Summary of visit to IREA by Eric Fielding

Dates: from 7 October 2013 to 18 October 2013

The aim of the visit of Dr. Eric Fielding to CNR-IREA was the study of earthquakes and landslides through the use of remote sensing data, and in particular from Synthetic Aperture Radar (SAR) sensors. The final goal is not only to measure the ground deformation associated with such an event, but also to better understand the fault processes that generate earthquakes and the processes that cause variations in landslide motion.

At the beginning of his visit, Dr. Fielding gave a talk entitled: “Measuring Deformation due to Earthquakes and Landslides with SAR Interferometry and Pixel Offsets” in order to present his recent studies pertinent to the topic of the visit and to stimulate cooperation between IREA-CNR and Jet Propulsion Laboratory.

A first activity carried out during the visit was the study of large earthquakes and fast moving landslides by using ERS/ENVISAT satellite data. These phenomena are often associated with relatively large ground deformation across the event, and very little movement before and after. For this reason, we considered the possibility to jointly apply the so called Pixel Offset (PO) techniques, which is able to catch the larger deformation, in addition to the Differential SAR Interferometry (DInSAR) approach, which is more suitable for capturing subtle and slower movements.

To this end, we started working on a set of SAR data acquired over an area in Baja California (Mexico) that was affected by a large earthquake in 2010. The data processing has been initialized, with a choice of parameters tailored to the peculiarity of the studied phenomenon, and is still ongoing: the results will be analyzed and interpreted in the next weeks.

Another focus of the visit was the use of second-generation SAR sensors, which are characterized by shorter revisit times and better spatial resolution. This is, indeed, a key element when dealing with both landslides and earthquakes, which are characterized by very fast ground motion.

To this end, two projects of cooperation have been started during this visit. The goal is to better understand the geologic controls of earthquakes and landslides to more accurately evaluate the risk of catastrophic damage to people, buildings and other infrastructure. These projects make use of the second-generation X-band SAR data acquired by COSMO-SkyMed and TerraSAR-X systems. The proposals will be shortly submitted to Italian Space Agency (ASI) and German Aerospace Establishment (DLR), respectively. At the present, the involved study areas are in California and Colorado (USA), Mexico, Pakistan, and Chile, although this may expand in the future.

Napoli, 21 October 2013