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Rotational long-period signals: From Ring Laser Data to Large Seismic Networks Array Derived Rotations.

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Rotational seismology is a recent and promising [U+FB01]eld in active development that focuses on the study of all aspects concerning rotational ground motions induced by earthquakes, explosions, and ambient vibrations among others. The understanding of rotational ground motions is relevant to several disciplines: seismology, earthquake engineering, exploration geophysics, and even the decoupling of sensitive structures from ground motions (e.g., gravitational wave detection). Here, we show two different approaches in the attempt to obtain additional information from long period signals induced by rotational seismic motions. We show recent results in regards to long period data achieved using Ring Laser technology based on the Sagnac effect. The Ring Laser Data potential for long period seismology was proven useful as a complement to traditional measurements in the study of Earth free oscillations generated by Toroidal eigen-modes. In this study, we show evidence of possible coupling observations between Spheroidal and Toroidal modes in the rotational spectra recorded by the G-Ring laser located at the Geodetic Observatory Wettzell (Germany), measuring the vertical component of rotation rate. Additionally, we explore the possibility of long-period studies based on the array derivation of rotation. Although array derived rotations have been mainly used for strong-motion studies, we show that this method could be also applied in the low frequency range of seismic signals generated for large earthquakes if the network is dense enough. The seismic network used in this study is the USArray transportable seismic network. It consists of 400 broadband seismometers placed in a regular grid pattern across the United States with station spacing of about 70 km. ,We compare the two approaches for the most recent large earthquakes in order to get a better understanding of how long-period seismology studies can bene[U+FB01]t from rotational ground motion measurements in the future.