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EARTH SCIENCE

地球科学

Extreme Weather 灾害天气

GLEN PHELAN (美) 著

外语教学与研究出版社

FOREIGN LANGUAGE TEACHING AND RESEARCH PRESS

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这套丛书秉承《国家地理》杂志图文并茂的特色，在书中配有大量精彩的图片，文字地道易懂、深入浅出，将科学性和趣味性完美结合，称得上是一套精致的小百科全书。特别值得一提的是本套丛书在提高青少年读者英语阅读能力的同时，还注重培养他们的科学探索精神、动手能力、逻辑思维能力和沟通能力。

本套丛书既适合学生自学，又可用于课堂教学。丛书各个系列均配有一本教师用书，内容包括背景知识介绍、技能训练提示、评估测试、多项选择题及答案等详尽的教学指导，是对课堂教学的极好补充。

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家小学问大
怎样坐飞机？
奇趣水族馆
食品店里的学问
商场里的秘密
公园乐事多
五光十色的海滩
动物园里的科学
为什么眨眼睛？
为什么打呵欠？

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北京 BEIJING

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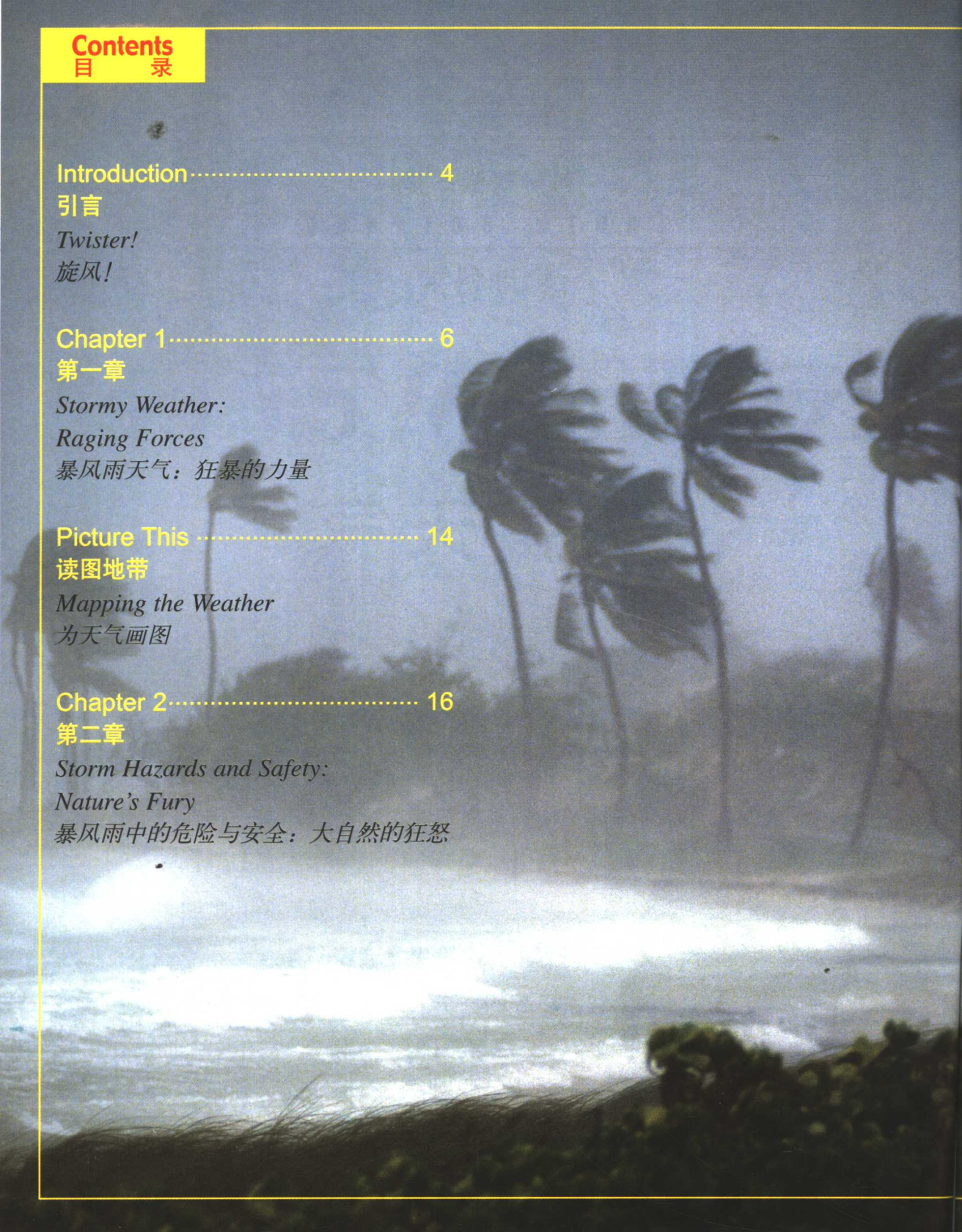
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Twister!

旋风!

Few sights are more awesome¹—
or frightening²—than a tornado³.

- | | | |
|----------------|-------------|-------|
| 1. awesome | <i>adj.</i> | 可怕的 |
| 2. frightening | <i>adj.</i> | 令人恐惧的 |
| 3. tornado | <i>n.</i> | 龙卷风 |

May 4, 2003, dawned¹ bright and beautiful in much of the Midwest². But by late afternoon, swarms³ of tornadoes were tearing⁴ wildly through eight states.

The destruction was incredible⁵. Among the sites worst hit was Pierce City, Missouri⁶. Almost every building in this town of 1,400 people was destroyed or seriously damaged. Cars were flung⁷ around like toys. Huge trees snapped⁸ like twigs⁹. Shards¹⁰ of wood became daggers¹¹ hurled¹² into the sides of houses.

The governor of Missouri called it “the most devastating¹³ series of tornadoes” the state had ever seen. More than 30 tornadoes, or twisters, carved¹⁴ deadly paths across the country’s midsection¹⁵. Over the next several days, that number would grow to more than 300—one of the worst outbreaks¹⁶ in history.

How did it happen? What weather events came together to produce such an awesome force of nature? More important, how successful are we at predicting such storms? That’s what you’re about to find out. Get ready for extreme weather!

1. dawn	v.	破晓
2. Midwest	n.	美国中西部
3. swarm	n.	[~s] 许多; 大量
4. tear	v.	疾驰
5. incredible	adj.	难以置信的; 惊人的
6. Missouri		密苏里州
7. fling	v.	用力扔
8. snap	v.	喀嚓折断
9. twig	n.	细枝
10. shard	n.	碎块; 碎片
11. dagger	n.	匕首
12. hurl	v.	猛投; 力掷
13. devastating	adj.	毁灭性的
14. carve	v.	切开; 划分
15. midsection	n.	中部
16. outbreak	n.	爆发



A tornado can destroy almost everything in its path.

Stormy Weather:

Raging Forces

暴风雨天气：狂暴的力量

A quiet Texas¹ evening is about to get a lot more interesting. These massive² storm clouds are producing torrential rain³ as well as hail⁴, high winds, and tornadoes.⁵

1. Texas		得克萨斯州
2. massive	<i>adj.</i>	巨大的
3. torrential rain		倾盆大雨
4. hail	<i>n.</i>	冰雹
5. roll	<i>v.</i>	翻滚

Storm clouds roll⁵ across the northern Texas plains.

Dry, cracked¹⁰ soil is one sign¹¹ of drought.

What's the weather today?

Would you describe it as extreme? Extreme weather includes conditions that endanger¹ people's lives or damage property². That might mean intense³ winds or heavy rains. It could mean bitter cold, pounding⁴ hail, or a blinding snowstorm.

Chances are that you aren't experiencing any of this extreme weather right now. But it's not rare⁵. At this moment a couple thousand thunderstorms⁶ are raging around the world, mostly in the Tropics⁷. On the other hand, some places in Africa are enduring⁸ a drought⁹. These places have had no rain for months or even years.

- | | | |
|-----------------|------|------|
| 1. endanger | v. | 危及 |
| 2. property | n. | 财产 |
| 3. intense | adj. | 强烈的 |
| 4. pound | v. | 猛烈袭击 |
| 5. rare | adj. | 罕见的 |
| 6. thunderstorm | n. | 雷暴 |
| 7. the Tropics | | 热带地区 |
| 8. endure | v. | 忍受 |
| 9. drought | n. | 干旱 |
| 10. cracked | adj. | 裂开的 |
| 11. sign | n. | 迹象 |



Extremely dry conditions can lead to wildfires.

Weather's Toll¹

Extreme weather can have some surprising—and tragic²—consequences³. For example, in July 1995, high temperatures and lots of moisture⁴ in the air, or humidity⁵, created a heat wave⁶ in the Midwest. About a thousand people died as a result. Most of the victims⁷ were elderly people who couldn't take the stress⁸ from the heat.

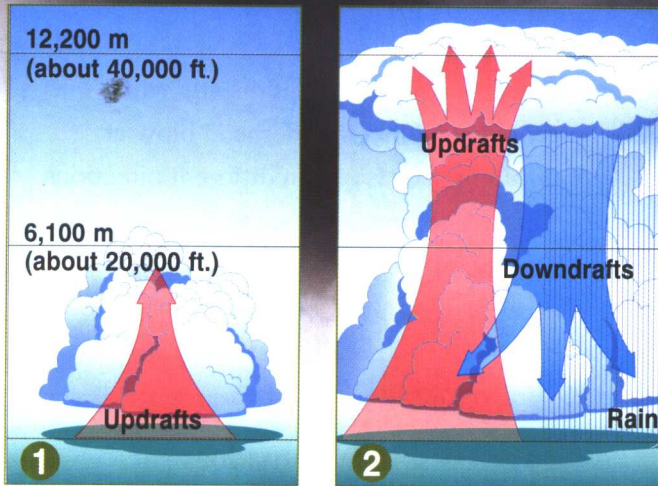
Just in 2003, extreme winter temperatures throughout much of the United States were the lowest in more than a century. In Minnesota⁹ about a hundred people died from exposure¹⁰ to the cold, heart attacks¹¹ from shoveling¹² snow, or traffic accidents caused by the weather.

Extreme weather takes its toll on human life. But it can have other consequences, too. A blizzard¹³ can bring a bustling¹⁴ city to a halt¹⁵ for days. An ice storm can damage power lines, cutting off electricity

to homes and businesses. During a drought, drinking water supplies can dry up. Dried-out vegetation¹⁶ becomes fuel¹⁷ for wildfires¹⁸. During the drought of 1988, U.S. farmers lost billions¹⁹ of dollars in crops. More than five million²⁰ acres²¹ burned, including large sections of Yellowstone National Park²².

- | | | |
|-------------------------------|-------------|---------------|
| 1. toll | <i>n.</i> | 代价; 损失 |
| 2. tragic | <i>adj.</i> | 悲惨的 |
| 3. consequence | <i>n.</i> | 后果 |
| 4. moisture | <i>n.</i> | 湿气 |
| 5. humidity | <i>n.</i> | 潮湿 |
| 6. heat wave | | 热浪; 奇热时期 |
| 7. victim | <i>n.</i> | 罹难者; 受害者 |
| 8. stress | <i>n.</i> | 重压; 紧张 |
| 9. Minnesota | | 明尼苏达州 |
| 10. exposure | <i>n.</i> | 暴露 (于寒冷、危险等中) |
| 11. heart attack | | 心力衰竭; 心脏病发作 |
| 12. shovel | <i>v.</i> | 铲 |
| 13. blizzard | <i>n.</i> | 暴风雨; 大风雪 |
| 14. bustling | <i>adj.</i> | 熙攘的; 忙碌的 |
| 15. halt | <i>n.</i> | 停止 |
| 16. vegetation | <i>n.</i> | 植物; 植被 |
| 17. fuel | <i>n.</i> | 燃料 |
| 18. wildfire | <i>n.</i> | 不易扑灭的大火; 野火 |
| 19. billion | <i>n.</i> | [~s] 许多; 大量 |
| 20. million | <i>n.</i> | 百万 |
| 21. acre | <i>n.</i> | 英亩 |
| 22. Yellowstone National Park | | (美国) 黄石国家公园 |

Formation of a Thunderstorm



1. Warm, moist air rises. The water vapor condenses and forms clouds. The rising air creates updrafts¹⁹ that bring more water vapor, and the cloud grows.
2. Water droplets and ice crystals become big enough to fall. They drag²⁰ air down, forming downdrafts²¹ that bring pouring²² rain.

Storms on the Horizon¹

When you think of extreme weather, you probably think of thunderstorms and the severe² weather they bring. Thunderstorms are heavy rainstorms that produce lightning³ and thunder⁴. They form when warm, moist air rises rapidly. How can air be moist? All air contains⁵ some amount⁶ of water vapor⁷, which is water in the form of a gas. The air in a thunderstorm has more water vapor than usual.

What makes the air rise? Think of a hot, muggy⁸ summer day. All day long the sun has been heating the ground. The warm ground warms the air above it. The heat makes the air particles⁹ move faster and farther apart. The air becomes lighter (less dense¹⁰) and rises. As warm, moist air rises, it cools. As the air cools, its water vapor condenses¹¹, or changes into tiny droplets¹² of liquid water and ice crystals¹³. These droplets and crystals form a cloud.

Thunderheads¹⁴

Warm, moist air also rises rapidly at a cold front¹⁵. That's where a mass of cooler air bumps¹⁶ into a mass of warmer air. The cool air wedges¹⁷ under the warm air like a plow¹⁸, pushing the warm air up sharply. A cloud grows quickly.

- | | | |
|-------------------|-------------|------------|
| 1. on the horizon | | (事件) 即将来临的 |
| 2. severe | <i>adj.</i> | 严酷的 |
| 3. lightning | <i>n.</i> | 闪电 |
| 4. thunder | <i>n.</i> | 雷鸣 |
| 5. contain | <i>v.</i> | 包含 |
| 6. amount | <i>n.</i> | 数量 |
| 7. water vapor | | 水蒸气 |
| 8. muggy | <i>adj.</i> | 闷热而潮湿的 |
| 9. particle | <i>n.</i> | 微粒; 颗粒 |
| 10. dense | <i>adj.</i> | 密集的 |
| 11. condense | <i>v.</i> | 凝聚; 凝结 |
| 12. droplet | <i>n.</i> | 小滴 |
| 13. ice crystal | | 冰晶(体) |
| 14. thunderhead | <i>n.</i> | 雷暴云砧; 雷雨云砧 |
| 15. cold front | | 冷锋 |
| 16. bump | <i>v.</i> | 碰; 撞 |
| 17. wedge | <i>v.</i> | 楔入; 强行挤入 |
| 18. plow | <i>n.</i> | 犁 |
| 19. updraft | <i>n.</i> | 上升气流 |
| 20. drag | <i>v.</i> | 拖; 拉 |
| 21. downdraft | <i>n.</i> | 下沉气流 |
| 22. pour | <i>v.</i> | 下倾盆大雨 |

Whether the cloud forms at a cold front or not, upward movement of warm, moist air, or updrafts, feed the cloud. The cloud grows wider and higher. Then it becomes a huge thundering cloud, or a thunderhead. The water droplets and ice crystals become large enough to fall through the cloud, dragging air down with them. The ice crystals melt as they fall through warmer air. Rain pours down. (See the drawing on page 9.)

Flash...BOOM!

But rain is only part of the story. The thunderhead is now a violent system of updrafts and downdrafts moving at high speeds. This up-and-down air builds up positive¹ and negative² electric charges³ in the cloud. When the difference between these charges becomes great enough, electrons⁴ flow between them. This flow of electrons is a giant spark⁵ called lightning.

A lightning bolt⁶ heats the air to as much as 30,000°C (54,032°F). This intense, rapid heating makes the air expand explosively.

The explosion is thunder. You see the lightning before you hear the thunder because light travels faster than sound.

Tornadoes

Perhaps the most frightening weather event of all is a tornado. A tornado is a funnel-shaped⁷ cloud of spinning⁸, rising air.

Tornadoes form during severe thunderstorms,

especially in storms along a cold front.

Scientists think a tornado starts when crosswinds⁹ in a thunderhead blow at different speeds and in different directions. This action creates a horizontal¹⁰ spinning tube of air. Strong updrafts tilt¹¹ the tube into a vertical¹² funnel cloud. If the cloud touches the ground, it is called a tornado.

Low Pressure in Tornadoes

Tornadoes produce the fastest winds on Earth. The air inside the most powerful twisters spins more than 400 kilometers per hour (about 240 miles per hour). This speed is related to air pressure. Air pressure is the force of air pressing down on Earth's surface. Air moves from areas of high pressure to areas of low pressure. This movement of air is wind. The greater the difference is in air pressures, the faster the wind. The air pressure within a tornado is extremely low, so the tornado violently sucks¹³ in nearby air.

- | | | |
|--------------------|-------------|--------|
| 1. positive | <i>adj.</i> | 正电的 |
| 2. negative | <i>adj.</i> | 负电的 |
| 3. electric charge | | 电荷 |
| 4. electron | <i>n.</i> | 电子 |
| 5. spark | <i>n.</i> | 火花 |
| 6. lightning bolt | | 闪电, 霹雳 |
| 7. funnel-shaped | <i>adj.</i> | 漏斗状的 |
| 8. spinning | <i>adj.</i> | 旋转的 |
| 9. crosswind | <i>n.</i> | 侧风 |
| 10. horizontal | <i>adj.</i> | 水平的 |
| 11. tilt | <i>v.</i> | 使倾斜 |
| 12. vertical | <i>adj.</i> | 垂直的 |
| 13. suck | <i>v.</i> | 吸 |
| 14. thundercloud | <i>n.</i> | 雷雨云 |
| 15. rotate | <i>v.</i> | 旋转 |
| 16. current | <i>n.</i> | 流, 股 |

How a Tornado Works

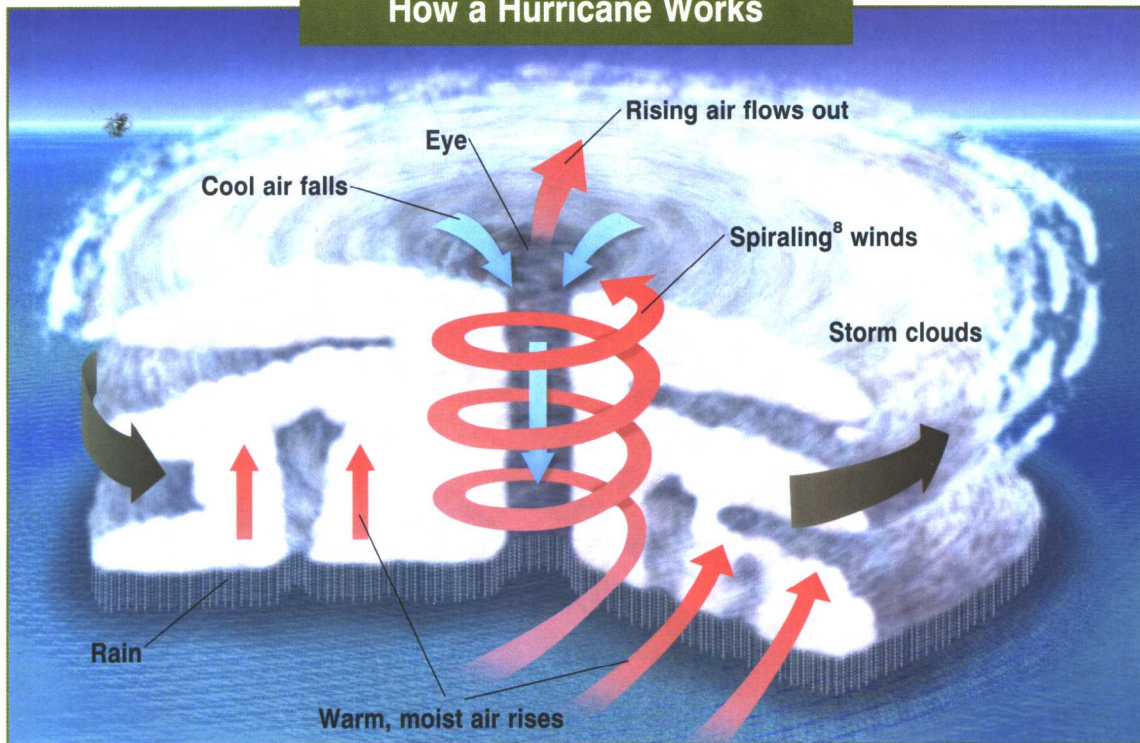
Thundercloud¹⁴
(注释见第 10 页)

Sinking cool, dry air

Rising rotating¹⁵ current¹⁶
of warm, moist air

Direction of tornado

How a Hurricane Works



Hurricanes¹

You now know that all storms have warm, moist air. This type of air is common over the warm, tropical oceans near the equator². It's not surprising, then, that the Tropics are the starting points of the largest storms on Earth—hurricanes.

How does a hurricane form? Lots of water evaporates³ into the warm air above the tropical oceans. This warm, moist air rises, creating an area of low pressure. Warm air rushes into the area of low pressure to replace⁴ the air that is rising. Several thunderstorms form. The rotation of Earth causes the storms to clump⁵ together into one big storm and start turning like

a huge pinwheel⁶. Over several days the moving storm may grow to be several hundred kilometers across. As air pressure continues to fall in the center, the winds pick up speed. If the wind speed reaches 120 kilometers per hour (about 74.6 miles per hour), the storm is classified⁷ as a hurricane.

- | | | |
|--------------|----|-------------|
| 1. hurricane | // | 飓风 |
| 2. equator | // | 赤道 |
| 3. evaporate | v: | 蒸发 |
| 4. replace | v: | 代替; 取代 |
| 5. clump | v: | 凝集成团 |
| 6. pinwheel | // | 玩具纸风车; 五彩转轮 |
| 7. classify | v: | 把……归入某类 |
| 8. spiral | v: | 盘旋上升(或下降) |

The Eye of the Storm

If you look at a satellite¹ image² of a hurricane, you probably notice two things: the swirling³ clouds and the circular center. This center is the storm's eye. The heaviest winds swirl in the cloud wall next to the eye. But the eye itself is an area of calm. In fact, sometimes the skies are clear. But that calm lasts only about a half hour at any one place as the giant, rotating storm slowly moves on. Then any place in the path of the storm gets socked⁴ with the cloud wall surrounding⁵ the eye.

Running Out of Energy

As long as the hurricane is positioned over warm water, it maintains⁶ its strength. But when it moves over land or over cooler water, it begins to lose its energy. The hurricane weakens, breaks up into separate thunderstorms, and then dies out.

1. satellite	<i>adj.</i>	人造卫星传送的
2. image	<i>n.</i>	图像
3. swirl	<i>v.</i>	打旋
4. sock	<i>v.</i>	猛击
5. surround	<i>v.</i>	围住; 环绕
6. maintain	<i>v.</i>	保持
7. interpret	<i>v.</i>	解释; 说明
8. datum	<i>n.</i> (<i>pl. data</i>)	资料; 数据
9. automate	<i>v.</i>	使自动化
10. around the clock		昼夜不停
11. associate	<i>v.</i>	使有联系
12. reading	<i>n.</i>	读数
13. hint	<i>n.</i>	提示
14. approach	<i>v.</i>	接近
15. Florida		佛罗里达州

The eye of a hurricane approaches¹⁴ the Florida¹⁵ coast.

Thinking Like a Scientist: Interpreting⁷ Data⁸

Automated⁹ weather stations collect weather data around the clock¹⁰, including temperature, humidity, air pressure, and more. But all this data means little unless it can be interpreted, or explained. That's one of the most important things a scientist does—interpret data.

For example, you know that storms are associated¹¹ with areas of low pressure. The low pressure allows air to rise and clouds to form. Now suppose air pressure readings¹² are rising. A scientist might interpret this data to mean that a mass of high-pressure air is moving into the area.

What kind of weather do you think high pressure would bring?

HINT¹³ High pressure makes it difficult for air to rise.