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Magnetotelluric investigation of the sensitivity of Ioannina plateau to seismic electric signals

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During recent years, efforts at better understanding the physical properties of precursory ultra-low frequency pre-seismic electric signals (SES) have been intensified. Experiments show that SES cannot be observed at all points of the Earth's surface but only at certain so-called sensitive sites. Moreover, a sensitive site is capable of collecting SES from only a restricted number of seismic areas (selectivity effect). Therefore the installation of a permanent station appropriate for SES collection should necessarily be preceded by a pilot study over a broad area and for a long duration. In short, a number of temporary stations are installed and, after the occurrence of several significant earthquakes (EQs) from a given seismic area, the most appropriate (if any) of these temporary stations, in the sense that they happen to collect SES, can be selected as permanent. Such a long experiment constitutes a serious disadvantage in identifying a site as SES sensitive. However, the SES sensitivity of a site should be related to the geoelectric structure of the area that hosts the site as well as the regional geoelectric structure between the station and the seismic focal area. Thus, knowledge of the local and regional geoelectric structure can dramatically reduce the time involved in identifying SES sites. In this paper the magnetotelluric method is used to investigate the conductivity structure of an area where a permanent SES station is in operation. Although general conclusions cannot be drawn, the area surrounding an SES site near Ioannina, Greece is characterized by: (1) major faults in the vicinity; (2) highly resistive structure flanked by abrupt conductivity contrasts associated with large-scale geologic contacts, and (3) local inhomogeneities in conductivity structure. The above results are consistent with the fact that electric field amplitudes from remotely-generated signals should be appreciably stronger at such sites when compared to neighboring sites.