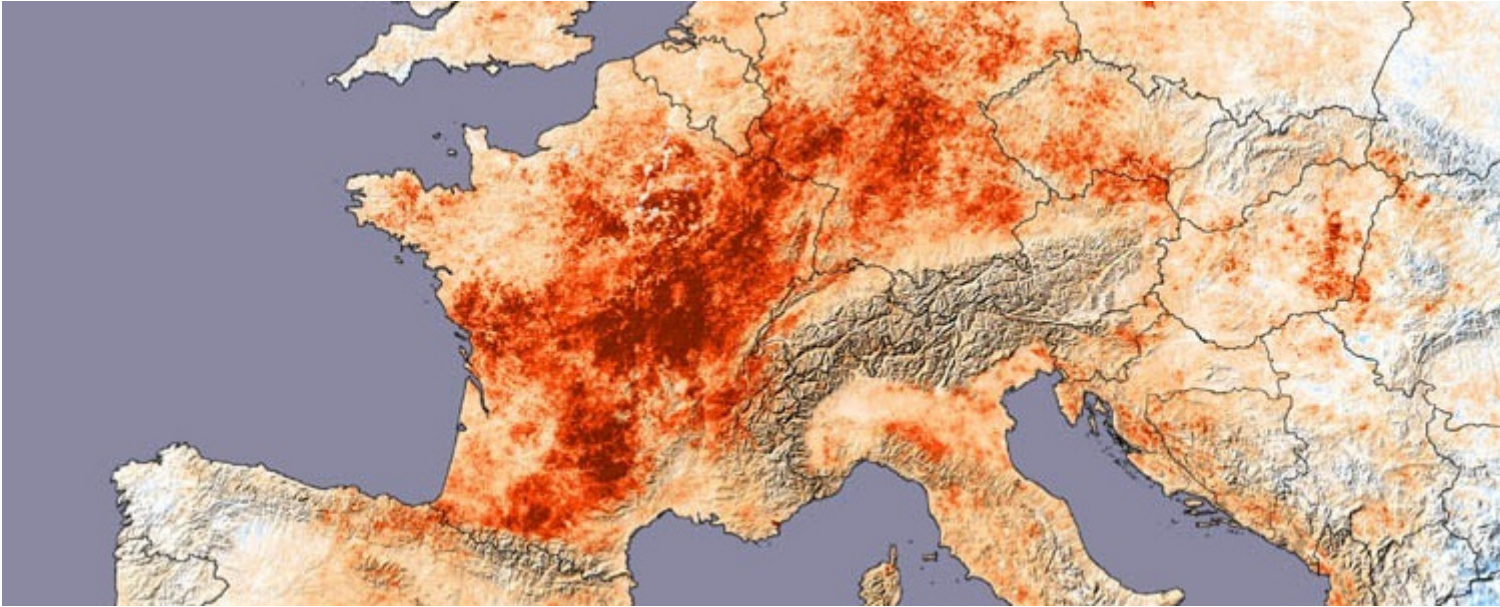# Seasonal prediction and attribution of extreme events

Extreme climate events cause high losses and casualties worldwide every year. At BSC scientist investigate whether past extreme events could have been foreseen using seasonal predictions and whether they are attributable to natural climate phenomena or human induced climate change.

Summary

Since the beginning of the 80's science demonstrated that predictability of the Earth's climate system goes beyond the time scales of weather forecasting practices. Slow phenoma as the El Niño Southern Oscillation (ENSO) and its teleconnections around the globe allow to potentially predict how the coming season is going to evolve. Prediction at this time scale is highly relevant to vurnable sectors such as agriculture and health, which can take precautionary actions on the basis of reliable predictions. Supported by this public need climate centres world-wide have set up operational seasonal prediction systems which already serve numerous societal needs.

A fundamental aspect in seasonal prediction is the level of prediction skill. A seasonal prediction is only useful if it provides information beyond what we expect from of an average season. In the course of the last decades this prediction skill progressively improved due to development of climate models, improvements in describing the initial conditions of the Earth's climate and calibration methodologies that correct the predictions for known deficiencies. However, seasonal prediction remains a young discipline with a large potential for further improvement.

An important practice, tightly connected to seasonal forecasting, is the attribution of "extreme" weather and

climate events. Extreme events such as flooding or long-lasting droughts cause very high socio-economic damages. Understanding extreme events is therefore of high public interest. Moreover, since it has become evident that climate change increases the risk of certain extreme events the public question on the "human factor" repeatetily arises. Disentangling the factors that lead to an extreme event has become a very active line of research which is about to become an operational activity.

Objectives

The principal goal of the climate prediction unit at BSC is to improve seasonal prediction capabilities and contribute to the understanding of how extreme events develop. Tackling these overarching questions involves the following core activities:

- Investigate the seasonal predictions capabilities using different intital conditions and climate models
- Study retrospective predictions of extreme climatic conditions such as droughts or heavy flooding
- Attribute past extreme events to responsible natural and anthropogenic drivers

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