SPECIAL SESSION 13

Time series analysis:
Method advancements and applications for continuous forest monitoring

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The goal of the session

Current Earth observation missions employing space-borne optical sensors like Sentinel-2 or Planet acquire a vast volume of data. A new image every 5 days is acquired by Sentinel-2 of virtually every place on earth – free and open. Using the commercially available Planet data, the time between consecutive images of the same region is reduced to one day at even higher resolution and further increasing the chance of acquiring cloud-free observations. RADAR data such as Sentinel-1, with their capability to map independently of cloud and daylight further add to the available data pool. Through high-quality georeferencing of the satellite images it is possible to create dense time series at an individual pixel level. The vast amount of high resolution data theoretically allows – for the first time – to map also small changes in near real-time. The challenge is to develop innovative and robust methods for large area forest monitoring ideally taking into account different sensors.

This session should bring together the newest developments in the algorithmic domain with experiments and applications in forestry. Current algorithms like trajectory segmentation, curve fitting, hypothesized curve fitting, harmonic regression, Kalman filtering or also approaches using artificial intelligence such as convolutional neural networks shall be presented and reviewed. There are several related applications and software developments such as BFAST, LandTrendR, CCDC or EWMA (among others). Contributions testing such or similar algorithms in various forest ecosystems and comparing the results are highly welcome.

Potential topics:

- Which types of changes (e.g. deforestation, thinning, diseases, drought, and insect infestations) in forests can be mapped with different approaches?
- What are the requirements to the time series and to the algorithms for monitoring specific changes, such as bark beetle attacks?
- How fast can we detect changes in a continuous monitoring?
- What is the best trade-off between timeliness and commission error?
- Is there an added value of integrating different sensors into one time series and how can we achieve that?