



## **What can High Resolution Inertial Rotation Sensing do for the Geosciences? (Christiaan Huygens Medal Lecture)**

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Strap-Down inertial gyroscopes are essential for the attitude control of aircrafts - they keep helicopters and planes in the sky. What if the same technology is strapped to the Earth? It will allow the observation and understanding of the geophysical processes behind minute changes of the rate of rotation as well as variations of the orientation of the instantaneous axis of rotation of the Earth. Unlike the highly dynamic aircraft motion geophysical signals are very small and act on much longer timescales. Therefore we have to make a suitable gyro for the application in the Geosciences significantly more sensitive and stable than aircraft gyros, improving them by many orders of magnitude. Large scale optical interferometers suggest themselves for this purpose, but the requirements are demanding. We have built and explored a variety of monolithic and heterolithic ring lasers, spanning areas between 1 and more than 800 m<sup>2</sup>. On this road of applying a locally installed high resolution active optical interferometer to a global measurement quantity (earth rotation), we have encountered a number of serious challenges some of which already puzzled Christiaan Huygens some 300 years ago.