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Forest cover mapping in Central Asia using multi-resolution remote sensing imagery

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Knowledge on spatial extent and types of forests at continental and global scale is essential for the evaluation of valuable ecosystem services. The recently developed global coverage forest maps have greatly enhanced our knowledge on forests distribution, however, the mapping accuracy of the available global forest maps is often questionable at regional scales. Besides, global coverage forest maps usually adopt a binary forest and non-forest classification scheme and the diversity of the forests is neglected. We produced a regionalised forest map for Central Asia using multi-resolution satellite imagery. First, we built ground reference using medium resolution Landsat imagery. Three seasonal composites targeting spring, summer and autumn seasons were generated using all available Landsat imagery in 2010. More than 460 scenes of Landsat imagery covering 18 Landsat footprints were employed to this end. Second, high resolution imagery from Google Earth and SPOT was used to classify Landsat seasonal composites. Four forest types including broadleaved, needle-leaved, riparian and mixed forests were identified. Third, we used forest map generated from Landsat composite to estimate forest cover for the whole Central Asia at MODIS scale. Sub-pixel fractional forest cover was delineated using non-parametric ensemble regression trees from Random Forest model. Accuracy assessment revealed good performance of our approach (RMSE≈8%). The presented analysis is the first time, cross-border forest mapping initiative for Central Asia after the collapse of the Soviet Union. The generated maps lay the ground for further assessment of biomass and carbon stocks in various forest types in the region.