

IAA Study Group Status Report

Responsible Commission:

COMMISSION 4

Study Number and Title:

SG 4.20

International Cooperation on Remote Sensing in Earthquake Emergency Response

Short Study Description (repeat from Study Group Proposal):

In recent years, earthquake emergency response experiences, such as Wenchuan and Haiti earthquakes, indicate that it is necessary to bring together different satellite resources, including remote sensing satellite, communication satellite and navigation satellite, to support the earthquake emergency rescue. It also highlights the importance of international cooperation on satellite resources, which can help us to assign the distribution of earthquake emergency rescue resource, and to reduce the loss of life and property of the affected areas. An effective coordination policy will be established, which enables better coordinated remote sensing, communication and navigation satellite systems among different countries, so that technical capabilities will be better utilized and experts all over the world can be efficiently gathered after a devastating earthquake. The advantages will complement each other and provide emergency support for future strong earthquakes.

Overall Goal:

To coordinate the international remote sensing to make full use of international advanced technologies and experience, to provide a platform for international experts to contribute their wisdom in earthquakes, to form a collaborative satellite rapid response mechanism for earthquake emergency response.

Progress in past six months:

(1) Co-seismic Deformation Field Acquisition Using InSAR Technology

After 29 July 2018 Indonesia earthquake, the remote sensing earthquake emergency work was carried out by using Sentinel SAR data obtained from ESA. We quickly acquired and analyzed the co-seismic deformation field.

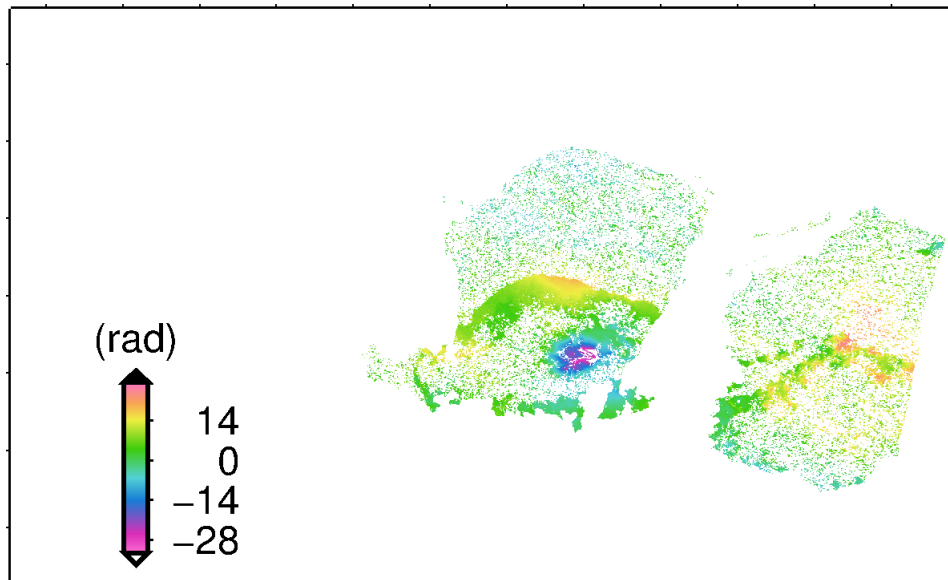


Fig.1 Coseismic Deformation Field of Indonesia earthquake

After 30 November 2018 Alaska Earthquake, the remote sensing earthquake emergency work was carried out by using Sentinel SAR data obtained from ESA. We quickly acquired and analyzed the co-seismic deformation field.

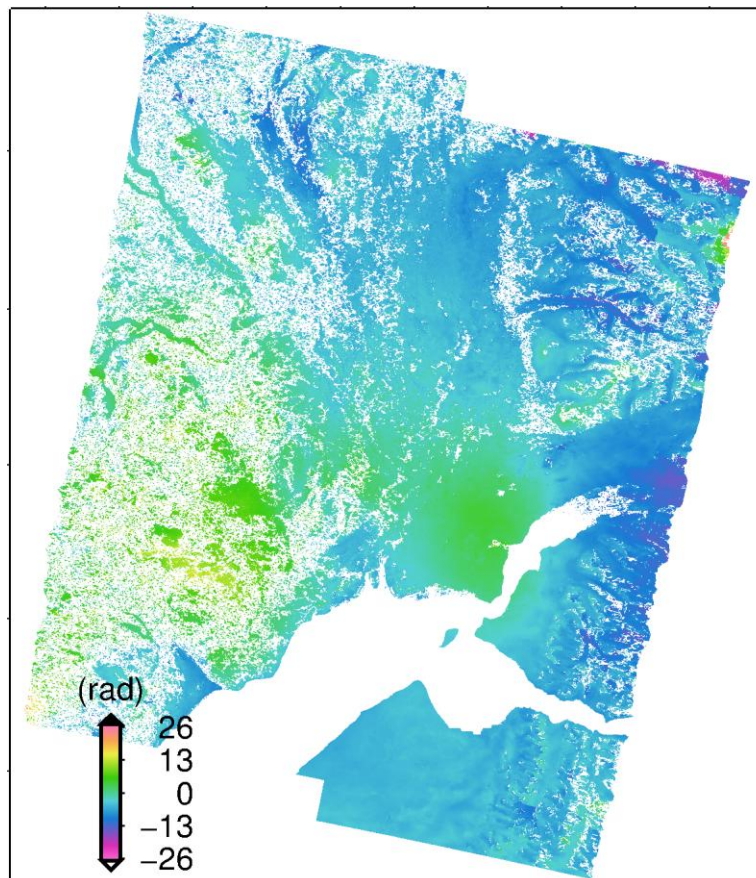


Fig.2 Coseismic Deformation Field of Alaska Earthquake

(2) Emergency response of Jinsha River landslide

On October 11, 2018, a landslide occurred in Boro Township, Jiangda County, Tibet Autonomous Region, causing the Jinsha River to break off and form a barrier lake. After the disaster, we rushed to the scene as soon as possible, and integrated sky-ground monitoring of landslides was carried out by using ground-based SAR equipment, UAV imagery and space-based remote sensing technology. The monitoring results are submitted to relevant units, which provides important support for emergency decision-making. Landslide dynamic monitoring based on high temporal resolution remote sensing is carried out to realize dynamic tracking and analysis of disaster situation.



Fig.3 ground-based SAR equipment

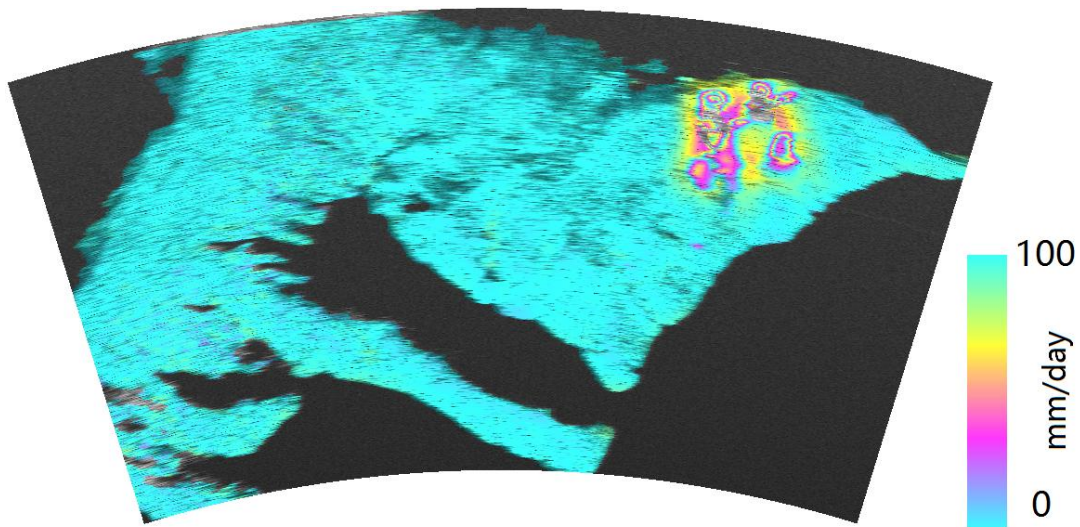


Fig.4 Deformation Monitoring based on GB-SAR



Fig.5 UAV image of landslide

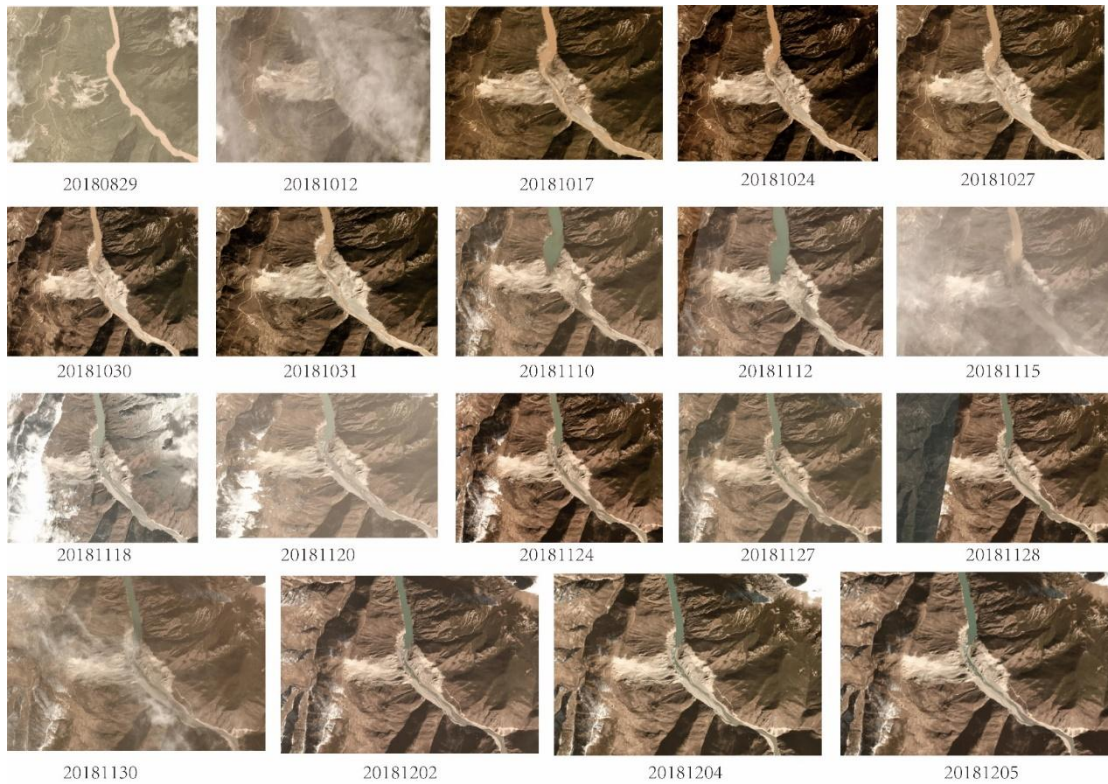


Fig.6 Dynamic monitoring based on high temporal resolution remote sensing data

(4)Compilation and protocol formulation of remote sensing earthquake emergency application

The monograph summarizes and summarizes the technical methods, workflow, expert knowledge, thematic product mode, data sharing mode, cooperation platform construction of multi-source and multi-mode remote sensing images for earthquake emergency application. The method model and the cooperation mode of emergency work are introduced in detail. Based on this, the cooperation agreements and modes of multi unit and team are summarized when a major earthquake occurred, and the cooperation principle, cooperation content and cooperation model are elaborated in detail.

1.合作原则

遥感地震应急合作框架是一个由多个国家地震灾害专家和机构组成的减灾合作机制，是世界范围内运行性的、为重大地震灾害提供实质性空间技术服务和支撑的民间组织。

框架的宗旨是通过加强利用空间设施以进行重大地震灾害应急管理，利用每一个专家和机构的资源和能力减缓地震灾害对人类生命和财产的影响。

空间技术和空间基础设施在减轻自然灾害上面发挥着非常重要的作用。与其他手段相比，空间基础设施具有反应速度快、覆盖范围广、不受地面条件限制等特点，在应对重大地震灾害中具有独特的优势。在应急响应能力方面，通过卫星遥感技术和导航定位技术，通过气象、光学和雷达等卫星，可以进行全天候、全天时的大范围观测，获取灾害的形成、发展路径以及动态变化等信息，可以迅速获得灾害范围、位置和受损程度等灾情，为救灾人力和物资的投放提供指挥决策支持。在对灾害管理的持续性、动态性和广域性需求方面，及时提供灾情监测和灾害影响数据，为准确评估灾害损失提供科学依据。

合作框架协议旨在强地震发生后，快速联合国内外相关机构和个人，包括遥感数据获取、数据处理、数据判读解释机构和专家，提供一套空间数据接收、处理、判读与成果交付的标准化系统和云平台，并通过授权用户向受到地震灾害影响的地区提供服务，支持受灾国家的灾害管理决策。每一个成员机构或专家都提供各自相应的资源和能力来支持 IAA 以减缓重大地震灾害对人类生命和财产的影响。

合作协议框架是通过联合开展合作与学术交流，并相互为重特大地震应急提供数据、技术、专家等多方面支持。在地震应急过程中，参与单位或个人承担不同应急工作任务，接受协议框架构建单位的总体指导和计划安排。围绕协议框架的应用目标，构建以下管理、协调及合作机制：

1. 以合作协议的形式明确各单位的分工

为加强合作协议的统一管理，确保地震应急过程中各项工作有序开展，明确合作形式，以协议书的形式确定在重特大地震应急中各合作单位的任务，以及牵头单位与各合作单位单位的职责和权利，建立应急工作中各项任务与其责任人员的定向矩阵关系。

Fig.7 Emergency Sharing Cooperation Agreement

(4) International Exchange and Conference

Zhang Jingfa, Li yongsheng the member of the research group, participated in an on-site investigation of the inter-seismic deformation of the Chichi earthquake in Taiwan. In addition, the relevant scholars in Taiwan exchanged views on earthquake emergency response work.



Fig.8 Field Investigation of Jiji Earthquake

Gong Lixia and Jiao Qisong attended the Asian Conference on Remote Sensing and conducted in-depth study and exchange with experts and scholars from various countries on the application of disaster remote sensing.

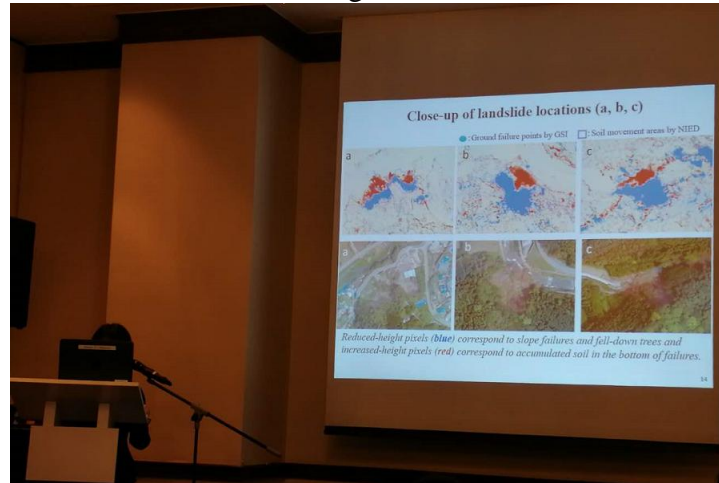


Fig.9 Photographs of attending the conference

Website Study Information update: (please give any update regarding Study Group Membership, documents, Study Plan and Schedule):

Study Group Membership.

Issues requiring resolution? (recommend approach):

None

Product Deliveries on Schedule? (If modified explain rationale):

Yes.

Study Team Member Changes? (List any Study Team Members that you wish to discontinue, and provide names plus contact coordinates of any Members you wish to add on the second page of this Study Update form.) Note: Complete contact information including email, tel. and fax must be provided for all additions. Only Members with complete contact information will be listed and receive formal appointment letters from the IAA Secretariat.)

None.

Name of person providing Study Group Status (Study Group Chair or Co-Chair):

Professor Jingfa ZHANG, Study Group Secretary

Status Report Date:

Feb, 2019