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What's exposed? Mapping elements at risk from space

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The world has suffered from severe natural disasters over the last decennium. The earthquake in Haiti in 2010 or the typhoon "Haiyan" hitting the Philippines in 2013 are among the most prominent examples in recent years. Especially in developing countries, knowledge on amount, location or type of the exposed elements or people is often not given. (Geo)-data are mostly inaccurate, generalized, not up-to-date or even not available at all. Thus, fast and effective disaster management is often delayed until necessary geo-data allow an assessment of effected people, buildings, infrastructure and their respective locations.

In the last decade, Earth observation data and methods have developed a product portfolio from low resolution land cover datasets to high resolution spatially accurate building inventories to classify elements at risk or even assess indirectly population densities. This presentation will give an overview on the current available products and EO-based capabilities from global to local scale.

On global to regional scale, remote sensing derived geo-products help to approximate the inventory of elements at risk in their spatial extent and abundance by mapping and modelling approaches of land cover or related spatial attributes such as night-time illumination or fractions of impervious surfaces. The capabilities and limitations for mapping physical exposure will be discussed in detail using the example of DLR's 'Global Urban Footprint' initiative.

On local scale, the potential of remote sensing particularly lies in the generation of spatially and thematically accurate building inventories for the detailed analysis of the building stock's physical exposure. Even vulnerability-related indicators can be derived. Indicators such as building footprint, height, shape characteristics, roof materials, location, and construction age and structure type have already been combined with civil engineering approaches to assess building stability for large areas. Especially last generation optical sensors – often in combination with digital surface models – featuring very high geometric resolutions are perceived as advantageous for operational applications, especially for small to medium scale urban areas.

With regard to user-oriented product generation in the FP-7project SENSUM, a multi-scale and multi-source reference database has been set up to systematically screen available products – global to local ones – with regard to data availability in data-rich and data-poor countries. Thus, the higher ranking goal in this presentation is to provide a systematic overview on EO-based data sets and their individual capabilities and limitations with respect to spatial, temporal and thematic details to support decision-making in before, during and after natural disasters.