Local changes in Bulgarian climate could have widespread impacts

Southwest Bulgaria has an unusual climate with Mediterranean temperatures in the summer and cold winters. New research indicates that there will be an increase in annual mean temperature in this region and suggests that climatic changes could have damaging environmental and socio-economic impacts.

The Intergovernmental Panel on Climate Change (IPCC) has reported that the global average annual temperature has increased by 0.74 °C since 1990. Global studies are highly important, but climate research at a local level is also informative.

Southwest Bulgaria has a typical Balkan landscape, characterised by a mosaic of mountains and plains. The research analysed climate data taken from 25 weather and climate stations in the Pirin mountains and adjacent areas extending over 6500 km². Monthly temperature and precipitation measurements were available from 1931 to 2006.

The results were reported for the two main areas: the town of Bankso (altitude 936m) and the mountain area of Musala Peak (altitude 2925m). Until the 1990s there was little variation in the average annual temperature (-3.0°C) in the Musala Peak area. However, in the 1990s, the average annual temperature rose to -2.7°C, and has been -2.5°C since 2001. In Bankso the average annual temperature was 8.1°C in the 1970s. In the 1990s the average annual temperature rose to 9.1°C; and has been 9.6°C since 2001.

In the last thirty years, although there has been a general drop in the number of days with temperatures below 0°C, there was also an increase in the number of ‘frost change’ days in Musala Peak. Frost change days are days with one or more movements through 0°C. The period during which plants grew was significantly longer and there tended to be shorter winters and longer summers. These changes have implications for the stability of this area in terms of soil structure, water retention and the ecosystem as a whole.

Changes in rain and snowfall (precipitation) were not as obvious. The analysis suggests there was levels of precipitation fell between 1955 and 1995 for the Bankso region. The annual number of days with snowfall at Musala Park during 1973-2006 has fallen for both summer and autumn. However, measurements of precipitation in high mountain regions can be unreliable and previous research has indicated an error rate of 15 per cent for rain and 50 per cent for snow.

These changes in the climate could have a long-term effect on local ecosystems. Warming leads to a change in the distribution of trees and plants; for example, the Mountain Pine is now growing at higher altitudes than before. An increase in the number of days with frost change could increase erosion in high mountain areas.

Generally it is thought the ecosystem changes in this region could be similar to those occurring in the Alps. These changes may also have socio-economic impacts, for example, less reliable snow in the ski resorts and effects on the water supply. More droughts are expected which could have a future impact on water reservoirs and irrigation in neighbouring Greece.

1. See http://www.ipcc.ch/


Contact: k.grunewald@lfz-dresden.de

Theme(s): Climate change and energy