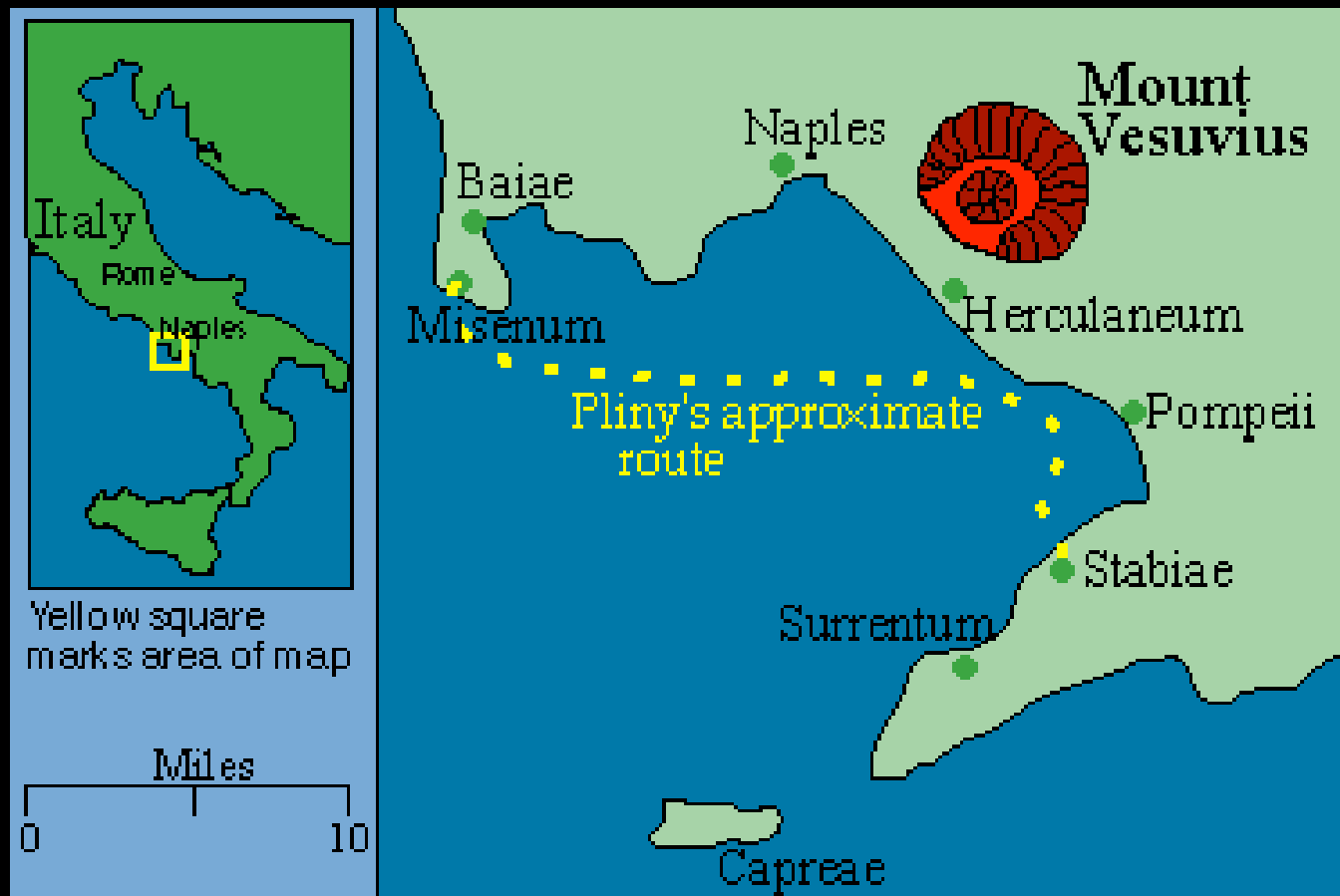


Vesuvius, AD 79

From Scarth (1999)

Lecture Objectives

- key hazards
- key mitigation problems
- how effective were the various groups (science, public, media, engineering, government) at hazard mitigation?
- realistic solutions



Naples -
50,000

Herculaneum -
5,000

Pompeii -
20,000

Vesuvius (A.D. 79) was perhaps the first well-documented eruption, thanks to the observations of Pliny the Younger (while his uncle the Elder was off rescuing, observing and getting killed). Not to mention all of the slaves who actually did the work. "Observing" is an extremely valuable and underrated skill. Most geologists are unable to do this (they tend to merge observations with interpretations), and often the best descriptions are from non-experts.

Hazards - Precursory Activity

- large earthquake in 62 (mainlyPompeii)
- 17 years of seismicity indicating magma rising to the surface.



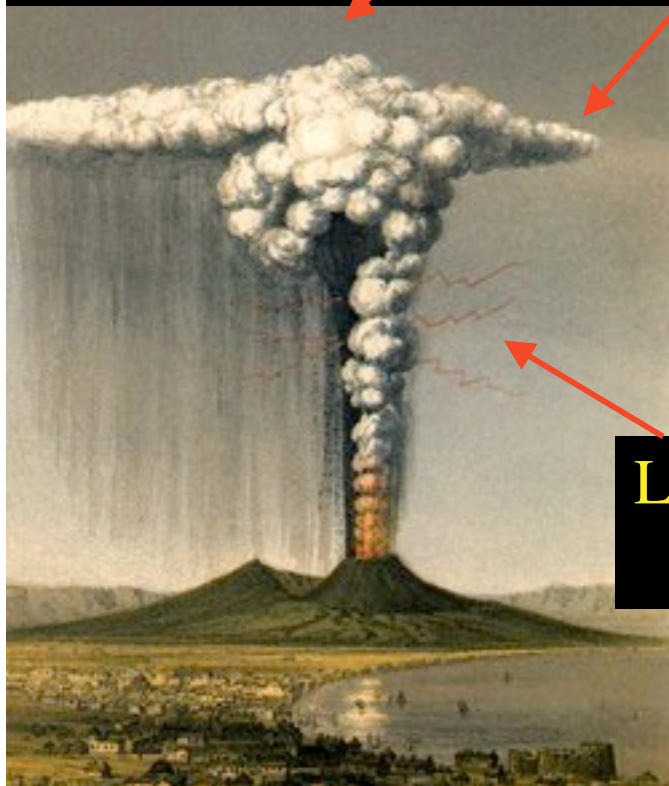
-noticeable increase in the days before the eruption; but earthquakes and volcanoes were not known to be connected.

Eruption

- explosive, with ash and pumice falls and minor lava flows.
- At least 8 nuee ardentes, causing the majority of casualties.
- Height of eruption cloud estimated at 33 km. VEI of 5.

Plume overshoot

Neutral buoyancy



Lightning,
ashfall



“The cloud could best be described as more like an umbrella pine than any other tree, because it rose high up in a kind of trunk and then divided into branches.” *Pliny the Younger.*

Eruption Sequence

August 24, morning: Elder Pliny heads towards Vesuvius, then turns towards Stabiae. Ash and pumice falls throughout the day, with pieces becoming larger after 8 pm.



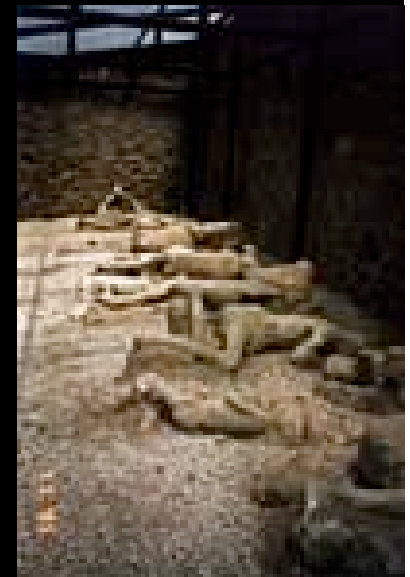
August 25, 1 am - column collapse produces nuee ardente which strikes Herculaneum (most residents already evacuated)

2 am - second nuee ardente, hits Herculaneum

6:30 am - 3rd nuee ardente, hits Herculaneum

7:30 am - 4th nuee ardente, this one hits Pompeii

8 am - 5th and 6th nuee ardente reaches Stabiae (kills Pliny); 6th almost reaches Misenum and produces tsunami which reaches Misenum; ash and pumice falls on Misenum





aftermath: destruction of Pompeii, Herculaneum, Oplontes, Stabaie; the latter three rebuilt or new town built on top of debris.



Vesuvius erupts in 1944



NASA Photo

Vesuvius from space

Hazards - Primary

- ash and pumice falls which were deep and covered towns and fields;
- structural collapse;
- earthquakes;
- nuee ardentes (pyroclastic flow);
- tsunami;

Hazards - Secondary

- displacement and famine following due to loss of homes and agriculture;
- disruption and destruction of shipping.
- misinformation/rumors; ignorance

Mitigation

- mainly concerned with evacuation during the eruption.

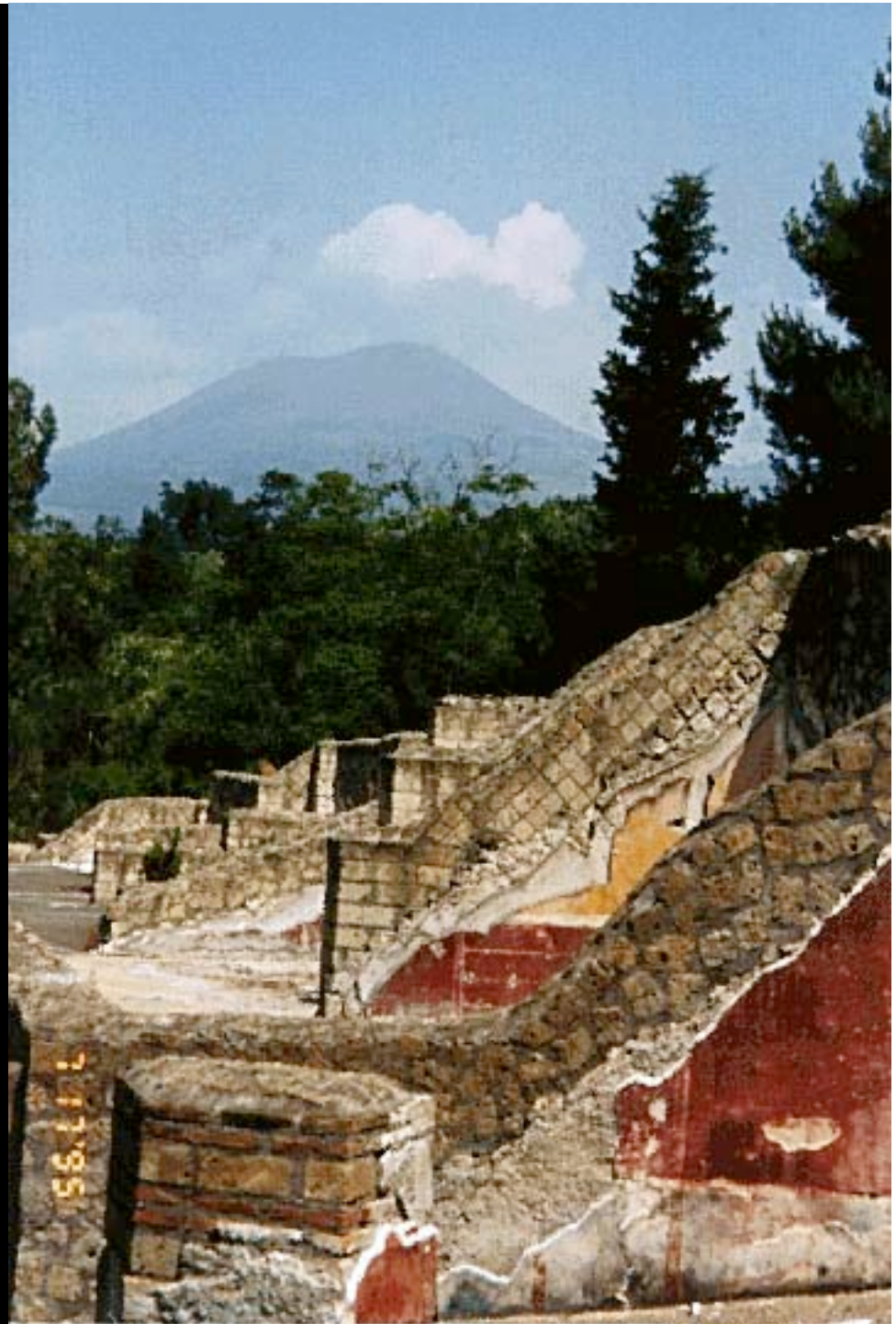
- Wealthier residents escaped by boat, poorer by foot if possible.

- Rich and poor alike made bad decisions about when and where to evacuate.

- No apparent organization, with evacuation simply "away" from volcano, often following city "leaders", which would be the wealthiest, most educated.

- Pompeii residents fled south, Herculaneum to the north, but those at shore killed by nuee ardente, Misenum went to north and upslope.

- Emperor appointed two former Consuls to deal with political and social issues afterwards.



Improvements?

- education
- preparation
- during event: leadership
- after event: relief efforts
- rebuilding

