AGU Fall Meeting 2015

Measuring Gravitational Tides Cheaply with Arduino

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Description of Pop-Up Talk

We present a simple gravimeter design that is adequate to detect tidal signals from the Sun and Moon. Conductive foam is wedged between two rigid conductive plates and light pressure applied by fishing weights. This makes a variable resistor that is placed in a voltage divider. An Arduino and a 16-bit analog-to-digital converter are used to read the output of the voltage divider to provide the relative gravity change. With simple modifications, the design can be extended to measure other environmental conditions such as temperature, humidity, and atmospheric pressure. The observations can be posted online in near real-time for students to examine. The cause of gravitational tide can be introduced to young students with a hands-on activity of measuring it. More advanced students can use the data to learn about gravitational fields and gravitational field models. Advanced students can model the predicted tide and compare it with their readings.

Relation to Session Theme

This apparatus and demonstration illustrate basic physical principles that influence many Earth processes. The simple experiments promote understanding of factors that can influence many physical measurements. Online data availability allows students and the interested public to access and to examine data without access to the physical device.