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Winter variability in Romania in connection to large-scale atmospheric circulation

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Daily measurements of snow depth, cumulated precipitation and mean temperature from 105 meteorological stations with continuous record over the 1961-2010 period were analysed for trends with the Mann-Kendall nonparametric test, for the meteorological winter season (DJF). Trends in the number of days with snow cover, and in the mean snow depth are decreasing at 29% and 18% of the stations, respectively. The decrease in snow depth affects Transylvania and Northeastern Romania. The most dramatic change concerns the number of snowfall days, which is decreasing at 82% of the locations. There is a slight decrease in precipitation amount, significant at only 8% of the stations. The mean temperature is increasing at 47% of the stations, while the number of days with temperature over 0˚C shows upward trends at 63% of the stations. The results point to an increase in heavy snowfall events (due to an increased moisture-holding capacity of the warmer atmosphere), and in the percentage of liquid precipitation (because of the temperature increases). Overall, the winter season in Romania has changed substantially. All snow-related parameters show significant negative correlations with the North Atlantic Oscillation (NAO) index for winter. The NAO has a strong impact throughout the country suggesting that the winter variability in Romania is driven by the large scale atmospheric circulation over the North Atlantic.