Water deficit and possible climate change impacts in Slovenia

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During recent years concern is rising about the frequency and impact of weather-related natural disasters such as droughts. Also climate change scenarios predict increase in water-related stresses in Europe, likewise in Slovenia. The pattern of droughts appearance and their duration is changing. In the thesis the analysis of water deficit status in the period from 1961 up to 2004 in Slovenia was performed. For the estimation of daily, weekly and seasonal intensity and duration of water deficit in the vegetation period the model IRRFIB was used. Water deficit was calculated for 3 hypothetical soil types wit different water-holding capacity in 10 regions in Slovenia (Maribor, Murska Sobota, Maribor, Łmartno pri Slovenj Gradcu, Celje, Novo mesto, Rateče, Postojna, Bilje, Portorođ). Model inputs are meteorological data, soil data about water holding capacity and soil depth and phenological data of reference crop. For the calculation of evapotranspiration Penman-Montheit method was used. The time trend analysis of water balance components for all the regions was carried out. The results show increase of cumulative evapotranspiration in the vegetation period, which is in major part of Slovenia positive.There is a statisticaly significant trend of the number of days with high evapotranspiration rate ($>$ 5 mm/day) in all the regions. Average increase is around 3 %, the largest increae is in Bilje (6 % / 10 years), the least in Łmartno pri Slovenj Gradec and Porotorđ. By trend analysis of precipitation in the vegetation period slightly decrease was noticeable. Trends of water deficit are distinguished among regions, but showing statistical significant increase of water deficit: in Ljubljana, Murska Sobota and Portorođ for 1-2%/10 years, in Maribor, Novo mesto and Rateče for 2-3 %/10 years, in Bilje and Łmartno pri Slovenj Gradcu for around 4 %/10 years. The largest negative trend was observed for Celje ($>$ 5 %/10 years). Trends are statistically significant only in Maribor, Łmartno pri Slovenj Gradcu, Rateče and Bilje. For other regions trends are not significant. The merger information about duration and intensity of water deficit in the vegetation period as dryness index (ISv) shows that in the major part of Slovenia in the last twenty years more extreme dry and very dry vegetation periods is recorded. Key problem is not only the change of average water deficit but its increasing variability. It is likely that the drought hazard will increase also in Slovenia, but the actual changes are a balance of mean moisture availability and the distribution of drought events. The outcome of these hazards will depend on vulnerability and capability of specific region to manage and to adapt to changes.