Pleiades and radar imagery in tracking water level fluctuations in reservoirs

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PLEIADES AND RADAR IMAGERY IN TRACKING WATER LEVEL FLUCTUATIONS IN RESERVOIRS

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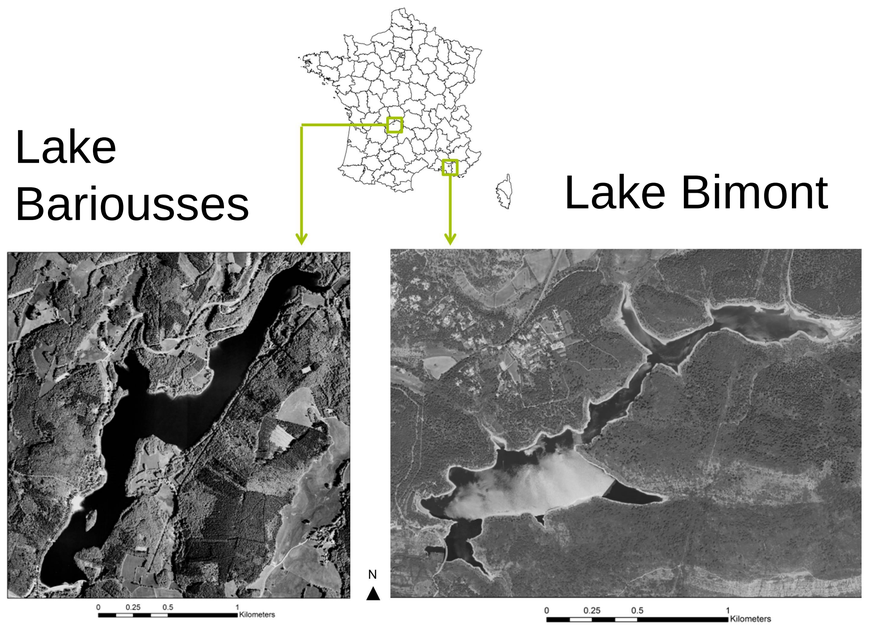
Very high spatial and temporal multispectral and RADAR interferometry data are complementary.

INTRODUCTION

Natural and anthropogenic water level fluctuations strongly modify key ecological parameters in natural lakes and reservoirs (e.g. water temperature and transparency, habitat availability, etc.). Characterizing this process at a fine scale is essential to understand its impact, define effective management strategies and/or detect water budget disequilibrium due to climate change. **How suitable are very high spatial and temporal resolution satellite imagery for this purpose?**

STUDY SITES



Source of images: IGN BDOrtho

DATA

1. Imagery:

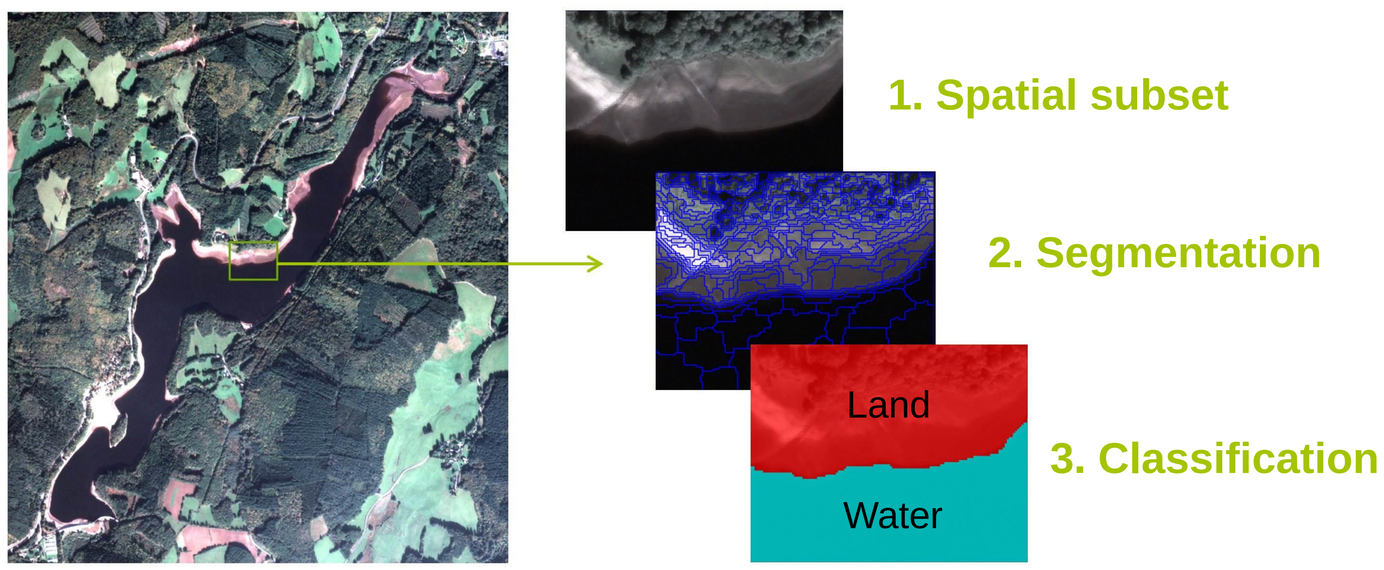
Reservoir	Quantity	Period
L. Bariousses	Pléiades: 4 Cosmo-Skymed: 5 TerraSAR-X: 5	06/10 to 27/11/2013
L. Bimont	Pléiades: 5	11/10 to 08/12/2013

Pléiades: 5 bands, multispectral: 4m, panchro: 0.5m
Cosmo-Skymed (RADAR): 1 band, 0.5m
TerraSAR-X (RADAR) : 1 band, 0.5m

2. Field data: water surface altitude (in meters) for every image.

METHODS

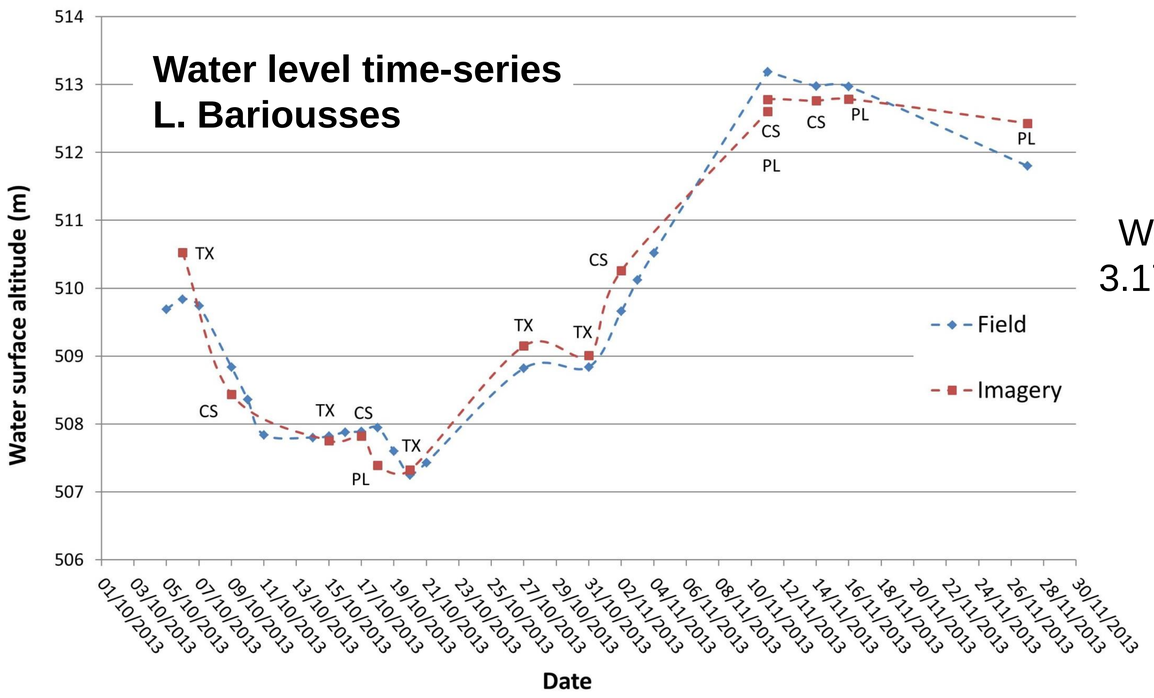
Object-based image analysis: segmentation and classification of each image to extract the water surface of a local spatial subset of flat and unencumbered littoral zone.



Regression analysis: water surface altitude (vertical component, from field) as a function of subset water surface area (horizontal components, from imagery).

RESULTS

Insufficient image frequency for L. Bimont but good results for L. Bariousses:



Regression:

Water surface altitude = 3.1757*(surface) + 501.07

R^2 = 0.9633

RMSE = 0.42m

CONCLUSIONS

	Positive	Negative
Pléiades	1. Very high spatial resolution 2. Multispectral (i.e. better classification) 3. Faster processing	1. Low temporal resolution (presence of clouds).
RADAR	1. Very high spatial resolution 2. High temporal resolution (all weather)	1. Single-spectral (in this study) 2. Slower processing

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