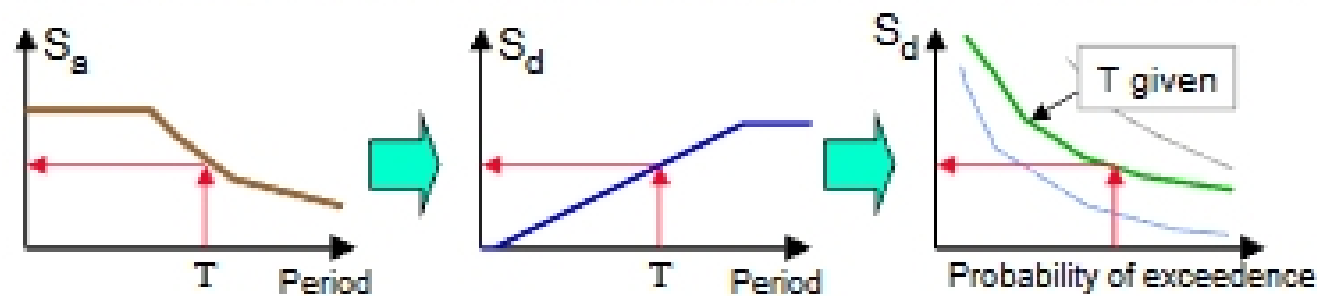


Part 2 - Engineering Characterization of Earthquakes and Seismic Hazard

Ultimately what we want is a seismic intensity measure, *IM*, that will allow us to quantify the effects of an earthquake on a structure.

Need to understand basic earthquake characteristics



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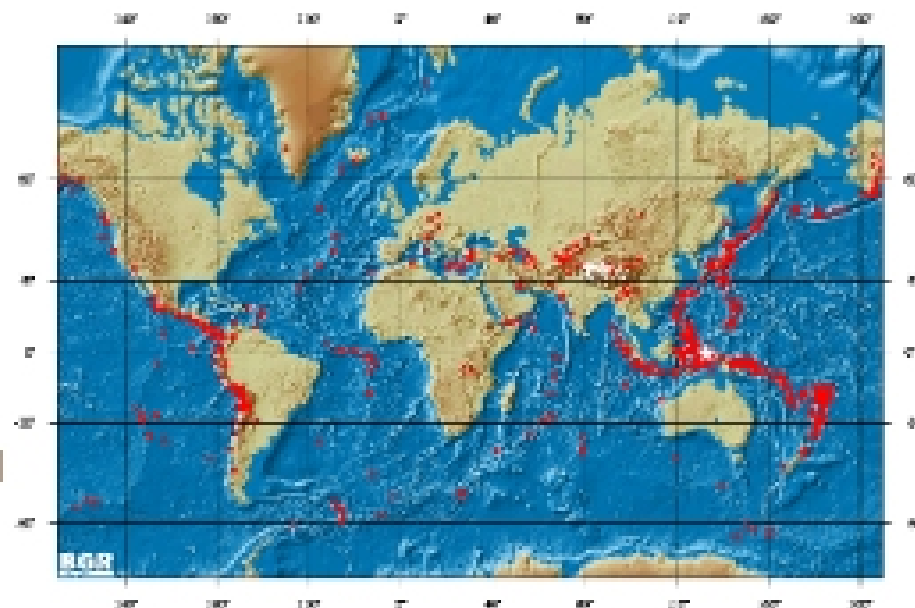
5-1



Earthquake Environment

Sources of Earthquakes

- **Meteor Impact**
- **Volcanoes**
- **Reservoir Induced**
- **Well Injection**
- **Tectonic**
 - Associated with continental drift
 - at edges of continental plates
 - mid-continent
 - mid-ocean ridges



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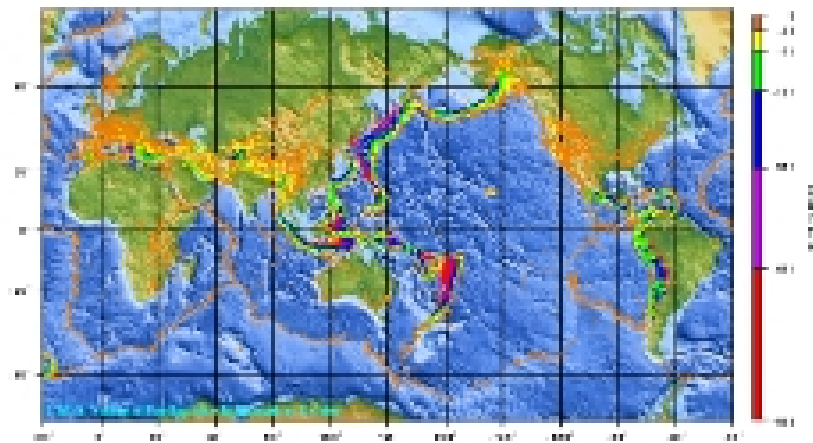
5-2



Earthquake Occurrence

Frequency of Occurrence of Earthquakes
Based on Observations since 1900

Descriptor	Magnitude	Average Annually
Great	8 and higher	1
Major	7 - 7.9	18
Strong	6 - 6.9	120
Moderate	5 - 5.9	800
Light	4 - 4.9	6,200 (estimated)
Minor	3 - 3.9	49,000 (estimated)
Very Minor	< 3.0	Magnitude 2 - 3: about 1,000 per day Magnitude 1 - 2: about 8,000 per day



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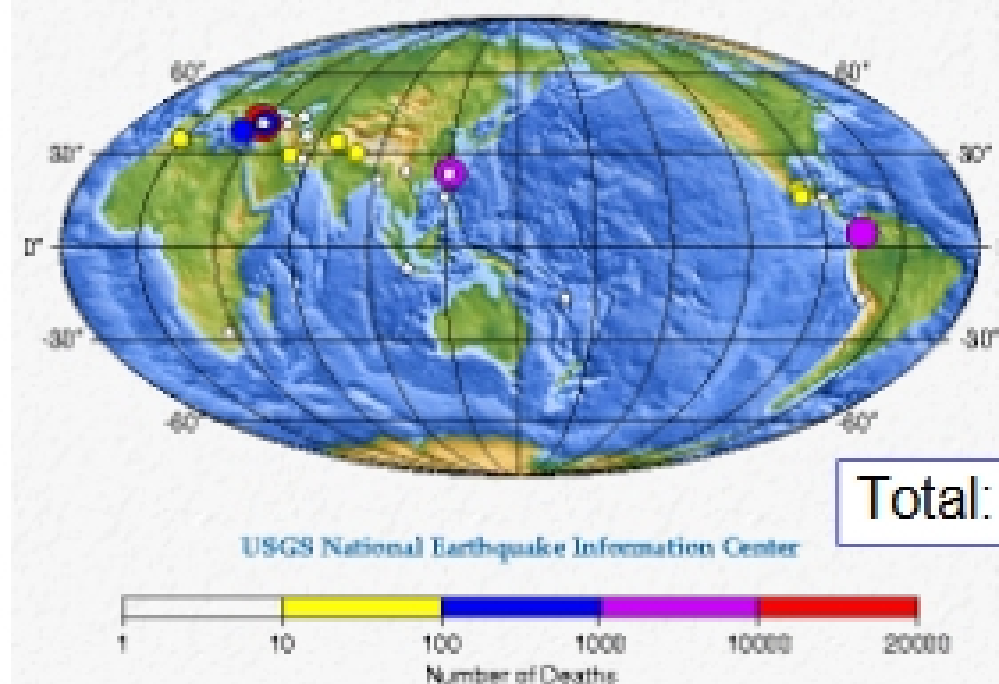
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Earthquake Fatalities

Deaths from Earthquakes in 1999



Total: 22711

USGS National Earthquake Information Center

1 10 100 1000 10000 20000
Number of Deaths

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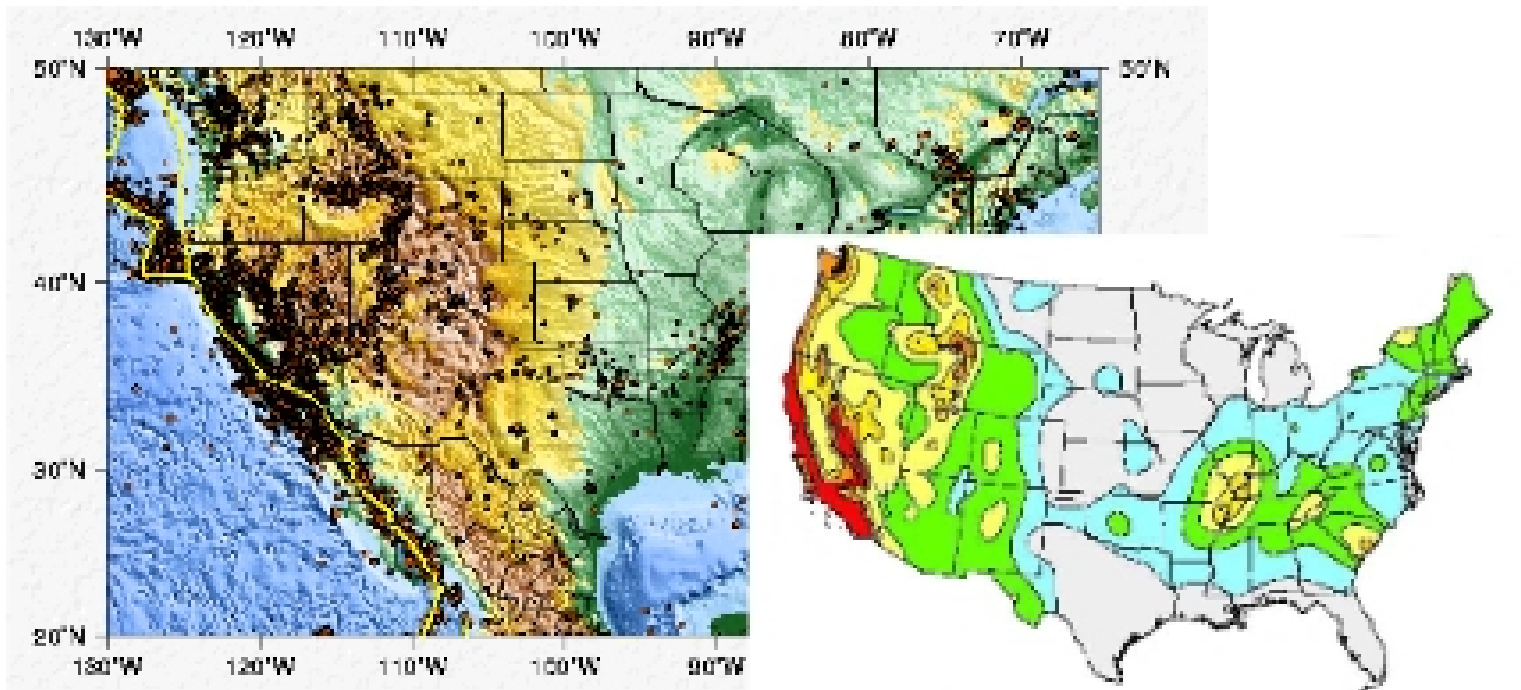
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Earthquakes in the US



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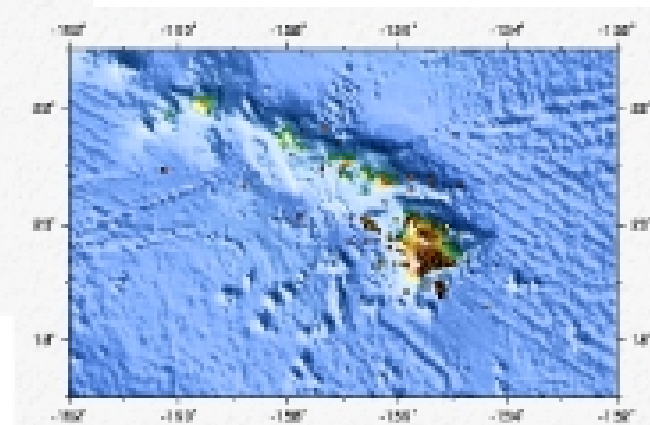
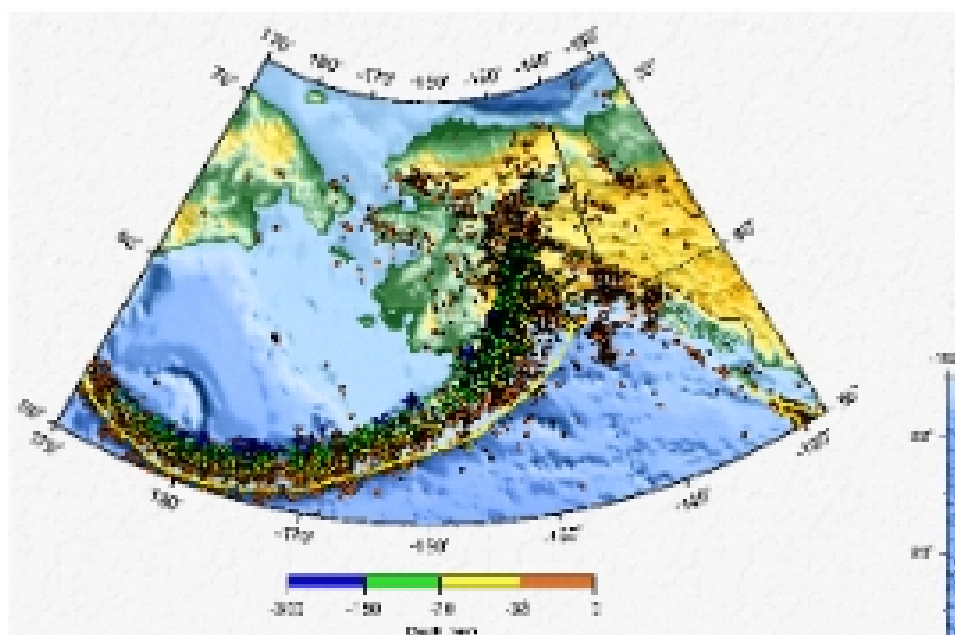
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US Earthquakes



See:
<http://quake.wr.usgs.gov/>

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