



**Public Alerting Presentation to REPC  
November 19, 2004**

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Industry Canada  
Emergency Telecommunications**

## **Outline**

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- Needs and risks
- Objectives
- Phases
- Political Support
- Grass Root support
- 9-1-1 Database for Emergency Public Alerting
- A vision to Public Alerting in Canada
- The Vision paper
- Working Groups
- Looking Ahead

## Phases

### ➤ 2002 - 2003 planning

- documents and study on existing systems, technologies and needs
- DG's working group
- federal working group

### ➤ 2003 – 2004 field trials and sharing information

- 4 field trials (Brandon's Siren and public education campaign, Sarnia's Civic Notification System and comparative study, New Brunswick's Geographic Public Alerting System, EC's Weather Alarm)
- first Canadian Public Alerting Workshop & Forum in Ottawa Nov 2003

### ➤ 2004 – present

- Provincial Champions working group – A vision paper
- Broadcasters working group
- 4 field trials (Telephone - Telus GoMatics, Internet - Samba, Radio and television – CBC, Radio Data Service – E-Radio)

[http://spectrum.ic.gc.ca/urgent/english/pa\\_forum/forum.html](http://spectrum.ic.gc.ca/urgent/english/pa_forum/forum.html)

## Principals of Public Alerting

- 1 Public Alerting is an integral part of emergency preparedness, planning and response, and mitigation.
- 2 Coordinated integrated diversified systems
  - Using existing broadcasting and telecommunication facilities
  - High-risk areas need additional alerting capabilities
- 3 Strong coordinated planning
  - coordination with all stakeholders
  - a regulatory framework
- 4 Main elements of an effective system
  - standards and protocols for a national system
  - Minimize time delay
  - Addressable systems
  - security and training
- 5 Public consultation and public education
- 6 Tested on a regular bases
- 7 Reach visually and hearing impaired
- 8 Language consideration

## 9-1-1 Database for Emergency Alerting

A need for 9-1-1 database.

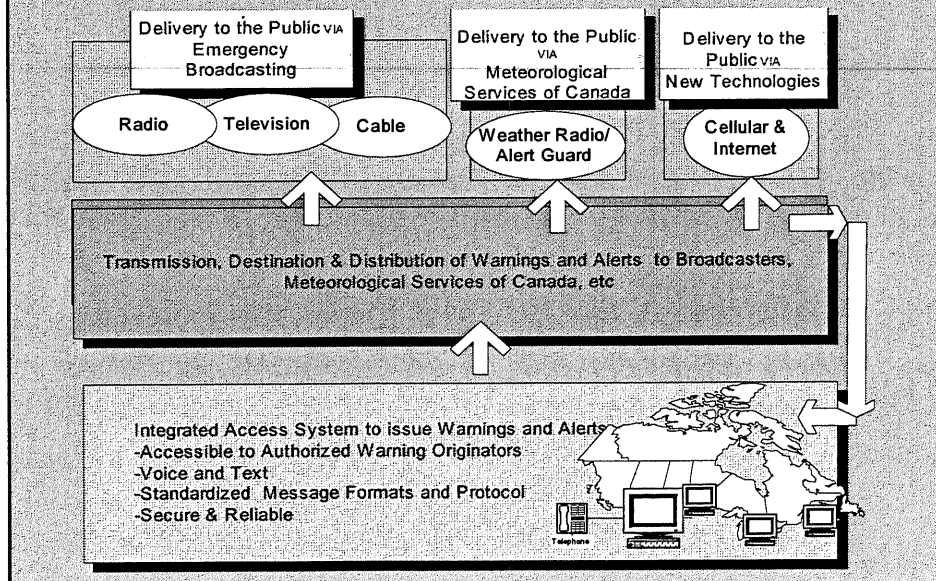
Co-applicants: County of Strathcona, the City of Fort Saskatchewan, the Association of Municipalities of Ontario, the City of Brandon, the New Brunswick – Department of Safety, Emergency Management Alberta, Emergency Management Ontario, the County of Essex and the City of Niagara Falls

Part VII Application Requesting Access to the Incumbent Local Exchange Carriers (ILECs) Emergency 9-1-1 Databases for the purpose of providing a community notification service.

- June 14 - applicants submitted Part VII to CRTC Part VII
- July 14 - end of public comment
- July 19 - applicants request for extension in filing reply comments
- July 29 - extension is granted
- July 30 - reply comments submitted

[http://www.crtc.gc.ca/partvii/eng/2004/8665/s62\\_200405888.htm](http://www.crtc.gc.ca/partvii/eng/2004/8665/s62_200405888.htm)

## A Vision of Canada Wide Public Alerting



## Looking Ahead

- Completed field trials and sharing of results
- Second Public Alerting Forum
- Concept for Canada Wide Public Alerting and Warning System
- Draft vision paper outlining standards and protocols for Canada wide public alerting system, and recommendation and best practices for local public alerting systems
- Provincial, federal private industry working groups

## Public Alerting Saves Lives

*What can municipalities do to support local and national public alerting systems?*

*(FCM Resolution ?)*

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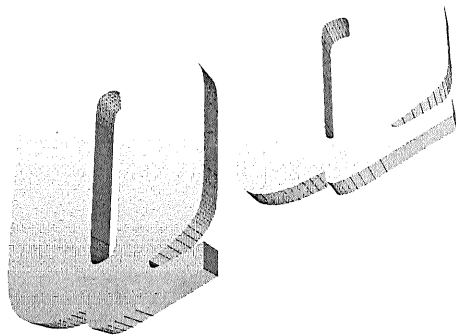
*e-mail: wu.wendy@ic.gc.ca*

[http://spectrum.ic.gc.ca/urgent/english/public\\_alert.html](http://spectrum.ic.gc.ca/urgent/english/public_alert.html)

# **EARTHQUAKE**

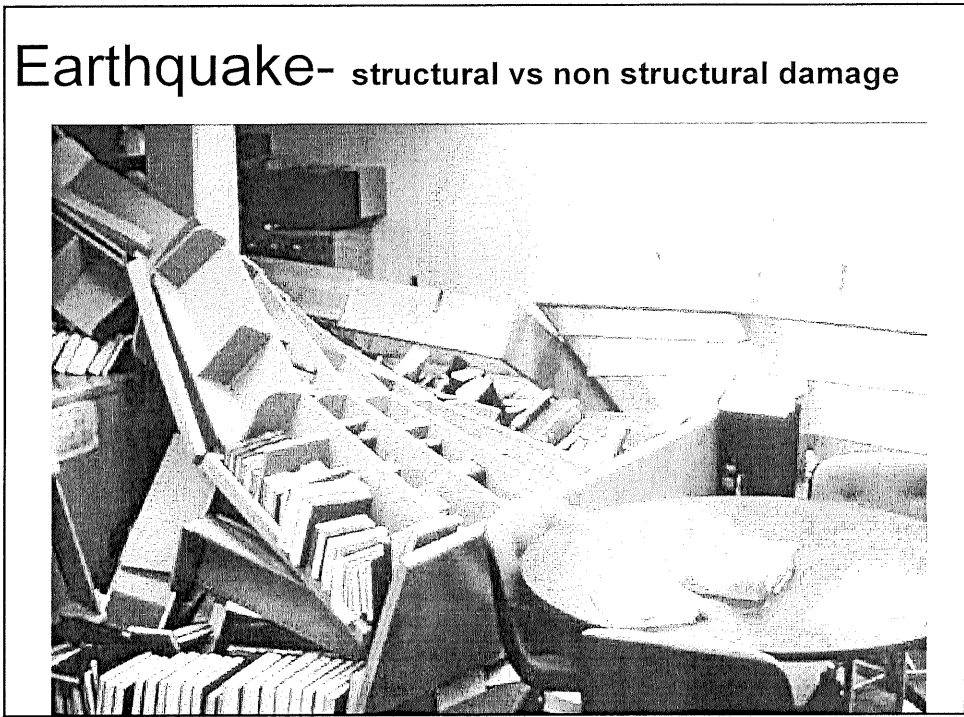
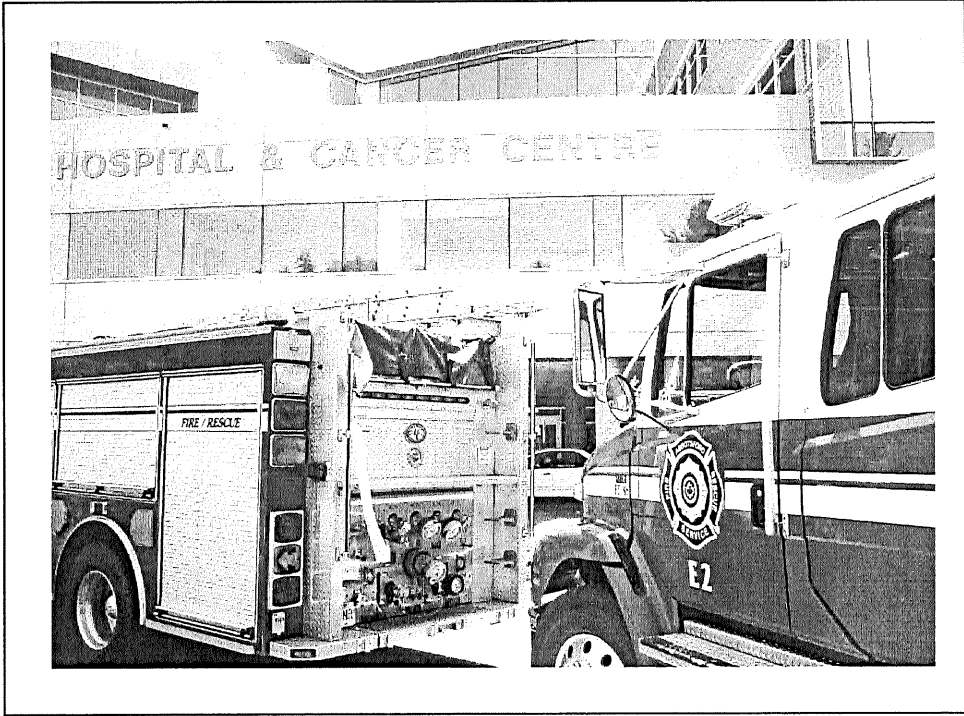
***It will happen  
here!***

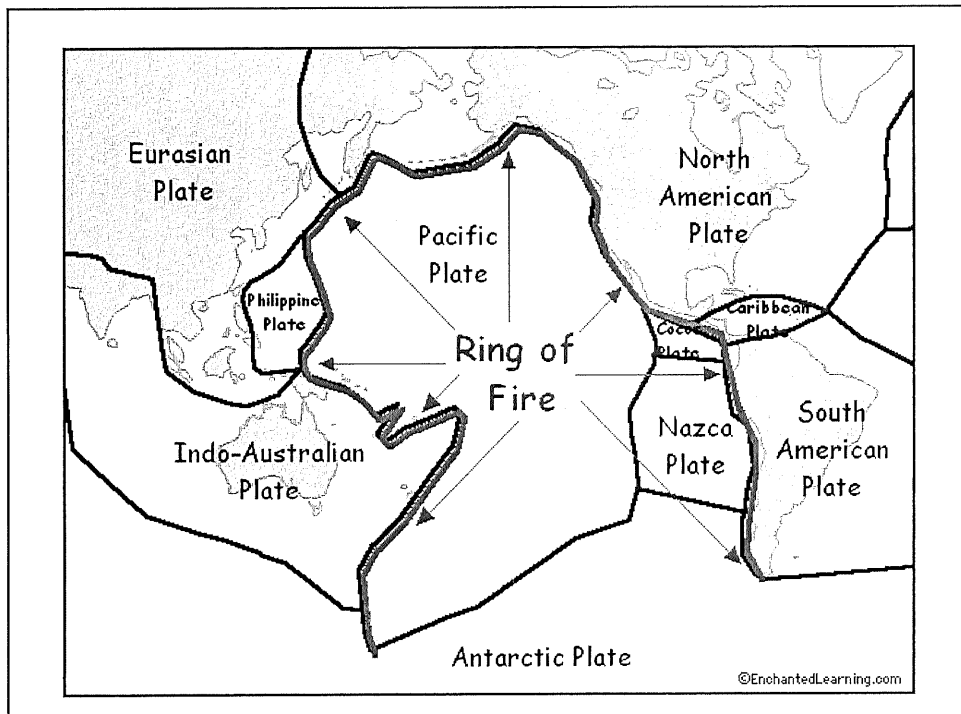
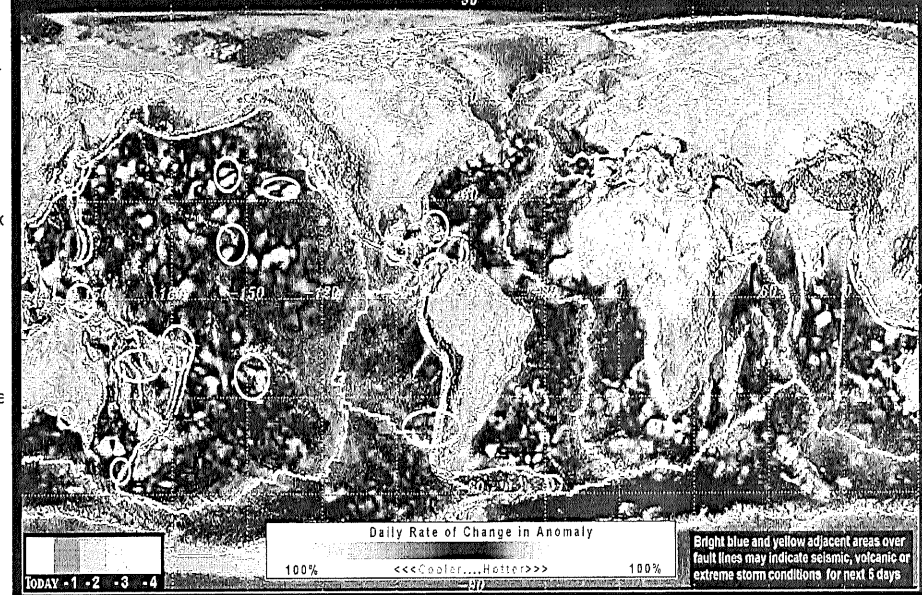
***Robin Gardner PHSA BCCA***

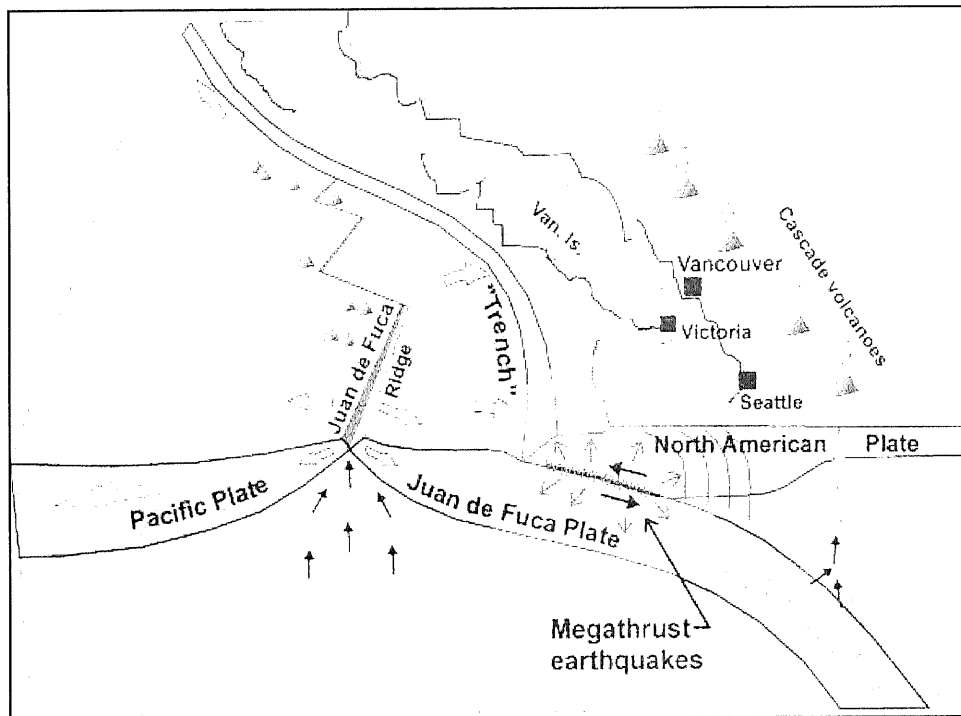
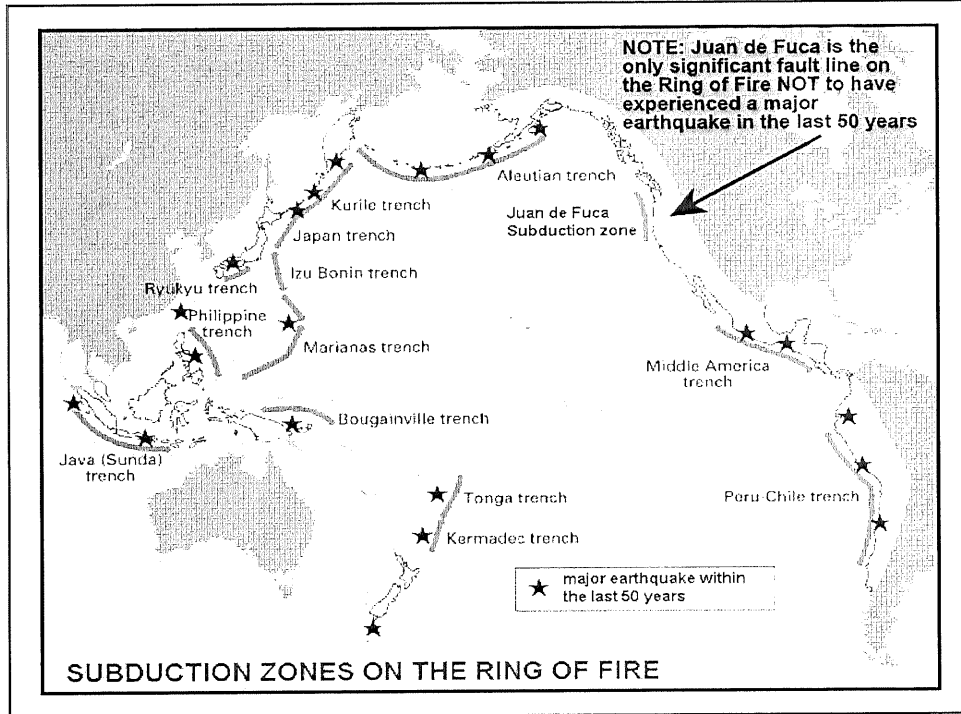


**Quiz  
questions**

**Prizes for the correct answer !**



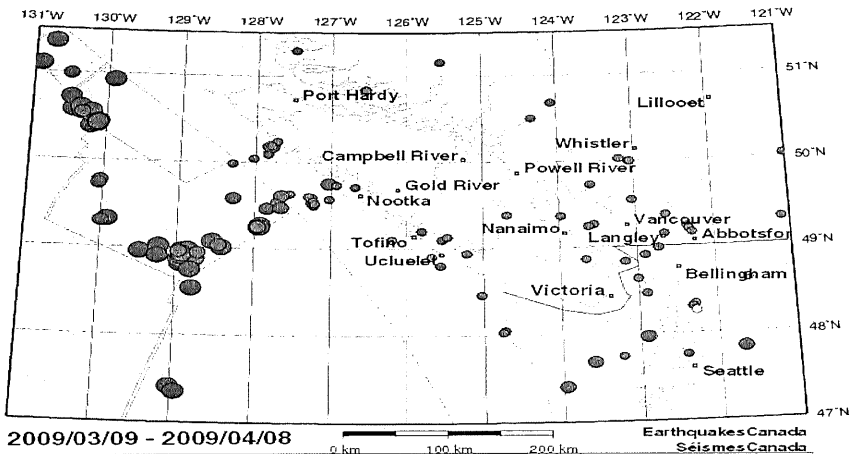






# Lower Mainland Earthquakes

Last 30 days (Apr 2009)

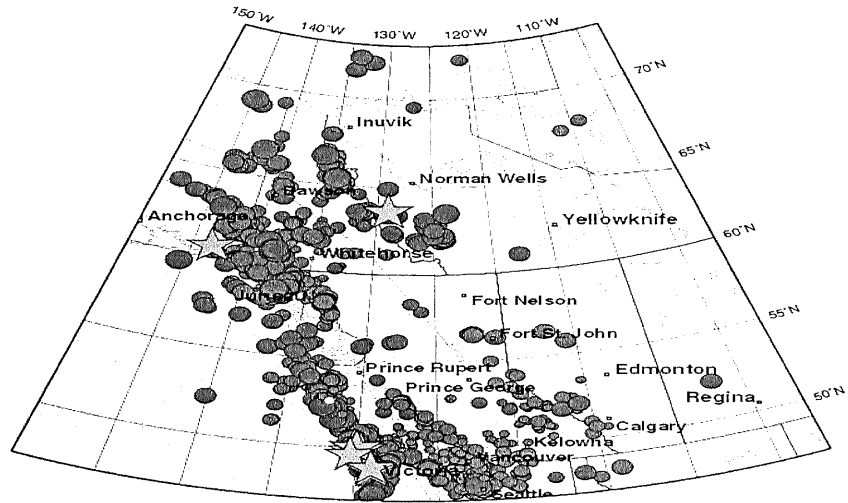


2009/03/09 - 2009/04/08

Recent earthquakes (most recent is shown in yellow)

- M < 2.0
- M ≥ 2.0
- M ≥ 3.0
- M ≥ 4.0
- ☆ M ≥ 5.0
- ☆ M ≥ 6.0

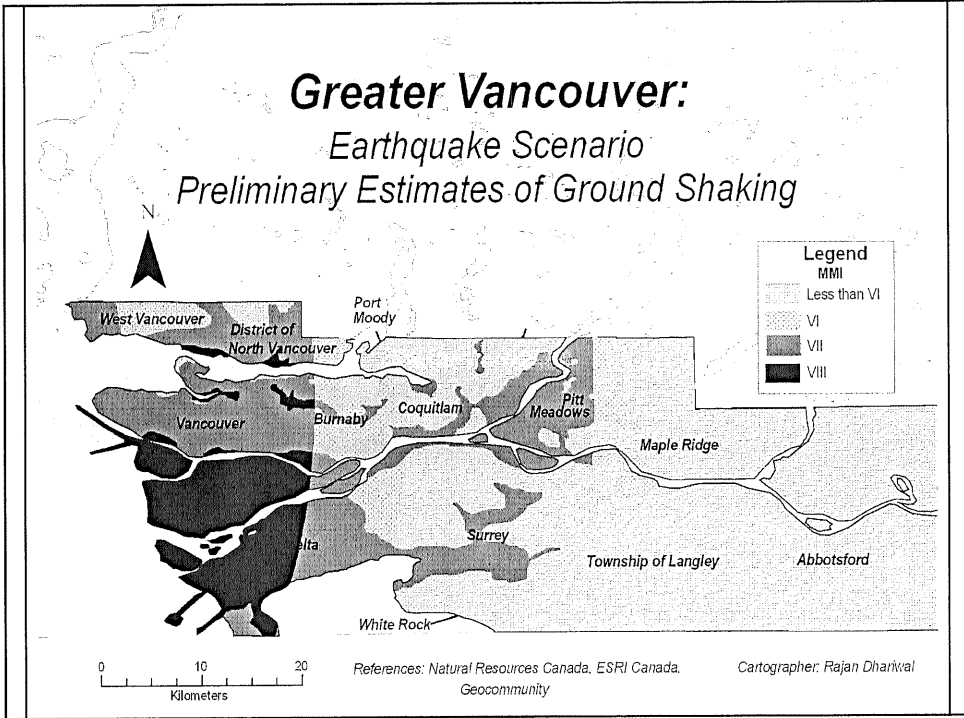
# BC Earthquakes - April 08 09




2008/04/08 - 2009/04/08


Recent earthquakes (most recent is shown in yellow)


- M < 2.0
- M ≥ 2.0
- M ≥ 3.0
- M ≥ 4.0
- ☆ M ≥ 5.0
- ☆ M ≥ 6.0




## Before an Earthquake

Look Up 

Stock Up 

Talk it Up 

Check Up 

## Look up



- **At home or school:**
- What dangers lurk above or beside you?
- Have house insurance –Eq. or glass package
- At home know how to turn gas & water off
  
- **At work:**
- What dangers lurk above or beside you?
- Know your exit paths

## Stock Up

- **At Home:**
- Freezer – blocks of Ice
- Camping out at home **SAFELY !**
- Liquids
- LED Flashlights
- Grab and go bag
- Shoes by the bed
- **At work:**
- Emergency Cabinets



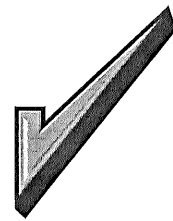
## Talk it up

- **At home:**
- Family knows what to do or where to evacuate to
- Extended family and pets
- Dangers in the house
- Get out alive [fire following]
- What to expect [no power, displaced items etc.]
- **At work:**
- **Know the plans and procedures**
- Remember if home is not in walking distance you will be safer at work, so plan accordingly

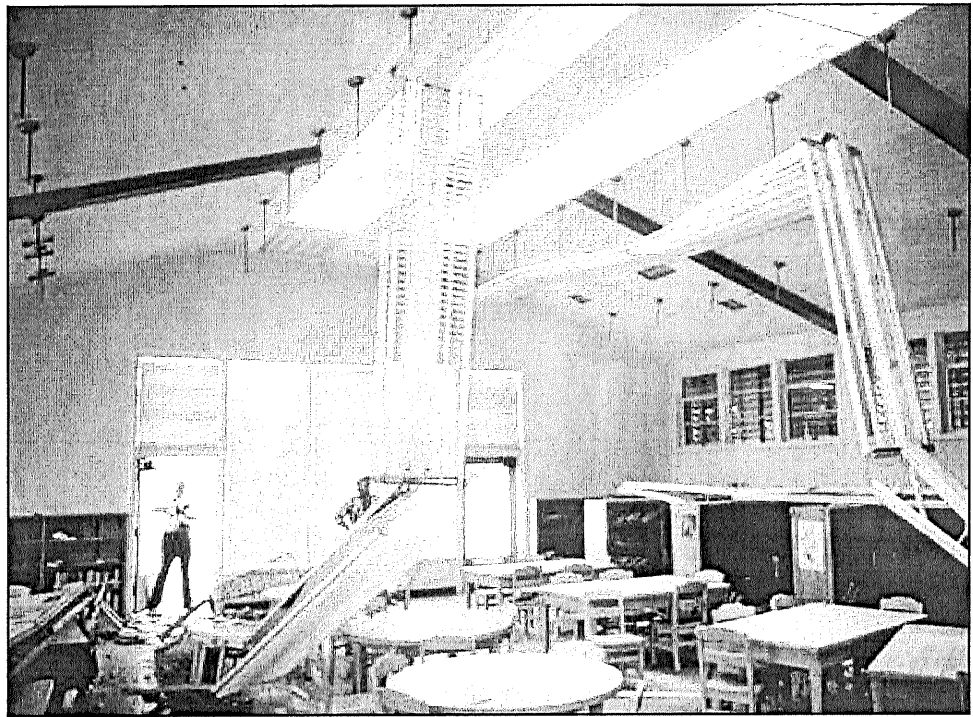
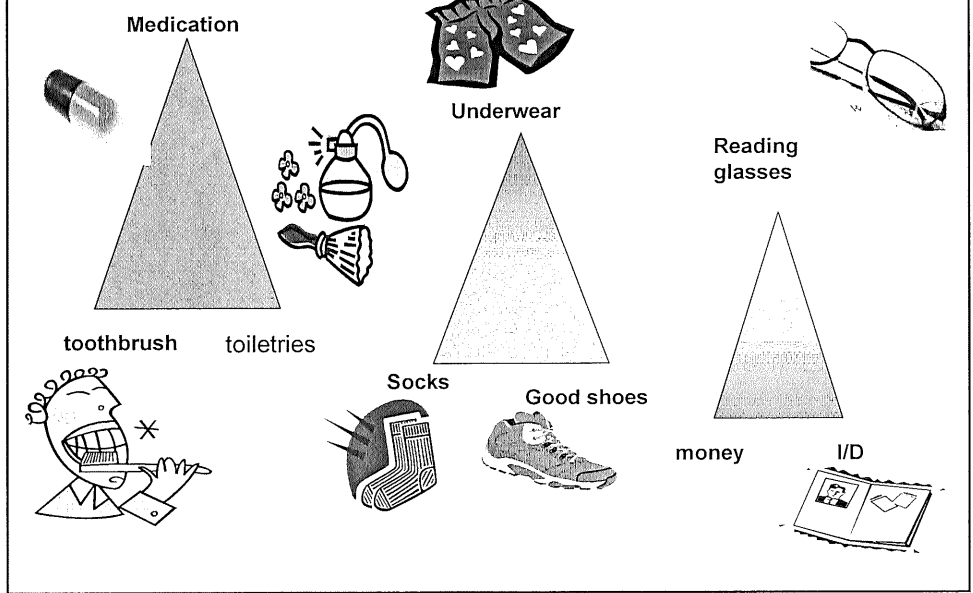


## Check Up

- **At Home:**
- Have an ABC fire extinguisher
- Know where the gas meter shut off is
- Know where the water shut off is
- Ensure the water heater is firmly attached
- Ensure the house is securely fixed to the foundation
- **At Work:**
- Know where the safe locations and EOC are
- Know your floor wardens

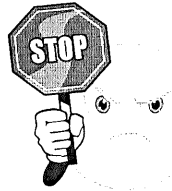


# Evacuation essentials

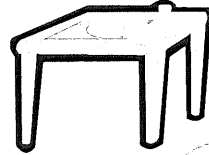


# During an Earthquake

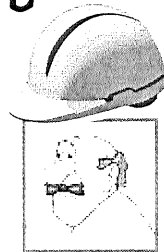
Stay Put



Take Cover

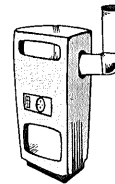


Protect Your Head



# After an Earthquake

Turn Off



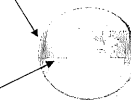
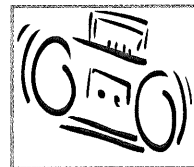
Check Out



Check In



Tune In



## **The Quiz part 1**

- We live on the ?
- The earth's crust is broken into?
- The cause of earthquakes in BC is?
- Earthquakes are measured using this scale?
- One of the three types of earthquake is?

## **The Quiz part 2**

- Two principle types of earthquake damage occur –they are?
- A third type, also very damaging occurs?
- Our best defense against earthquakes is?
- It is good to have ? Contacts
- If you are experiencing an earthquake it is best to ?

**Questions**

**FROM  
YOU  
?**

**The End**

**MANY THANKS FOR  
LISTENING**



# **EARTHQUAKES**

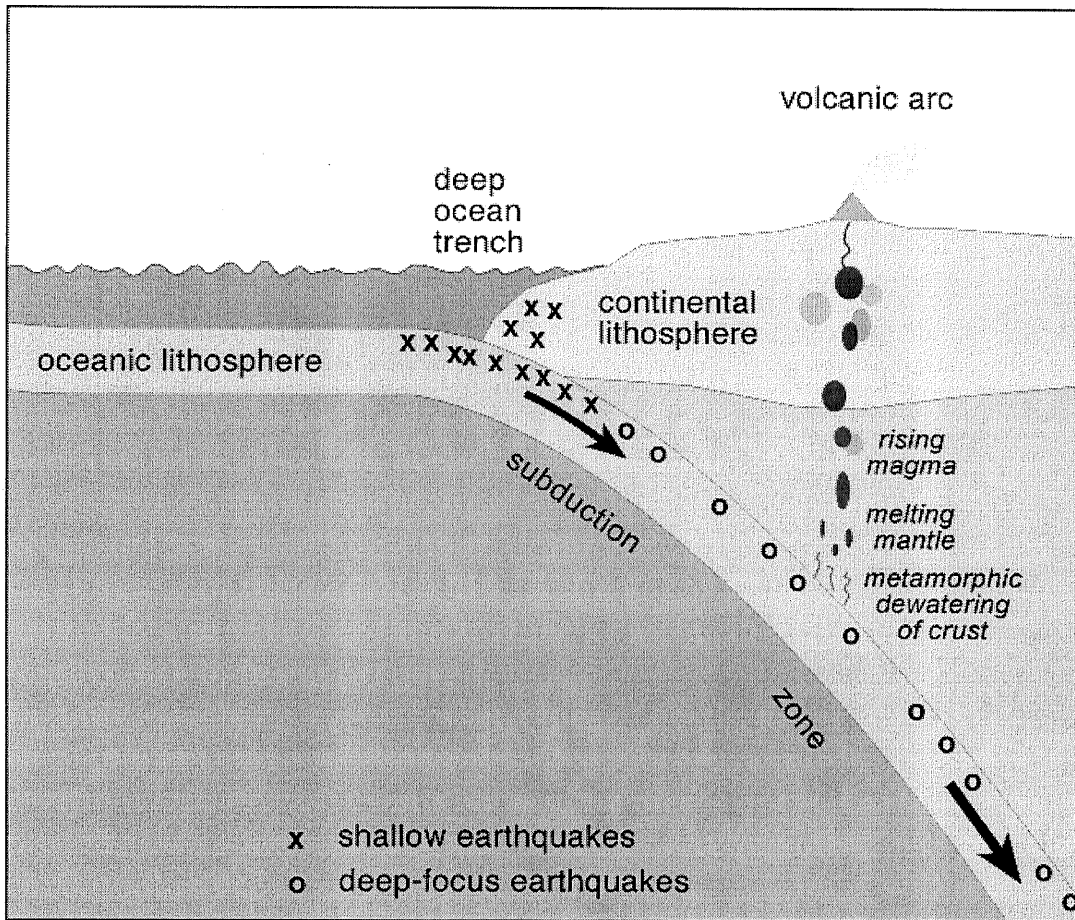
## **WHAT TO DO!**

### **A primer from the BC Cancer Agency and Emergency Management and Business Continuity**

#### **Introduction:**

**For those of us who live in British Columbia and particularly in the lower mainland and on Vancouver Island it is important that we understand that we live in earthquake country. While the very large subsection earthquakes occur at very long intervals, some 300 to 500 years apart we now know that 26 January 1700 saw the last mega thrust earthquake in this area. So, the likelihood of another such earthquake is probably closer rather than further away in time. Hence, the importance of being prepared.**

**In addition, there are two other types of earthquake, crustal earthquakes, fairly shallow in the Earth's crust and the deep earthquakes, Benioff events, caused by pieces of the Earth's crust pushing down into areas of magma and breaking off. These types of earthquakes occur on a more frequent basis and many will remember the Nisqually earthquake on February 28, 2001 that significantly shook the Puget Sound area and was felt across Metro Vancouver.**



**Consider a three-step process to being better prepared!**

**STEP ONE: Know the risks and get prepared**

To get prepared for an earthquake, you should know the risks specific to your community. Consult your local community's Emergency management website; it will contain all the information you need to know about all types of risks and what to do about them where you live.

At work, ensure that workspaces are not a hazard, tall furniture is properly attached to the building structure, and you know you're Departments emergency plan and your responsibility to assist patients. There are significant resources also available on the PHSA Emergency Management and Business Continuity POD site. The BC Cancer Agency Emergency Management and Business Continuity Team Site also contains copies of the emergency plans for each Center and various activities occurring at your site.

## **Before an Earthquake**

**Go through your home, or workspace imagining what would happen to each part of it, if shaken by a violent earthquake. Check off the items you have completed in the following list.**

- **Teach everybody in the family [if they are old enough] how to turn off the water and electricity**
- **Clearly label the 'on' and 'off' positions of your water, electricity and gas utilities.**
- **Repaired loose roof shingles and gutters.**
- **Secure water heaters to wall studs or masonry using a bracing kit to reduce the possibility of the heater falling and rupturing gas and water connections**
- **Secure major appliances such as fridges and stoves to walls since many sit on rollers or small feet.**
- **Secure costly and heavy electronics to furniture or desktops**
- **Secure the tops of top-heavy furniture to a wall by anchoring to studs and using flexible fasteners. Keep heavy items on lower shelves.**
- **Safely store expensive or fragile items that if damaged would be a significant loss.**
- **Affix mirrors, paintings and other hanging objects securely so that they won't fall off hooks. Consider using hooks that penetrate behind drywall for heavy items.**
- **Locate beds and frequently used chairs away from chimneys and windows. Do not hang heavy pictures and other items over beds. Closed curtains and blinds at night will help stop broken window glass being a hazard. Keep shoes beside the bed.**
- **Put anti-skid pads under TVs, computers and other small appliances, or secure them with Velcro or similar products.**
- **Used childproof or safety latches on cupboards to stop contents from spilling out. This is particularly important in kitchens.**
- **Keep flammable items and household chemicals away from sources of heat and where they are less likely to spill.**
- **Secure items stored in the garage to reduce hazardous materials spills or damage to vehicles.**

- **If you are in an older house consult a professional for additional ways to protect your home, such as bolting the house to its foundation and other structural mitigation techniques.**
- **If you live in an apartment block, or a multistory building, work with your building manager or Condominium Council to decide how best to ensure quake resistance in your building and unit.**
- **If you live in a mobile home you can leave the wheels on the mobile home to limit its fall. Or, you can install a structural bracing system to reduce the chance of your unit falling off its supports. If you have an awning on your home ensure that it is securely supported and fastened to the unit.**
- **Discuss earthquake insurance with your insurance broker. Check your coverage-it may affect your financial ability to recover losses after an earthquake. Consider a window glass coverage package.**

#### **During an earthquake:**

**After you first feel an earthquake there is a strong likelihood that the shaking will increase in intensity and may last up to some minutes. Wherever you are when an earthquake starts, take cover immediately. Move a few steps to nearby safe place, follow the procedure described below are squat down with your back against a wall, press against it and protect your upper body and neck area. Stay there until the shaking stops.**

#### **If you are indoors:**

- **stay inside**
- **drop under heavy furniture such as a table, desk, bed or other solid furniture [drop, cover and hold]**
- **cover your head and torso to prevent being hit by falling objects**
- **Hold on to the object that you are under so that you remain covered. Be prepared to move with the object until the shaking is finished.**
- **If you're in a shopping mall go into the nearest store. Stay away from windows and shelves with heavy objects.**
- **If you're at school gets under a desk or table and hold on. Face away from windows.**
- **If you're in a wheelchair lock the wheels and protect the back of your head and neck**

- **Immediately following the shaking wait to see if any further items are insecure or continuing to fall. Check your immediate area for safety and if you are unhurt ensure the safety of others.**

**If you are outdoors:**

- **stay outside**
- **Go to an open area away from buildings. The most dangerous place is near exterior walls and windows of buildings.**
- **If you are in a crowded public place, take cover where you won't be trampled.**

**If you are in a vehicle:**

- **Pull over to a safe place where you are not blocking the road. Keep roads clear for rescue and emergency vehicles.**
- **Avoid bridges, overpasses, underpasses, buildings or anything that could collapse on your vehicle.**
- **Listen to your car radio for instructions from emergency officials.**
- **Do not attempt to get out of your car if downed power lines are across it. Wait to be rescued.**
- **After the earthquake, if you decide to proceed, be very careful to look for collapsed sections of the road, liquefaction boils and damaged bridge approaches.**
- **If you are on a bus, stay in your seat until the bus stops. Take cover in a protected place or sit in a crouched position and protect your head from falling debris or broken glass.**

**Avoid the following in an earthquake:**

- **Doorways. Doors can slam shut and cause injuries**
- **Windows, bookcases, tall furniture and light fixtures. You could be hurt by shattered glass or heavy objects.**
- **Elevators. If you are in an elevator during an earthquake, hit the button for every floor and get out as soon as you can and stay in the elevator lobby.**
- **Downed power lines. Stay at least 10 m away to avoid electrical injury.**
- **The coastline. Earthquakes can trigger tsunamis. If you're near a coastline in a high-risk area during a strong earthquake immediately move in land to higher ground and remain there until officials declare the area safe. Tsunami may take some time**

to appear and is often preceded by what appears like a very very low tide.

**After an earthquake:**

- **Stay calm. Help others if you are able.**
- **If you are work and have a specific emergency role proceed to the EOC. [emergency operations centre]**
- **If you are at work and staff or patient rescue is required, utilized the contents of the white safety cabinets.**
- **If you are at work and have patients in your care ensure their safety and the safety of co-workers**
- **turn on and listen to radios or television for information from public safety officials.**
- **In healthcare facilities listen to the overhead announcements and follow instructions given by emergency or facility staff.**
- **Place corded telephone receivers back in their cradles; only make calls if requiring emergency assistance. Do not use cell phones.**
- **Put on sturdy shoes and protective clothing to help prevent injury from debris, especially broken glass.**
- **Check your home or work area for structural damage and other hazards. If you suspect the area is unsafe do not re-enter.**
- **Unplug electronics and appliances and broken lights to prevent fire starting once power is restored or a generator activates.**
- **Stay away from brick walls and chimneys as they may be damaged or weakened and could collapse during aftershocks. At home, do not use your fireplace if your chimney has been damaged.**
- **If you have to leave your home or work area take your emergency kit or essential items with you. Post a message in clear view indicating where you can be found. Do not waste food or water and supplies may be interrupted.**
- **Do not light matches or turn on light switches until you are sure that there are leaks or flammable liquids spilled. Use a flashlight to check utilities and do not shut them off unless damaged. Leaking gas will smell like rotten eggs. Invest in LED flashlights which have a very long shelf and operating life.**
- **If your home is equipped with natural gas call your gas provider once the phone lines are available to report any concerns or if you smell gas. Shut off the gas at the gas valve on the meter if you**

smell gas. Do not turn it back on until inspected by a licensed gas technician.

- If tap water is still unavailable immediately after the earthquake, fill the bathtub and other containers in case your supply gets cut. If your water to supply could be contaminated by sewerage do not use it. Listen for boil water Orders.
- Do not flush toilets if you suspect sewer lines are broken. Place plastic bags in toilets and replace them as required.
- Use extreme caution around hazardous materials or spills.
- Check on your neighbors or co-workers and render assistance if required
- Ensure that your family is prepared at home, at school or other work location. Do not tie up telephone lines required for emergency use by emergency responders to inquire as to family status.
- If you have pets, try to find and comfort them. If you have to evacuate from your location take them with you to a pre-identified pet friendly evacuation shelter. Look at the resources on your local authority website or contact your municipal emergency manager.
- If you are housebound and require assistance place a colored HELP sign in a street facing window or driveway.

## **STEP TWO**

### **Emergency Plan:**

**Every household should have an emergency plan. It will help you and your family to know what to do in the case of an emergency of any type. Ensure that in addition to smoke detectors you have a Plan to Get Out Alive in the event of fire.**

- Start by discussing what could happen and what you should do at home, at school or at work if an earthquake strikes.
- Remember your family may not be together when an earthquake or other emergency occurs. Plan how you will respond to this eventuality.
- To be prepared, make a list of what needs to be done ahead of time. Store important family documents, such as birth certificates,

- passports, Will's and critical financial documents, insurance policies etc. in waterproof containers or in a fireproof safe.
- Identify an appropriate out-of-town contact that can act as a central point of contact for all of the family in the event of an emergency.
  - Consider keeping spare water in the form of ice blocks in your freezer. This will ensure a separate source of drinking water and will keep food in the freezer frozen for a much longer period.
  - Write down and exercise your plan with the whole family at least once a year. Practice evacuating from your house as though it was on fire in the middle of the night.

### **STEP THREE**

#### **Emergency Kit:**

Every household should have an emergency kit. In an emergency you will need some basic supplies. You may need to get by without power or safe tap water. Be prepared to be self-sufficient for at least 3 to 5 days. You will already have many of the items for an emergency kit. The key is to make sure they are organized and easy to find or transport to another location. Make sure your kit is easy to find and carry. Keep it in a backpack, duffel bag or travel bag with wheels in an easy-to-reach, accessible place. If you drive to work consider having an emergency kit in your car as well. Make sure everyone in the household knows where emergency kits are kept. At work, be familiar with where the emergency cabinets on your floor are located.

- Water -each person requires at least 2 Liters of water per day. Keep water bottles or bottled water so that it can be easily carried in the event of evacuation.
- Store food that won't spoil, such as canned food, energy bars and dried foods. Rotate foods on an annual basis to ensure that it is edible when needed.
- Have adequate auxiliary sources of light such as wind up or battery-powered LED flashlights
- have a wind up or battery-powered radio
- have a basic first aid kit
- if you require glasses to read ensure spare glasses are available



- if you required medications ensure that you have them or a replacement prescription
- keep extra keys for your car and house
- consider what special items may be required for infants, elderly or people with disabilities.
- write out and keep a list of your key phone numbers, contact e-mail addresses and similar contact information

**remember! British Columbia *is*  
earthquake country**

**one day we *will* have a significant  
earthquake here**

**realizing this is psychologically  
important- and preparing for it is - a  
"best practice"!!!!!!!!!!**

with acknowledgment to Public Safety Canada

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[Zoom Astronomy](#)

# THE EARTH

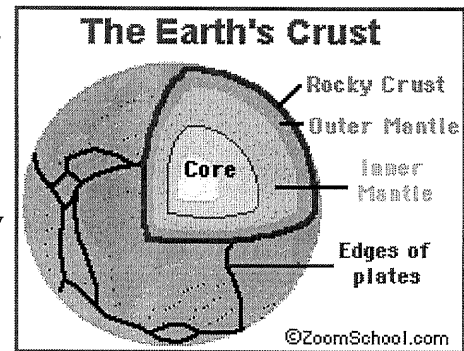
[Back to the Planets](#)

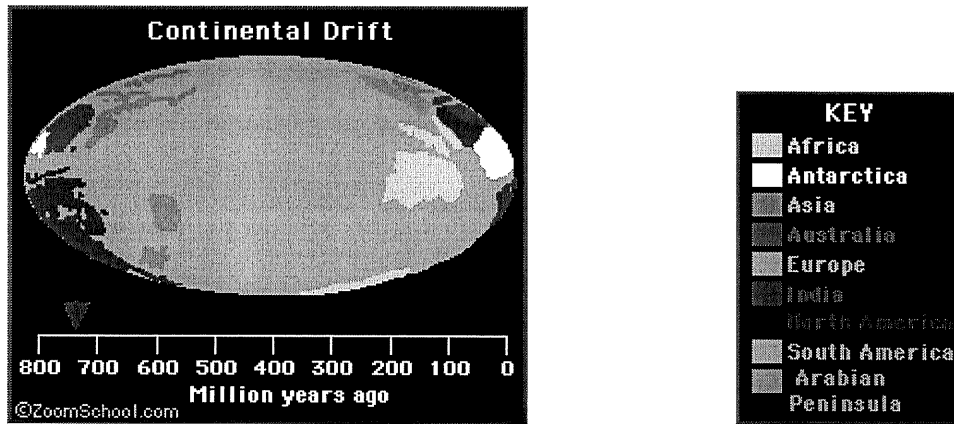
<a href="#">Introduction: Size, Orbit, etc.</a>	<a href="#">How Fast is Earth Moving?</a>	<a href="#">Continental Drift</a>	<a href="#">Oceans</a>	<a href="#">The Atmosphere</a>	<a href="#">Clouds</a>	<a href="#">Magnetosphere</a>	<a href="#">Moon</a>
<a href="#">Axis Tilt, Seasons</a>	<a href="#">How is its Mass Determined?</a>	<a href="#">Inside the Earth</a>	<a href="#">Water Cycle</a>	<a href="#">Greenhouse Effect</a>	<a href="#">Why is the Sky Blue?</a>	<a href="#">Activities, Web Links</a>	<a href="#">Geologic Time Chart</a>

## All About Plate Tectonics: Earth's Plates and Continental Drift

The Earth's rocky outer crust solidified billions of years ago, soon after the Earth formed. This crust is not a solid shell; it is broken up into huge, thick plates that drift atop the soft, underlying mantle.

The plates are made of rock and drift all over the globe; they move both horizontally (sideways) and vertically (up and down). Over long periods of time, the plates also change in size as their margins are added to, crushed together, or pushed back into the Earth's mantle. These plates are from 50 to 250 miles (80 to 400 km) thick.

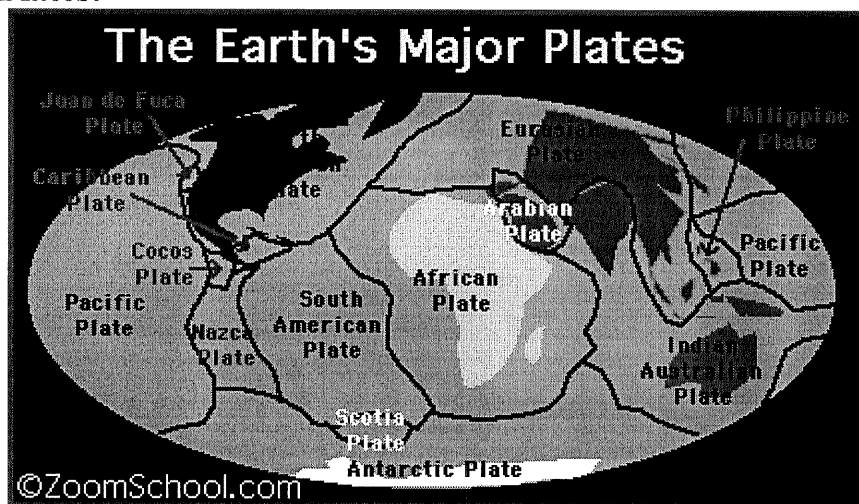




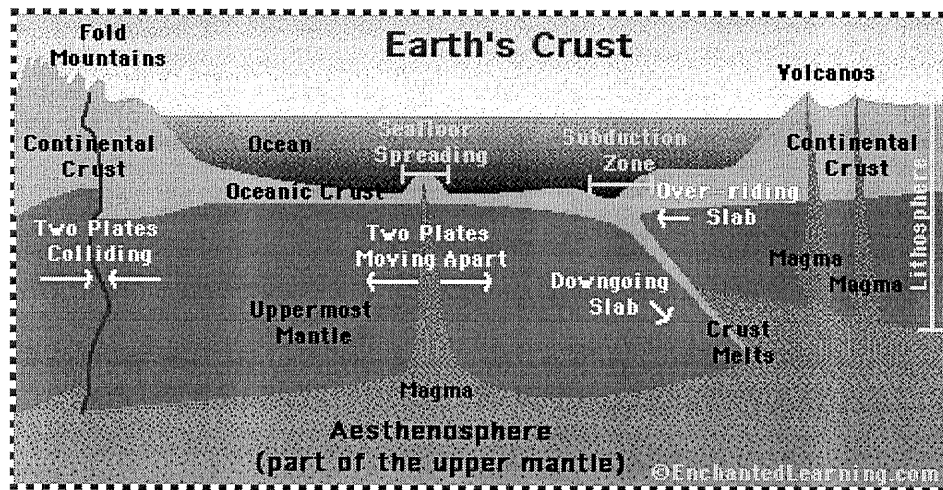
Forward  Backward

The map of the Earth is always changing; not only are the underlying plates moving, but the plates change in size. Also, the sea level changes over time (as the temperature on Earth varies and the poles melt or freeze to varied extents), covering or exposing different amounts of crust.

**Earth's Major Plates:**



The current continental and oceanic plates include: the Eurasian plate, Australian-Indian plate, Philippine plate, Pacific plate, Juan de Fuca plate, Nazca plate, Cocos plate, North American plate, Caribbean plate, South American plate, African plate, Arabian plate, the Antarctic plate, and the Scotia plate. These plates consist of smaller sub-plates.

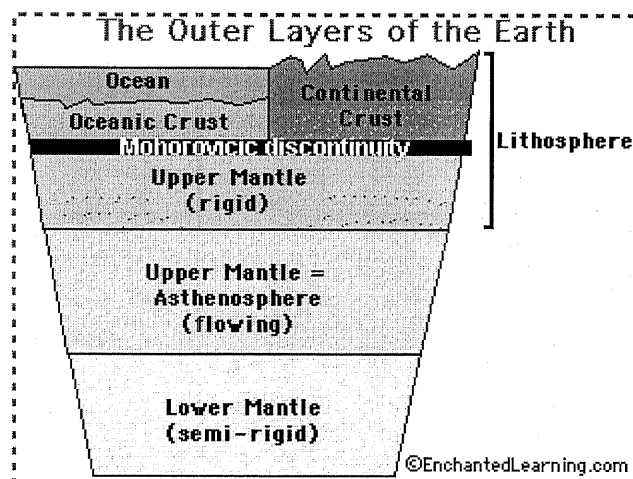


**PLATE TECTONICS**

The theory of plate tectonics (meaning "plate structure") was developed in the 1960's. This theory explains the movement of the Earth's plates (which has since been documented scientifically) and also explains the cause of earthquakes, volcanoes, oceanic trenches, mountain range formation, and many other geologic phenomenon.

Type of Crust	Average Thickness	Average Age	Major Component
Continental Crust	20-80 kilometers	3 billion years	Granite
Oceanic Crust	10 kilometers	Generally 70 to 100 million years old	Basalt

The plates are moving at a speed that has been estimated at 1 to 10 cm per year. Most of the Earth's seismic activity (volcanoes and earthquakes) occurs at the plate boundaries as they interact.



The top layer of the Earth's surface is called the crust (it lies on top of the plates). **Oceanic crust** (the thin crust under the oceans) is thinner and denser than **continental crust**. Crust is constantly being created and destroyed; oceanic crust is more active than continental crust.

Under the crust is the rocky mantle, which is composed of silicon, oxygen, magnesium, iron, aluminum, and calcium. The upper mantle is rigid and is part of the **lithosphere** (together with the crust). The lower mantle flows slowly, at a rate of a few centimeters per year. The **asthenosphere** is a part of the upper mantle that exhibits plastic properties. It is located below the lithosphere (the crust and upper mantle), between about 100 and 250 kilometers deep.

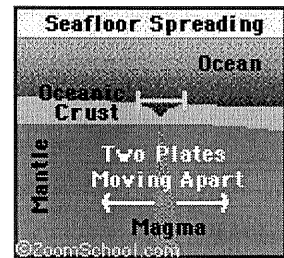
**TYPES OF PLATE MOVEMENT: Divergence, Convergence, and Lateral Slipping**  
 At the boundaries of the plates, various deformations occur as the plates interact; they

separate from one another (seafloor spreading), collide (forming mountain ranges), slip past one another (subduction zones, in which plates undergo destruction and remelting), and slip laterally.

**Divergent Plate Movement: Seafloor Spreading**

Plate Divergence  
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Seafloor spreading is the movement of two oceanic plates away from each other (at a divergent plate boundary), which results in the formation of new oceanic crust (from magma that comes from within the Earth's mantle) along a mid-ocean ridge. Where the oceanic plates are moving away from each other is called a zone of divergence. Ocean floor spreading was first suggested by Harry Hess and Robert Dietz in the 1960's.



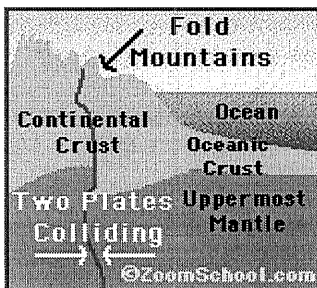
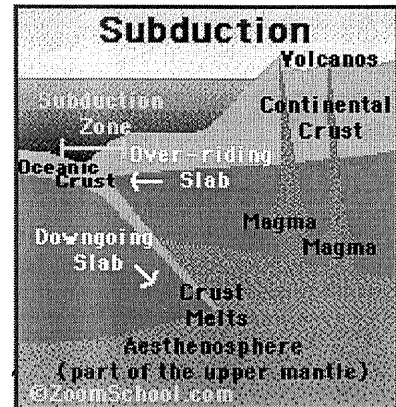
**Convergent Plate Movement:**

Plate Convergence  
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When two plates collide (at a convergent plate boundary), some crust is destroyed in the impact and the plates become smaller. The results differ, depending upon what types of plates are involved.

**Oceanic Plate and Continental Plate** - When a thin, dense oceanic plate collides with a relatively light, thick continental plate, the oceanic plate is forced under the continental plate; this phenomenon is called subduction.

**Two Oceanic Plates** - When two oceanic plates collide, one may be pushed under the other and magma from the mantle rises, forming volcanoes in the vicinity.



**Two Continental Plates** - When two continental plates collide, mountain ranges are created as the colliding crust is compressed and pushed upwards.

**Lateral Slipping Plate Movement:**

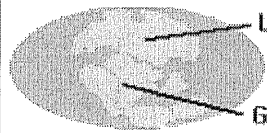
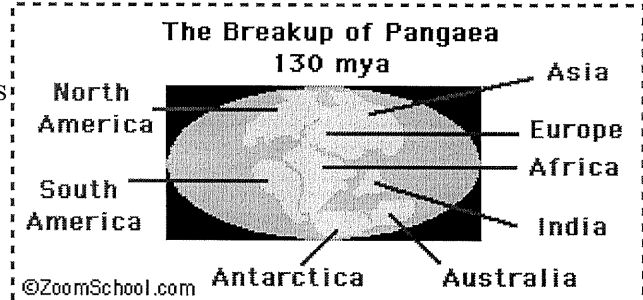
Two Plates Sliding Past Each Other  
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When two plates move sideways against each other (at a transform plate boundary), there is a tremendous amount of friction which makes the movement jerky. The plates slip, then stick as the friction and pressure build up to incredible levels. When the pressure is released suddenly, and the plates suddenly jerk apart, this is an earthquake.

**ALFRED WEGENER AND PANGAEA**

In 1915, the German geologist and meteorologist Alfred Wegener (1880-1930) first proposed the theory of continental drift, which states that parts of the Earth's crust slowly drift atop a liquid core. The fossil record supports and gives credence to the theories of continental drift and plate tectonics.

Wegener hypothesized that there was an original, gigantic supercontinent 200 million years ago, which he named Pangaea, meaning "All-earth". Pangaea was a supercontinent consisting of all of Earth's land masses. It existed from the Permian through Jurassic periods. It began breaking up during the Jurassic period, forming continents Gondwanaland and Laurasia, separated by the Tethys Sea.



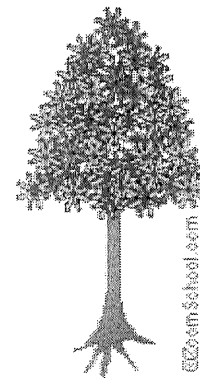
Pangaea started to break up into two smaller supercontinents, called Laurasia and Gondwanaland, during the Jurassic period. By the end of the Cretaceous period, the continents were separating into land masses that look like our modern-day continents.

Wegener published this theory in his 1915 book, *On the Origin of Continents and Oceans*. In it he also proposed the existence of the supercontinent Pangaea, and named it (Pangaea means "all the land" in Greek).

### Fossil Evidence in Support of the Theory

Eduard Suess was an Austrian geologist who first realized that there had once been a land bridge between South America, Africa, India, Australia, and Antarctica. He named this large land mass Gondwanaland (named after a district in India where the fossil plant Glossopteris was found). This was the southern supercontinent formed after Pangaea broke up during the Jurassic period. He based his deductions on the plant Glossopteris, which is found throughout India, South America, southern Africa, Australia, and Antarctica.

Fossils of Mesosaurus (one of the first marine reptiles, even older than the dinosaurs) were found in both South America and South Africa. These finds, plus the study of sedimentation and the fossil plant Glossopteris in these southern continents led Alexander duToit, a South African scientist, to bolster the idea of the past existence of a supercontinent in the southern hemisphere, Eduard Suess's Gondwanaland. This lent further support to A. Wegener's Continental Drift Theory.



Glossopteris, a tree-like plant from the Permian through the Triassic Period. It had tongue-shaped leaves and was about 12 ft (3.7 m) tall. It was the dominant plant of Gondwana.

## ACTIVITIES ABOUT EARTH'S CONTINENTAL PLATES AND CRUST

An interactive quiz about plate tectonics

A quiz about Continental drift and plate tectonics

Label the outer layers of the Earth

Label Seafloor Spreading (Plate Divergence) Label the growth of new oceanic crust as two plates diverge.

Label Subduction (Plate Convergence) Label the destruction of crust as two plates converge.

The Ring of Fire

**WEB LINKS ON THE EARTH'S CONTINENTAL PLATES**

The Great Continental Drift Mystery from the Yale-New Haven Teachers Institute, by Lois Van Wagner.

Questions and answers about continental drift from Monash University Earth Sciences.

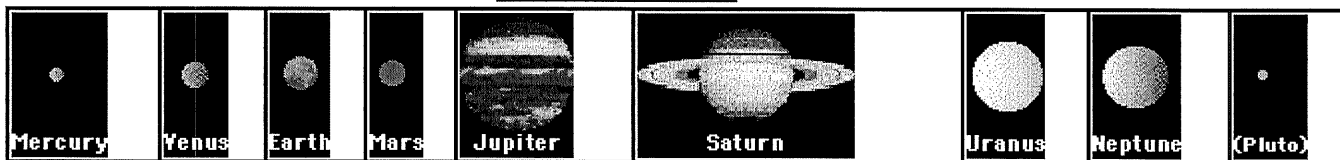
Plate tectonics from the University of Tennessee (Knoxville).

Speed of the continental plates from Zhen Shao Huang.

Plate tectonics from the US Geological Service

**The Planets**

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