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Nonvolcanic tremors and their correlation with slow slip events in Mexico

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Significant activity of nonvolcanic tremor (NVT) has been observed in the central Mexico (Guerrero) subduction zone since 2001 when continuous seismic records became available. Albeit the quality of these records is poor, it is possible to estimate a temporal variation of energy in the range of 1-2Hz (best signal/noise ratio for the NVT), which clearly indicate the maximum of NVT energy release (En) during the 2001-2002 and 2006 large aseismic slow slip events (SSE) registered by a GPS network. In particular the En is higher for the 2001-2002 SSE which had larger surface displacements and extension than the 2006 SSE. A more detailed and accurate study of NVT activity was carried out using the data collected during the MASE experiment in Mexico. MASE consisted of 100 broad band seismometers in operation for $\tilde{2}$.5 years (2005-2007) along the profile oriented SSW-NNE from Acapulco, and crossing over the subduction zone for a distance of $\tilde{5}$00 km. Epicenters and depths of individual tremor events determined using the envelope cross-correlation technique have rather large uncertainties partly originated from the essentially 2D geometry of the network. The "energy" approach is more efficient in this case because it provides an average NVT activity evolution in time and space. The data processing consists of a band pass (1-2Hz) filter of the raw 100 Hz sampled N-S component records, application a 10 min-width median filter to eliminate an effect of local seismic events and noise, and integration of the energy and normalization of daily En using an average coda amplitude from several regional earthquakes of M$\tilde{5}$. A time-space distribution of En reveals a strong correlation between NVT energy release and 2006 SSE, which also replicates the two-phase character of this slow event and a migration of the slow slip maximum from North to South. There are also a few clear episodes of relatively high NVT energy release that do not correspond to any significant geodetic signal in GPS time series. An advanced and more precise processing of both seismic and GPS data will probably answer questions: Do SSE and NVT represent manifestations of the same physical process (episodic tremor and slip (ETS)) in Mexico? Or are those two phenomena only space-time correlated?