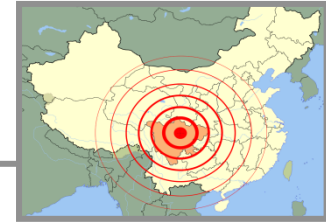


Earthquake Prediction



Overview

- **Description:** A distinction must be made between the prediction of an earthquake and earthquake early warning systems (EEW). EEW systems use seismic monitoring systems to alert devices and people when shaking waves, generated by an earthquake, are expected to arrive at their location. Monitoring technologies recognize P-waves which are not destructive. After some seconds to minutes (depending on their intensity and the distance to the epicenter) these are followed by damaging S-waves. During the period between P- and S-waves, people and technical systems can be warned to protect life and property from destructive shaking (warning time: about 1 second for every 5 miles). On the current state of scientific knowledge reliable earthquake predictions are not possible.
- **State of research:** In addition to research on improved technologies for EEW systems (trains slow down automatically, elevators stop on at the next floor, power plants go down etc.) and the development of these systems (cost-effective monitoring systems, network-expansion), basic research is still conducted to realize earthquake predictions. Research also focusses on tsunami early warning systems. Although it is more difficult to recognize seismic activity of tsunami events, there is more time to protect the population as its waves disseminate more slowly.
- **Capabilities:** If an earthquake event has occurred, the seismic activity can be measured by monitoring systems to alert the population e.g. by public communication systems or web-apps. EEW systems are currently expanded by private household devices^[1].
- **Limits:** In some cases the development of EEW systems is limited by legal foundations (e.g. responsibility in case of a false alarm). It is not possible to predict an earthquake on the current state of scientific knowledge.

Further Information

- **Key player:** The key players are countries in earthquake endangered areas and vulnerable zones. A comprehensive EEW system e.g. exists in Japan. Furthermore regionally limited and similar systems already exist in Mexico, Taiwan, Romania and Turkey. Italy, Switzerland and the US states of Hawaii and California are currently building up such systems and with it investing in earthquake research.
- **Readiness:** Technologies to predict an earthquake are currently in state of basic research. Indeed there are indicators (e.g. certain patterns of foreshocks or unusual seismic silence, changes in radon concentrations in groundwater or increased groundwater levels) that are able to announce earthquakes; however they are scientifically controversial.
- **Users:** Private Persons, Public Institutions, Operators of public buildings, Police, Firefighters, Security Personnel
- **Future outlook and foresight:** EEW technologies are ready for the market and successfully used e.g. in Japan. Here, the focus lies on a better network expansion and alternative monitoring systems that are more cost effective than common seismometers. Future developments focus on technologies to predict earthquakes as well as to make precautions concerning the occurrence of such events.
- **Related Technologies:** Seismometers, Geotechnics, GPS technology
- **Links:** <http://www.gfz-potsdam.de>, <http://earthquake.usgs.gov>, [1] <http://www.brinco-home.com/>

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