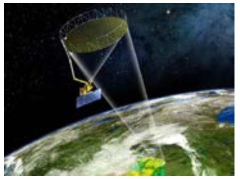
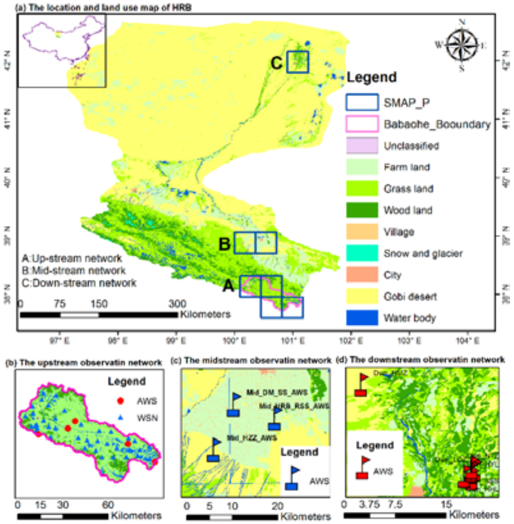
An Evaluation of SMAP Soil Moisture Products over Cold and Arid Regions Using Distributed Observation Network Data

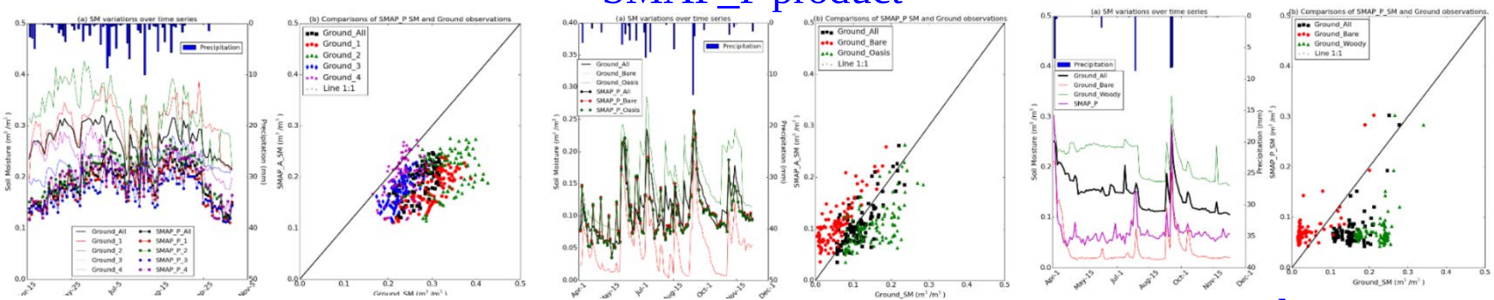
Chunfeng Ma, Shuguo Wang, Rui Jin, Xn Li



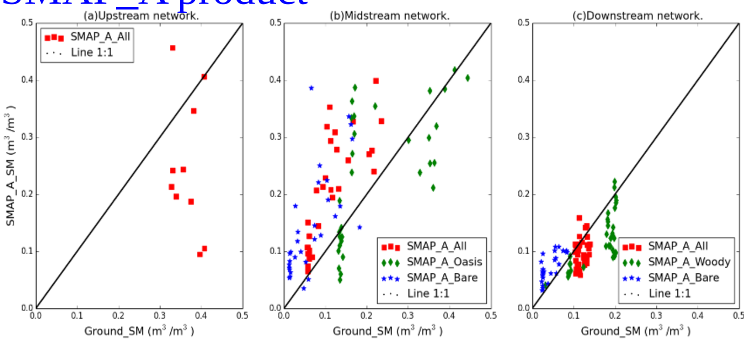
- **We are going to:**
  - To validate the **multi-scale SMAP SM products** (active, passive, combined) using distributed ground observation network data over Heihe River Basin (HRB)
  - To test SMAP SM products **over typical climatic regions** (cold & arid) **and surface types** (alpine meadow, oasis, desert, etc.)
- **We find:**
  - That the SMAP SM products over the most parts of HRB present relative satisfactory spatial-temporal variation, especially they can capture the typical precipitation events.
  - Relatively, the performance of the passive SM products is the best and the active SM products is worse than the two others.
  - All SMAP SM product present a little better over the midstream area than those over the cold (upstream) and extreme arid (downstream) of HRB. Better performance of all SMAP SM products can be observed over bare soils than the vegetated soils.
  - The unsatisfied performance of SMAP SM products over cold region may be caused by freezing and thawing cycle.



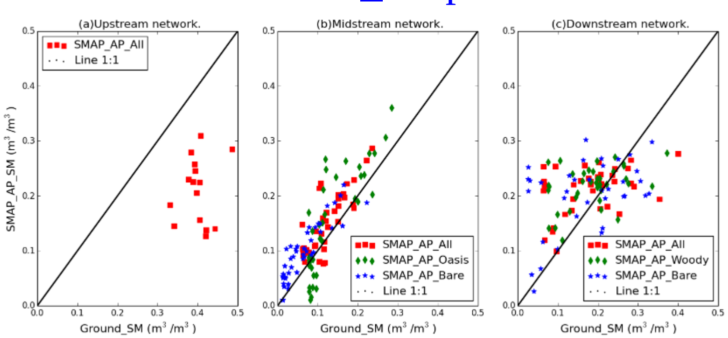
SMAP_P product



SMAP_A product



SMAP_AP product



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Article

Multi-Scale Validation of SMAP Soil Moisture Products over Cold and Arid Regions in Northwestern China Using Distributed Ground Observation Data

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Abstract: The Soil Moisture Active Passive (SMAP) mission was designed to provide global mapping of soil moisture (SM) on nested 3, 9, and 36 km earth grids measured by L-band passive and active microwave sensors. The validation of SMAP SM products is crucial for the application of the products and improvement of the retrieval algorithm. Since the SMAP SM products were released, much effort has been invested in the evaluation of the SMAP radiometer SM product (SMAP_P). However, there has been little validation of SMAP radar (SMAP_A) and active/passive combined (SMAP_AP) SM products. This paper presents an evaluation of SMAP_P, SMAP_A and SMAP_AP SM products by using distributed ground observations networks in different landscapes in the Heihe River Basin of northwestern China. The standard error metrics of SMAP products and relative error are applied to measure the products' performances. The results show that the SMAP SM products exhibit consistent spatial-temporal variation with the ground measurements and typical precipitation events. Three products show various types of performance capability (e.g., active, passive and combined), surface coverage (e.g., bare, vegetated) and climatic region (e.g., cold, arid). Relatively, the SMAP_P shows