

# SIO15: Natural Disasters – Forces&Energy

<https://geowiki.ucsd.edu/sio15>



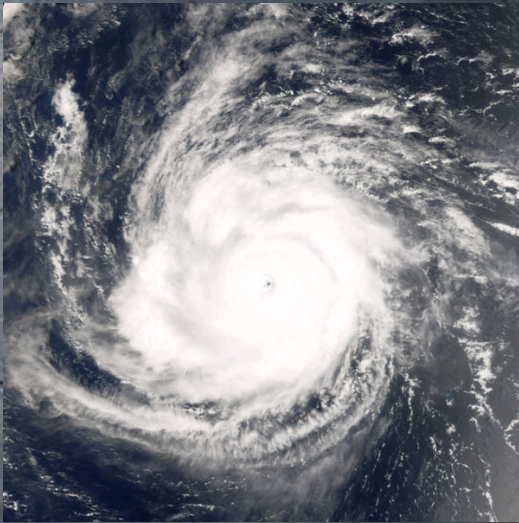
SIO15 (9/29/25): Topic 02: Forces and Energy – Part 1

# Energy Sources and Forces of Disasters

Images:  
wikipedia

an average hurricane (10 days)  
releases as much energy as the  
Mw=9.5 5/22 1960 Chile earthquake

Book chapter 2  
watch short  
videos!



- from Sun
- fusion
- latent heat

$$E_S = 5300 * E_E$$



- from Earth/plate tectonics
- primordial+fission
- potential energy



Fig. 2.1

# The Energy of Disasters

10km Meteorite impact

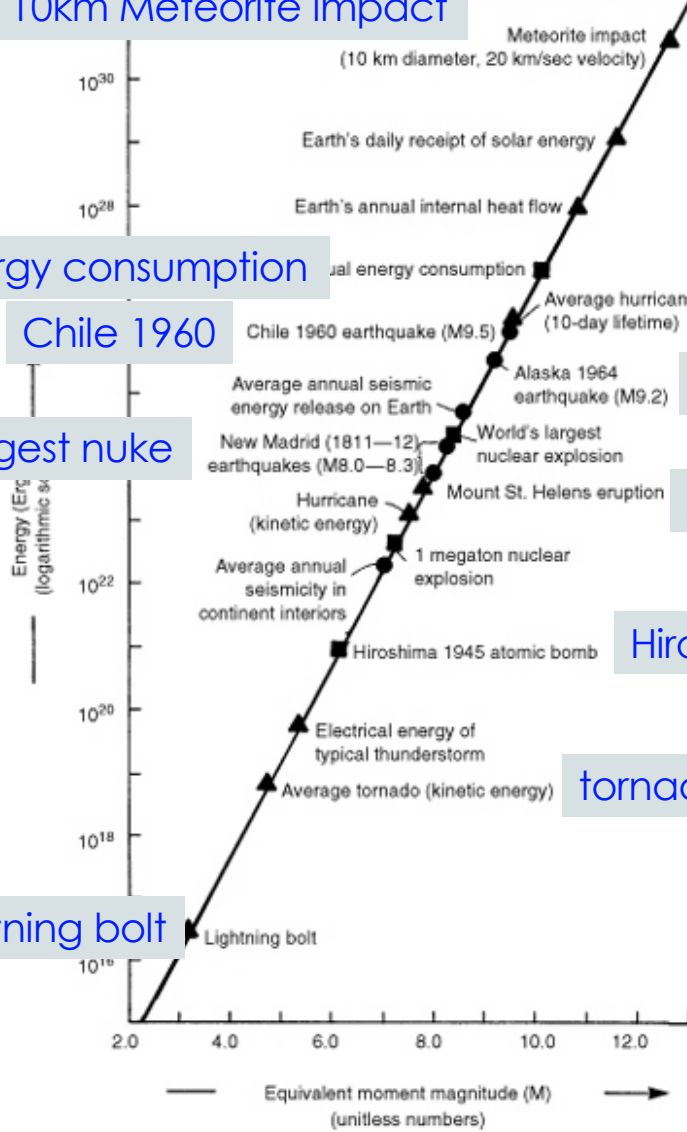
U.S. annual energy consumption

Chile 1960

largest nuke

lightning bolt

required for reproduction or display.



Hurricane

Alaska 1964

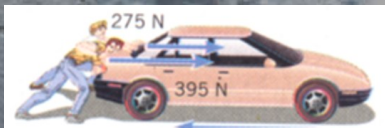
Mt. St. Helens

Hiroshima

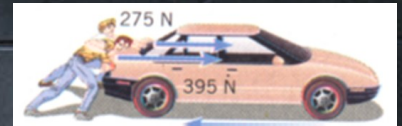
tornado

# Forces, Energy and Power

- force: acts on body
- energy: work done on body or capacity to do work
- power: work done per time



D



F

F proportional to:

- mass  $m$
- acceleration  $a$

$$F = m \times a$$

$$W = F \times D$$

Short video 2a  
Short video 2b

# Potential and Kinetic Energy on a Slope

energy can be transferred  
from one type to another

top:  
pot. energy

middle:  
mixed

bottom:  
kin. energy

The Gravitational Force and Potential Energy

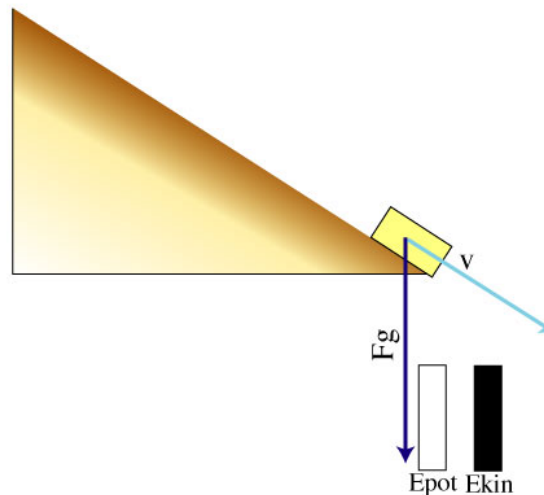


Fig. 2.4

*example for a mass movement*



## Short video 2a Forces - Potential Energy Short video 2b

energy that is stored in some form to be later used

'loading' potential energy by exerting a force

### Newton's Apple



Fig. 2.3

### Spring

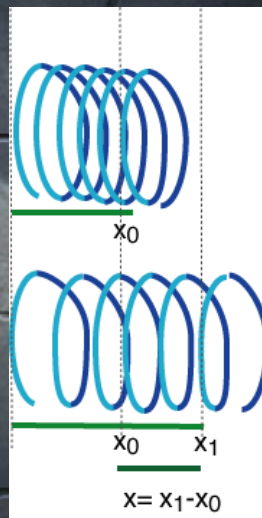
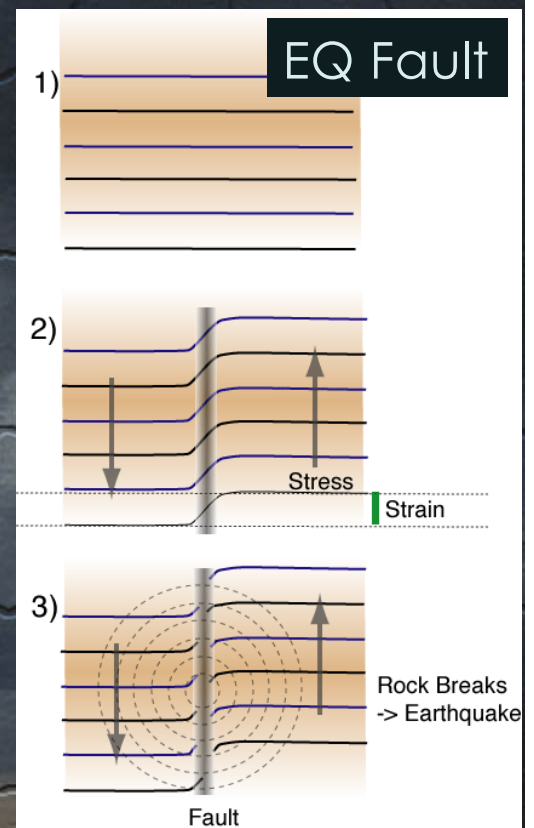


Fig. 2.5

Fig. 2.6



# Force and Deformation on an EQ Fault

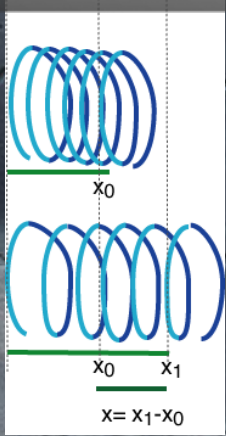


Fig. 2.5

Short video 2b

cause:  
force  $\leftrightarrow$  stress

consequence:  
deformation  $\leftrightarrow$  strain

$$F_g = k \times x$$

strain is a result of stress

*example for an earthquake*

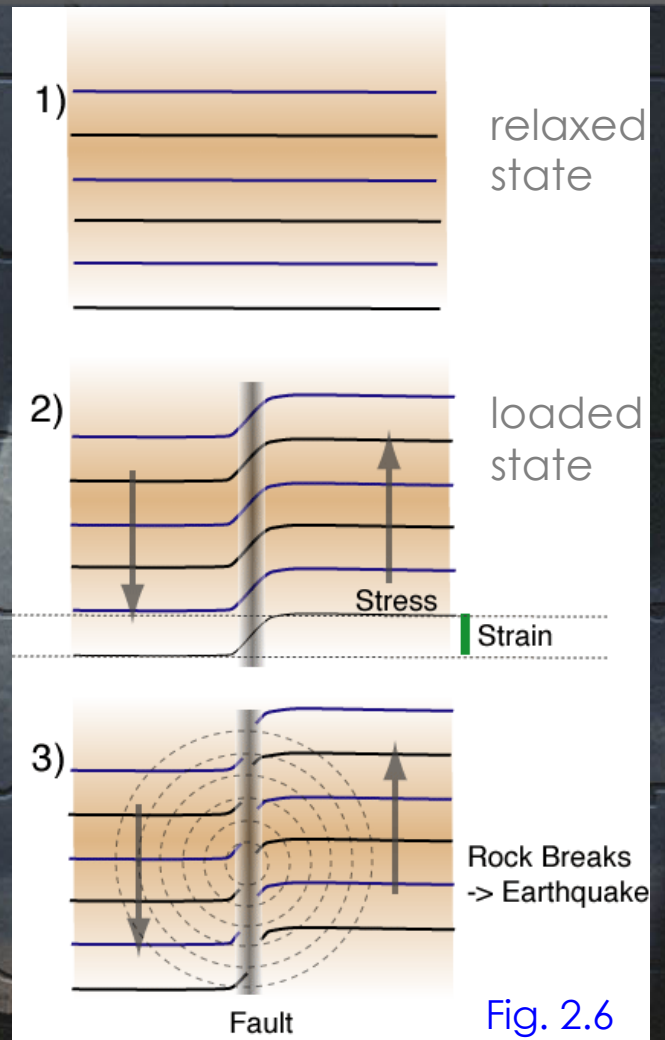


Fig. 2.6