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High resolution strain observations: Installation and first results of new laser strainmeters at the Geodynamic Observatory Moxa/Germany

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Since 1964 two quartz tube strainmeters (SN & EW) have been operating as long-period seismometers in the gallery of the Geodynamic Observatory Moxa, located approx. 30 km south of Jena (Germany). In the last 15 years, also the longperiodic signals have been recorded and investigated. The mechanical strainmeters were complemented by a third component in 2003, a laser strainmeter which is oriented NW-SE and connects the endpoints of the quartz tube strainmeters. In 2005 a borehole strainmeter was added to the whole arragement. In 2011 parallel to the east-west and north-south oriented quartz tubes, two new laser strainmeters were installed. Comparing the first time series of all strainmeters shows a significantly higher data quality of the new laser systems, especially regarding the long- and aperiodic drift behaviour, the signal to noise ratio of the diurnal and semidiurnal tidal periods as well as the high frequency parts of the signal. As such laser strainmeter systems could also operate with small base lengths of e.g. one meter, it is potentially feasible to construct mobile systems, which can be used, e.g. in connection with monitoring hazard related phenomena, such as cockpits or collapse sinks as well as tectonically highly active regions.