

New Zealand Ring Lasers: Rotational Motions around Horizontal Axes

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ABSTRACT

By now it is well established that the rotational motions around a vertical axis are compatible in phase and amplitude with collocated broadband observations under the assumption of plane wave propagation. We observe rotational motions with optical interferometers in the newly emerging field of ring laser technology.

Additionally to the measurements of rotational motions around vertical axes one of the New Zealand ring lasers - G0 - makes signals around a horizontal axis available too.

The latter had so far not been studied in detail.

- We investigate whether these observations are as compatible with the broadband translations as the rotations around a vertical axis.
- At the Earth's surface this component of rotation is equal to tilt. However, as tiltmeters are sensitive to horizontal acceleration, a pure tilt signal is difficult to obtain in a broadband spectrum. G0 offers a unique opportunity to investigate "true" tilt signals in the seismic broadband range.
- We compare these tilt observations with translation-derived tilt under the plane wave assumption.

Optical rotation (tilt) sensors may play an important role in the development of six-component sensors that allow recovering the complete displacement history.

