

# **Anthropogenic and Novel Sources**

*Sources in the Solid Earth, Atmosphere,  
Cryosphere and Oceans*



# List of Sources

- Nuclear explosions
- Ambient Noise- Cultural or natural, Continuous can be advantage
- Underground mining failures
- Seismo-acoustic sources
- Hydrofracture
- Weather effects and storms - noise
  - ETS as an imaging source
  - Volcanic eruptions as exotic sources in solid earth, atmosphere, oceans
  - Continuous INSAR or LIDAR?
  - Biological sources
  - Super mechanical oscillators Mechanical Signals - At the surface and underground
  - Active Sources - Cheaper and less impact
  - Surface and underground mining explosions of all kinds - impulsive?
  - Fluids in Fractures
  - Bolides
  - Induced seismicity Planned and unplanned detonations of explosives
  - Urban sources of signals
  - Building detonations and collapses
  - Aircraft and ships
  - Landslides and rock falls
  - Lahars

# Science Issues Associated with Sources

- Monitoring of novel sources - impact on people and societies
- Physical understanding of ambient noise - source and variability
- Importance of nonlinear processes in non earthquake sources
- How do we explore existing or future data sets for new and unique sources?

# Importance of Seismology to Earth and other sciences

- Political implications of monitoring human activities- seismology and long term data sets are critical
- Seismology contributes to the assessment of environmental impact and can guide near-surface human activities
- Serendipity of new discoveries/new sources

# Societal Importance of Science Issues

- Decadal documentation of activities in the earth system and its change
- Seismology has a critical role in resource recovery and waste disposal
- Non earthquake sources offer opportunity for educational activities at all age groups
- Arms control, nonproliferation, treaties and international cooperation

# What Do We Need to Move Forward

- Importance of continuous recording, archiving and open access of data (rescuing older data)
- Expansion of infrasound capabilities
- Multi-discipline engagement in problems of common interest
- Development of authoritative catalog of unusual, non-earthquake events

# Figures

- Crandall Mine Figure
- North Korean Explosion
- Figure that combines a number of the unusual sources observed by seismology
- Near-surface explosion or industrial accident generating seismic and acoustic
- Ambient noise for monitoring