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Poster
This study presents an approach to determine water volume of small lakes (<100 Hectares) by combining satellite altimetry data and high resolution (HR) images. The studied lake is located in the South West of France, and is only used for agricultural irrigation purposes. Altimetry satellite data are provided by the RA-2 sensors onboard Envisat, and high resolution images (<10m) come from optical (Formosat-2) and Synthetic Aperture Radar (SAR) antennas (Terrasar-X and Radarsat-2) satellites. Altimetry data (one every 35 days) and HR images (77) have been respectively available since 2003 and 2010. In situ data (water levels and volumes) have been provided by the manager of the lake since 2003. Three independent approaches are developed to estimate lake volume and its temporal variability. The first two are empirical and use synchronous ground measurements of volume and satellite data. Results demonstrate the good capability of altimetry and imagery to monitor the time-variations of the lake with a good accuracy (R^2 ALTIMETRY=0.97, RMSE ALTIMETRY=6,4%, R^2 IMAGERY=0.88 and RMSE IMAGERY=10%). The third method, which consists in combining altimetry (level of the lake) and satellite images (surface of the lake) to estimate volume changes of the lake, provides even better results (R^2=0.99), and demonstrates the potential of future Sentinel and SWOT missions for agricultural and irrigation applications through the monitoring of small lakes and reservoirs.
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