



Development of an Interferometric Laser Ranging System for a Follow-On Gravity Mission to GRACE

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The Gravity Recovery and Climate Experiment (GRACE) has ushered in a new era for satellite measurements of the Earth system. The tremendous advances made by GRACE have led to an interest in launching a follow-on mission with even better spatial resolution. The spatial resolution can be improved by improving the ranging performance, implementing a drag-free control system, and flying at a lower altitude. This presentation will focus on an effort, funded by NASA's Instrument Incubator Program, to develop an interferometric laser ranging system that we expect to perform near the 1 nm/sec level or better over 5 second intervals, which when coupled with other mission improvements, would improve the spatial resolution to ~100 km for 1 cm water equivalent accuracy. We report progress towards building an engineering model of the instrument, with which we will demonstrate its accuracy in the laboratory over the next few years. The laser system will range directly to the proof mass of the drag-free system, eliminating many of the difficulties associated with post-processing the accelerometer data on GRACE. In addition, we will show new results from our successful laboratory tests of the breadboard design in both ambient and vacuum conditions.