AC-DCFS: a toolchain implementation to Automatically Compute Coulomb Failure Stress changes after relevant earthquakes.

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We present an automated free software-based toolchain to obtain Coulomb Failure Stress change maps on fault planes of interest following the occurrence of a relevant earthquake. The system uses as input the focal mechanism data of the event occurred and an active fault database for the region. From the focal mechanism the orientations of the possible rupture planes, the location of the event and the size of the earthquake are obtained. From the size of the earthquake, the dimensions of the rupture plane are obtained by means of an algorithm based on empirical relations. Using the active fault database in the area, the stress-receiving planes are obtained and a verisimilitude index is assigned to the source plane from the two nodal planes of the focal mechanism. The obtained product is a series of layers in a format compatible with any type of GIS (or map completely edited in PDF format) showing the possible stress change maps on the different families of fault planes present in the epicentral zone. These type of products are presented generally in technical reports developed in the weeks following the occurrence of the event, or in scientific publications; however they have been proven useful for emergency management in the hours and days after a major event being these stress changes responsible of aftershocks, in addition to the mid-term earthquake forecasting. The automation of the calculation allows its incorporation within the products generated by the alert and surveillance agencies shortly after the earthquake occurred. It is now being implemented in the Spanish Geological Survey as one of the products that this agency would provides after the occurrence of relevant seismic series in Spain.