



Design of monitoring and early warning system for geo-hazards in Three Gorges reservoir area using infrasound

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With the progress of the Three Gorges Dam Project, geological disasters have become increasingly prominent. The reservoir area prone to landslides, collapses, cracks, and earthquake disaster because the complex terrain and geological conditions. It is of significance to monitor and foresee geo-hazards in the reservoir area. Here we introduce our design of monitoring and early warning system for geo-hazards in Three Gorges reservoir area using infrasound.

Infrasound may be abnormal during geological disasters, such as debris and earthquake occurred. The formation and movement of debris flow in its basin will generate infrasound, and spread to the surrounding air medium. Velocity of infrasound is much larger than that of debris flow, so we can monitor and forecast debris flow using infrasound. The sudden vertical displacement brought about by earthquake will generate acoustic-gravity wave which can be observed in distance to monitor earthquake, especially to monitor earthquake precursors. So we try to monitor the geological disasters for the Three Gorges reservoir area in China by design a infrasound array monitor system. This work is supported by Chinese "985 Project".

The infrasound monitor system is comprised of two observation stations arranged in Badong county inside the reservoir area and in Wuhan city, respectively. Each station has respectively arranged a kind of augmentable linear array in the form of quasi-uniform linear array and additional amending direction sensors. The linear array comprises eight sensors arranged in several different uniform intervals along a line. The amending direction sensor is situated at certain point in mid-perpendicular of linear array in order to reduce multiplicity in determine the direction of arrival. The sensors used in the system are CDC-2B capacitances infrasonic receiver which can observe frequency ranging 0~20Hz. The measurement resolution is 750mV/LPa. Infrasonic wave signal collected by sensor is transferred from observation stations to Data Processing Centre in China University of Geosciences, using telecommunication networks, and then we can process and analyze the infrasonic signals.

Observations all-weather infrasound near the reservoir area can be achieved on monitoring geological disasters in Yangtze River Three Gorges. There are still problems to be considered in the system: (1) in the conditions of using few sensors, this system need more rational array layout mode; (2) array sensors in field can lasting stability in some way; (3) the amount of data acquisition, real-time data transmission, storage and backup need higher demands in hardware and software.