，在2007年末被评选为“北京市高等教育精品教材立项项目”，由高等教育出版社正式出版。

这本教材适应地质学的最新发展，突破了以往地质学专业英语教材所采用的地层、岩石、构造等狭义地质学内容，结合了地球系统科学的思想，兼顾了知识性与可思性、系统性与灵活性、可接受性和前瞻性、语言典范和时代气息之间的关系。课文内容难易兼顾，充分考虑到了目前学生的英语水平和专业结构。课文语言难度适中，部分正文和补充阅读材料难度稍大；尽量使不同水平的学生均能受益。实践证明，本教材适应地质教育改革和学科建设的需要，在很大程度上提高了地质学专业本科生专业文献的阅读能力和专业会话交流能力，可供地质学专业、地球化学专业和资源勘查工程专业等课程的教学使用。

《地质学专业英语》大部分内容节选自近年来国际重要地质学类英文刊物发表的成果，通过适当删减，分为8个单元。每个单元均有课前热身、精读课文、泛读课文、难句分析、完形填空、阅读理解、英汉互译等内容，有利于学生在知识、能力、素质等方面的协调发展，培养学生学习的主动性和创新性。编者力图使前、后课文之间的衔接紧密结合，便于教师采取动态的教学方法。通过课堂教学，培养学生对专业文献的理解能力；通过课外练习，认识本专业的

热点问题。对典型例句精准详尽的分析，有利于学生了解地质学类文章的特定表述方式，并通过大量阅读和持久的写作实践，提高专业文献的理解能力，领悟英语科技文章的写作策略，较为熟练地操控专业词汇，掌握撰写英文摘要的规律。在练习的编排上，力求多样实用。考虑到地质学专业本科生的特点，在同类教材中首次设计了课堂热身练习，使本教材区别于以往同类教材，有助于学生巩固专业知识并拓展思路，在英语环境中进一步认识地质学。

当然，再好的阅读材料也只是教学的载体，如果用全部学时去讲解这些文章本身，不但会使学生感到乏味，产生畏难情绪，也会失去地质专业英语教学的深层含义。良好的教学效果不能仅靠教材，还需要师与生之间的努力、教与学之间的协同。本教材在某种程度上兼顾了地质英语教学过程中师生之间的互动，通过恰当的练习可加强学生的英语实际交流能力，起到了加强互动性、提高趣味性、调动积极性的作用。同时考虑到不同起点的学生，既照顾起点较低的学生，又给基础较好的学生以发展的空间；既能使学生打下扎实的语言基础，又能培养他们较强的实际应用能力，尤其是听说能力，最大程度保证学生的英语语言水平稳步提高。

在编写过程中，编者获得中国地质大学（北京）地层古生物教研室的大力支持；王训练教授、王成善教授和茅绍智教授提出了宝贵建议；初稿经由万晓樵教授和万天丰教授审阅，提出了建设性意见；教材的试用由欧强老师完成；清华大学外语系何福胜教授对编者给予了不断的鼓励和支持，在此一并表示衷心感谢。

承蒙中国科学院院士殷鸿福教授为本书作序。

编者水平有限，书中不足之处，敬请读者批评指正。

阴家润　张翼翼

2009年春节

Contents

Unit 1

Warm-up Reading

Please choose one of the following paragraphs to read aloud.

1. Most discussion of the cosmos begins with the origin of the universe. That this event is both remote and mysterious has not prevented us from thinking about it. Many theories have been proposed, one of them seems to be clearly the most acceptable today. This ruling theory is called the evolutionary, or Big-bang theory. The basic concept is that the universe is not static but is evolving. It had a specific beginning at some point in the past and has progressed through definite stages to the present. The origin of this concept may be traced to the Belgian cosmologist, Georges Lemaitre, who published his comprehensive theory in 1931. The theory was explained and modified by George Gamow, a Russian-born American astrophysicist, in 1946.
2. Stars in universe may be classified according to size, color, composition, temperature, mutual relationships, or stages of evolutionary development. Obviously, a description of all these classifications is beyond the scope of the present discussion. Our talk just concerns problems of the origin and composition of stars in the same class as the sun. All stars appear to form from clouds of gas and dust. Although these clouds consist mainly of helium and hydrogen, there are various amounts of other elements.
3. A star can have a life span ranging from a few hundred thousand years to billions of years. This is depending on the size of the mass of primary material from which the star formed. During the normal life of the star, its energy and heat come from the conversion of hydrogen atoms into helium atoms. Because the star is continually expending its supply of hydrogen, the time eventually comes when there is little or none left to convert into helium. At this point, the mass of the star begins to contract under the force of gravity, causing a drastic rise in the temperature at the core.

Cosmic Beginnings

Where and when does the history of the Earth begin? Only in the last few decades could this question be asked with any hope of a scientific answer. Certainly one good point at which to start is the time when the materials that were to become the Earth became separated in space from materials that were to become other members of the solar system. Although the story could well commence here, a great many important questions would remain unanswered. Something needs to be said about the materials that make up the Earth, and this pushes the question of origin to a more remote period. Earth's partners in space must also be considered. Now that we know from first-hand observations a great deal about physical conditions on other planets we can seek reasonable answers as to why early Earth was different from early Mars and early moon. To understand differences and similarities, we must study the entire solar system including the sun. To understand stars of the class to which the sun belongs, we need to know more about other bodies in the Milky Way Galaxy.

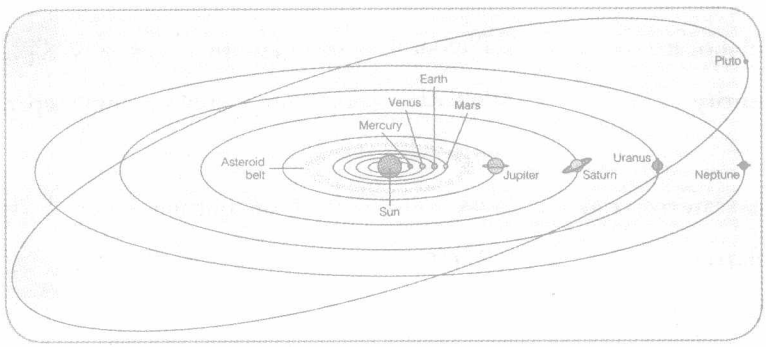
Evidence becomes less easy to gain or interpret as we pass beyond the realms of our Milky Way Galaxy to other regions of space. We now know that there are many different kinds of galaxies, including many like our own. How did the different types originate and become different? This problem is at the forefront of astronomy today and apparently holds the key to proper understanding of the solar system.

Obviously, there can be no planets without suns, no suns without galaxies, no galaxies without a universe, and no universe without both space and matter. Our line of inquiry about the origin of the materials of the Earth therefore, leads to the ultimate origin of matter and space, and these are weighty subjects with many obscure and unknown or unknowable byways.

The solar system occupies a vast, flattened, lens-shaped region of space, in which the planets and most of the smaller components move in an almost perfect plane around the sun. This structure has naturally been compared to the spiral galaxies and to the planet Saturn with its satellites and puzzling rings. Although the solar system is unlike either of these aggregations in detail, the concept of a large central body with flattened encircling rings or spiral arms remains as the starting point for modern theories of its origin.

As long ago as 1644, the great French philosopher and mathematician R. Descartes proposed that the solar system began as a cloud of unorganized primordial matter. The sun and planets, he believed, were accumulations caused by eddies or vortices within this cloud. In 1755, I. Kant published a more detailed theory that took into account the laws of gravity that Newton had described in 1687. Kant considered the combined effects of spiral motions and gravity within the primeval mass and came up with a surprisingly good explanation of the solar system.

Although the subsequent history of thought about the origin of the Earth and solar system is interesting, we cannot elaborate on the many diverse ideas that have been proposed. Suffice it to say that the most acceptable modern theories commence with a nebulous aggregation of diffuse matter such as Descartes envisioned centuries ago. The chief difficulties arise in accounting for the very peculiar family of planets that accompany the sun. The sun itself probably originated by the process of star formation that is seen going on today by contractions within the mixture of elements that prevail in the spiral arms of the Milky Way Galaxy.



Assuming that essentially the entire content of the solar system was once contained in a spherical nebula of gas and dust, we are confronted with several interesting questions: Why did the nebula segregate into entities of different size, and why are these so diverse in structure and composition? A specific question with regard to the Earth is how did a small body, exceptionally rich in heavy elements, segregate from a much larger mass of lighter elements? No doubt the answer to this question is locked in the Earth, but many essential clues also exist in other solid Earth-like members of the solar system. A brief look at what might be called the extraterrestrial evidence is in order.

(717 words)

Words and Expressions

account for 解释；占(比例)

aggregation /ˌægrɪˈgeɪʃən/ *n.* gathering together; a total 聚集；总计

byway /ˈbaɪweɪ/ *n.* a side road or a secondary or arcane field of study 侧道；冷门或偏门学科

commence /kəˈmens/ *v.* to begin / start 开始

contraction /kənˈtrækʃən/ *n.* the act of becoming smaller 缩小

cosmic /ˈkɒzmɪk/ *adj.* of or related to the whole universe 宇宙的

diffuse /dɪˈfjuːz/ *adj.* widely spread 弥漫的；扩散的

diverse /daɪˈvɜːs/ *adj.* different, various 不一样的；各式各样的

eddy /ˈedi/ *n.* a circular movement 漩涡

elaborate /ɪˈlæbərət/ *v.* to add more details to 详尽叙述；做详尽说明

entity /ˈentɪti/ *n.* something that has a single separate and independent existence 实体；统一体

extraterrestrial /ˌekstrətəˈrestrɪəl/ *adj.* outside the Earth 地球外的

flatten /ˈflætn/ *v.* to make or become flat 使平；变平

forefront /ˈfɔːfrʌnt/ *n.* the most forward place 最前线；最前列

matter /ˈmætə/ *n.* the material which makes up the world 物质

nebula /ˈnebjʊlə/ *n.* 星云

nebulous /ˈnebjʊləs/ *adj.* not clear 星云(状)的；模糊不清的；朦胧的

obscure /əbˈskjʊə/ *adj.* dark, not clearly seen or understand 暗的；不清楚的

peculiar /pɪˈkjuːljə/ *adj.* strange, unusual 特别的；古怪的

primeval /praɪˈmiːvəl/ *adj.* very ancient 原始的；远古的

primordial /praɪˈmɔːdjəl/ *adj.* primeval 原始的；原生的

segregate /ˈsegrɪgeɪt/ *v.* separate 隔离

spherical /ˈsferɪkəl/ *adj.* ball-shaped 球(形)的

spiral /ˈspaɪərəl/ *n.* a three - dimensional curve that turns around an axis 螺旋 / 螺线；*adj.* 螺旋形的

weighty /ˈweɪti/ *adj.* important and serious 重要的；重大的

★ 本部分单词中涉及到的地质学专业词汇为学生应掌握词汇。为方便学生理解，有些词汇未加英文注释。

Specialized Items

Descartes /deɪˈkɑːt/ 笛卡尔(1596—1650)，西方著名的哲学家

Kant 康德(1724—1804)，德国著名哲学家，1755年在《自然通史和天体论》中首先提出太阳系起源的星云假说；1796年法国天文学和数学家拉普拉斯(P. S. Laplace)也独立地提出了和康德相类似的观点，合称为康德—拉普拉斯星云假说(Kant-Laplace Hypothesis)

Milky Way Galaxy 银河系

Saturn /ˈsætə(ː)n/ *n.* 土星

solar system 太阳系

★ 本部分所涉及地质学专业性词汇是为了方便学生阅读使用，并不要求复用掌握。

Notes to the Text

1. Only in the last few decades could this question be asked with any hope of a scientific answer. (Para. 1)

This question could be asked with the hope of a scientific answer only in the last few decades.

Only: in writing and formal speech, you can put *only* at the beginning of a sentence, followed by the word, word group, or clause it modifies, and then you put an auxiliary verb or be followed by the subject of the main clause.

2. Certainly one good point at which ... solar system. (Para. 1)

There are four attributive clauses. They are *at which to start* modifying *point*, *when the material ... solar system* modifying *time*, *that were to become the Earth* modifying *material* and *that were to become other members of the solar system* modifying *the materials*.

3. Evidence becomes less easy to gain or interpret. (Para. 2)

It is less easy to gain or interpret evidence.

4. Assuming that essentially the entire content ... (Para. 7)

Assuming that 假设。For example: Even assuming that smokers do see health warnings, I doubt they will take any notice.

Exercises

Comprehension

Answer the following questions in your own words according to the article.

1. Do you know where and when the history of the Earth began?
2. Why must we study the entire solar system?
3. In whose theory was the laws of gravity?
4. Among these theories, which one do you support?
5. Do you have your own explanation about cosmic beginning?
6. What's the key point in order to understand the solar system?
7. We want to know the origin of the Earth, but why should we investigate the origin of matter and space?

Vocabulary and Structure

A. Use the correct forms of the given words to complete the following sentences.

1. Water _____ Hydrogen and Oxygen. (component)

2. In political _____ there is talk of war. (encircle)
3. They accepted _____ that the trip be postponed. (propose)
4. After a two-week-discussion, they handed in a (an)_____ plan. (elaborate)
5. The traffic had to follow a _____ because of an accident on the main road. (diverse)
6. Our factory _____ several years ago. (diverse)
7. One of the _____ of her behavior is that she shouts instead of talking. (peculiar)
8. We can't risk another _____ with the government. (confront)
9. All her children are clever, but the youngest boy is really _____. (exceptionally)
10. His main _____ of influence is the world of banking. (spherical)

B. Choose an appropriate word or expression from the following list to fill in each of the following blanks. Each can be used only ONCE. Change the form where necessary.

whose	erupt	break	volcano	nature	every
make up of	pile	move down	top	which	

The volcano is one of the most surprising frightening of 1)_____. Maybe you have seen pictures of these fireworks of nature. Sometimes when a volcano 2)_____, a very large wall of melted rock 3)_____ the side of a mountain. It looks like a river of fire . Sometimes volcanoes explode, throwing the melted rock and ashes high into the air. But where does this melted rock come from?

The Earth 4)_____ many layers. The 5)_____ layer that we see is called the crust. Under the crust are many layers of hard rock. But far, far beneath the crust 6)_____ rock is so hot, it is soft. In some places it even melts. The melted rock is called magma. Sometimes the magma 7)_____ out to the surface through cracks in the crust. The cracks are volcanoes.

Most people think of mountains when they think of volcanoes. But not 8)_____ mountain is a volcano. A volcano is simply the opening in the Earth from 9)_____ the magma escapes. The hot magma, or lava as it is called, cools and builds up on the surface of the Earth. Over thousands of years, this 10)_____ of cooled lava can grow to be very, very big. For example, the highest mountain in Africa, Kilimanjaro, is a 11)_____. It towers more than 16 000 feet above the ground around it.

Translation

(一) 词类转译法：

词类转译法是在英译汉和汉译英中都经常要用到的翻译方法。在翻译过程中，由于英汉两种语言的表达方式不同，有些句子就不能逐词对译，只能将词类进行转译，使译文通顺、自然。

1. 转译成动词

英语中的某些名词、介词、形容词，翻译时可转译成汉语中的动词。

1) *The government called for the establishment of more technical schools.*
政府号召建立更多的技术学校。(名词转译为动词)

2) *Obviously, there can be no planets without suns.*
很显然，没有恒星就没有行星。(介词转译为动词)

3) *Doctors have said that they are not sure they can save his life.*
医生们说过他们不能肯定是否能够救活他。(形容词转译为动词)

2. 转译成名词

英语中的某些动词、形容词，翻译时可转换成汉语中的名词。

1) *He objected that the plan is not practical.*
他反对的理由是这个计划不现实。(动词转译为名词)

2) *The doctor did his best to save the wounded.*
医生尽了最大的努力来挽救伤员。(形容词转译为名词)

3. 转译成形容词

英语中有些作表语或宾语的抽象名词，以及某些形容词派生的名词，往往可转译成汉语中的形容词。另外，有一些副词也可以转译为形容词。

1) *The movie is a success.*
这部电影很成功。(作表语的名词转译为形容词)

2) *Kant considered the combined effects of spiral motions and gravity within the primeval mass and he came up with a surprisingly good explanation of the solar system.*
康德考虑到了在原始物质当中的螺旋运动和重力的共同作用，因而对太阳系给出了一个令人惊讶的不错解释。(副词转译为形容词)

4. 转译成副词

英语中的某些名词、形容词，翻译时可转译成汉语中的副词。

1) *Independent thinking is an absolute necessary in study.*
在学习时能够独立思考是必要的。(形容词转译为副词)

2) *No doubt the answer to this question is locked in the Earth. But many essential clues also exist in other solid Earth-like members of the solar system. (Para. 7)*
毫无疑问，这个问题的答案被封锁在地球内部。但是在太阳系中其他