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Direct Attribution of the Anthropogenic climate signal to PHENological observations - DATAPHEN

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Warming of the climate system has been widely observed during the last decades. Attribution analyses suggest that the global pattern of warming during the past half century is very likely caused by human-induced greenhouse gas forcing. There is a dearth on direct attribution studies, which quantitatively link the human influence on the climate system with observed impacts for instance on the biosphere. This work intends to apply the direct attribution method via an end-to-end modelling system to quantitatively link anthropogenic forcing with the observed shift of phenological entry dates.
The project is still in progress and we would like to introduce it to the scientific community with the following data sets and procedures:
• Dynamical downscaling of a small ensemble of 6 ECHAM 5 runs, with 3 runs with natural forcing only and natural plus anthropogenic forcing each, and the ERA40 run from 1958 – 2002. The regional climate model is the CCLM with a domain over Europe and a grid spacing of 50 km.
• The observational data sets are the COST725 phenological observations from a number of European countries (1951 – 2004) and the ECA – D daily mean temperature time series from European stations.
• For a number of selected phases covering the seasonal cycle parameters for the temperature sum model are being deduced and validated over an area covered by the phenological station network.
• The phenological model will be run with the dynamically downscaled mean daily temperature fields over Europe for each of the 7 ensemble cases.
• One or several suited detection and attribution methods will be selected to describe the influence and significance of the natural and anthropogenic forcing on the phenological entry dates.
What has been done so far:
• A 3 parameter phenological temperature sum model is being prepared for the CCLM grid.
• The ERA40 run and two of the 6 ECHAM 5 runs have been downscaled with the CCLM on a 50 km grid over Europe.
Tentative conclusions:
Plotting the mean global surface temperature time series the anthropogenic signal is clearly visible in the ECHAM 5 runs, but as soon as a certain area or season is picked out, the signal to noise ratio decreases dramatically. Possible solutions for that problem are looked for, like the application of a more sophisticated detection and attribution technique (optimal fingerprint) and/or increase the model ensemble.