

Consistency of recent climate change and expectation as depicted by scenarios over the Mediterranean region

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The principle aim of this study is to tackle the question, whether the recent change is a plausible harbinger of future change that is, we examine to what extent the observed climate trends in the Mediterranean region are already an indication of the conditions described by the climate change scenarios at the end of this century.

We have determined that recently observed warming over the Mediterranean region has very likely an anthropogenic origin and thus will likely continue, albeit not in a monotonous manner. We conclude that anthropogenic (Greenhouse gases and tropospheric Sulphate aerosols, GS) forcing is a plausible explanation for the observed warming in the Mediterranean region (except winter). The consistency analysis of surface specific humidity (q), which is an important factor in human thermal comfort, indicates that the increases in annual and seasonal q over this region are very unlikely to be due to natural variability or natural forcing alone and that the large-scale component (spatial-mean) of the anthropogenic forcing has a detectable and dominant influence in the observed trends of q (except winter).

In contrast, the expectation of future precipitation change is different from the observed trends. While the influence of GS signal is detectable in winter and early spring, observed precipitation changes are several times larger than the projected response to GS forcing. The most striking inconsistency, however, is the contradiction between projected drying and the observed increase in precipitation in late summer and autumn, irrespective of the observed data set used. Natural (internal) variability as estimated from 9,000 years control integrations cannot account for these inconsistencies.

The analysis of large-scale circulation patterns, in terms of mean and extreme sea-level pressure and Geopotential height at 500-hPa, confirms the inconsistency detected for precipitation. These significant shortcomings in our understanding of recent observed changes of precipitation complicate communication of future expected changes in the Mediterranean.

References

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