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| **Assessment of forest nitrogen dynamics with multitemporal remote sensing** |
| Nitrogen is an important nutrient for the growth and productivity of forest. Foliar nitrogen and nutrient deficiencies have been successfully quantified with remote sensing for many systems. However, remote  sensing assessments of the rates of nitrogen movement within and through forest systems has been historically constrained by a lack of necessary data at appropriate scales. We have now moved into an era where multitemporal remote sensing data are available in locations coincident with long term field experiments. Here, we explore the use of multitemporal Landsat data to characterize nitrogen dynamics of 10 pine stands across New Zealand that underwent a fertilization experiment  described in Davis et al. (2012). We used the Continuous Change Detection and Classification (CCDC) of landcover algorithm to fit all available Landsat data from 2000-2012, which included stand establishment and growth through the historic fertilization experiment. We used the difference of nitrate-N between control and fertilization plots (from Davis et al. 2012) to rank the leaching across the sites.CCDC results suggest that wetness and NDVI fit parameters may be indicative of relative leaching potential.  The site with the lowest leaching had more than double the mean and amplitude of fit to the wetness index in the years following the fertilization experiment (mean=-0.005, amplitude=0.025 in 2010 for the site with the lowest leaching, versus mean=-0.025, amplitude=0.01 in 2010 for the site with the highest leaching). Our analysis highlights the value of multitemporal remote sensing analysis to explore stand development and nitrogen dynamics. |