

## A statistical study on ELF-whistlers/emissions and $M \geq 5.0$ earthquakes in Taiwan

# Jann-Yenq Liu[1]

[1] Institute of Space Science, National Central University, Taiwan

The ELF system in Taiwan has been established for the global monitoring of lightning activities and ELF events since August, 2003. Up to now in addition to the lightning and Schumann resonance signatures, other two major types of signals below around 120 Hz have been observed. It has been reported low-latitude ELF whistlers-like events with frequencies between 60 and 100 Hz and termed them to be :ELF-whistlers;. Similar events had also been observed in Alaska, California, and the South Pole and several mechanisms including the tail of lightning-generated VLF whistlers have been suggested but there are no solid conclusions. Therefore, the source of these events has remained unsolved. The other type oft observed signals is named as :ELF-emissions;, following the name :VLF emissions; given in previous. The shapes of these emissions on the f-t spectrograms are not as regular as the observed ELF-whistlers. Though the wave-particle interaction occurred at the ionosphere and magnetosphere has been the mostly discussed mechanism to produce VLF emissions, the possibility for the ELF-emissions to relate to the earthquakes cannot be ruled out for there have been relevant reports regarding ULF/ELF emissions below 50Hz. In this paper, we statistically examine ELF-whistlers/emissions below 120Hz and  $M \geq 5.0$  earthquakes occurred in Taiwan during August 26, 2003 - July 13, 2004. Occurrence rates of the ELF-whistler and the ELF-emission during the entire observation period are computed as the reference backgrounds. It is found that the ELF-whistlers and the ELF-emissions during the earthquake period appear less and more frequently than their associated backgrounds, respectively. For the ELF-emission, the larger earthquakes generally yield the higher occurrence rates. The statistical analysis further confirms the occurrence rates of the ELF-emission significantly enhanced 5-7 days before the earthquakes.