MAPPING EARTHQUAKE DAMAGE IN VHR RADAR IMAGES OF HUMAN SETTLEMENTS: PRELIMINARY RESULTS ON THE 6TH APRIL 2009, ITALY CASE

Fabio Dell'Acqua (1), Paolo Gamba (2), Diego Polli(2)

(1)-The European Centre for Training and Research
in Earthquake Engineering (EUCENTRE) – Pavia, Italy
(2) Department of Electronics, University of Pavia – Pavia, Italy

1. INTRODUCTION

Especially when earthquake damage is concerned, the use of EO data in a disaster context has been widely investigated by many actors [1-5], but only recently the developed methods seem to have sufficiently approached the operational use to be worthwhile considering them in future events [6][7][8]. In particular, while former ten-meter resolution has inspired block-level damage assessment techniques [9] the use of new-generation spaceborne Very High Resolution (VHR) radar data such as those provided by the COSMO/SkyMed constellation has opened new opportunities. Such data may be profitably used for damage assessment on the disaster site. Satisfying results may be achieved if the damage is assessed at a block level, somehow averaging the unreliable results of pixel-wise comparing pre-and-post data pairs. Though, homogenous pre-event data have to be available, which may not be always the case for new-generation, very-high-resolution systems like COSMO/SkyMed, especially when operated in narrow-scope, spotlight mode. In this paper a case study is considered on the 6th April 2009 earthquake event, which stroke L'Aquila, Italy, investigating possible damage signatures in the post-event image alone, starting from texture measures and possibly integrating ancillary information like urban block partition. Preliminary experiments have highlighted a possible connection between some block-average texture statistics and block-averaged damage level [10], especially if damaged blocks can be preliminary sorted out from non-damaged blocks by fusing with results from e.g. optical data as illustrated in figure 1.

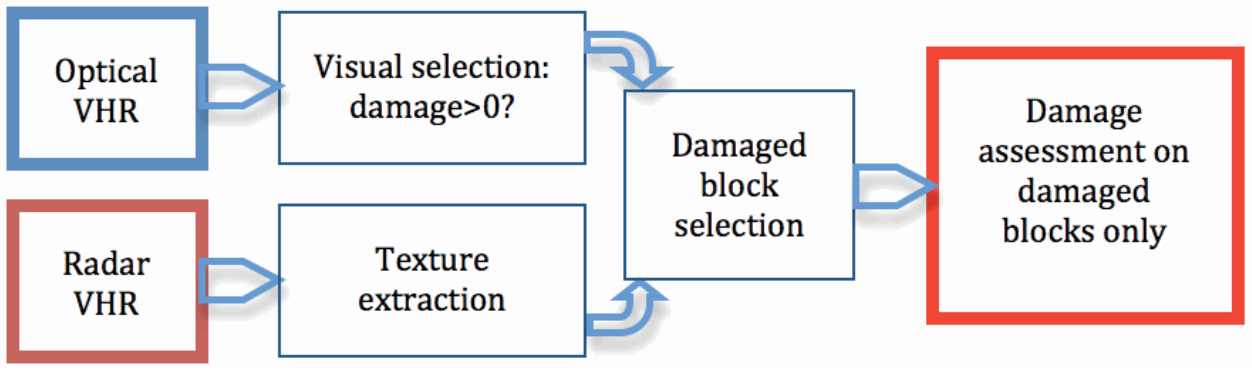

Figure 1: damage assessment using data fusion

Higher correlation levels for post-event images compared with pre-event images seems to testify a link between data statistics and damage levels, which can not be entirely attributable to chance. The same experiments have highlighted very different correlation levels between 19° and 50° incidence angle images, better for the former case, which is reasonable to trace to the different visibility of the collapsed roofs in the two cases.

The full paper will illustrate and discuss the results (an example is presented in figure 2) and provide some clues for an operational use of the developed methods.

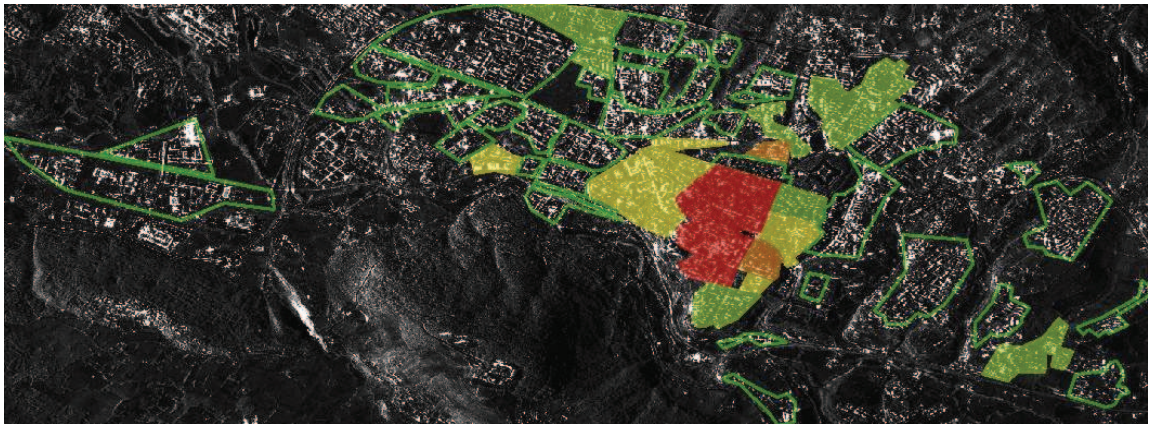

Figure 2: Urban blocks on city layer. Damage level is colour coded (transparent = no damage; red = heaviest damage)

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