

A 28-year Haines Index Climatology for North America

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Overview:

This work was partially supported by the JFSP project. It was not in the original scope of the proposal, but it fits the broad theme of developing tools for predicting wildland and prescribed fires and their impacts on air quality. With partial support from this project we have developed a 28-year (1980-2007) Haines Index (HI) climatology using 32-km grid spacing temperature and humidity data from the recently released North American Regional Reanalysis (NARR) data set. The Haines Index (HI), initially named the 'Lower Atmospheric Severity Index', is a widely used index that is designed to detect the potential for dry, unstable air to impact a plume-dominated fire such that the fire becomes large or exhibits erratic fire behavior. Conceptually, the HI represents an empirical relationship between a dry, unstable atmosphere and extreme and erratic fire behavior in large wildfires. The index is calculated by combining a lower-atmospheric stability term (A) and a moisture term (B) into a single number that correlates with erratic fire behavior. Since its development, the HI has become widely used and accepted by fire managers as an indicator of the potential for an existing wildfire to become large and/or exhibit erratic fire behavior. The HI has become a standard element of U. S. National Weather Service fire weather forecasts and is routinely employed as a planning tool for daily fire management activities. The climatology employs spatial analyses of warm season lapse rates and dewpoint depressions to derive the lower-atmospheric stability factor (A) and the moisture factor (B) for each of the low-, mid-, and high-elevation variants of the HI. The factors A and factor B are then used to compute the HI for each variant, and the mean and standard deviation of the resultant HI are investigated to establish the climatological mean and variability of each HI variant across North America. The new climatology is compared with a previous climatology derived from 2.5 degree global reanalysis data. Analyses of the frequency and maximum consecutive days in the 28-year period of $HI \geq 4$, $HI \geq 5$, and $HI = 6$ provide additional insight into the spatial variability of the HI. Time series analyses of the number of days in each year where $HI \geq 4$, $HI \geq 5$, and $HI = 6$ for six climatic regions in the United States highlight the interannual variability of the HI and indicate temporal trends in the number of days of moderate, high, and very high HI that occur in each year.

Current Progress:

A manuscript was submitted to *Internal Journal of Wildland Fires* four months ago and it is currently still under review. We are expecting to hear back from the editor about the reviews soon and will revise the manuscript based on the review comments.