

# Application of High-Resolution SAR Images in Wenchuan Earthquake Hazard Monitoring and Assessment

LIU B intao<sup>1,2</sup>, TAO Heping<sup>2</sup>, FAN Jianrong<sup>2</sup>, TIAN Binwei<sup>1,2</sup>, ZHANG Jianqiang<sup>1,2</sup>, YAN Dong<sup>1,2</sup>

(1 Graduate University of Chinese Academy of Sciences, Beijing 100049, China;

2 Institute of Mountain Hazards and Environment, The Chinese Academy of Sciences, Chengdu 610041, China)

**Abstract** One heavy earthquake with MS8.0 occurred on May 12, 2008 in Wenchuan County, Sichuan province. After the earthquake, the bad weather has made the optical satellite acquired data difficult. Microwave can transmit through cloud and rain, so synthetic aperture radar images has widely used in Wenchuan earthquake hazard monitoring and assessment. Using high-resolution SAR images, such as COMOS, TerraSAR, RADARSAT, the buildings and roads which has been damaged by earthquake were monitored and the landslides, debris flow, landslide-blocked lake were recognized. The result shows that high-resolution SAR images are a very important data source in natural hazard monitoring and assessment, especially in the cloudy and rainy weather.

**Key words** Earthquake Hazard, Synthetic Aperture Radar, Hazard monitoring, Wenchuan

## 堰塞湖

堰塞湖, 这个过去连许多水利行业人士都不甚熟悉的专业术语, 如今因 5·12 汶川地震而引起社会各界的广泛关注。堰塞湖, 英文名 imprisoned lake, 指河流被外来物质堵塞而形成的湖泊。常由火山熔岩流, 或由地震活动等原因引起山崩、滑坡、泥石流等堵截河谷或河床而成。由火山熔岩流堵截而形成的湖泊称为熔岩堰塞湖, 还有由冰川泥石流形成的冰湖等。

由山崩滑坡所形成的堰塞湖多见于藏东南峡谷地区, 且年代都很新近, 如藏东南波密县的易贡错是 1990 年由于地震影响暴发的特大泥石流堵截了乍龙湫河道而形成的; 波密县的古乡错是 1953 年由冰川泥石流堵塞而成 (冰湖); 八宿县的然乌错是 1959 年暴雨引起山崩堵塞河谷形成的; 还有最新的易贡湖是 2000 - 04 发生的西藏易贡藏布大滑坡引起的堰塞湖, 覆盖面积 33 km<sup>2</sup>。另外, 我国东北的五大连池旧称鸟得邻池, 系由老黑山和火烧山两座火山喷溢的玄武岩熔岩流堵塞堰塞湖; 黑龙江省的镜泊湖是由第四纪玄武岩流形成的一个典型熔岩堰塞湖, 面积约 90.3 km<sup>2</sup>。

堰塞湖的堵塞物不是固定永远不变的, 河谷、河床被堵塞后, 流水聚集, 堵塞物受冲刷、侵蚀、溶解、崩塌等等, 一旦堵塞物被破坏, 湖水便四周漫溢, 甚或倾泻而下。由地震灾害区形成的堰塞湖一旦决口会对下游形成洪峰, 破坏性不亚于地震灾害的破坏力。

5·12 四川汶川特大地震, 已造成 36 处堰塞湖危险地带, 北川部分地区被堰塞湖水淹没。伴随次生灾害的不断发生, 堰塞湖的水位可能会迅速上升, 对此, 有关部门已经采取了调查、监测、监督、评价等措施, 动用航空遥感等手段, 通过高分辨率的图像查清堰塞湖的分布, 对堰塞湖的水位上升情况和坝体的结构进行评价。为保障居民安全, 政府已对有些由比较松散的物质构成的危险堰塞湖下游沿岸位置较低的居民, 实行了尽快转移。

(冯海燕)