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Electrical resistivity measurements of volcanic ash samples collected from a transect of the 2011 Puyehue Cordón Caulle eruption plume

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It is well established that electric power networks are vulnerable to disruption from ash contamination during and immediately after explosive volcanic eruptions. Of the possible impacts to power systems during ashfalls, volcanic ash-induced insulator flashover is the most frequent and is initiated by conductive, wet ash deposits. Electrical resistivity measurements provide a rapid and comprehensive method for assessing the risk of flashover across station and line insulators. While some resistivity data exist for a few notable eruptions, little information is available on the electrical characteristics of volcanic ash with increasing distance from the vent. This study reports on a suite of resistivity measurements of volcanic ash samples collected at varying distances from the volcano during or immediately following different phases of the 2011 Puyehue Cordón Caulle eruption. Ashfall caused widespread disruption of power supply in the region, yet results suggest that the variability in geophysical and chemical properties of volcanic ash with increasing distance from the vent have minimal influence on the ash's electrical resistivity and therefore hazard intensity. Prudent emergency management requires hazard intensity information to support system operators at the onset of ashfall when deciding whether to employ mitigation strategies or shut down the network. Considering the dependence of other critical infrastructure sectors on electricity supply to carry out daily operations, studies such as the one detailed here can help to reduce economic losses and productivity in vulnerable populations.