

中国气象局培训中心英语培训教材

气象

英语口语教程

Speak in Scientific English
in Meteorology

田 静 编著



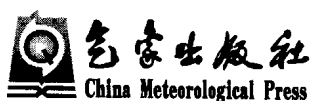
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内容简介

本书为气象英语教学用书,内容包括大气的组成与结构,大气环流,地球的气候,人工影响天气,强对流天气(如冰雹、龙卷风、飓风等),应用气象学(如海洋气象学、农业气象学等),大气化学(如酸雨等),大气电学(如闪电等),卫星、雷达的遥感探测,天气预报和预测,数值天气预报,世界气象日及二十四节气等基本知识。

本书是气象专业人员气象英语口语的培训用书,也可供其他相关人员参考。

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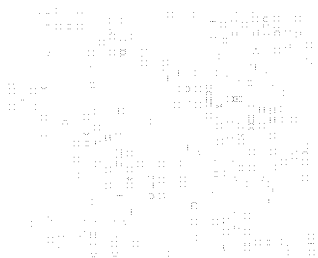
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前 言 (Preface)

编写本书的目的是培训学员的气象英语基础知识,培养学员用气象专业英语进行交流的能力。本书的编写历时一年,并且经气象基础知识班试用,获得了比较满意的效果。本书共 30 单元,每单元包括课文、生词、练习、会话、语音知识、课文译文、练习答案七部分。本书有以下几个特点:

一、选材内容广泛、深入浅出

本书内容涉及天气学、气候学、大气探测、大气化学、大气电学、农业气象、海洋气象等。所选内容通俗易懂,是大气科学各领域的基本概念和基础知识,也可以成为气象科技英语普及性读物。

二、突出英语口语的特点

书中汇集大量的气象专业英语基本词汇和表达式,并且词汇都标有音标,能够达到基本交流的目的。本书以课文为线索,配备了与课文有关的会话、口语讨论题以及相关的语音知识。会话部分短小精悍,琅琅上口,体现了口语的特点,尽管和课文内容相关,但不是课文的翻版。学习语音知识的目的是为了达到发音的正确,语调的地道、得体。

三、配有图表、生动形象

书中包含有许多图表使所学内容更加生动形象,加深记忆。

本书在撰写过程中得到了培训中心气象业务培训部老师牛宁、朱玉祥、朱玉洁、袁薇、朱禾、徐怀刚、柳士俊、宋燕等的帮助,在此表示由衷的感谢。由于作者水平和经历的限制,缺乏经验,书中难免存在不少错误,欢迎批评指正。

编 者
2008 年 10 月



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Unit 1

The Earth's Atmosphere— Composition and Structure

1. Composition of the earth's atmosphere

A gaseous layer that envelops the earth is called atmospheric shell (region). The composition of the earth's atmosphere is primarily nitrogen, oxygen and argon. The concentration of water vapor is highly variable, especially near the surface, where volume fractions can vary from nearly 0% to as high as 4% in the tropics. There are inert gases such as neon, helium, krypton and xenon, and there are also trace gases, such as carbon dioxide, methane, hydrogen, nitrous oxide, carbon monoxide, ozone and sulfur dioxide, that play an important role in radiative and biological processes.

Table 1 Composition of the earth's atmosphere

Mean composition of dry air in the troposphere	volume content in %	ppm (parts per million)
nitrogen(N_2)	78.08	780 800
oxygen(O_2)	20.95	209 500
argon(Ar)	0.934	9340
neon(Ne)	0.0018	18
helium(He)	0.0005	5
krypton(Kr)	0.0001	1
xenon(Xe)	0.000009	0.09
carbon dioxide(CO_2)	0.035	350
methane(CH_4)	0.00017	1.7
dinitrogen monoxide(N_2O)	0.00003	0.3
carbon monoxide(CO)	0.00002	0.2
hydrogen(H_2)	0.00005	0.5

In addition to the gaseous component, the atmosphere suspends many solid and liquid particles. The atmosphere also contains solid and liquid particles of different nature and origin as airborne particulates (also called “aerosols”), such as dust and ash clouds from volcanic eruptions.

The atmosphere contains up to 4% of water in all states of aggregation. Up to 80% of all water in the atmosphere is found in heights up to 3000 m. In the stratosphere, only 1—10 ppb water is found. Despite these relatively small amounts, water plays an important role in the atmosphere. By phase transformations between gaseous, liquid and solid, it is involved in energy transformation and transport and weather formation. Because of its ability to absorb infrared radiation it plays an important role for the warming of the atmosphere.

2. The structure of earth's atmosphere

Based on the vertical temperature distribution in the earth's atmosphere, there are four distinctly layers: the troposphere, stratosphere, mesosphere and thermosphere. These layers are separated by “pauses”, where no change in the temperature occurs with altitude change: the tropopause (between the troposphere and the stratosphere), the stratopause (between the stratosphere and the mesosphere), the mesopause (between the mesosphere and the thermosphere) and thermopause (between the thermosphere and the exosphere).

1) The troposphere

The troposphere is where all weather take place; it is the region of rising and falling air. The air pressure at the top of the troposphere is only 10% of that at sea level (0.1 atmospheres). There is a thin buffer zone between the troposphere and the next layer called the tropopause.

2) The stratosphere

Above the troposphere is the stratosphere, where air flow is mostly horizontal. The thin ozone layer in the upper stratosphere has a high concentration of ozone; ozone is a particularly reactive form of oxygen, it is a form of oxygen that has three atoms per molecule. This layer is primarily responsible for absorbing the ultraviolet radiation from the sun. The formation of this layer is a delicate matter, since only when oxygen is produced in the atmosphere can an ozone layer form and

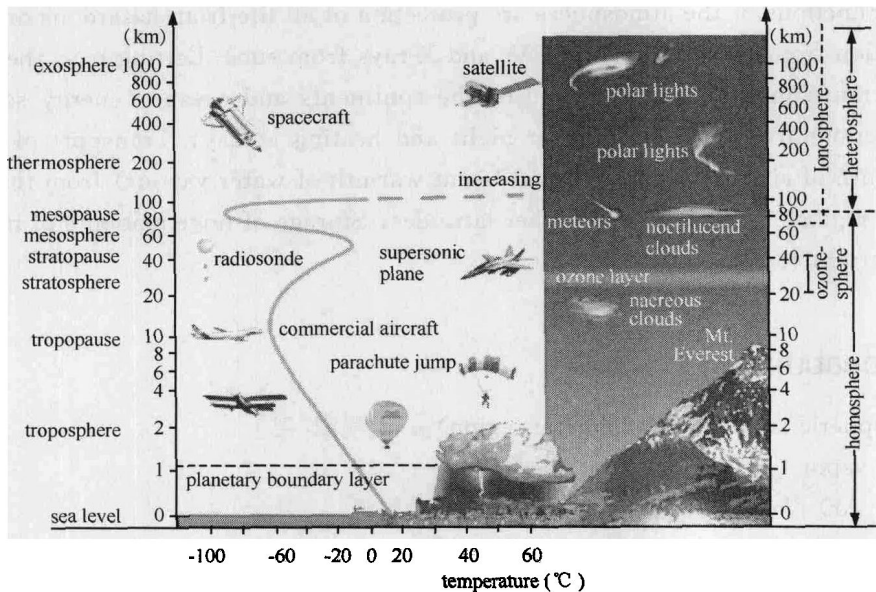


Fig. 1 The structure of the earth's atmosphere

prevent an intense flux of ultraviolet radiation from reaching the surface, where it is quite hazardous to the evolution of life. There is considerable recent concern that man-made fluorocarbon compounds may be depleting the ozone layer, with dire future consequences for life on the earth.

3) The mesosphere

The mesosphere is the layer of the earth's atmosphere that is directly above the stratopause and directly below the mesopause. The mesosphere is located from about 50 km to 85 km altitude above the earth's surface. Within this layer, temperature decreases with increasing altitude. In this region, concentrations of ozone and water vapor are negligible. Hence the temperature is lower than that of the troposphere or stratosphere.

4) The thermosphere

Above the mesopause is the thermosphere (or the ionosphere), where many atoms are ionized (have gained or lost electrons so they have a net electrical charge). The ionosphere is very thin, but it is where aurora takes place, and is also responsible for absorbing the most energetic photons from the sun, and for reflecting radio waves, thereby making long-distance radio communication possible.

Functions of the atmosphere are protection of all life from hazardous or deadly radiation from space (filter for UV- and X-rays from sun). Letting pass the vitally important sunlight to the surface of the continents and oceans (energy source); Protections from rapid cooling at night and heating at day; Transport of energy (warmth of air that can be felt and latent warmth of water vapour) from the equatorial regions to medium and higher latitudes; Storage of huge amounts of nitrogen (important for plants).

• Vocabulary •

atmospheric shell (=atmospheric region) *n.* 大气圈[层]

water vapor (H_2O) [大气] *n.* 水[蒸]汽

argon (Ar) ['ɑ:gən] *n.* 氩

trace gas [treis gæs] *n.* 痕量气体,微量气体

inert [i'næt] gas *n.* 惰性气体

neon (Ne) ['ni:ən] *n.* 氖

helium (He) ['hi:liəm] *n.* 氦

krypton (Kr) ['kriptən] *n.* 氪

xenon (Xe) ['zi:nən] *n.* 氙

carbon dioxide (CO_2) ['kɑ:bən dai'ɒksaid] *n.* 二氧化碳

carbon monoxide (CO) ['kɑ:bən mə'nɒksaid] *n.* 一氧化碳

methane (CH_4) ['mi:θein] *n.* 甲烷

dinitrogen monoxid (N_2O) [dai'naitrədʒən mə'nɒksaid] *n.* 一氧化二氮(或氧化亚氮)

hydrogen (H_2) ['haɪdrɪdʒən] *n.* 氢

nitrous oxide (N_2O) ['naitrəs 'ɒksaid] *n.* 一氧化二氮

ozone ['əʊzəʊn] (O_3) *n.* 臭氧

ozone layer [大气] *n.* 臭氧层

sulfur dioxide (SO_2) ['sʌlfə dai'ɒksaid] *n.* 二氧化硫

airborne particulate ['æbə:n pə'tɪkjulɪt] *n.* 空中悬浮微粒

aerosol ['eərəsɔl][大气] *n.* 气溶胶

troposphere ['trɒpəsfiə] [大气] *n.* 对流层

tropopause ['trɒpəʊpəʊz] [大气] *n.* 对流层顶

stratosphere ['strætəʊsfiə][大气] *n.* 平流层

stratopause ['strætəʊpəʊz][大气] *n.* 平流层顶

mesosphere ['mesəʃfiə] [大气] *n.* 中间层
 mesopause ['mesəpəʊz] [大气] *n.* 中间层顶
 thermosphere ['θɜ:məsfiə] [大气] *n.* 热层
 thermopause ['θɜ:məʊpəʊz] [大气] *n.* 热层顶
 ionosphere [ai'ɒnəsfiə] [大气] *n.* 电离层
 exosphere ['eksəsfiə] [大气] *n.* 外大气层, 外(逸)层
 ionize ['aɪənaɪz] *v.* (使)电离
 fluoro-carbon [flu(:)ərə 'kɑ:bən] compounds *n.* 碳氟化合物
 aurora [ɔ:'rɔ:rə] [地] *n.* 极光 (= polar light)
 photon ['fəʊtɒn] [物] *n.* 光子
 vitally ['vaɪtəli] *adv.* 极其, 极为

Exercise

I. Answer the following questions

1. What is primarily the composition of the earth's atmosphere?
2. Based on the vertical temperature distribution in the earth's atmosphere, how many distinctly layers there are? What are they called?
3. What is ozone layer primarily responsible for?
4. What are functions of the atmosphere?

II. Choose the best answer for each of the sentences below

1. The concentration of water vapor is highly variable, especially near the surface, where volume fractions can vary from nearly ____ to as high as 4% in the tropics.
 a. 0% b. 0.5% c. 2%
2. There are ____ such as neon, helium, krypton and xenon.
 a. active gases b. trace gases c. inert gases
3. The atmosphere also contains solid and liquid particles of different nature and origin as airborne particulates (also called ____), such as dust and ash clouds from volcanic eruptions.
 a. inert gases b. trace gases c. aerosols
4. There is a thin buffer zone between the troposphere and the next layer called the ____.
 a. tropopause b. stratopause c. mesopause

5. The mesosphere is located from about 50 km to 85 km altitude above the earth's surface, within this layer, temperature ____ with increasing altitude.
a. increases b. no change c. decreases

III. Look and talk

According to text's pictures, please talk about "Earth's atmosphere-composition and structure" in English.

Everyday Practice

A gaseous layer that envelops the earth is very important to human beings. Do you know how important the atmosphere is?

包围地球的一层大气对于我们人类来说是非常重要的。你知道它的重要性吗?

First, I think human beings cannot survive without the atmosphere; Second, functions of the atmosphere are protection of all life from hazardous or deadly radiation from space.

首先,人类没有大气就无法生存。其次,大气可以保护人类避免外层空间辐射的危害。

Is there anything else?

还有别的吗?

Protections from rapid cooling at night and heating at day; Transport of energy from the equatorial regions to medium and higher latitudes; Storage of huge amounts of nitrogen is important for plants.

大气可以保护人类避免快速的日暖夜凉;大气可以使能量从赤道地区输送到中高纬度;大气储存的大量氮对植物是很重要的。

You are clever!

你很聪明!

Pronunciation Tips

连读(一)

同一意群内,如果前一个词以辅音结尾,后一个词以元音开头,那么前词的词尾辅音常与后词元音相拼,即连读。了解连读的规律,有助于提高英语口语和听力的水平。

1. 连读有两种,一种是前词的词尾辅音与后词词首元音相拼(辅音+元音),如 look out/lu'kaʊt/.

1) La Niña's effects on fisheries along the immediate coast of South ~

America. [sauθ ə'merikə] (不连读) → [sauθə'merikə] (连读)

2) Not~at all. ['nɒt æt əl] (不连读) → ['nɒ tə'tɒl] (连读)

3) Let me tell~you something about climate of the earth. [tel ju] (不连读) → ['telju] (连读)

4) Don't mention~it. ['menʃən it] (不连读) → ['menʃənɪt] (连读)

5) He goes to America once~a year. [wʌns əjə] (不连读) → ['wʌnsəjə] (连读)

Unit 2

How Does the Weather Affect Our Behavior?

We perform at our best when our bodies are not under stress from surroundings, and that include the weather. But different aspects of weather can have very specific affects on us.

1) Pressure

Atmospheric pressure is continually fluctuating, and researchers have found that slight low-frequency atmospheric oscillations can influence human mental activity, causing significant changes in attention and short term memory functions. So next time you find it hard to concentrate at work, blame it on the pressure!

2) Temperature and humidity

The body finds it hard to cope with extremes of temperature, either producing enough heat to keep us warm in very low temperatures or getting rid of our own internally produced heat when temperatures are high. Mortality rates tend to rise when temperatures soar. Mortality rates are consistently linked to extremes of temperatures, particularly in the elderly whose bodies find it harder to cope with. At times when temperatures exceed 38°C for more than a week, mortality rates tend to increase by up to 10%. In heat waves, where the temperature is significantly higher than expected for the time of year, people tend to behave more irrationally.

Hot humid days are the worst possible combination in terms of affecting our behavior, causing periods of sleeplessness, decreased general activity, poorer vigilance, poorer reaction times and performance, irritability and lethargy. Cooler days, with lower humidity, tend to increase alertness and general activity and improve moods.

3) Wind

How often do you hear people say that the wind is driving them crazy! A persistent or noisy wind can lead to an increase in tiredness and irritability, or even a sudden decrease in mood. Some school teachers have noticed that children tend to

be more irritable and that there are more playground “upsets” when it is windy.

Seasonal winds are known as “ill winds” in many cultures and have a variety of names such as the Föhn, Mistral, Chinooks. They are linked to feelings of anxiety, stress, depression and sleepless nights. When these winds blow, temperature can increase by up to 15°C in as little as two hours. As they are common in mountainous regions where they are often responsible for avalanches. Studies have linked these winds to an increase in traffic accidents, crime and suicide rates, and they have even been taken into account during legal proceedings!

The exact reason why these winds have such extreme effects is unknown, but it has been suggested that it may be the electrical charge of the air. When people are exposed to negatively charged air they report feeling positive and vice versa. Dry and warm winds, such as those mentioned above are positively charged.

A scale of wind strengths, devised in 1805 by Admiral Sir Francis Beaufort, and modified in 1926. The scale ranges from light winds (1–3) to breezes (4–6) and to gales and hurricanes (7–12). Wind speeds are now generally expressed in metres per second (m/s) or miles per hour (mi/h). The Beaufort scale is an empirical measure for describing wind velocity based mainly on observed sea conditions. Its full name is the Beaufort wind scale.

• Vocabulary •

atmospheric pressure [大气] *n.* 气压

fluctuate ['flʌktʃueɪt] *v.* 变动, 上下摇动

oscillation [ɒsi 'leɪʒən] *n.* [物] 振动, 振荡

low-frequency oscillation (LFO) *n.* 低频振荡

heat wave [大气] *n.* 热浪

irrationally [i'ræʃənəli] *adj.* 不合理的, 非理性的

combination [kəm'bi 'neɪʃən] *n.* 结合, 联合

vigilance ['vɪdʒɪləns] *n.* 警戒, 警觉

exceed [ɪk 'si:d] *v.* 超过, 胜过, 越出

irritability [ɪrɪtə 'bɪlɪti] *n.* 急躁, 烦躁

lethargy ['leθədʒi] *n.* 嗜睡, 无力气

humidity [hju: 'mɪdɪti] [大气] *n.* 湿度

avalanche ['ævələʃn] *n.* 雪崩

suicide ['suɪsaɪd] *a.* 自杀(者)(的) *v. & n.* 自杀
legal proceedings ['li:ɡəl prəu 'si:diɪz] *n.* 法定程序, 法律诉讼
negative charge [电] *n.* 负电荷
positive charge [电] *n.* 正电荷
gale[geɪl] [大气] *n.* 8 级风; 大风
admiral['ædmərəl]*n.* 海军上将
Beaufort['boufət] (wind) scale [大气] *n.* 蒲福风级
wind velocity[vi 'ləʊsɪti] [大气] *n.* 风速
vice versa ['vaɪsɪ 'vɜ:sə]*ad.* <拉丁>反之亦然
take into account 引起……, 注意……

Notes

extremes of temperatures(=extreme temperature)极端温度
Föhn 焚风 (Alps)
Mistral 密史脱拉风(southern France)
Chinooks 钦诺克风 (western Canada and the USA)

Exercise

I . Answer the following questions

1. How does atmospheric pressure influence human mental activity?
2. Why do mortality rates tend to rise when temperatures soar?
3. Hot humid days are the worst possible combination in terms of affecting our behavior, causing what kinds of periods?
4. How does wind affect our health? What increased studies have linked "ill winds" to?
5. What is Beaufort wind scale?

II .Choose the best answer for each of the sentences below

1. We perform at our best when our bodies are not under stress from our surrounding, and that includes the _____.
a. rain b. weather c. wind
2. Mortality rates are consistently linked to extremes of temperatures, particularly in the _____ whose bodies find it harder to cope with.
a. elderly b. middle-aged c. junior

3. In heat waves, where the temperature is significantly higher than expected for the time of year, people tend to behave more ____.
- a. irritability b. irrational c. irrationally
4. Föhn, Mistral, Chinooks are linked to feelings of anxiety, stress, depression and ____ nights.
- a. sleep b. sleeplessness c. sleepless
5. The exact reason why these winds have such extreme effects is unknown, but it has been suggested that it may be the ____ of the air.
- a. positive charge b. negative charge c. electrical charge

III. Translate the words that are connected with “extreme” in meteorology into Chinese

1) extreme drought; 2) extreme arid environments; 3) extreme climate; 4) extreme climatic events; 5) extreme weather events; 6) extremely hot and dry climate; 7) extreme precipitation; 8) extreme precipitation quantities; 9) extreme precipitation process; 10) extremes of rainy years; 11) extremely wet climate; 12) extreme ultraviolet radiation; 13) extreme wind speed; 14) extreme value

Everyday Practice

Why hot humid days are the worst possible combination affecting our behavior, causing sleeplessness, irritability and lethargy?

为什么炎热潮湿的天气会影响我们的行为,引起失眠、烦躁和嗜睡?

Under normal conditions, the body's internal thermostat produces perspiration that evaporates and cools the body. However, in extreme heat and high humidity, evaporation is slowed and the body must work extra hard to maintain a normal temperature.

正常情况下,人体自身具有排汗和蒸发保持恒温的能力。然而在炎热潮湿的天气里,人体的排汗能力降低,体内超负荷运转(工作)才能保持正常体温。

Why mortality rates are consistently linked to extremes of temperatures, particularly in the elderly, the very young and the extremely overweight whose bodies find it harder to cope with?

为什么死亡率和极端温度有关,特别是老人、小孩和肥胖者很难应对极端温度?

They are more prone to suffer from heat illness, since their bodies may be pushed beyond their limits. The elderly have trouble regulating their body temperature because their circulatory systems are less efficient and, since they're also less mobile, it is harder for them to go somewhere cooler or get a glass of water. Small