



## **An experimental wireless monitoring network for highway slope in Tibet -Qinghai frozen ground zone**

**A.P Tang**

School of Civil Engineering, Harbin Institute of Technology, 150090, Harbin, China,  
(tangap@hit.edu.cn / phone: 0086-451-86282257)

For the sake of developing the western China, traffic system is quickly extended in Tibet province and Qinghai province in last decade. Because seasonally frozen ground and perennially frozen ground widely distribute herein, which are hypersensitive and vulnerable to human activities, particular engineering activities, It is easy understood why there are kinds of geological disaster to occur in these engineering activities zones. Slope failure in frozen ground zone is one of the typical and severe geological disasters in these zones. To ensure safety of Tiber-Qinghai highway transportation system and improve emergency response capacity, it is necessary to build a quick assessment system for highway slope. The paper presents an experimental wireless monitoring network based on globe position system (GPS), remote sensing (RS), geographical information system (GIS) and optical fiber temperature and moisture sensor technique for monitoring frozen slope failure. Herein, A triangle GPS monitoring network is constructed; Trimble 4600LS GPS receivers are installed in the high-risk zone of slope failure to monitor the ground deformation. Datum from GPS are transmitted by wireless telecommunication technique, data is firstly disposed by variance compensation adaptive Kalman filtering to debase noise to identify ground deformation. RS is applied to assess large ground deformation and monitor the abnormal territorial temperature distribution. Optical fiber temperature and moisture sensors are installed in the seasonally ground to monitor slope statue in the progress of thaw and frozen. All of monitoring signals are integrated into GIS. According to slope failure criterion, a failure probability distribution is zoned in GIS, and alarm will be give off when the failure likelihood preponderates over the critical value. This monitoring network is being experimented and a few valuable results have been got.

**Key words:** Slope Failure, Wireless Monitoring Network, Frozen Ground