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Piezometric monitoring in vertical profile at sites across the southern and coastal floodplains of the Ganges/Brahmaputra/Meghna (GBM) delta confirms gravitational flow in sediments of the Bengal Aquifer System (BAS) to a depth of at least 320 m (the maximum depth of measurement). Individual and paired records of groundwater head indicate seasonal recovery and recession of water storage, periodic and episodic ground surface loading, and earth tide responses. Lunar periodicity in groundwater head fluctuation coincident with tide height at one coastal site is consistent with tidal surface loading/unloading. Diurnal tidal fluctuations in the same record change amplitude and shift phase with depth, also indicative of surface loading/unloading. Transience in the surface loading signals with depth is governed by the vertically integrated hydraulic properties of the thick BAS sedimentary sequence. Inland, earth tide responses of smaller amplitude and lacking phase shift with depth are ubiquitous in the background signal. Most records include clearly resolvable episodic deflections in the order of 0.1 m water head and up to 0.5 m water head, near simultaneous with depth, corresponding to individual episodes of rainfall. The episodic head deflections provide a record of change in terrestrial water storage (ΔTWS) comprising undifferentiated surface water flooding, soil moisture and shallow groundwater recharge – a direct land-based equivalent of satellite estimates of ΔTWS . Enigmatic short-term recession from individual deflection peaks may be related to elastic deformation and ground surface lowering under terrestrial water storage loading.

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<https://agu.confex.com/agu/fm14/meetingapp.cgi/Paper/5197>

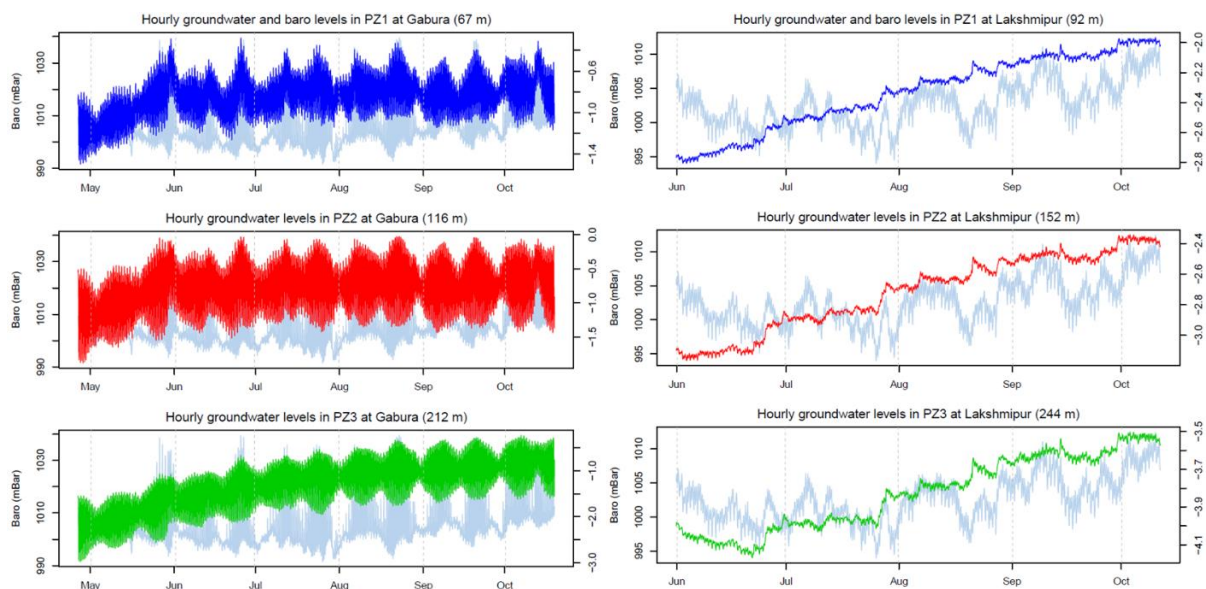


Figure: Groundwater head records in vertical profile and barometric pressure from Gabura (coastal site) and Lakshmipur (inland site) – note raw data require additional corrections for salinity. Depth values (m) in the plot titles indicate the depth below datum for the piezometers. The barometric data is shown as a pale blue line.