Geophysical Research Abstracts
Vol. 12, EGU2010-5518, 2010
EGU General Assembly 2010

Surface-ionosphere coupling of earthquake induced electrical changes

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A mechanism explaining observed interactions between seismic activity and the ionosphere is presented. This is used to explain changes in the lightning-induced extremely low frequency (ELF) radio noise spectrum, as observed in nocturnal data before major earthquakes by sensors carried on the DEMETER satellite. The mechanism depends on an increase in lower troposphere air conductivity before a major earthquake, which in turn reduces the surface-ionosphere electrical resistance. In response the vertical fair weather current density increases, which lowers the ionosphere above the region of changed surface air conductivity. Using this theoretical framework, observed changes are found to be consistent with predictions. Natural variability in the ionospheric and atmospheric electrical properties is also considered, which would present a limitation on this technique as a basis for earthquake prediction.