USGS
science for a changing world

Living With a Volcano in Your Back Yard: Mount Rainier Volcanic Hazards

A prepared presentation for use by public officials and educators

Open-File Report 98-519

In cooperation with: Washington Military Department
Emergency Management Division

USGS
science for a changing world

"Living with a volcano in your back yard"

Mount Rainier Volcanic Hazards

U.S. Geological Survey
Open-File Report 98-519

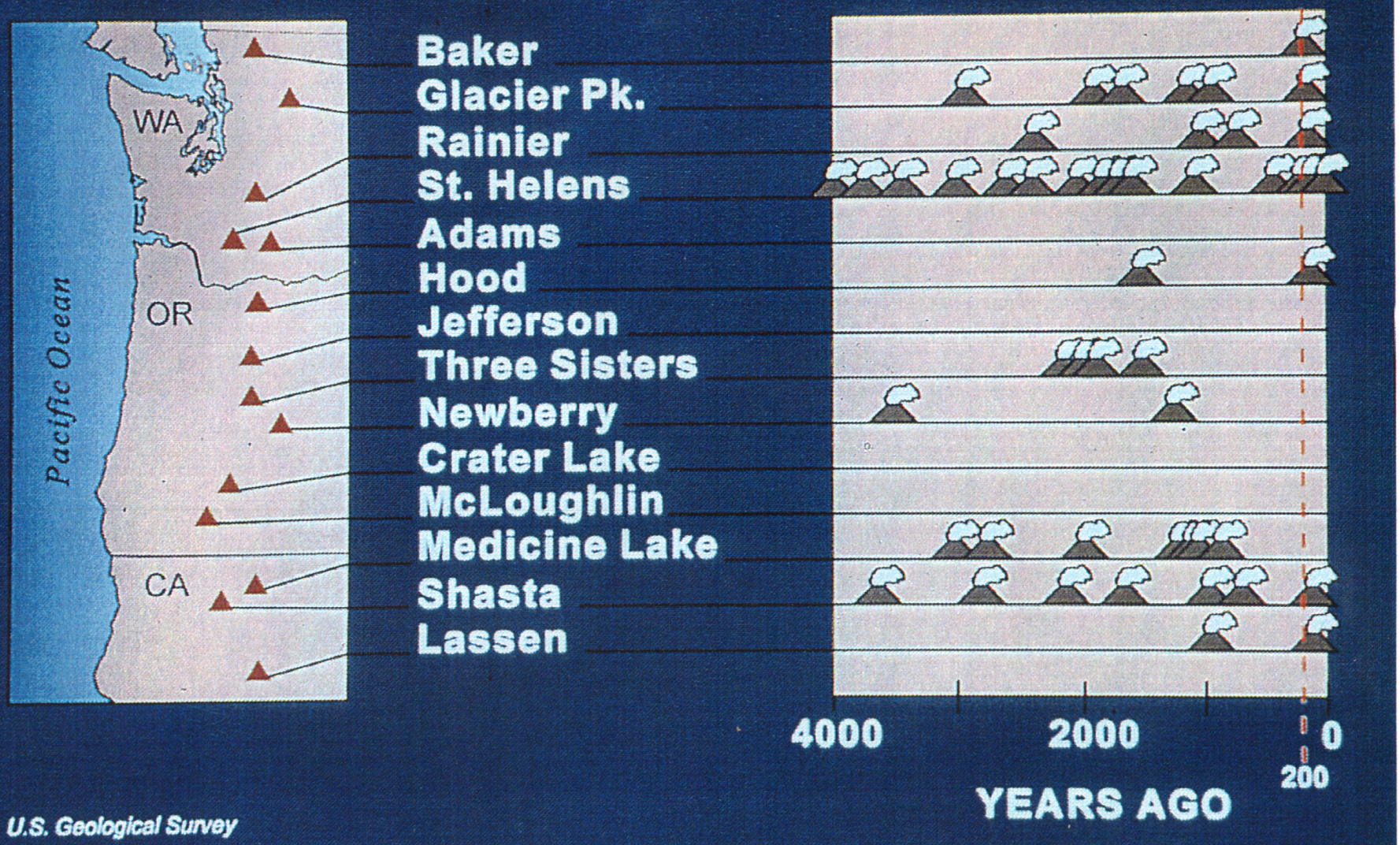
U.S. Department of the Interior
U.S. Geological Survey

Major Points

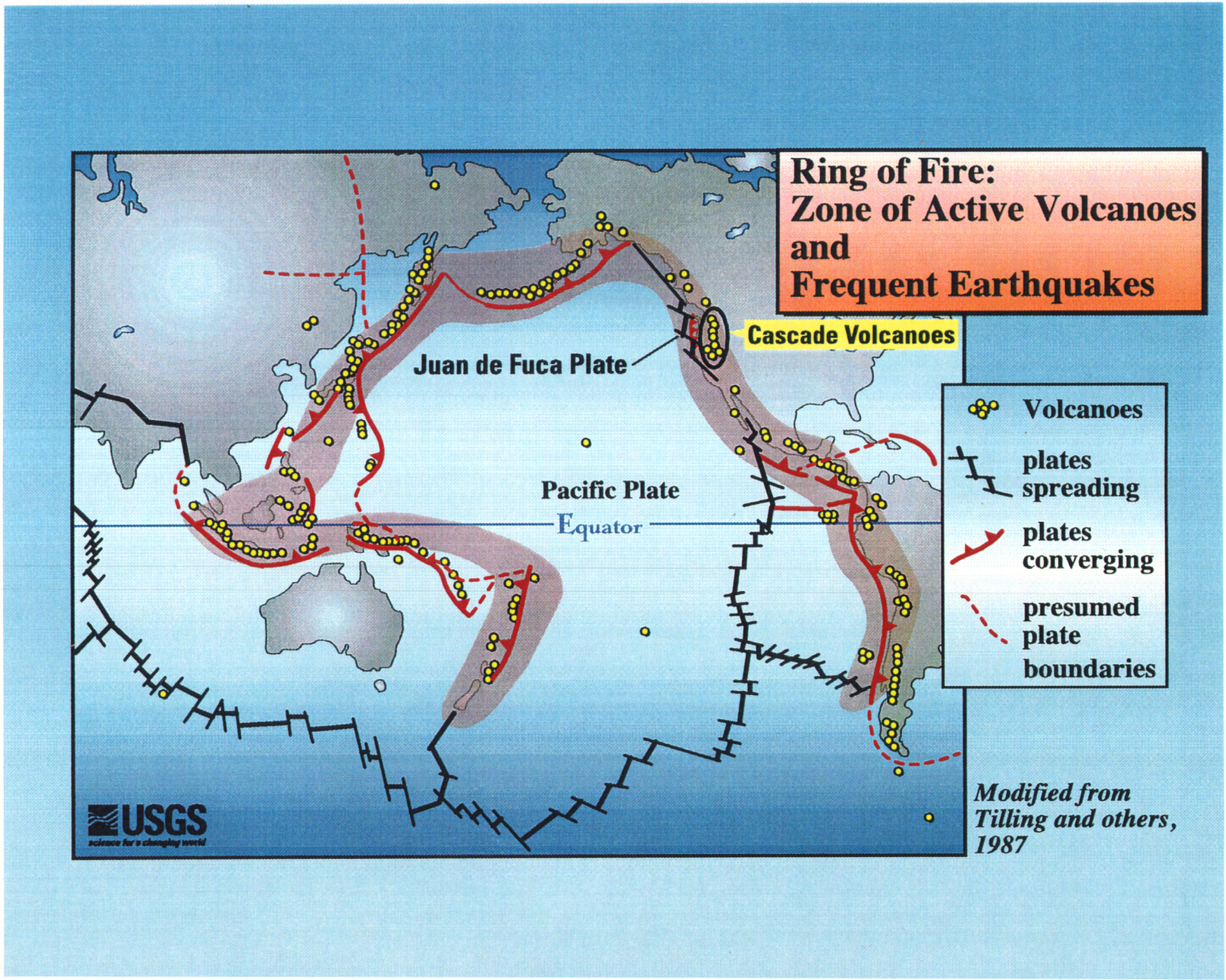
- Related geologic processes cause earthquakes and volcanoes
- Mount Rainier is an "active" volcano
- Volcanic processes that built Mount Rainier are a continuing threat
- Lahars (mudflows) are the greatest volcanic hazard at Mount Rainier
- Simple steps taken now reduce volcanic risk

USGS
science for a changing world

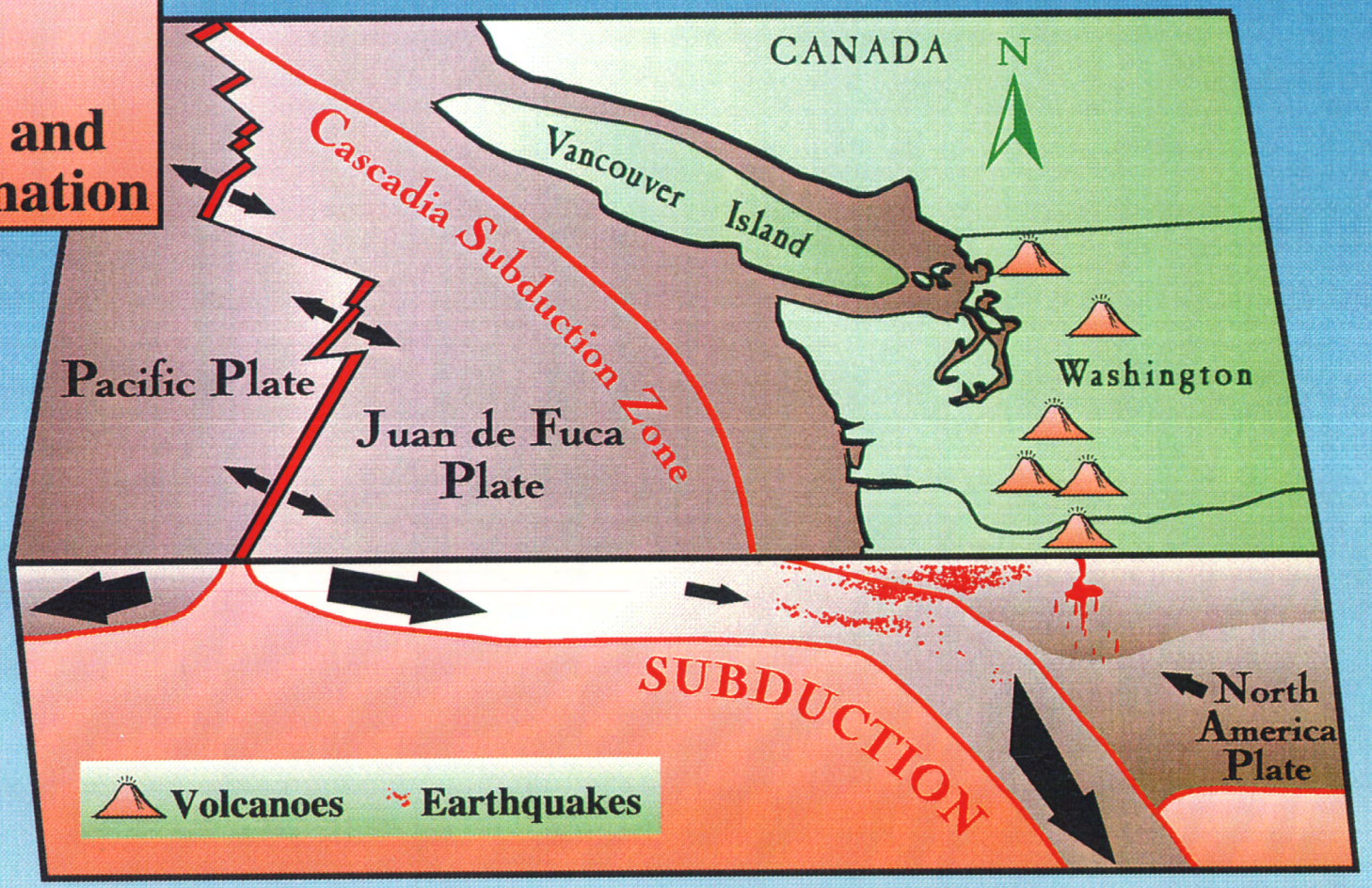
CASCADE ERUPTIONS DURING THE LAST 4000 YEARS



U.S. Geological Survey


Ring of Fire:
Zone of Active Volcanoes
and
Frequent Earthquakes
Cascade Volcanoes
Juan de Fuca Plate
Pacific Plate
Equator
Volcanoes
plates spreading
plates converging
presumed plate boundaries
USGS
science for a changing world
Modified from Tilling and others, 1987

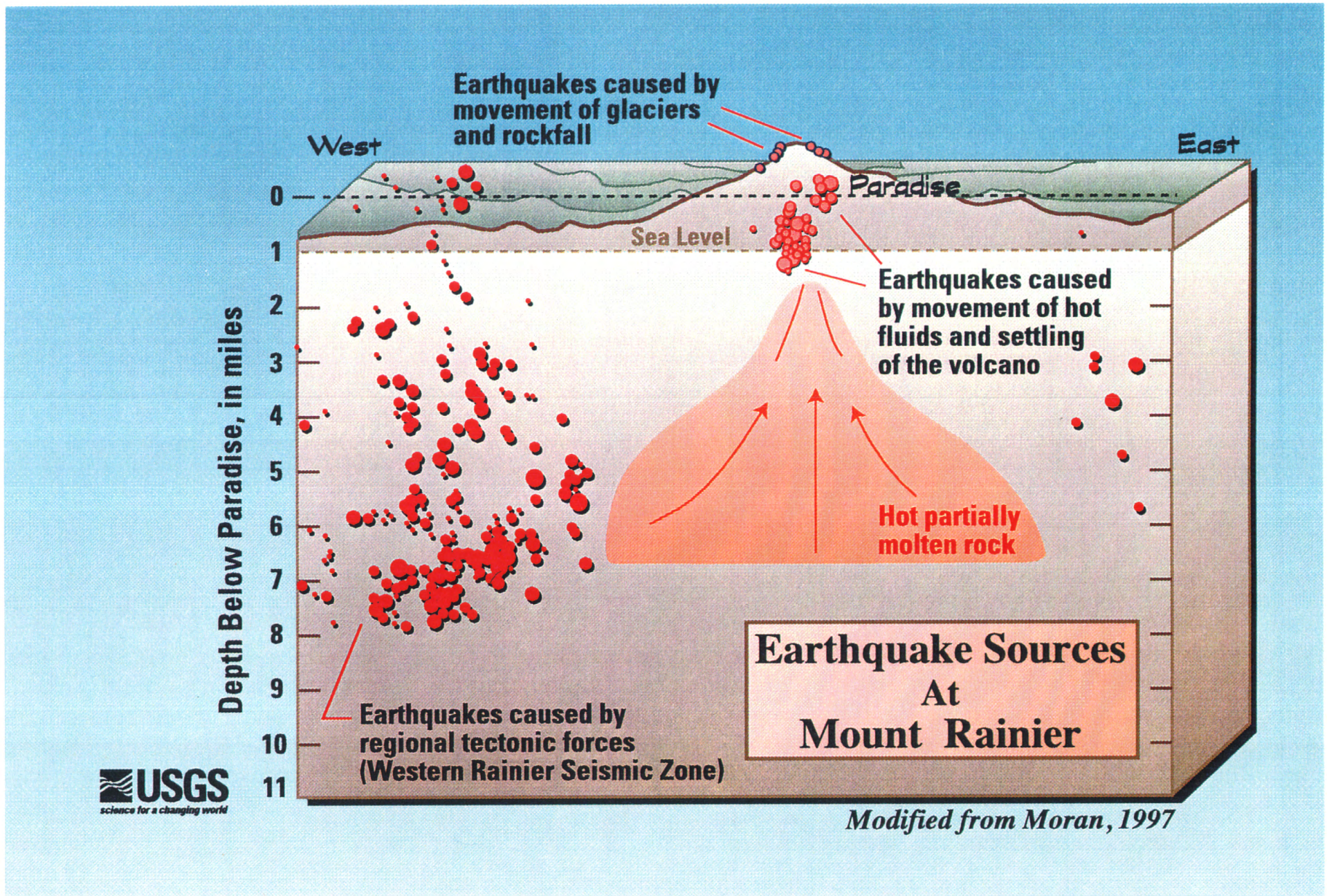
Subduction Provides Forces for Earthquakes and Magma Formation

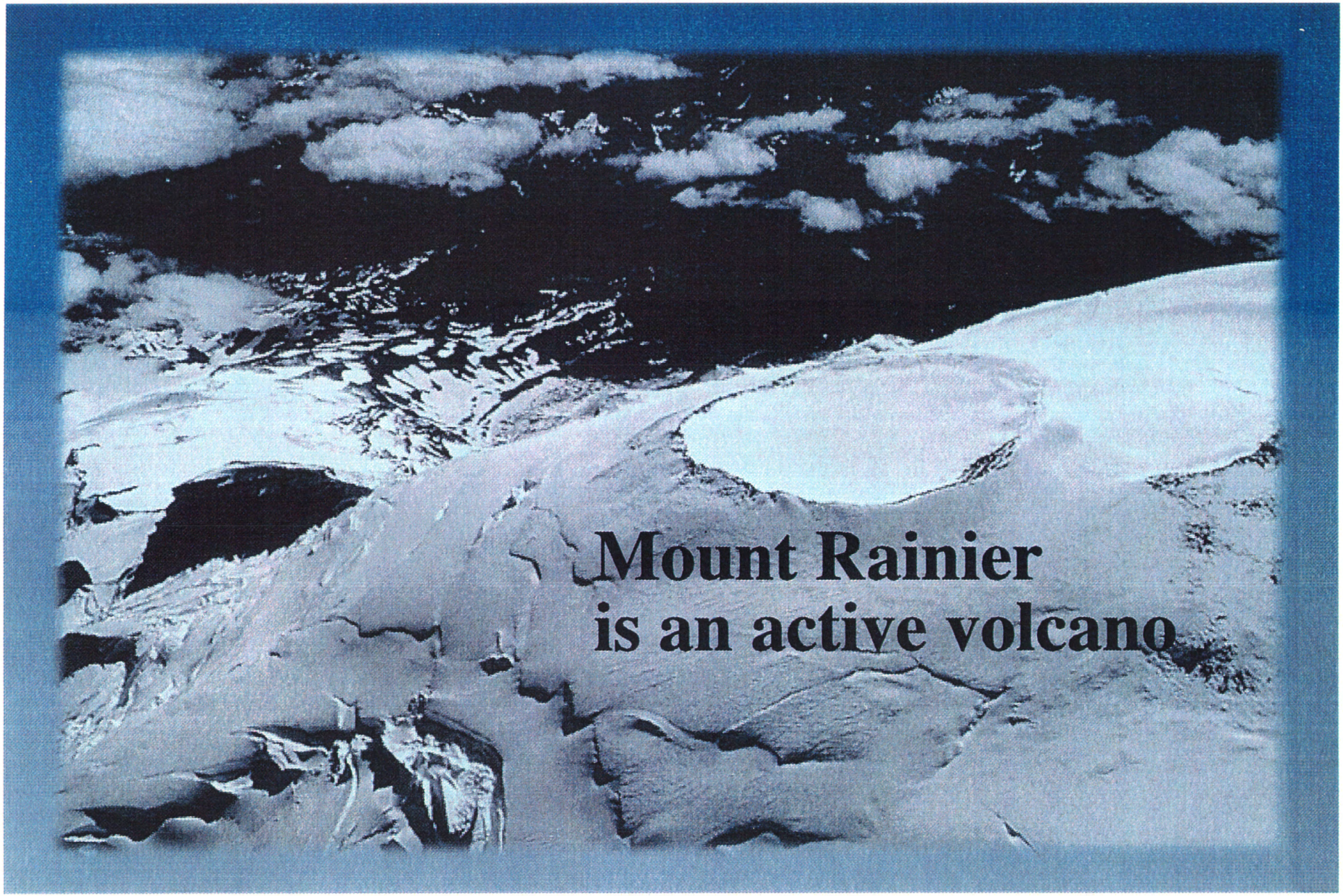


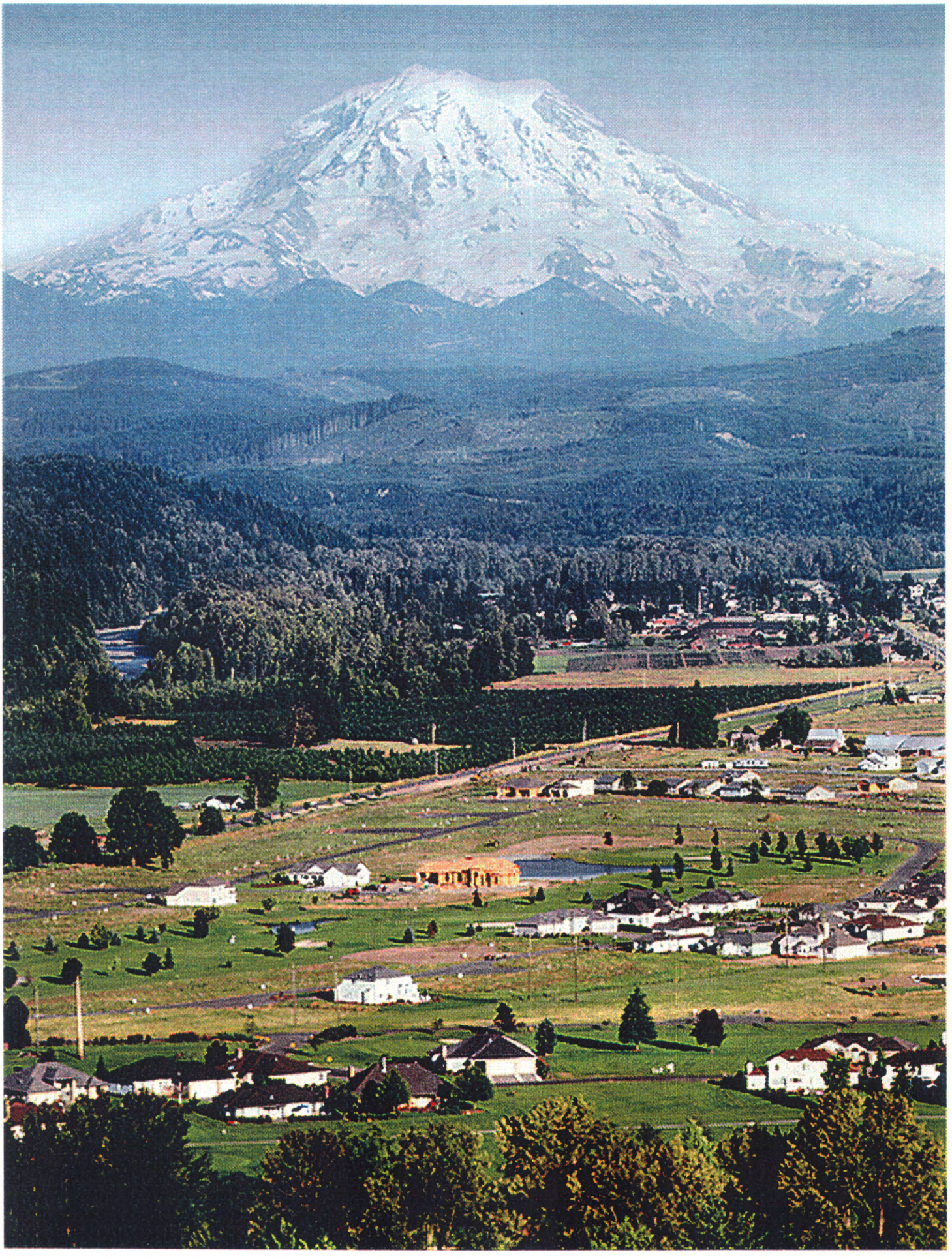
USGS
science for a changing world

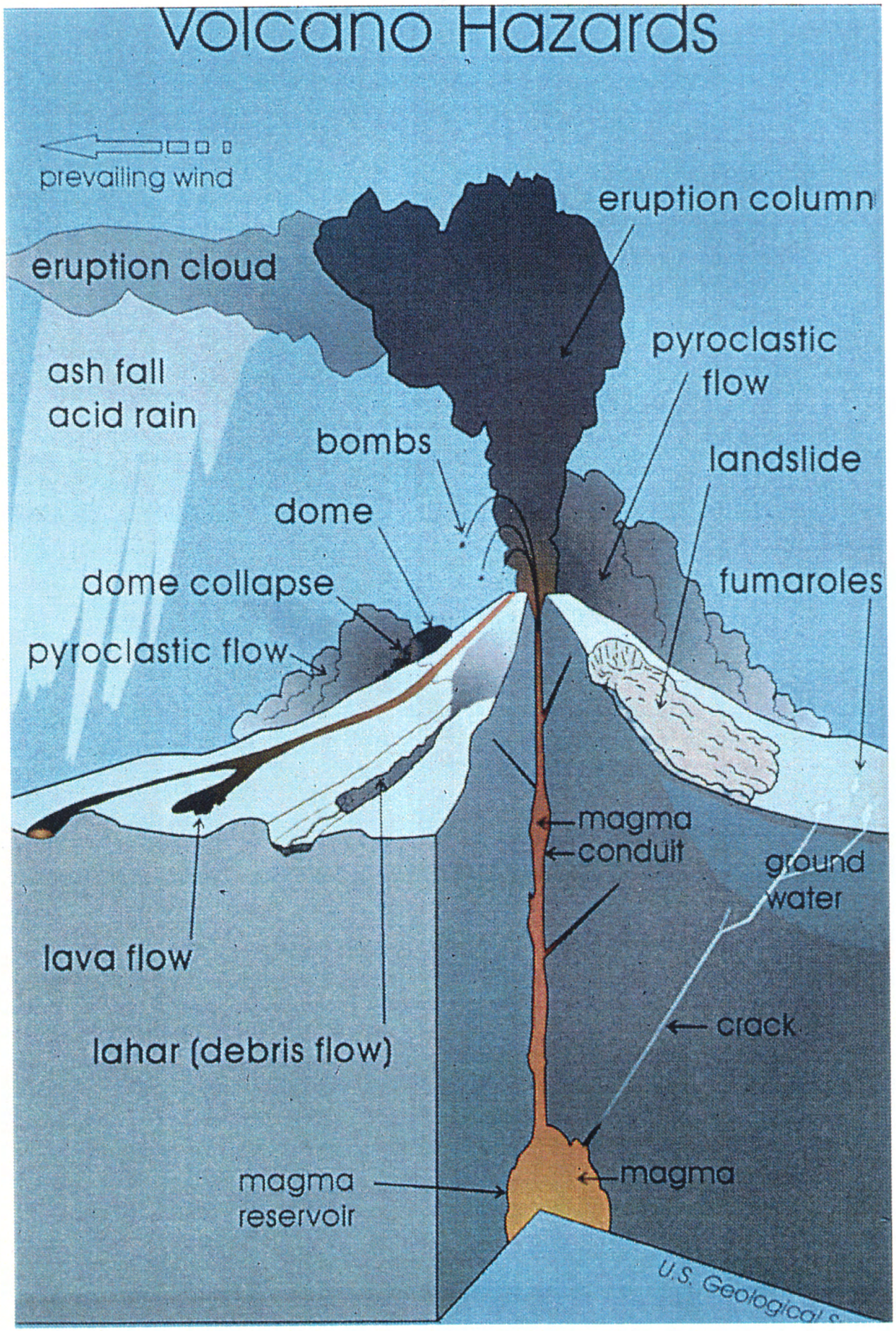
Modified from Yelin and others, 1994

KEEP
AWAY!


Earthquakes caused by movement of glaciers and rockfall
West
East
Paradise
Sea Level
Depth Below Paradise, in miles
0
1
2
3
4
5
6
7
8
9
10
11
Earthquakes caused by movement of hot fluids and settling of the volcano
Hot partially molten rock
Earthquakes caused by regional tectonic forces (Western Rainier Seismic Zone)
Earthquake Sources At Mount Rainier
USGS
science for a changing world
Modified from Moran, 1997


Mount Rainier
is an active volcano



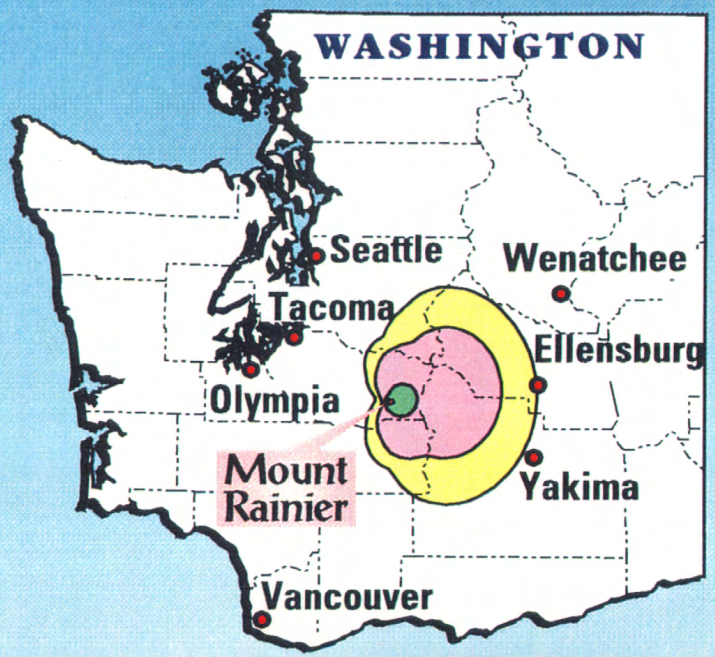

Volcano Hazards
prevailing wind
eruption column
eruption cloud
pyroclastic flow
ash fall
acid rain
bombs
landslide
dome
dome collapse
fumaroles
pyroclastic flow
magma
conduit
ground water
lava flow
crack
lahar (debris flow)
magma
magma reservoir
U.S. Geological S

Volcanic Ash

- Affects people and property distant from volcano
- Makes breathing difficult
- Irritates eyes
- Reduces visibility
- Is abrasive to machinery, aircraft and computer equipment
- Clogs filters and causes electrical shorts
- Strips leaves from crops and trees
- Collapses buildings when wet and in excess of 4 inches

USGS
science for a changing world

Potential ashfall from Mount Rainier



Map shows the **PROBABILITY** that volcanic ash will be deposited to a thickness of **1/3 inch** during one year. Volcanic ash, of this thickness or less, can cause disruption of ground and air transportation, and cause damage to electronics and machinery.

Map shows the **PROBABILITY** that ash will be deposited to a thickness of **4 inches** during one year. Four inches of volcanic ash is a sufficient quantity to collapse roofs of buildings.

USGS
science for a changing world

Lava Flows

- Make land unusable for years
- Can start fires
- Destroy all in their path by burial and fire
- Collapse on steep slopes and cause Pyroclastic Flows

USGS
science for a changing world

2 7 '97

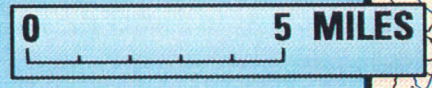
Pyroclastic Flows

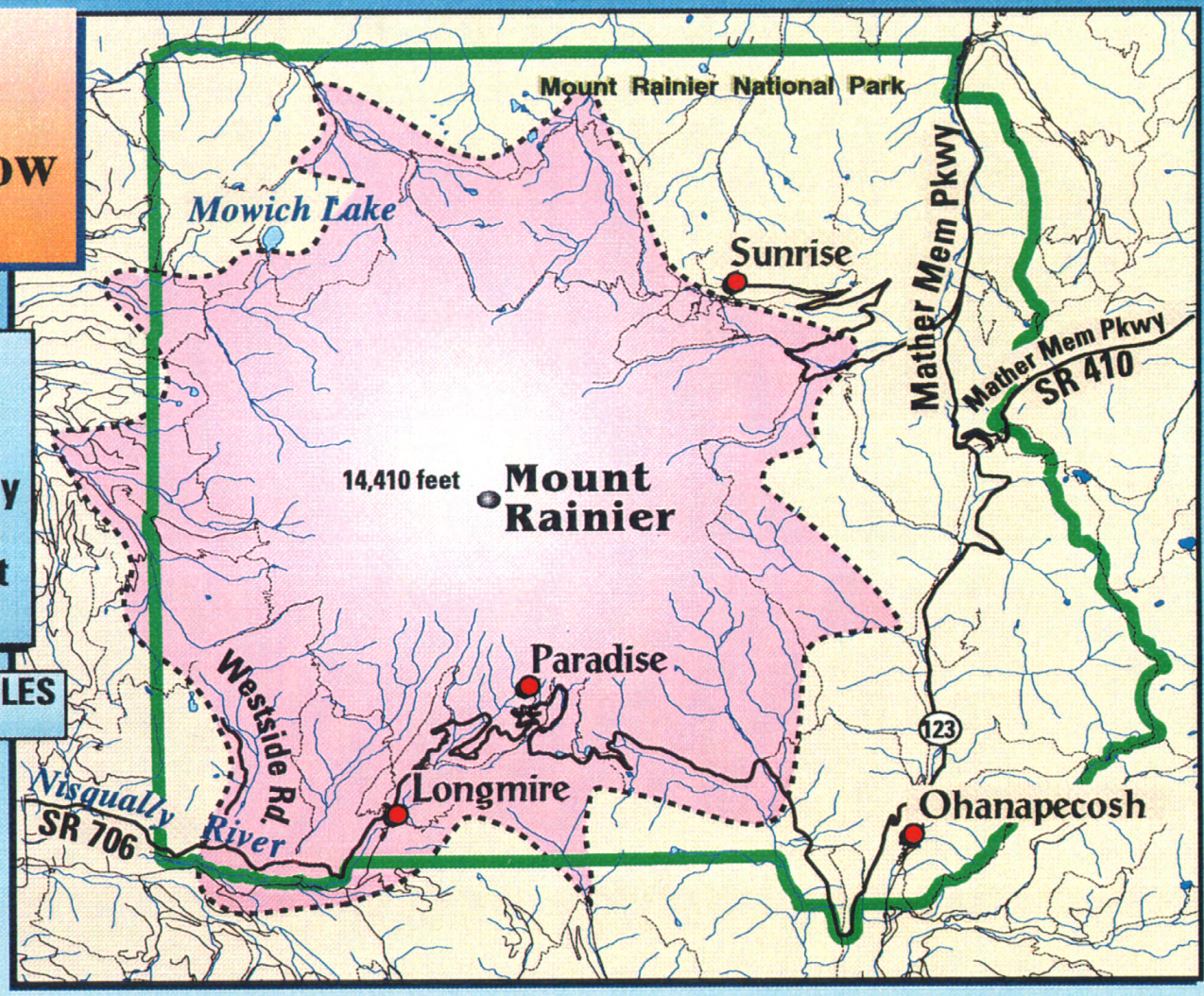
- Are formed by collapse of lava flows or eruption columns
- Destroy all in their path by burial, burning or asphyxiation
- Can start fires
- Melt snow and ice and indirectly cause lahars

USGS
science for a changing world

Lava and pyroclastic flow hazards

The yellow area within the dotted lines represents regions most likely to be affected by lava flows and hot ash flows.

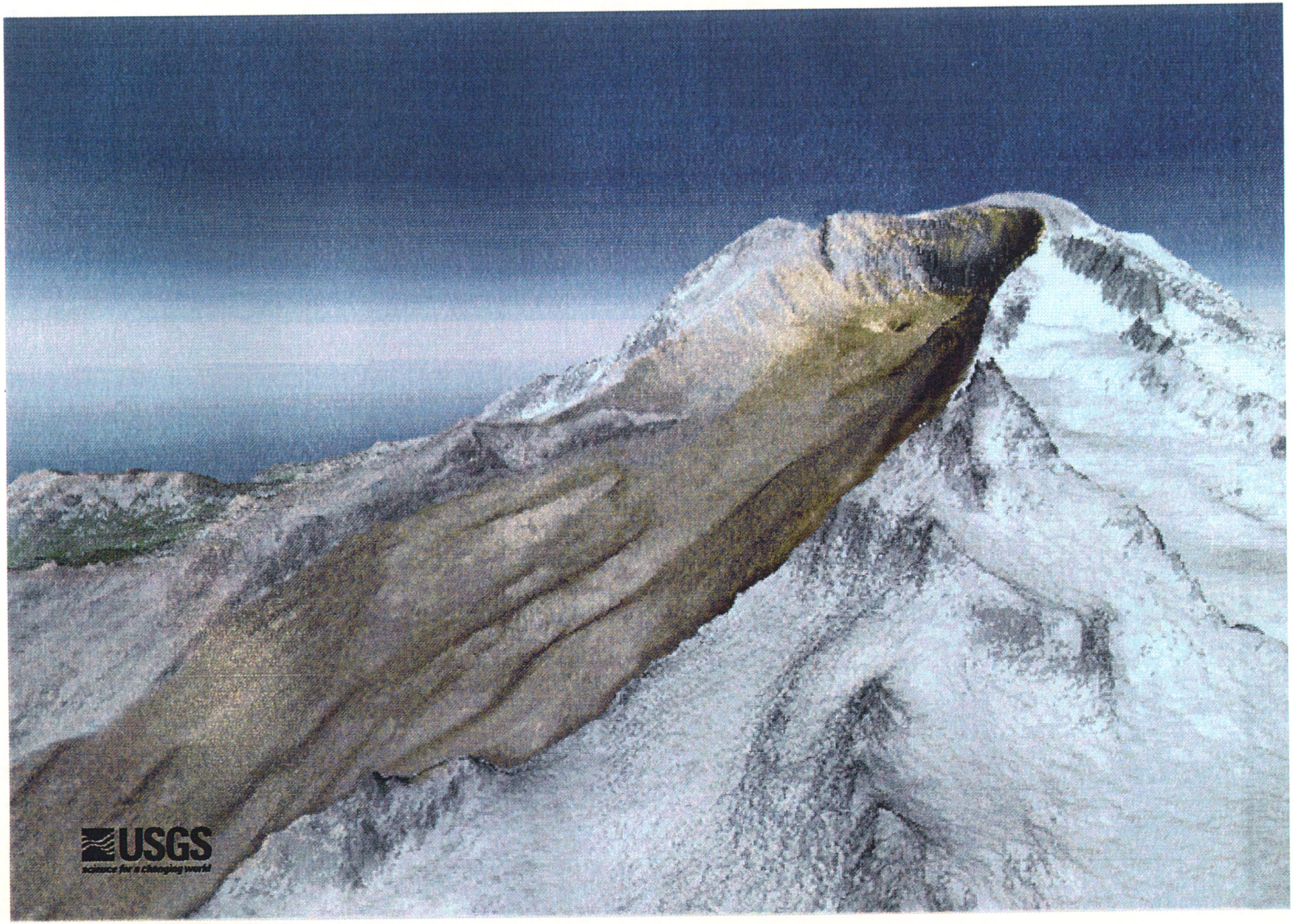


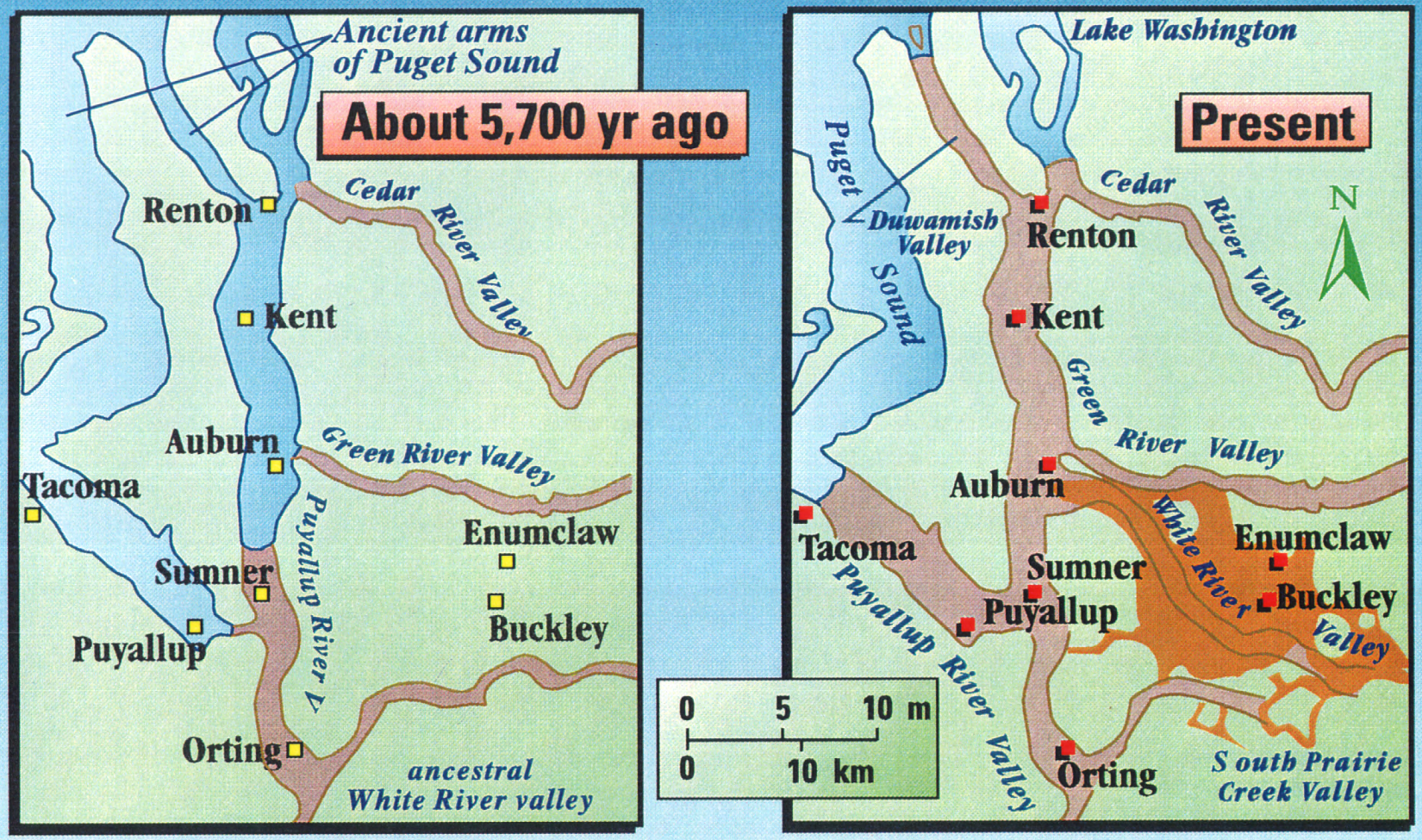


USGS
science for a changing world

12 09 85

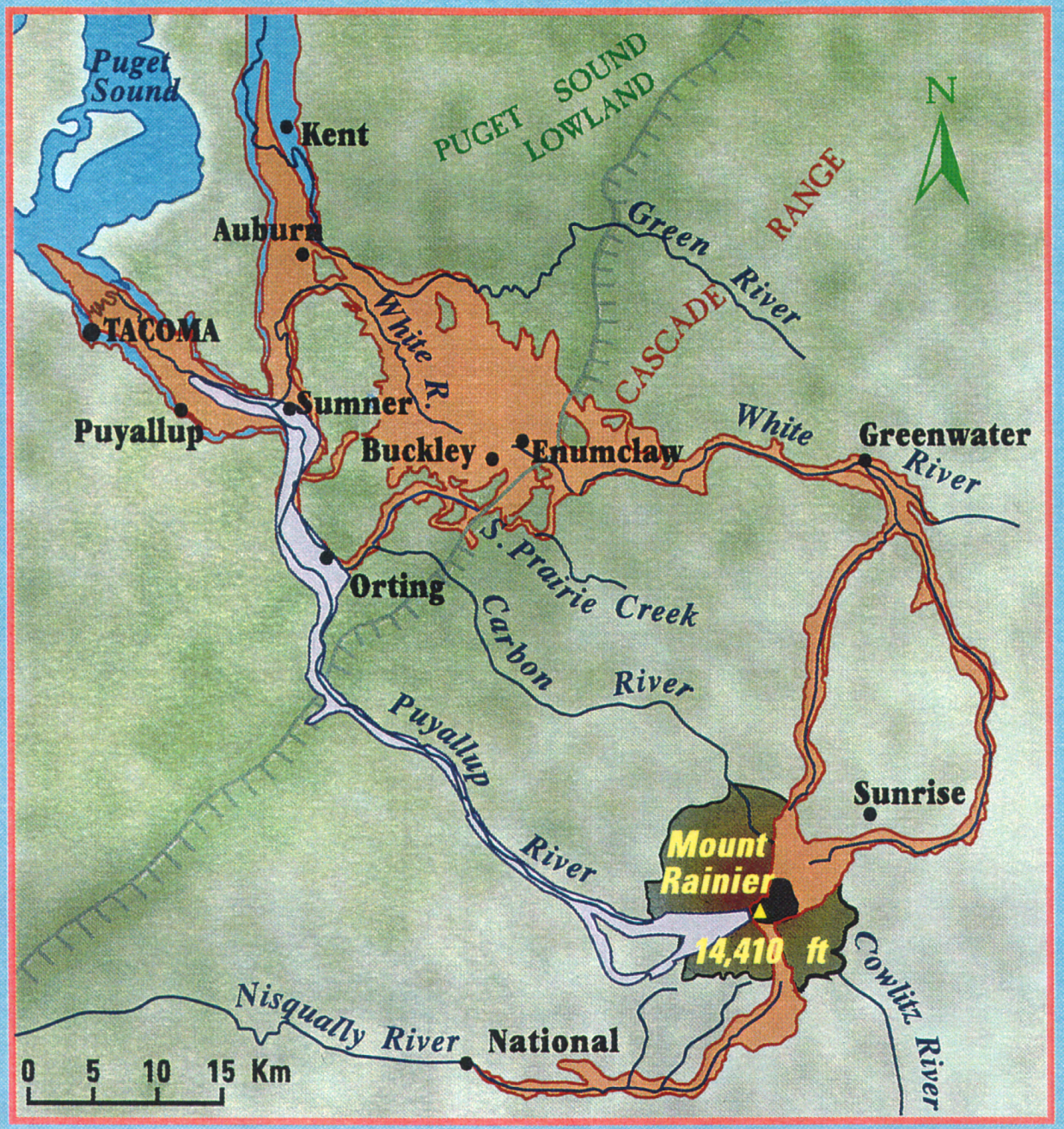
USGS
science for a changing world


USGS
science for a changing world



USGS
science for a changing world

Modifed from Dragovich, Pringle and Walsh, Washington Geology, vol.22, no. 3, September 1994



Osceola Mudflow

Source of Osceola Mudflow

Ancient arms of Puget Sound

Electron Mudflow

Margin of Puget Sound lowland

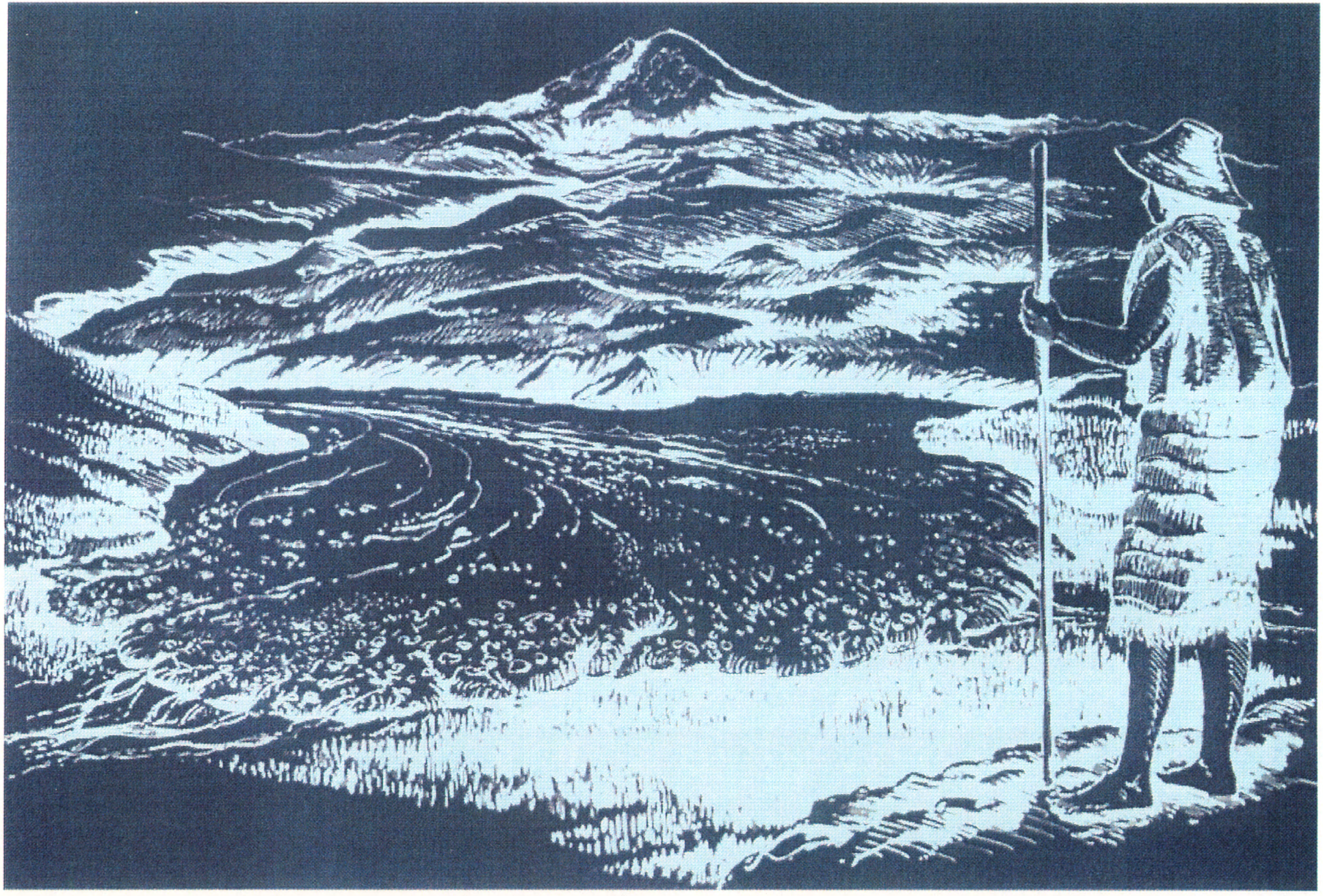
Modified from Vallance and Scott, 1997

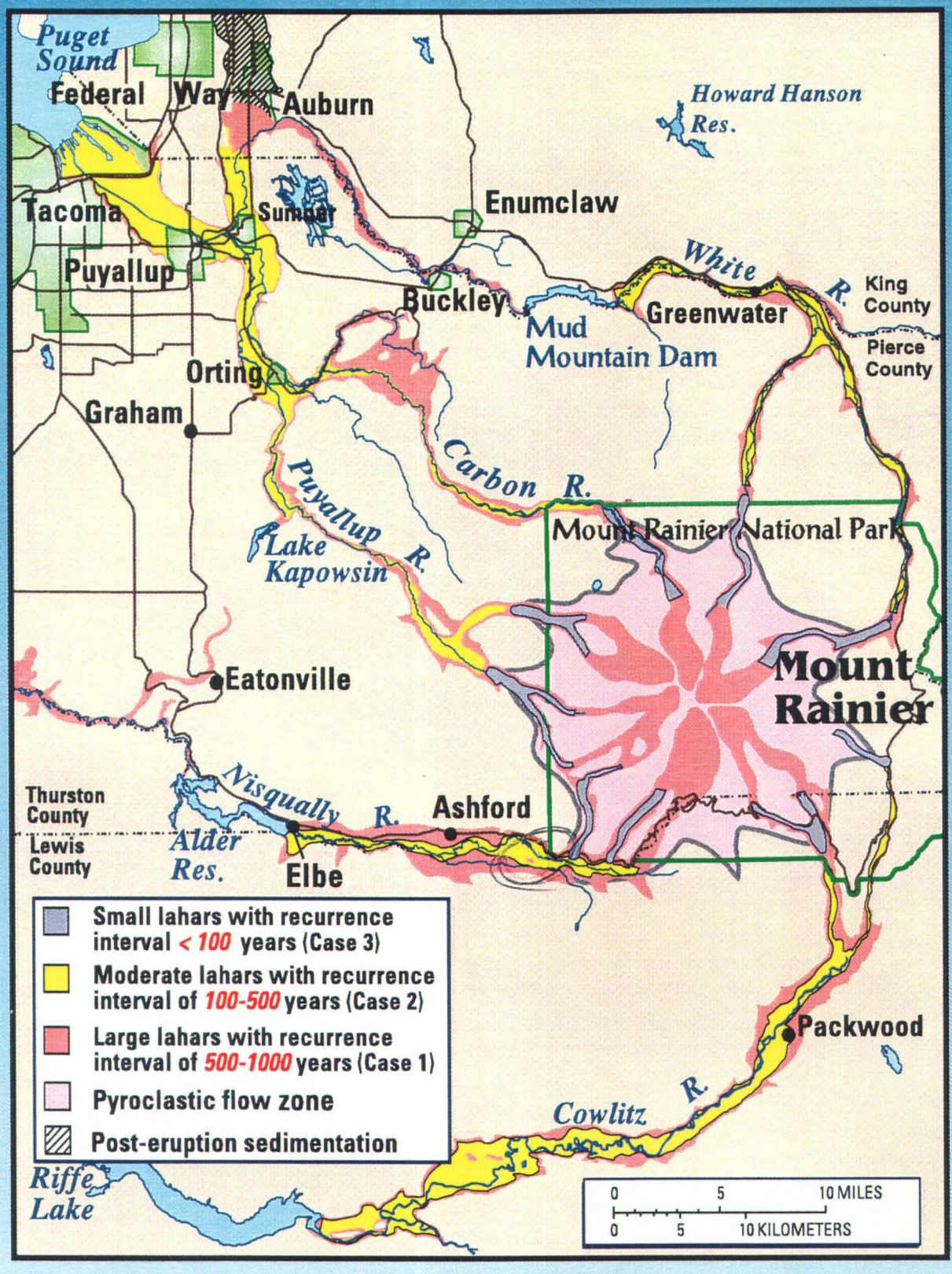
USGS
science for a changing world

Lahars

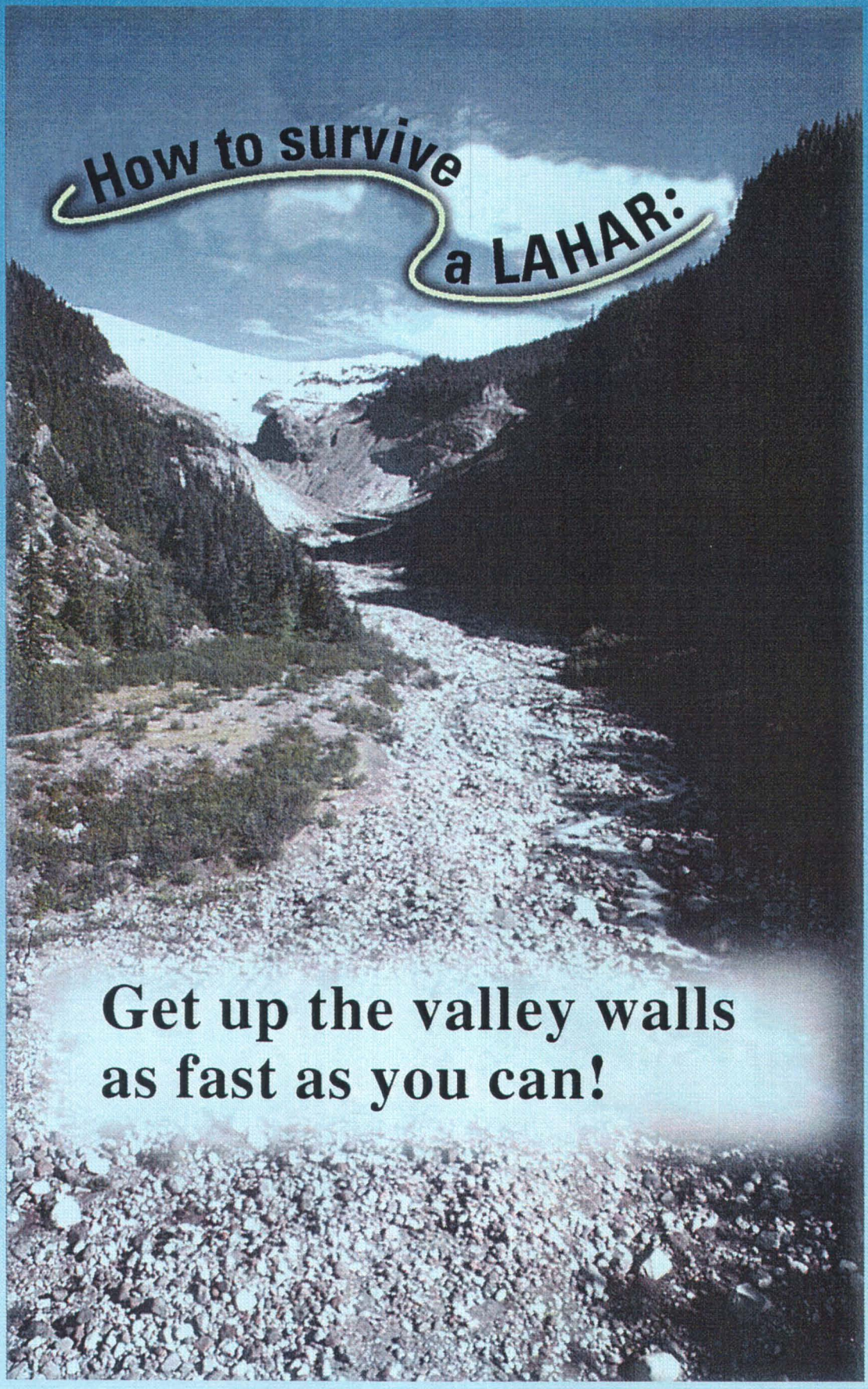
- Destroy all in their path
- Can be formed by
  - landslides
  - volcanically-melted snow and ice
  - glacial floods
- Travel at speeds often exceeding 40 mph
- Travel to areas distant from volcano
- Displace river beds causing long-term flooding

USGS
science for a changing world





USGS
science for a changing world


How to survive a LAHAR:
Get up the valley walls as fast as you can!

Simple Steps to Lesson Volcanic Risk

- **LEARN:** Learn whether you live, work, or go to school in a volcano hazard zone
- **PLAN:** Develop an emergency plan with your family or business to help you during any natural disaster
- **INQUIRE:** Ask local public officials how they advise you to respond

USGS
science for a changing world

For more information contact:

U.S. Geological Survey
Cascades Volcano Observatory
5400 MacArthur Blvd.
Vancouver, WA 98661

360-696-7693
http://vulcan.wr.usgs.gov

AND

Your local emergency management agency

USGS
science for a changing world