Forest fire burn areas in Western Canada modeled as self-similar criticality

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Forest fire burn areas in the western Canadian provinces of Alberta and British Columbia have cumulative frequency-area distributions that are well-described by a power law or an upper-truncated power law. The power law scaling extends over as many as five orders of magnitude and is observed for different geographical regions and for various time intervals. The observed scaling exponent varies both geographically within and between provinces and temporally between annual records. The temporal variability decreases at the decadal scale, suggesting that decadal distributions may be useful for long term fire control planning within a geographical region. Unlike the traditional Self-Organized Criticality (SOC) forest fire model that produces a single scaling exponent, the Self-Similar Criticality (SSC) model replicates the range of scaling exponents observed for cumulative frequency-area distributions of natural forest fires.