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INCREASE - an Integrated Network on Climate Change REsearch Activities on Shrubland Ecosystems

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Climate change poses a serious challenge for the scientific communities to develop new concepts for research and modeling to provide better and more realistic answers and predictions of what the impact will be. INCREASE is an EU-funded research infrastructure based upon large scale field experiments with non-intrusive manipulations of temperature and precipitation since 1999. The experiments are placed in vulnerable scrubland ecosystems across Europe. Shrubland ecosystems were chosen because they represent an important natural resource, which are known to be sensitive to observed changes in environmental pressures.
The experiments combine 2 different approaches to study climate effects on ecosystems. The first approach is known as “space for time” substitution, where the long term effect of a pressure on an ecosystem at any particular site is studied by moving to another site along temperature and precipitation gradients. This was done by carrying out the same studies in comparable ecosystems in UK, Denmark, the Netherlands, Hungary, Spain and Italy – which are naturally exposed to large differences in the climatic conditions. The other approach applied is “ecosystem manipulations”, which means that the ecosystem is exposed to the changes in the field by realistic manipulations of temperature and water and in one experiment in combination with CO_2. This combination of gradients and experimental manipulation increases the potential for evaluating the generality of the observed responses to the changes in the climatic drivers.
Within INCREASE we improve the technology and methodology for studies of climate change effects on European shrublands and stimulate collaboration within the scientific community around climate manipulation experiments. In addition, data and results from the research infrastructures were collected into an integrated database (INCREASE DB) with the aim to improve capacities in the protection, management and storage of data and to provide a web-based access to data and results for a larger research community.
The effects of the treatments on key ecosystem pools and processes were studied throughout the project together with the effects of the climate manipulations (artefacts). We observed effects of both warming, drought and increased atmospheric CO_2 on a number of key processes. However, the combined effects of the treatments often counteracted the main effects. This emphasizes the need to investigate interactions between climate change factors as these may be unpredictable based only on single factor studies.
We will present the experimental approach and a summary of climate change effects on ecosystem processes and functions.