

# Status of Forecast Methods: State of Knowledge and Next Steps

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# Methods

- Electro-magnetic
- Thermal
- Strain/crustal deformation
- Seismicity

What physics should be represented in more than one data type?

What causes small events to cascade into large events?  
Is that detectable?

# Proximity of Observations

- Lab
  - Rock mechanics
- In situ
  - Borehole strainmeters, seismometers, EM, tiltmeters
- Ground-based networks
  - EM, GPS, strainmeters, seismometers
- Airborne
  - InSAR, lidar, EM
- Space-borne observations
  - InSAR, EM, TEC

How do spatial scales of processes impact results for observations from different proximities?

# Issues

- Results need to be independently verifiable
  - Requires open data access
  - Information clearing house
    - Supersite with data, methods, links, etc.
- Rigor
  - Statistical analysis
  - Blind testing
  - Long time series

# Recommendations

*Thanks to Jeffrey Love*

Issue	Approach	Recommendation
False positives	<ul style="list-style-type: none"><li>• Does the method yield signals that might be misidentified as precursory?</li></ul>	Look at long time series of data
Localization	<ul style="list-style-type: none"><li>• Does the signal arise in the vicinity of the earthquake?</li><li>• Is it a global signal?</li></ul>	Look at a global distribution of data
Multiple sensors	<ul style="list-style-type: none"><li>• Is the signal recorded on more than one sensor?</li><li>• Could the signal be attributed to problems with an individual sensor?</li></ul>	Need to see precursory signals in multiple sensors
Consistency	<ul style="list-style-type: none"><li>• Has the method been shown to work more than once?</li><li>• Have individual results required “tuning”?</li></ul>	Need to see precursory signals in multiple events
Reproducibility	<ul style="list-style-type: none"><li>• Can other researchers duplicate the result?</li></ul>	Requires clear documentation and open-access to data