EARTHQUAKES, VOLCANOES, HURRICANES AND TORNADOES

Earthquakes

Earthquakes are caused by the motion of tectonic plates - individual sections that make up the Earth's surface like panels on a football. Immense strain accumulates along fault lines where adjacent plates meet. When the rock separating the plates gives way, sudden seismic ground-shaking movement occurs.

Of course, if we want to know why earthquakes happen, we need to dig a little deeper.

The Earth is made up of three main layers:

- The core is at the centre of the Earth,
- The mantle is a mobile semi-molten layer around the core,
- The outer-shell of the Earth is called the crust. Scientists call this the lithosphere - it's the part we're on now.

The crust is made up of 12 individual tectonic plates. Below the sea, they can measure three to six miles (4km-9.6km) thick and under land this increases to 20-44 miles (32 km-70.8 km). Below the crust, radiation from the Earth's core heats the semi-molten mantle to temperatures of over 5000°C.

All fluids when heated - even molten rock - are affected by a process called convection. It makes hot liquid rise to displace cooler liquid, creating a current. Tectonic plates effectively float on the mantle, like croutons in a bowl of super-heated soup. But these plates are constantly moving due to the convection current.

Of course, they creep along very slowly - roughly the same speed your fingernails grow. Even at this sub snail-pace, the effects can be devastating. The combined annual force of earthquakes is equal to 100,000 times the power of the atomic bombs that flattened Hiroshima.

The point where the seismic activity occurs is the epicentre, where the earthquake is strongest. But it doesn't always end there. Seismic waves travel out from the epicentre, sometimes creating widespread destruction as they pass.

Earthquakes hit Britain on a fairly regular basis. In fact, there can be as many as three in a week. Luckily, the geology beneath us is stable, and these tremors usually go unnoticed.

Volcanoes

Without a doubt, erupting volcanoes are the most awesome and terrifying sights in nature. In fact, their untamed destructive firepower has shaped and influenced many ancient cultures from Pompeii, to Japan.

It's estimated that one in ten of the world's population live within 'danger range' of volcanoes. According to the Smithsonian Institute, there are 1511 'active' volcanoes across the globe, and many more dormant ones that could recharge at any moment.

Like earthquakes, volcanoes form at weak-points in the Earth's crust, known as 'fault lines'.

When two tectonic plates collide, the event can provide the catalyst for volcanic activity. As one section slides on top of the other, the one beneath is pushed down into the mantle. Water trapped in the crust can cause reactions within the mantle. Why? Well, It's thought that when the water mixes with the mantle, it lowers the mantle's melting point, and the solid mantle melts to form a liquid, known as 'magma'.

Since liquid rock is less dense than solid rock, magma begins to rise through the Earth's crust. It forces its way up, melting surrounding rock and increasing the amount of magma.

Magma only stops rising when the pressure from the rock layer above it becomes too great. It gathers below the Earth's surface in a 'magma chamber'.

When the pressure increases in the chamber, the crust finally gives way and magma spews out onto the Earth's surface forming a volcano. When it reaches the surface, magma becomes known as 'lava'.

Volcanic eruptions vary in intensity and appearance depending on two factors:

- the amount of gas contained in the magma,
- its viscosity - how runny it is.

In general, the explosive eruptions come from high gas levels and high viscosity in the magma whilst lava floes result from magmas with low gas levels and low viscosity.

Over millions of years, lava and ash from eruptions might build up to form a mountainous volcano

like Mt Etna in Italy.

Tornadoes and Hurricanes

With the amount of media coverage dedicated to American storm-chasers, you'd think the US had the monopoly on these twisters. It doesn't. It might come as a shock, but the United Kingdom is actually the world's most tornado-prone nation.

This fact was calculated by the late Dr Fujita of Chicago University. He devised the standard method of measuring tornado intensity. Fujita figured that since Britain has an average of 33 tornadoes every year in an area 38 times smaller than the USA, you're twice as likely to witness a tornado here.

How tornadoes happen

- Warm and cool airstreams collide,
- A rotating area of low pressure storm clouds form,
- Air within a low pressure front rises, creating a strong upward draught like a vacuum cleaner,
- This draws in surrounding warm air from ground level, causing it to spin faster and faster,
- These strong air currents can create a vortex - a spiralling funnel of wind - that can reach speeds of 300 mph,
- Where the funnel touches the ground, it creates a path of concentrated destruction, rarely more than 250 m across.

Heavy objects, like cars and cows, can be sucked up and flung around like confetti, and houses appear to explode. This is because air pressure within the vortex is extremely low. Inside the building the air pressure is normal, so when the tornado passes over, the air inside the building expands, creating an explosion.

Wind speeds in tornadoes can vary from 72 to almost 300 mph. Fortunately, only 2 percent of all tornadoes have winds greater than 200 mph.

By definition, a hurricane is a fierce rotating storm with an intense centre of low pressure that only happens in the tropics. In south-east Asia they're known as typhoons and in the Indian Ocean, cyclones.

They cause high winds, huge waves, and heavy flooding. In 1998, Hurricane Gilbert produced 160 mph winds, killing 318 people, and devastating Jamaica. A tropical storm can only be classified as a hurricane if it sustains wind speeds above 73 mph or force 12 on the Beaufort Scale. Each year about 50 tropical storms reach hurricane status.

One of the most powerful of all weather systems, hurricanes are powered by the heat energy released by the condensation of water vapour. However, the conditions have to be exact for a hurricane to form, with the sea's surface temperature being above 26.5°C.

Air above warm tropical water rises quickly as it is heated by the sea. As the air rises it rotates or spins creating an area of low pressure, known as the eye of the storm. The eye can be clearly seen on satellite pictures, and is usually eerily calm.

The hurricane only moves slowly at speeds of 20-25 mph bringing torrential rain and thunderstorms and very strong winds. However, they also cause flooding on low lying coastlines with a phenomenon known as a 'storm surge'.

Taken from
http://www.bbc.co.uk/print/science/hottopics/naturaldisasters/print.shtml
30 August, 2007; 13:55 p.m.

Exercises

I Match the words 1- 15 with their definitions *a-o.*

Earthquakes	
1. *strain* C	a. flow; tide;
2. *fault* F	b. to move slowly;
3. *adjacent* E	c. pressure;
4. *to melt* G	d. the process by which heat travels through air, water, and other gases and liquids;
5. *convection* D	e. adjoining; next to each other;
6. *current* A	f. a place where there is a break in the continuity of layers of rock;
7. *to creep* B	g. to liquefy; to change from solid to a liquid usually because it has been heated;
Volcanoes	h. the quality that some fluids have of being sticky and therefore not flowing easily; stickiness;
8. *to tame* I	i. to bring under control;
9. *to collide* K	j. to flow out; to eject;
10. *to spew* J	k. to hit one another violently after one or both of them have been moving very quickly;
11. *viscosity* H	l. a cone-shaped object, wide at the top and with a short tube at the bottom;
Tornadoes and Hurricanes	m. to throw sth using a lot of force; to hurl;
/ˈhʌrɪkən/	n. a current of air;
/ˈhɜːrəkeɪn/	o. a mass of wind, water, *etc*. that spins round so fast that it pulls objects down into its empty centre;
12. *draught* N	
13. *vortex* O	
14. *funnel* L	
15. *to fling* M	

Definitions taken from
Collins Cobuild English Language Dictionary
Oxford Advanced Learner's Dictionary of Current English by AS Hornby

II **Which nouns can be derived from the following verbs?**

Verbs from the text	Nouns
to rise	→ RISE
to shape	→ SHAPE
to influence	→ INFLUENCE
to form	→ FORM
to force	→ FORCE

Verbs from the text	Nouns
to appear	→ APPEARANCE
to collide	→ COLLISION
to create	→ CREATION
to rotate	→ ROTATION
to destroy	→ DESTRUCTION

III **Put the words/phrases from the box into the correct category.**

funnel	*tectonic plates*	*layer*
core	*wind speed*	*viscosity*
firepower	*to erupt*	*draught*
fault lines	*huge waves*	*seismic movement*
lava	*storm*	*dormant*
magma	*mantle*	*catalyst*
low air pressure	*vortex*	*crust*

Earthquakes	**Volcanoes**	**Tornadoes Hurricanes**
CORE	TO ERUPT	LOW AIR PRESSURE
MANTLE	DORMANT	STORM
CRUST	MAGMA	DRAUGHT
TECTONIC PLATES	CATALYST	VORTEX
LAYER	LAVA	FUNNEL
FAULT LINE	VISCOSITY	WINDSPEED
SEISMIC MOVEMENT	FIREPOWER	HUGE WAVES

IV True or false?

S t a t e m e n t	True	False
The Earth is made up of three main layers.	√	
The core is made up of 12 tectonic plates.		√
Tectonic plates float on the mantle.	√	
There are 1511 dormant volcanoes.		√
The USA is the world's most tornado-prone nation.		√
A hurricane is fierce rotating storm with an intense centre of low pressure that happens only in the Indian Ocean.		√

V Match the beginning of each sentence with the most appropriate ending.

1. Volcanoes form 2. Earthquakes are caused 3. The earthquake is strongest 4. The mantle is 5. Hurricanes cause	❑ at the epicentre. 3 ❑ at weak points in the Earth's crust. 1 ❑ a semi-molten layer around the core. 4 ❑ by the motion of tectonic plates. 2 ❑ high winds, huge waves and heavy flooding. 5

VI Look at the text and fill in the missing words.

- *the motion of tectonic _____*
- *strain accumulates along _____ lines*
- *the _____ is at the centre of the Earth*
- *the mantle is a _____ layer around the core*
- *the epicentre is the point where the _____ activity occurs*
- *the mantle melts to form _____*
- *when it reaches the surface, magma becomes _____*
- *wind speeds in _____ can vary from 72 to almost 300 mph*
- *_____ is a fierce rotating storm that happens in the tropics*
- *_____ happen in south-east Asia*
- *_____ happen in the Indian Ocean*

VII Answer the questions.

1. What are earthquakes and what are they caused by?
2. What are the three main layers of the Earth?
3. What is the epicentre?
4. What are volcanoes?

5. How do tornadoes happen?
6. How would you define a hurricane?

MY WORDLIST

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N.B.

For more details about the EARTHQUAKES, VOLCANOES, HURRICANES AND TORNADOES, watch and listen to the videos I will post on our Seesaw platform and study the enclosed presentation.

As far as our GRAMMAR MATERIAL is concerned, all the lecture slides, as well as further instructions/assignments will be posted on our Seesaw learning platform.