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Numerical inversion and reconstruction of the medial and distal tephra deposit of the 1982 El Chichon eruption (Chiapas, Mexico). Implications for hazard assessment

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In March 1982 the volcano El Chichon, Chiapas, southern Mexico, reawakened after a maximum dormant period of 500 to 600 years. Between March 29th and April 4th a series of ten explosive eruptions occurred, generating ash-fall, pyroclastic flows, surges and debris flows which destroyed, either totally or partially, nine villages within a devastated wide area surrounding the volcano.
After the occurrence of the eruption, great deal of information has been gathered regarding the Holocene eruptive records of the El Chichon volcano, and the recent activity. Despite this, more quantitative ash fallout hazard assessments for
potential Plinian activity at El Chichon volcano are still lacking.
Here we use analytical (HAZMAP) and numerical (FALL3D) tephra transport models to reconstruct the deposits and the atmospheric plume dispersal associated with the three main ash fallout units of the 1982 eruption. On the basis of such a reconstruction, we produce hazard maps of tephra fallout associated to a Plinian eruption and discuss the implications of such a severe eruption scenario.