



## The OPAL Project: Open source Procedure for Assessment of Loss using Global Earthquake Modelling software

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This paper provides a comparison between Earthquake Loss Estimation (ELE) software packages and their application using an “Open Source Procedure for Assessment of Loss using Global Earthquake Modelling software” (OPAL). The OPAL procedure has been developed to provide a framework for optimisation of a Global Earthquake Modelling process through:

- 1) Overview of current and new components of earthquake loss assessment (vulnerability, hazard, exposure, specific cost and technology);
- 2) Preliminary research, acquisition and familiarisation with all available ELE software packages;
- 3) Assessment of these 30+ software packages in order to identify the advantages and disadvantages of the ELE methods used; and
- 4) Loss analysis for a deterministic earthquake (Mw7.2) for the Zeytinburnu district, Istanbul, Turkey, by applying 3 software packages (2 new and 1 existing): a modified displacement-based method based on DBELA (Displacement Based Earthquake Loss Assessment), a capacity spectrum based method HAZUS (HAZards United States) and the Norwegian HAZUS-based SELENA (SEismic Loss EstimatioN using a logic tree Approach) software which was adapted for use in order to compare the different processes needed for the production of damage, economic and social loss estimates. The modified DBELA procedure was found to be more computationally expensive, yet had less variability, indicating the need for multi-tier approaches to global earthquake loss estimation. Similar systems planning and ELE software produced through the OPAL procedure can be applied to worldwide applications, given exposure data.

Keywords: OPAL, displacement-based, DBELA, earthquake loss estimation, earthquake loss assessment, open source, HAZUS