前　言

地理科学专业本科培养方案中规定，地理科学专业学生需要掌握一门外国语，能够较熟练地阅读本专业外文书刊、文献，具有一定的专业英文写作和国际学术交流能力。地理科学专业英语作为地理科学专业的一门基础课，是学生在大学公共英语的基础上，以专业学科英语为方向的进一步学习。通过地理科学专业英语的学习，使学生掌握基础专业词汇的涵义，扩充专业词汇量，熟悉一些专业上常用的英语表达方式，了解英文书籍和专业文献的特点，掌握基本的英文专业论文的阅读、翻译和写作能力，具备一定的口头交流能力。

为保证教材内容的系统性和权威性，本书从多方面选取具有代表性的、内容涵盖地理科学专业各学科的信息资源作为课文的基本资料，在保持原有资料特色和连贯性的基础上对其进行加工整理，使每一个单元的内容控制在2~4个学时之内，既保持了每个单元的知识承载量又易于组织学习。

全书共包括16个单元，内容涉及自然地理学概论、地图学、天文学基础、地球概论、气象学、生态学、地质学、人口、移民、文化、政治地理学、农业和工业等方面的地理科学专业知识。每个单元包括课文学习、生词学习、习语学习、注释、课后练习和阅读材料6个部分。课文学习部分为本单元的精读课文，每个单元讲解一个专题并自成体系，学习过程中可以根据不同专业的设置情况和学习进度灵活选择。生词学习和习语学习部分针对本单元出现的新单词和习语，根据其在上下文语境中的涵义作出了解释。注释部分针对文中出现的较复杂的、容易产生理解困难和歧义的句子进行了翻译。课后练习分为问答（Essay Questions）、阅读理解（Reading Comprehension）和词汇（Building Science Vocabulary）三部分，其中阅读理解部分又分为判断对错和填

空两个小部分。阅读理解和词汇部分的练习题为客观问题，主要用以帮助学生对本单元所学知识进行回顾；问答部分设有开放式问题，引导学生对课文中所学知识进行进一步的思考。阅读材料部分为本单元的泛读课文，内容与精读课文相关，作为学生课外自主阅读的材料，可以进一步扩展词汇量，扩充知识。本书附有所有练习的参考答案。

本书可以作为地理科学相关专业本科阶段、成人教育阶段的专业英语教材和双语课程参考教材，也可作为硕士研究生阶段学生、中学地理教师、相关专业科技工作者、出国留学人员的自学教材。

本书的 1~10 单元由李颉编写，11~18 单元由张永庭编写。全书习题由李颉编写。宁夏大学 2008 级人文地理学专业硕士研究生冯翠月进行了人文地理学部分的编辑修改工作，并编写了部分习题答案。全书由李颉统稿。

本书在撰写过程中，参阅了不少国内外文献，在此对这些文献的作者致以谢意。本书在出版过程中得到了宁夏人民出版社的编辑贺飞雁的大力支持，在此表示感谢。

由于时间仓促，书中不足之处敬请读者批评指正。

李　颉
于宁夏大学
2011 年 1 月

CONTENTS

Unit 1

Introduction to Physical Geography[1]

Physical geography is a discipline that is part of a much larger area of understanding called geography, which is the study of natural and human constructed phenomena relative to a spatial dimension[2].

The discipline of geography has a history that stretches over many centuries. Over this time period, the study of geography has evolved and developed into an important form of human scholarship.

William Pattison suggested that modern Geography was now composed of the following four academic traditions：

Spatial Tradition — the investigation of the phenomena of geography from a strictly spatial perspective.

Area Studies Tradition — the geographical study of an area on the Earth at either the local, regional, or global scale.

Human–Land Tradition — the geographical study of human interactions with the environment.

Earth Science Tradition — the study of natural phenomena from a spatial perspective. This tradition is best described as theoretical physical geography.

Today, the academic traditions described by Pattison are still dominant fields of geographical investigation. However, the frequency and magnitude of human mediated environmental problems has been on a steady increase since the publication of this notion. These increases are the result of a growing human population and the consequent increase in the consumption of natural resources. As a result, an increasing number of researchers in geography are studying how humans modify the environment[3]. A significant number of these projects also develop strategies to reduce the negative impact of human activities on nature. Some of the dominant themes in these studies include：environmental degradation of the hydrosphere, atmosphere, lithosphere, and biosphere； resource use issues； natural hazards； environmental impact assessment； and the effect of urbanization and land–use change on natural environments.

Considering all of the statements presented concerning the history and development of geography, we are now ready to formulate a somewhat coherent definition[4]. This definition suggests that geography, in its simplest form, is the field of knowledge that is concerned with how phenomena are spatially organized[5]. Physical geography attempts to determine why natural phenomena have particular spatial patterns and orientation. This text will focus primarily on the Earth Science Tradition. Some of the information that is covered in this text also deals with the alterations of the environment because of human interaction. These pieces of information belong in the Human-Land Tradition of geography.

Elements of Geography

Geography consists of at least two different sub-fields of knowledge with similar methodology: physical geography and human geography. The following table also helps to make the differences between these two types of geography more apparent. This table describes some of the phenomena or elements studied by each of these sub-fields of knowledge. Knowing what kinds of things are studied by geographers provides us with a better understanding of the differences between physical and human geography.

Geography is also a discipline that integrates a wide variety of subject matter. Almost any area of human knowledge can be examined from a spatial perspective. Figure 1T-1 describes some of the main subdisciplines within human and physical geography. Physical geography's primary subdisplines study the Earth's atmosphere (meteorology and climatology), animal and plant life (biogeography), physical landscape (geomorphology), soils (pedology), and waters (hydrology). Some of the dominant areas of study in human geography include: human society and culture (social and cultural geography), behavior (behavioral geography), economics (economic geography), politics (political geography), and urban systems (urban geography).

Table 1T-1: Some of the phenomena studied in physical and human geography.

Physical Geography	Human Geography
Rocks and Minerals	Population
Landforms	Settlements
Soils	Economic Activities
Animals	Transportation
Plants	Recreational Activities
Water	Religion
Atmosphere	Political Systems
Rivers and Other Water Bodies	Social Traditions
Environment	Human Migration
Climate and Weather	Agricultural Systems
Oceans	Urban Systems

The graphic model in Figure 1T-1 indicates that the study of geography can also involve a holistic synthesis. Holistic synthesis connects knowledge from a variety of academic fields in both human and physical geography. For example, the study of the enhancement of the Earth's greenhouse effect and the resulting global warming requires a multidisciplinary approach for complete understanding[⑥]. The fields of climatology and meteorology are required to understand the physical effects of adding additional greenhouse gases to the atmosphere's radiation balance. The field of economic geography provides

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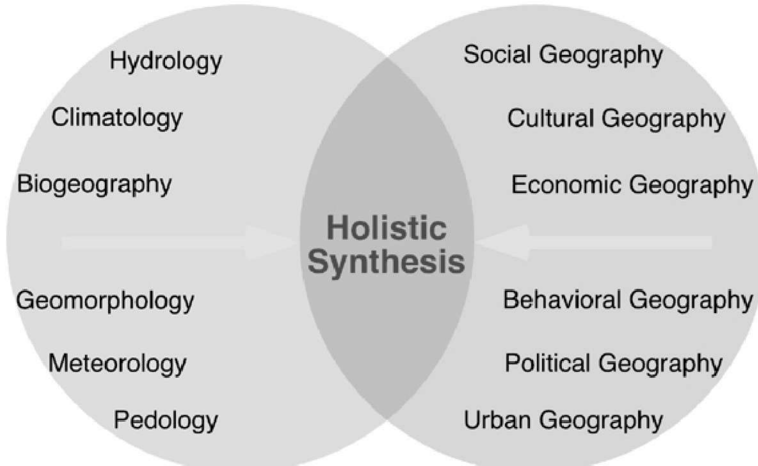

Figure 1T–1 Major subdisciplines of physical and human geography.

information on how various forms of human economic activity contribute to the emission of greenhouse gases through fossil fuel burning and land-use change. Combining the knowledge of both of these academic areas gives us a more comprehensive understanding of why this serious environmental problem occurs.

The holistic nature of geography is both a strength and a weakness. Geography's strength comes from its ability to connect functional interrelationships that are not normally noticed in narrowly defined fields of knowledge⑦. The most obvious weakness associated with the geographical approach is related to the fact that holistic understanding is often too simple and misses important details of cause and effect⑧.

Scope of Physical Geography

We have now learned that physical geography examines and investigates natural phenomena spatially. In the previous section, we identified some of the key elements studied by physical geographers. Combining these two items, we can now suggest that physical geography studies the spatial patterns of weather and climate, soils, vegetation, animals, water in all its forms, and landforms. Physical geography also examines the interrelationships of these phenomena to human activities. This sub-field of geography is academically known as the Human-Land Tradition. This area of geography has seen very keen interest and growth in the last few decades because of the acceleration of human induced environmental degradation. Thus, physical geography's scope is much broader than the simple spatial study of nature. It also involves the investigation of how humans are influencing nature.

Academics studying physical geography and other related earth sciences are rarely generalists. Most are in fact highly specialized in their fields of knowledge and tend to focus themselves in one of the following well defined areas of understanding in physical geography⑨:

Geomorphology — studies the various landforms on the Earth's surface.

Pedology — is concerned with the study of soils.

Biogeography — is the science that investigates the spatial relationships of plants and animals.

Hydrology — is interested in the study of water in all its forms.

Meteorology — studies the circulation of the atmosphere over short time spans.

Climatology — studies the effects of weather on life and examines the circulation of the atmosphere over longer time spans.

The above fields of knowledge generally have a primary role in introductory textbooks dealing with physical geography. Introductory physical geography textbooks can also contain information from other related disciplines including：

Geology — studies the form of the Earth's surface and subsurface，and the processes that create and modify it.

Ecology — the scientific study of the interactions between organisms and their environment.

Oceanography — the science that examines the biology，chemistry，physics，and geology of oceans.

Cartography — the technique of making maps.

Astronomy — the science that examines celestial bodies and the cosmos.

New Words and Expressions

degradation	[ˌdegrə'deiʃən]	n. 恶化；退化；降级
mediate	['miːdieit]	vt. 1. 居间促成； 2. 影响……的发生；使……可能发生 3. 促成……的解决
hydrosphere	['haidrəsfiə]	n. 水圈
lithosphere	['liθəuˌsfiə]	n. 岩石圈
biosphere	['baiəuˌsfiə]	n. 生物圈
migration	[mai'greiʃən]	n. 迁移；移居；迁徙
meteorology	[ˌmiːtiːə'rɔlədʒi]	n. 气象学
climatology	[klaimə'tɔlədʒi]	n. 气候学
biogeography	[ˌbaiəudʒi'ɔgrəfi]	n. 生物地理学
pedology	[pi'dɔlədʒi]	n. 土壤学
geomorphology	[ˌdʒiːəumɔː'fɔlədʒi]	n. 地形学
hydrology	[hai'drɔlədʒi]	n. 水文学
holistic	[həʊ'listik]	a. 全部的，综合整体思想的
ecology	[i'kɔlədʒi]	n. 生态，生态学
oceanography	[ˌəʊʃə'nɔgrəfi]	n. 海洋学
cartography	[kɑː'tɔgrəfi]	n. 制图学，制图法
astronomy	[ə'strɔnəmi]	n. 天文学

List of Key Words

Geography The study of natural and human constructed phenomena relative to a spatial dimension.

Spatial Tradition Academic tradition in modern geography that investigates geographic phenomena from a strictly spatial perspective.

Area Studies Tradition Academic tradition in modern geography that investigates an area on the Earth from a geographic perspective at either the local, regional, or global scale.

Human-Land Tradition Academic tradition in modern geography that investigates human interactions with the environment.

Earth Science Tradition Academic tradition in modern geography that investigates natural phenomena from a spatial perspective.

Physical geography Field of knowledge that studies natural features and phenomena on the Earth from a spatial perspective. Subdiscipline of geography.

Human geography Field of knowledge that studies human-made features and phenomena on the Earth from a spatial perspective. Subdiscipline of geography.

Notes

①本单元文章、图片来源于 http://www.physicalgeography.net/fundamentals/1a.html，http://www.physicalgeography. net/fundamentals/1b.html，http://www.physicalgeography.net/fundamentals/1c.html.

②自然地理学是一个被称之为地理学的更大的学科的分支学科。地理学是在空间维度下对自然和人造现象的研究。

③当今，由帕蒂森提出的学科传统仍然是地理研究的主流领域。然而，在这个观点发表之后，人类导致的环境问题发生的频率和幅度一直在持续增加，这些增加是人口增长和随之而来的自然资源消耗增长的结果。所以，越来越多的地理学研究者致力于研究人类是怎样改变自然环境的。

④考虑到上述所有的关于地理学的历史和发展的论述，我们现在就可以得出一个更合乎逻辑的定义了。

⑤这个定义表明：地理学，以它最简单的形式，是研究现象是怎样空间分布的学科。

⑥例如，对于温室效应的增加以及由此引起的全球变暖问题的研究需要多学科方法才能完全弄明白。

⑦狭义知识领域间的相互关系通常不被注意到，而地理学的优势就在于它能把这些相互关系连接在一起的能力。

⑧地理学方法最明显的弱点是：从整体看问题的方法通常过于简单而忽略了原因与结果之间的重要细节。

⑨自然地理学和其他相关地球科学领域的研究者很少是全才。实际上他们中的大多数都专注于自己的领域，这些领域往往是下列在自然地理学中有明确定义的领域之一。

Exercises

Essay Questions

1. What is geography? What is physical geography? What is the relationship between geography and physical geography?

2. What is modern geography composed of according to William Pattison?

3. What is physical geography composed of? What do they study?

4. What areas of understanding are academics studying physical geography tend to focus on?

Reading comprehension

Ⅰ. Answer the following questions according to the text. Write T if the statement is True, write F if the statement is false.

1. Geography consists of two major subfields, physical geography and human geography. ( )

2. Nowadays, Pattison's theory of the academic traditions that comprises modern geography is out of date and is not appropriate anymore. ( )

3. Geography is the field of knowledge that is concerned with how phenomena are spatially organized. ( )

4. The Earth Science Tradition of geography is the study of natural phenomena from a spatial perspective. This tradition is best described as theoretical physical geography. ( )

5. The Human–Land Tradition of geography studies the human interactions with the environment. ( )

6. Physical geography mainly study rocks and minerals, soils, landforms, agricultural systems, transportation, etc. ( )

7. Physical geography's primary subdisplines study the Earth's atmosphere (meteorology and climatology), animal and plant life (biogeography), physical landscape (geomorphology), soils (pedology), and waters (hydrology). ( )

8. The holistic nature of geography means that knowledge from different academic areas can be combined to understand serious environmental problem in a more comprehensive way. ( )

9. Physical geography studies the spatial patterns of weather and climate, soils, vegetation, animals, water in all its forms, and landforms. ( )

10. Geomorphology, pedology, biogeography, hydrology, meteorology, climatology, etc are all subareas of physical geography. ( )

Ⅱ. Fill in the blanks.

1. William Pattison suggested that modern geography was now composed of the following four academic traditions: ________, ________, ________, ________.

2. Geography is the study of ________ and ________ constructed phenomena relative to a spatial

dimension.

3. Earth Science Tradition is the study of _________ phenomena from a _________ perspective.

4. Area Studies Tradition is the geographical study of an area on the Earth at either the _________, _________, or _________ scale.

5. Spatial Tradition is the investigation of the phenomena of geography from a strictly _________ perspective.

6. Human-Land Tradition is the geographical study of _________ interactions with the _________.

7. Physical geography's primary subdisplines study the Earth's atmosphere (_________ and _________), animal and plant life (_________), physical landscape (_________), soils (_________), and waters (_________).

8. Some of the dominant areas of study in human geography include: human society and culture (_________ and _________ _________), behavior (_________ _________), economics (_________ _________), politics (_________ _________), and urban systems (_________ _________).

Building Science Vocabulary

Match the words in Column A with their corresponding definition in Column B.

A	B
1. geography	a. the study of natural phenomena from a spatial perspective.
2. physical geography	b. the geographical study of human interactions with the environment.
3. human-land tradition	c. studies the spatial patterns of weather and climate, soils, vegetation, animals, water in all its forms, and landforms.
4. earth science tradition	d. study of natural and human constructed phenomena relative to a spatial dimension.
5. area studies tradition	e. the investigation of the phenomena of geography from a strictly spatial perspective.
6. spatial tradition	f. the geographical study of an area on the Earth at either the local, regional, or global scale.

Reading Material

History and Future of Physical Geography

History of geography

The nature of understanding in physical geography has changed over time. When investigating this change, it becomes apparent that certain universal ideas or forces had very important ramifications to the academic study of physical geography. During the period from 1850 to 1950, there seems to be four main ideas that had a strong influence on the discipline：

Uniformitarianism this theory rejected the idea that catastrophic forces were responsible for the current conditions on the Earth. It suggested instead that continuing uniformity of existing processes were responsible for the present and past conditions of this planet.

Evolution – Charles Darwin's Origin of Species (1859) suggested that natural selection determined which individuals would pass on their genetic traits to future generations. As a result of this theory, evolutionary explanations for a variety of natural phenomena were postulated by scientists. The theories of uniformitarianism and evolution arose from a fundamental change in the way humans explained the universe and nature. During the 16th, 17th, and 18th centuries scholars began refuting belief or myth based explanations of the cosmos, and instead used science to help explain the mysteries of nature. Belief based explanations of the cosmos are made consistent with a larger framework of knowledge that focuses on some myth. However, theories based on science questioned the accuracy of these beliefs.

Exploration and Survey much of the world had not been explored before 1900. Thus, during this period all of the fields of physical geography were actively involved with basic data collection. This data collection included activities like determining the elevation of land surfaces, classification and description of landforms, the measurement of the volume of flow of rivers, measurement of various phenomena associated to weather and climate, and the classification of soils, organisms, biological communities and ecosystems.

Conservation beginning in the 1850s, a concern for the environment began to develop as a result of the human development of once natural areas in the United States and Europe. One of the earliest statements of these ideas came from George Perkins Marsh (1864) in his book "Man in Nature" or "Physical Geography as Modified by Human Action". This book is often cited by scholars as the first significant academic contribution to conservation and environmentalism.

After 1950, the following two forces largely determined the nature of physical geography：

The **Quantitative Revolution** measurement became the central focus of research in Physical Geography. It was used primarily for hypothesis testing. With measurement came mapping, models, statistics, mathematics, and hypothesis testing. The quantitative revolution was also associated with a change in the way in which physical geographers studied the Earth and its phenomena. Researchers now began investigating process rather than mere description of the environment.

The study of **Human/Land Relationships** the influence of human activity on the environment was becoming very apparent after 1950. As a result, many researchers in physical geography began studying the influence of humans on the environment. Some of the dominant themes in these studies included: environmental degradation and resource use; natural hazards and impact assessment; and the effect of urbanization and land-use change on natural environments.

Future of Physical Geography

The following list describes some of the important future trends in physical geography research：

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Continued development of applied physical geography for the analysis and correction of human-induced environmental problems. A student of applied physical geography uses theoretical information from the field of physical geography to manage and solve problems related to natural phenomena found in the real world.

Remote Sensing Advances in technology have caused the development of many new instruments for the monitoring of the Earth's resources and environment from airborne and space platforms. The most familiar use of remote sensing technology is to monitor the Earth's weather for forecasting.

Geographic Information Systems A geographic information system (GIS) merges information in a computer database with spatial coordinates on a digital map. Geographic information systems are becoming increasingly more important for the management of resources.

Unit 2

Introduction to Maps[1]

A map can be simply defined as a graphic representation of the real world. This representation is always an abstraction of reality. Because of the infinite nature of our Universe it is impossible to capture all of the complexity found in the real world. For example, topographic maps abstract the three-dimensional real world at a reduced scale on a two-dimensional plane of paper[2].

Maps are used to display both cultural and physical features of the environment. Standard topographic maps show a variety of information including roads, land-use classification, elevation, rivers and other water bodies, political boundaries, and the identification of houses and other types of buildings. Some maps are created with very specific goals in mind.

The art of map construction is called cartography. People who work in this field of knowledge are called cartographers. The construction and use of maps has a long history. Some academics believe that the earliest maps date back to the fifth or sixth century BC. Even in these early maps, the main goal of this tool was to communicate information. Early maps were quite subjective in their presentation of spatial information. Maps became more objective with the dawn of Western science[3]. The application of scientific method into cartography made maps more ordered and accurate. Today, the art of map making is quite a sophisticated science employing methods from cartography, engineering, computer science, mathematics, and psychology.

Cartographers classify maps into two broad categories: reference maps and thematic maps. Reference maps normally show natural and human-made objects from the geographical environment with an emphasis on location. Examples of general reference maps include maps found in atlases and topographic maps. Thematic maps are used to display the geographical distribution of one phenomenon or the spatial associations that occur between a number of phenomena.

The shape of the Earth's surface can be described as an ellipsoid. An ellipsoid is a three-dimensional shape that departs slightly from a purely spherical form. The Earth takes this form because rotation causes the region near the equator to bulge outward to space[4]. The angular motion caused by the Earth spinning on its axis also forces the polar regions on the globe to be somewhat flattened[5].

Representing the true shape of the Earth's surface on a map creates some problems, especially when this depiction is illustrated on a two-dimensional surface[6]. To overcome these problems, cartographers have developed a number of standardized transformation processes for the creation of two-dimensional maps. All of these transformation processes create some type of distortion artifact[7]. The nature of this distortion is related to how the transformation process modifies specific geographic properties of the map. Some of the geographic properties affected by projection distortion include: distance; area; straight line direction between points on the Earth; and the bearing of cardinal points from locations on our planet.

The illustrations below show some of the common map projections used today. The first two-dimensional projection shows the Earth's surface as viewed from space (Figure 2T-1). This orthographic projection distorts distance, shape, and the size of areas. Another serious limitation of this projection is that only a portion of the Earth's surface can be viewed at any one time.

The second illustration displays a Mercator projection of the Earth (Figure 2T-2). On a Mercator projection, the north-south scale increases from the equator at the same rate as the corresponding east-west scale[8]. As a result of this feature, angles drawn on this type of map are correct. The Mercator projection causes area to be gradually distorted from the equator to the poles. This distortion makes middle and high latitude countries to be bigger than they are in reality. Distortion on a Mercator map increases at an increasing rate as one moves toward higher latitudes. Mercator maps are used in navigation because a line drawn between two points of the Earth has true direction. However, this line may not represent the shortest distance between these points.

Figure 2T-1 Earth as observed from a vantage point in space. This orthographic projection of the Earth's surface creates a two-dimensional representation of a three-dimensional surface. The orthographic projection distorts distance, shape, and the size of areas.

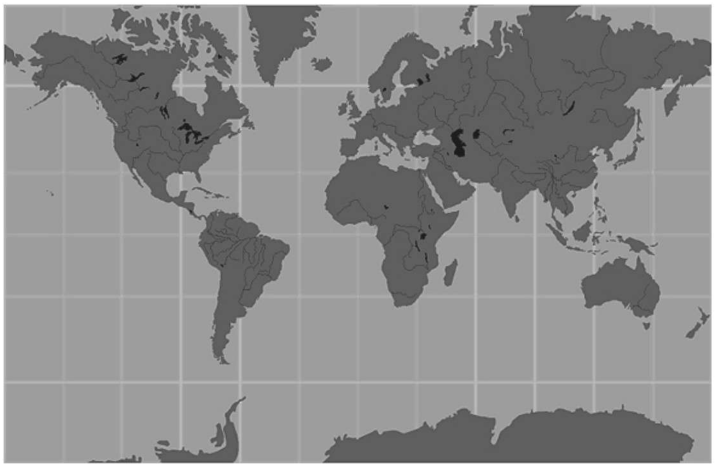

Figure 2T-2 Mercator map projection. The Mercator projection is one of the most common systems in use today. It was specifically designed for nautical navigation.

Maps are rarely drawn at the same scale as the real world. Most maps are made at a scale that is much smaller than the area of the actual surface being depicted. The amount of reduction that has taken place is normally identified somewhere on the map. This measurement is commonly referred to as the map scale. Conceptually, we can think of map scale as the ratio between the distance between any two points on the map compared to the actual ground distance represented[9]. This concept can also be expressed mathematically as:

$$\text{Map Scale} = \frac{\text{Map Distance}}{\text{Earth Distance}}$$

On most maps, the map scale is represented by a simple fraction or ratio. This type of description of a map's scale is called a representative fraction. For example, a map where one unit (centimeter, meter, inch, kilometer, etc.) on the illustration represents 1,000,000 of these same units on the actual surface of the Earth would have a representative fraction of 1/1,000,000 (fraction) or 1:1,000,000 (ratio). Of these mathematical representations of scale, the ratio form is most commonly found on maps.

Scale can also be described on a map by a verbal statement. For example, 1:1,000,000 could be verbally described as "1 centimeter on the map equals 10 kilometers on the Earth's surface" or "1 inch represents approximately 16 miles".

Most maps also use graphic scale to describe the distance relationships between the map and the real world. In a graphic scale, an illustration is used to depict distances on the map in common units of measurement (Figure 2T-3). Graphic scales are quite useful because they can be used to measure distances on a map quickly.

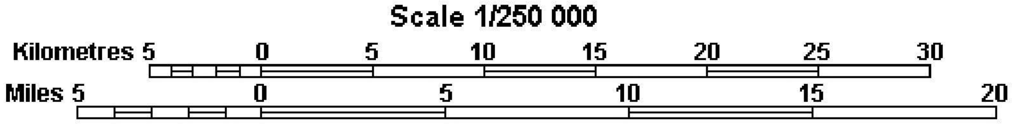

Figure 2T-3 The following graphic scale was drawn for map with a scale of 1:250,000. In the illustration distances in miles and kilometers are graphically shown.

Maps are often described, in a relative sense, as being either small scale or large scale. Figure 2T-4 helps to explain this concept. In Figure 2T-4, we have maps representing an area of the world at scales of 1:100,000, 1:50,000, and 1:25,000. Of this group, the map drawn at 1:100,000 has the smallest scale relative to the other two maps. The map with the largest scale is map C which is drawn at a scale of 1:25,000.

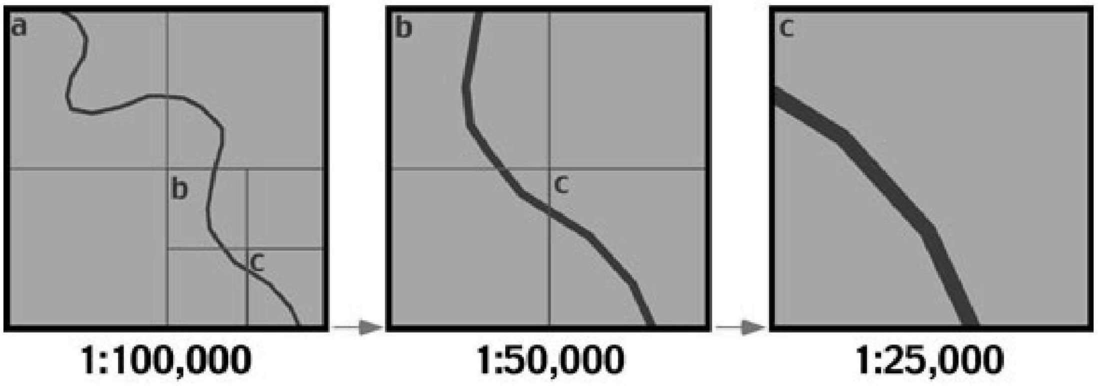

Figure 2T-4 The following three illustrations describe the relationship between map scale and the size of the ground area shown at three different map scales. The map on the far left has the smallest scale, while the map on the far right has the largest scale. Note what happens to the amount of area represented on the maps when the scale is changed. A doubling of the scale (1:100,000 to 1:50,000 and 1:50,000 to 1:25,000) causes the area shown on the map to be reduced to 25% or one-quarter.

New Words and Expressions

topographic	[ˌtɔpə'græfik]	adj. 地形学上的
reference	['refrəns]	n. 参照;参考
atlas	['ætləs]	n. 地图集,地图册
thematic	[θiː'mætik]	n. 主题的,论题的词干的,题目的
ellipsoid	[i'lipsɔid]	n. /adj. 椭圆形(的);椭圆球(的)
distortion	[distɔːʃən]	n. 扭曲;变形;失真,歪曲
projection	[prə'dʒekʃən]	n. 1. 投掷,发射,喷射 2. 投影,投影图
bearing	['beəriŋ]	n. 1. 举止, 风度,姿态 2. 关系,影响 3. (用罗盘测定的) 方位,
cardinal point		方位基点
orthographic	[ɔːθ'əgræfik]	adj. 正射的,正交的
Mercator Projection		墨卡托投影
vantage point		有利位置,至高点
representative fraction		数字比例尺
graphic scale		图解(图示) 比例尺

List of Key Words

Map An abstraction of the real world that is used to depict, analyze, store, and communicate spatially organized information about physical and cultural phenomena.

Topographic map Map that displays topography through the use of elevation contour lines. Base elevation on these maps is usually sea-level.

Cartography Field of knowledge that studies map construction. The act of creating a map.

Reference map Map that shows natural and human-made objects from the geographical environment with an emphasis on location. Compare with thematic map.

Thematic map Map that displays the geographical distribution of one phenomenon or the spatial associations that occur between a few phenomena. Compare with reference map.

Map projection Cartographic process used to represent the Earth's three-dimensional surface onto a two-dimension map. This process creates some type of distortion artifact on the map.

Orthographic projection Map projection that presents the Earth's surface in two-dimensions as if it were being observed from a great distance in space. Distortion of areas and angles becomes greater as you move from the center of the projection to its edges.

Mercator projection Map projection system that presents true compass direction. Distortion is manifested in terms of area. Area distortion makes continents in the middle and high latitudes seem larger than they should be. Specifically designed for nautical navigation.

Map scale Ratio between the distance between two points found on a map compared to the actual distance between these points in the real world.

Notes

①本单元文章、图片来源于 http://www.physicalgeography.net/fundamentals/2a.html.

②例如，地形图将三维的现实世界以缩小的比例抽象到二维平面的纸上。

③地图由于西方科学的黎明而变得更加客观了。

④地球之所以是这个形状是因为地球的自转使得靠近赤道的区域向外凸。

⑤由地球绕地轴自转产生的角运动压迫地球的两极区域使得它们变得扁平一些。

⑥将地球表面的真实形状表示在地图上时存在一些问题，特别是当这种描述是被展示在二维平面上的时候。

⑦所有这些变形过程都会产生某种人为的变形。

⑧在墨卡托投影上，南北比例尺从赤道开始增加的速度与其在东西方向增加的速度相等。

⑨理论上，我们可以认为地图比例尺是地图上任意两点间距离与其代表的地面真实距离的比值。

Exercises

Essay Questions

1. What is a map? How are maps classified by cartographer? What do they show?
2. What does a standard topographic map usually show?
3. What problems are associated with projecting the Earth's surface on a two-dimensional map?
4. What is Mercator projection? What are the properties associated with Mercator projection?

Reading comprehension

Ⅰ. Answer the following questions according to the text. Write T if the statement is True, write F if the statement is false.

1. A map is a graphic representation of the real world. ( )

2. Despite the fact that the Universe is very complex, we can still capture all of the complexity found in the real world using a map. ( )

3. Topographic maps show a variety of information including roads, land-use classification, elevation, rivers and other water bodies, political boundaries, and the identification of houses and other types of buildings. ( )

4. Today, map making is both an art and a science. It is quite sophisticated and involves methods

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