Geophysical Research Abstracts
Vol. 13, EGU2011-11187, 2011
EGU General Assembly 2011

Climate change impact on meteorological forest fire danger in the Alpine Space

Clemens Wastl, Christian Schunk, and Annette Menzel
Chair of Ecoclimatology, Technische Universität München, Freising, Germany (wastl@wzw.tum.de)

Several studies (e.g. IPCC, 2007; Reinhard, 2005) reveal that the climate in Central Europe has changed significantly over the last three decades. On the one hand temperatures have increased strongly all over Central Europe with a maximum rise in the elevated regions along the Alpine rim (due to feedback mechanisms). On the other hand the precipitation trend is spatially inhomogeneous with an increase in the Alps and northwards and a contrary decrease of average precipitation south of the Alps, especially in summer.
Beside well known problems like the melting of glaciers or changes in the hydrological cycle, a warming climate is very likely to influence the potential forest fire danger. For example the number of fires in the southern Alps strongly increased in the last decades accompanied by an extension of the fire season.
In this study we use historical weather observations from selected stations in Central Europe to calculate several meteorologically based forest fire danger indices (FWI, Baumgartner, M-68, Nesterov, Angstrom, McArthur). To assess climate change impacts we consider the statistical distribution of index values within the time period from 1950 to 2010. The area under investigation is a cross section from Nuremberg (Germany) north of the Alps to Bologna in the Italian Padan plane. Along this cross section we selected 5 stations (Nuremberg, Garmisch-Partenkirchen, Innsbruck, Bolzano, Bologna) which are representative for the different climate conditions in the greater Alpine region. Hence, we calculated the different forest fire danger indices for all days during the 60 years under consideration and for all 5 stations, respectively.
The statistical analysis is based on a simple percentile analysis. Therefore we divided the dataset into single years and computed index values at certain percentiles (e.g. 50th, 80th, 90th, 95th) for each year. To assess a potential temporal trend we look at statistically significant changes of the percentile values within the time period between 1950 and 2000. With this method it is possible to differentiate between the trend of low and high index values, respectively. Additionally also other statistical methods like seasonal averages of fire danger or number of days with elevated fire danger, ... have been applied to the dataset.
First results show that recent climate change has different impacts on potential forest fire danger in the Alpine space. Whereas there is hardly no temporal trend of fire danger north of the Alps, the analysis reveals a significant increase in the Alpine valleys and especially in the southern foothills of the Alps.