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# Mapping vegetation cover and biomass on the Qinghai-Tibet-Plateau using hyperspectral measurements and multispectral satellite images

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Pastoralism is the dominant land-use on the Qinghai-Tibet-Plateau (QTP) providing the major economic resource for the local population. However, the pastures are highly supposed to be affected by ongoing degradation whose extent is still disputed.
This study uses hyperspectral in situ measurements and multispectral satellite images to assess vegetation cover and above ground biomass (AGB) as proxies of pasture degradation on a regional scale. Using Random Forests in conjunction with recursive feature selection as modeling tool, it is tested whether the full hyperspectral information is needed or if multispectral information is sufficient to accurately estimate vegetation cover and AGB. To regionalize pasture degradation proxies, the transferability of the locally derived models to high resolution multispectral satellite data is assessed.
For this purpose, 1183 hyperspectral measurements and vegetation records were sampled at 18 locations on the QTP. AGB was determined on 25 0.5x0.5m plots. Proxies for pasture degradation were derived from the spectra by calculating narrow-band indices (NBI). Using the NBI as predictor variables vegetation cover and AGB were modeled. Models were calculated using the hyperspectral data as well as the same data resampled to WorldView-2, QuickBird and RapidEye channels. The hyperspectral results were compared to the multispectral results. Finally, the models were applied to satellite data to map vegetation cover and AGB on a regional scale.
Vegetation cover was accurately predicted by Random Forest if hyperspectral measurements were used. In contrast, errors in AGB estimations were considerably higher. Only small differences in accuracy were observed between the models based on hyper- compared to multispectral data. The application of the models to satellite images generally resulted in an increase of the estimation error. Though this reflects the challenge of applying in situ measurements to satellite data, the results still show a high potential to map pasture degradation proxies on the QTP even for larger scales.