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IONOSPHERE-ATMOSPHERE-OCEAN-CRYOSPHERE-GEOSPHERE INTERACTION FROM MICROSEISMS AND MICROBAROMS IN ANTARCTICA

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Several characteristic waves detected by seismographs in Antarctica are originated from physical interaction between solid-earth and atmosphere - ocean - cryosphere, involving environmental changes. An infrasound sensor was planted at Syowa Station (SYO; 39E, 69S), Antarctica at the International Polar Year. Continuous data in 2008-2009 include background signals (micro-baroms) with peak with few seconds of its intrinsic period. Signals with same period are recorded in broadband seismograph at SYO (microseisms). Continuous signals are identified as Double-Frequency Microseism-baroms (DFM) with peaks between 4 and 10 s in whole season. The peak amplitudes of DFM reflect the influence of winter cyclonic storms in Southern Ocean. The DFM has relatively lower amplitudes during winters, caused by sea-ice extent around the coast with decreasing oceanic loading effects. In contrast, Single-Frequency Microseism-baroms (SFM, between 12 and 30 s) are observable under storm conditions particularly in winter. On infrasound data, stationary signals are identified with harmonic over tones at a few Hz to lower most human audible band, which appear to be local effects, such as sea-ice cracking vibration. Microseism-baroms are useful proxy for characterizing ocean wave climate, and continuous monitoring by seismograph and infrasound contribute to FDSN and CTBT in southern high latitude.

Keywords: Antarctica, Microseismic Noise, Infrasound Microbaroms, ocean wave climate, earth system, physical interaction