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Current subsidence within the Houston metropolitan region derived from long-term GPS observations

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In this study we summarized land subsidence and groundwater level changes that have occurred in the Houston metropolitan area during the past eight years (2005-2012). The Chicot and Evangeline aquifers are the major aquifers that underlie the Houston metropolitan area. Subsidence measurements from 95 permanent Global Positioning System (GPS) stations and 11 borehole extensometers and groundwater level measurements from 170 wells screened in the Chicot aquifer and 320 wells screened in the Evangeline aquifer were investigated. GPS and extensometer observations indicate that the overall subsidence rate in the Houston area has been decreasing since 2005. Currently, subsidence in downtown Houston and in the southeastern region of the Houston metropolitan area has nearly ceased (<3 mm/year). However, subsidence is occurring at a rate as rapid as 2.5 cm/year in the western and northern regions of the Houston metropolitan area. This study indicates that the local preconsolidation heads were approximately 30 to 40 meters below the land surface. The land subsidence rate is decreasing in the areas where the water level is rising, but still below the preconsolidation head. The rate of land subsidence is steady in the areas that groundwater head is declining and below the preconsolidation head.

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Phenomenology of near UV flashes in the earth atmosphere collected in satellite observations and their relation to thunderstorm regions

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In flights of four satellites: Tatiana; Tatiana-2; Chibis and Vernov (RELEC before launching) near UV flashes in wide range of energies (from 1 K Joule to M Joule in UV) were studied by detectors capable to measure temporal profile of the event in range of 1- 128 Ms. Among all data on those flashes the most interesting are observations in Tatiana-2 and Vernov satellites series of short flashes (1 ms duration) correlated in trace of 128 ms and in several minutes of satellite flight. Series of flashes are strongly correlated with thunderstorm regions. Orbits of Tatiana's and Vernov satellites are close to geomagnetic field while Chibis orbit crosses geomagnetic field. Series of flashes were not registered by Chibis detector. This difference gives evidence for correlation of flash series with geomagnetic field. A qualitative interpretation of data on series of UV flashes is considered. UV flashes are suggested to be generated by lightning electromagnetic pulses partly going through ionosphere to the magnetosphere as whistlers. Whistlers' tracks are correlated to geomagnetic lines. They have a chance to come back to the atmosphere where they produce secondary flashes which could be detected by satellite following geomagnetic lines. Longer series (during seconds and up to minutes) also directed along geomagnetic field lines are due to additional effect of lightning high rate in specific thunderstorm regions.

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