



## **Eco-hydrological Wireless Sensor Network and upscaling method research in the Heihe River Basin, China**

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Wireless Sensor Networks are recognized as one of most important near-surface components of GEOSS (Global Earth Observation System of Systems), with flourish development of low-cost, robust and integrated data loggers and sensors. A nested eco-hydrological wireless sensor network (EHWSN) was installed in the up- and middle-reaches of the Heihe River Basin, operated to obtain multi-scale observation of soil moisture, soil temperature and land surface temperature from 2012 till now. The spatial distribution of EHWSN was optimally designed based on the geo-statistical theory, with the aim to capture the spatial variations and temporal dynamics of soil moisture and soil temperature, and to produce ground truth at grid scale for validating the related remote sensing products and model simulation in the heterogeneous land surface. In terms of upscaling research, we have developed a set of method to aggregate multi-point WSN observations to grid scale ( $\sim 1\text{km}$ ), including regression kriging estimation to utilize multi-resource remote sensing auxiliary information, block kriging with homogeneous measurement errors, and bayesian-based upscaling algorithm that utilizes MODIS-derived apparent thermal inertia. All the EHWSN observation are organized as datasets to be freely published at <http://westdc.westgis.ac.cn/hiwater>. EHWSN integrates distributed observation nodes to achieve an automated, intelligent and remote-controllable network that provides superior integrated, standardized and automated observation capabilities for hydrological and ecological processes research at the basin scale.