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Assessing the Impact of Slope and Aspect on Burn Severity for the Dixie Fire in California
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Wildfires are becoming a more frequent occurrence around the world. This increasing frequency causes significant threats to ecosystems and land stability. The first step to mitigating these impacts is understanding the factors that influence burn severity. The objective of this research was to relate wildfire burn severity to surface slope and aspect. This relationship was developed for the Dixie Fire in California using Landsat images. Burn severity describes the amount of damage a wildfire has caused to the land and ecosystem and is calculated using the differenced Normalized Burn Ratio (dNBR). dNBR was calculated using pre- and post-fire OLI images and has values ranging from -2 to 2. Slope and aspect were acquired using digital elevation models (DEMs). Slope was calculated in percent rise and ranges from 0% to 275%. Aspect was calculated in degrees representing the compass direction that a slope faces. The burn severity was compared across the different slope and aspect ranges to analyze how variations in slope and aspect impact fire severity. Statistical analysis was performed using an analysis of variance (ANOVA) to see whether there are significant differences in dNBR between areas of differing topography. The results showed a statistically significant relationship between slope and burn severity. Steeper slopes were associated with higher dNBR values. No significant relationship was found between aspect and burn severity. These findings show that slope does play a factor in influencing fire behavior. Furthermore, wildfire management and land restoration strategies can benefit from this information to better identify areas that may be more susceptible to damage and require longer recovery periods.