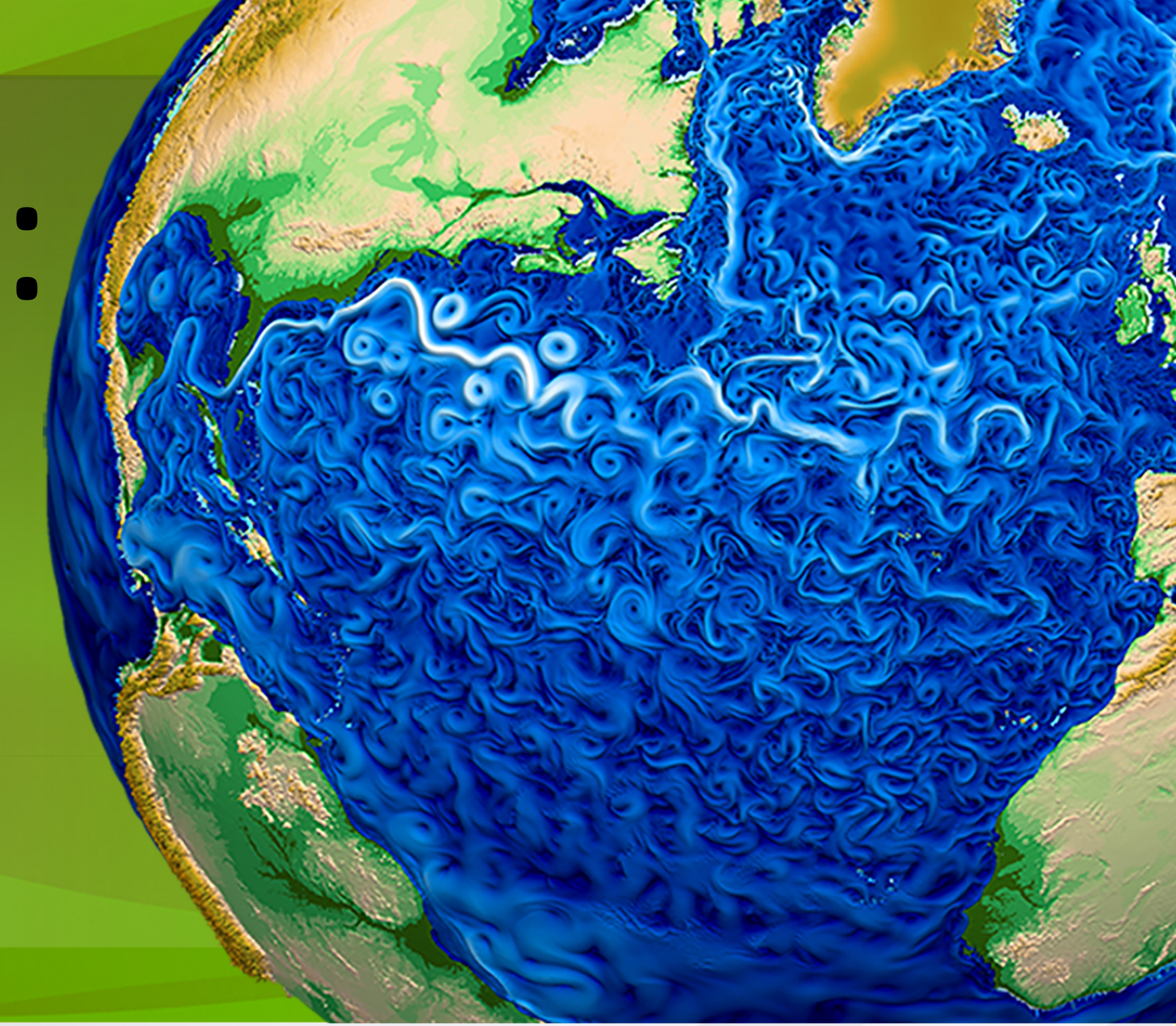


R: ACME v0

Tele-connections of Precipitation Extremes:

Salil Mahajan, Kate Evans, Marcia Branstetter



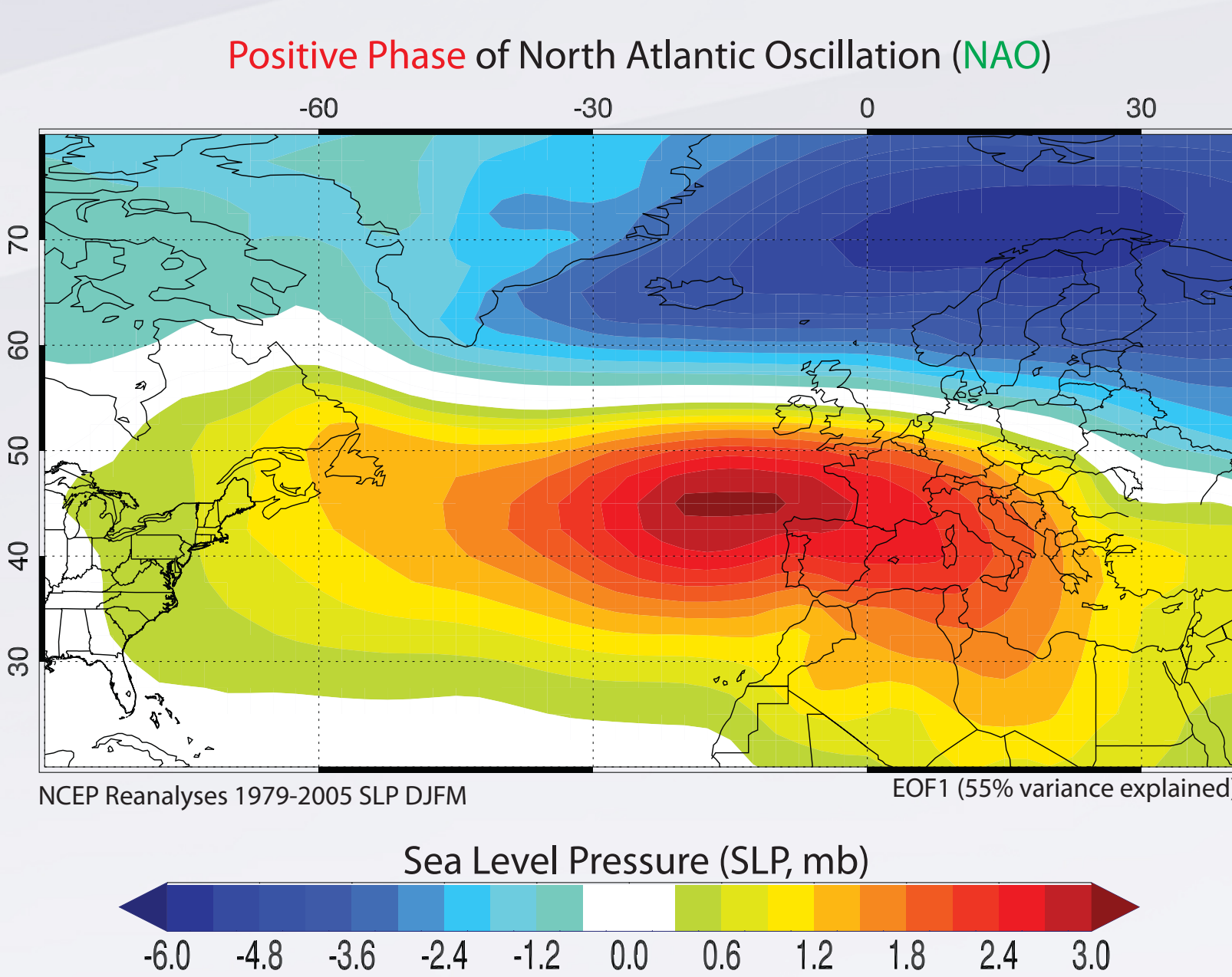
Objective

We evaluate the simulation of tele-connection of precipitation extremes to **North Atlantic Oscillation (NAO)** in Western Europe and North America

We compare **Generalized Extreme Value (GEV)** distribution parameters between simulations and observations.

We use a **region-of-influence** regionalization framework to improve sampling of extremes.

GEV metrics are part of **Tier1b atmospheric diagnostics**. The package submits a series of **parallel** jobs that generate a html page with plots.



Positive NAO Phase. Strong dipolar sea level pressure anomalies bring in moister, warmer air to Central Europe.

Approach

Data and Simulations:

NOAA Climate Prediction Center (**CPC**) Global Gauge-based Unified Daily Precipitation Data: Optimally Interpolated to half degree resolution.

ACME v0 **ne120** (quarter degree) and **ne30** (one degree) simulations: 4 member AMIP ensemble for the period 1979-2005

Generalized Extreme Value (GEV) Distribution:

Annual maximum of daily precipitation is assumed to follow a GEV distribution:

$$G(z) = \exp \left\{ - \left[1 + \xi \left(\frac{z - \mu}{\sigma} \right) \right]^{-1/\xi} \right\}$$

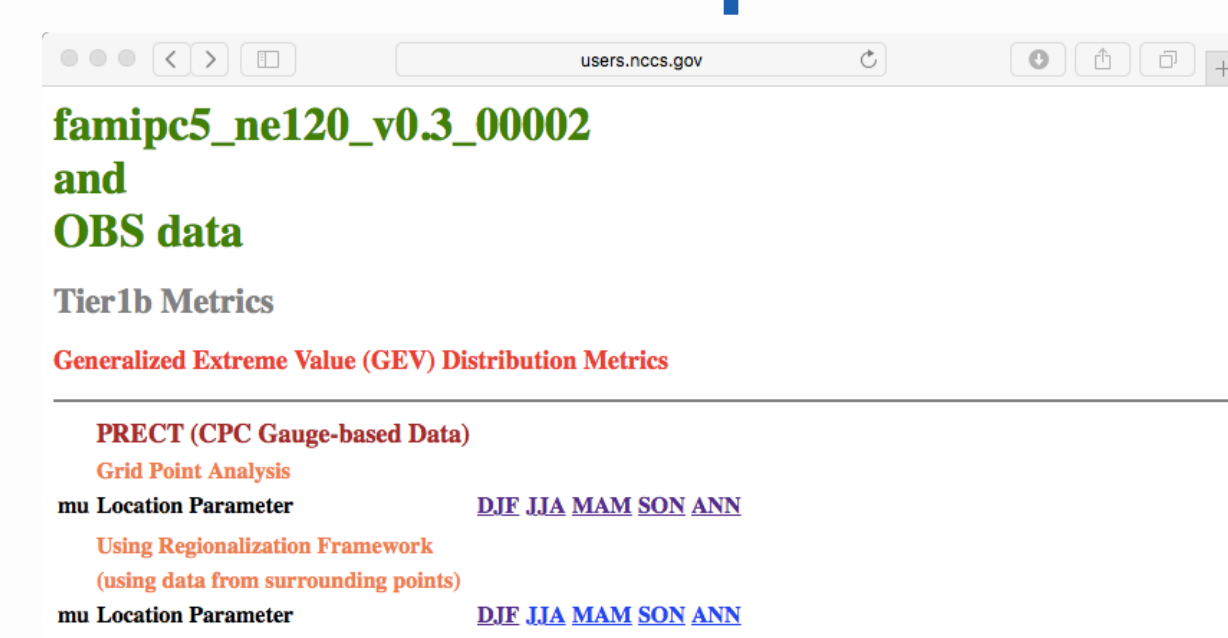
where μ , σ and ξ represent the location, scale and shape parameter respectively.

$$\mu = \mu_0 + \alpha t$$

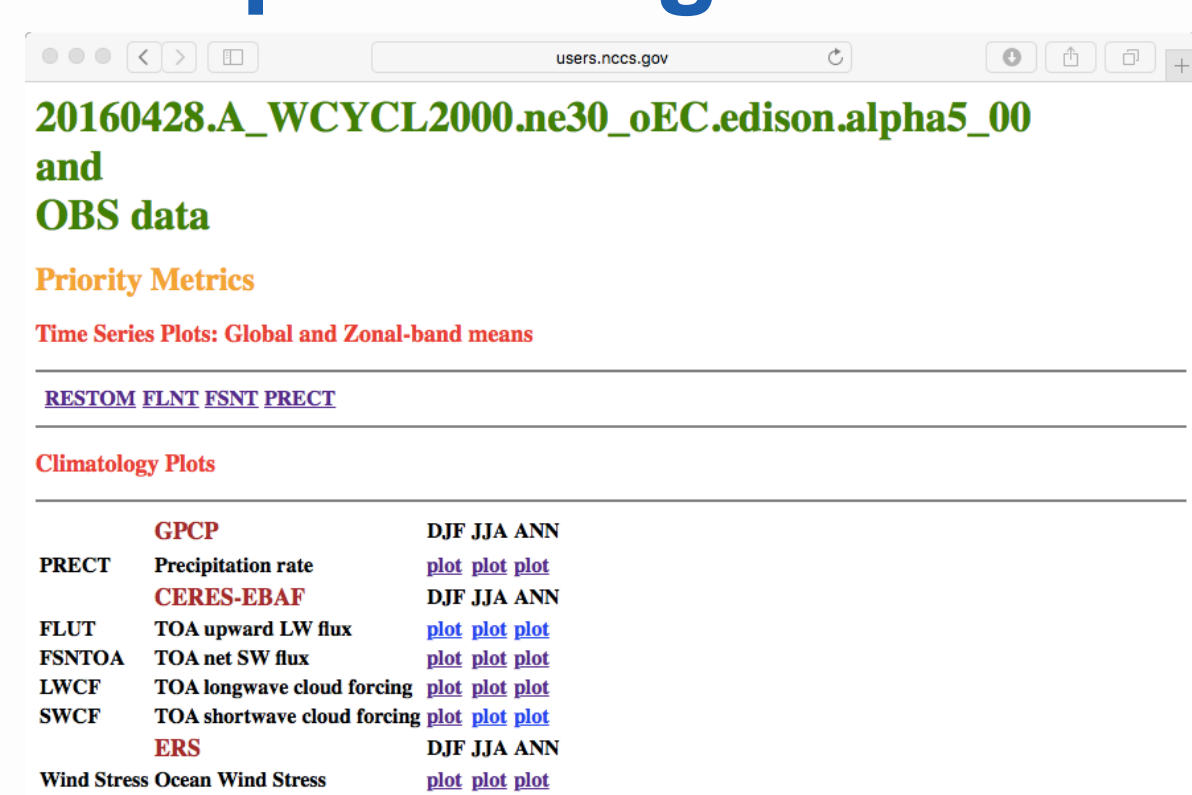
Impact of NAO is captured by a linear NAO index-dependent parameter in μ

The parameters are estimated by using the maximum likelihood method, which maximizes the probability of the occurrence of each of the annual maximum values in $G(z)$

Tier1b Atmospheric Diagnostics

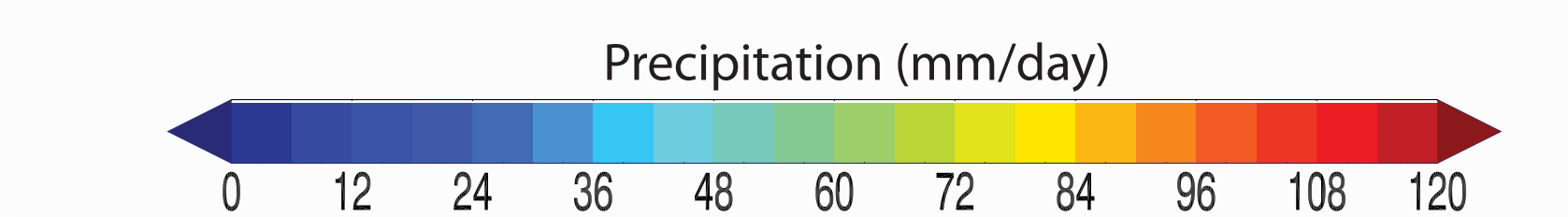
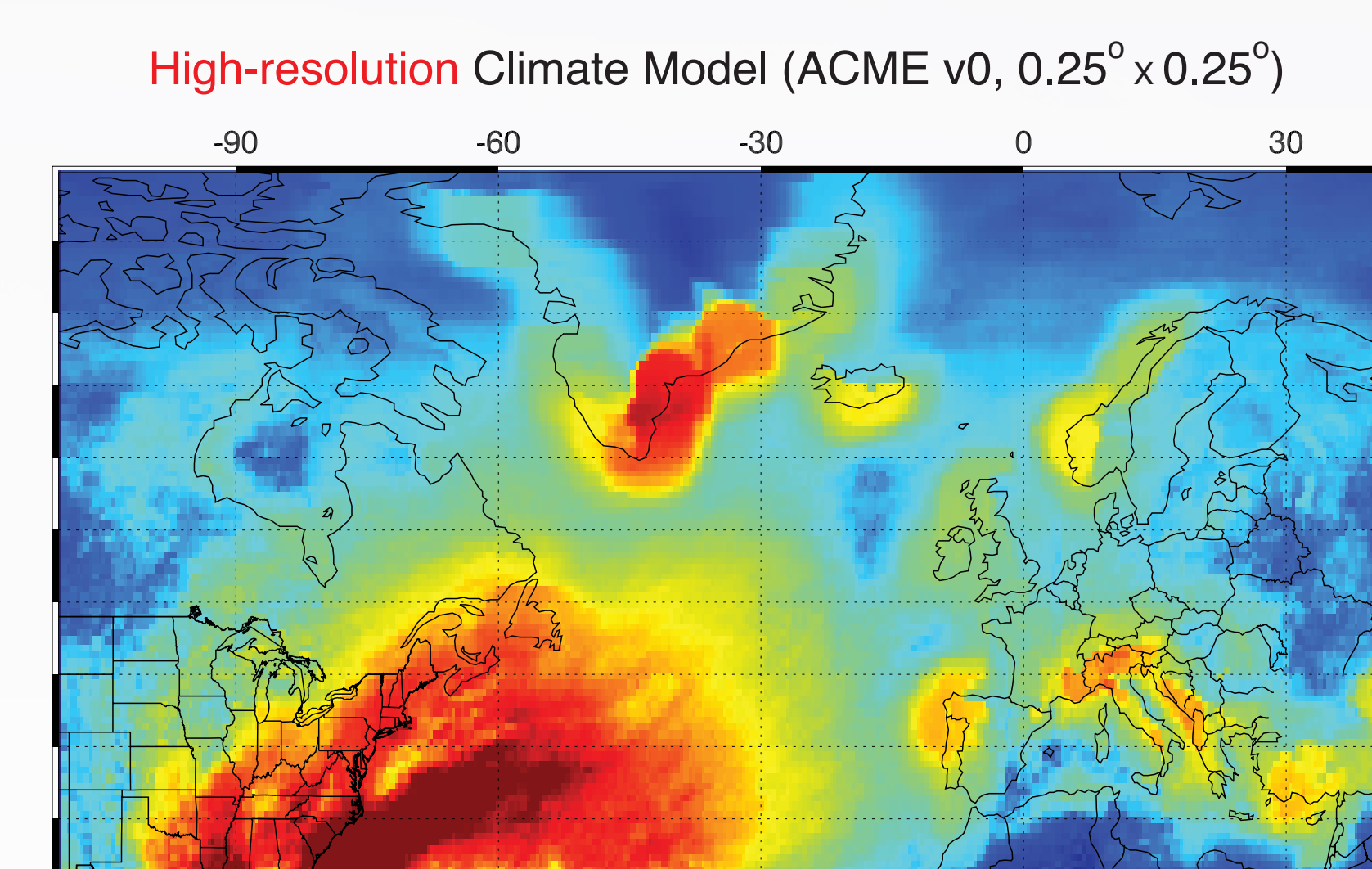
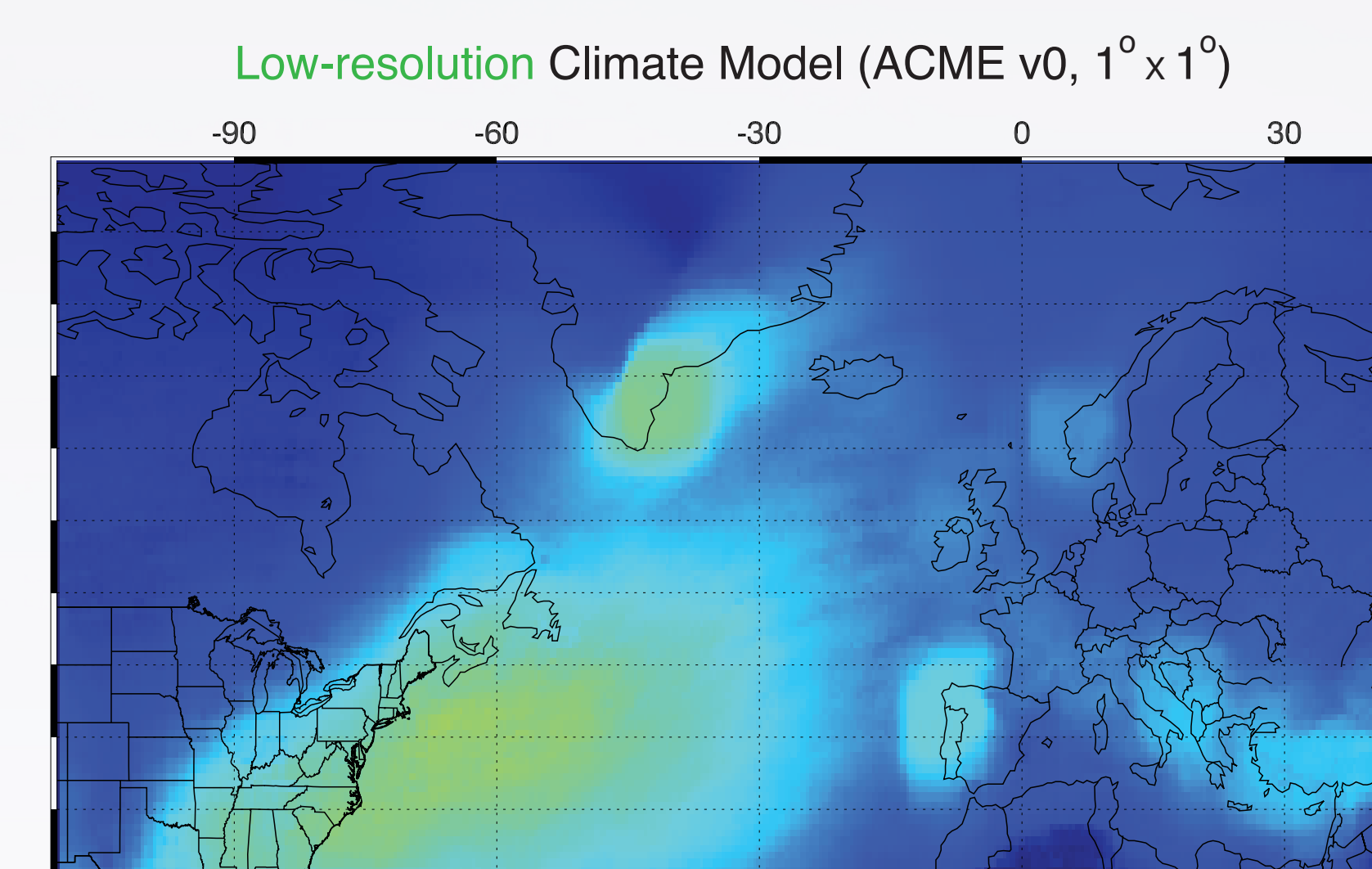
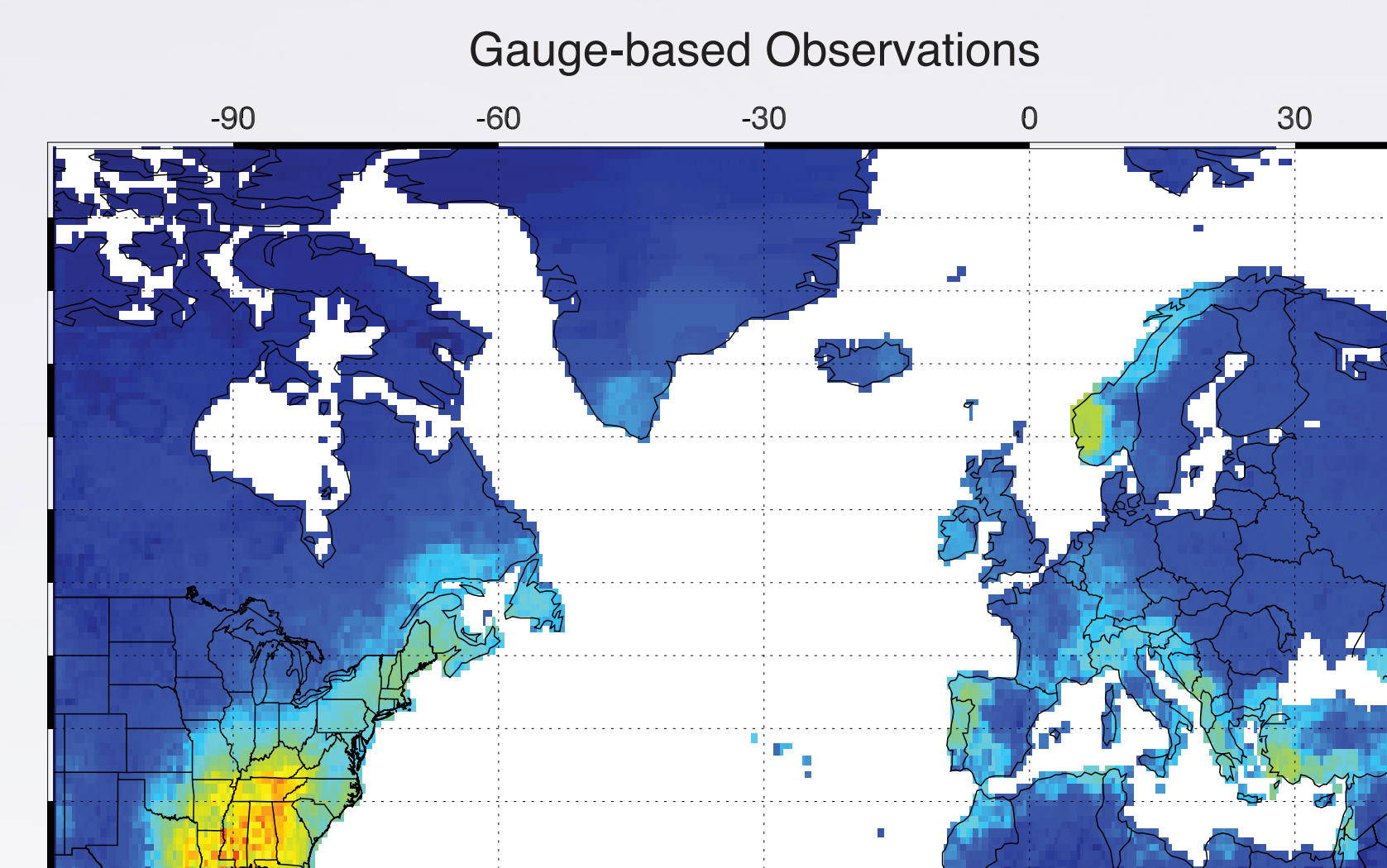


Coupled Diagnostics:



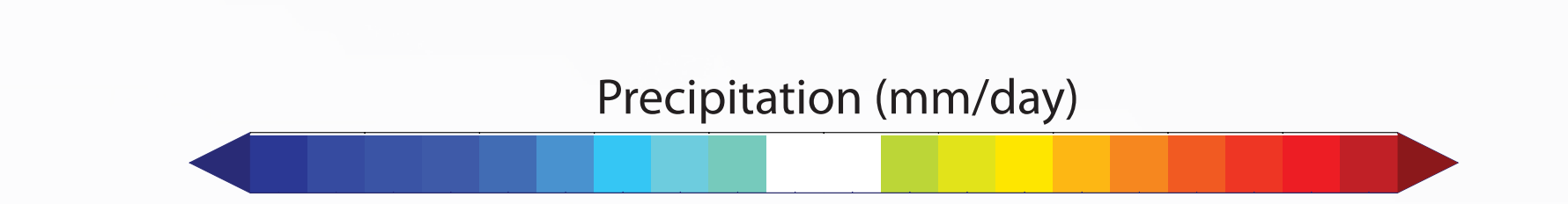
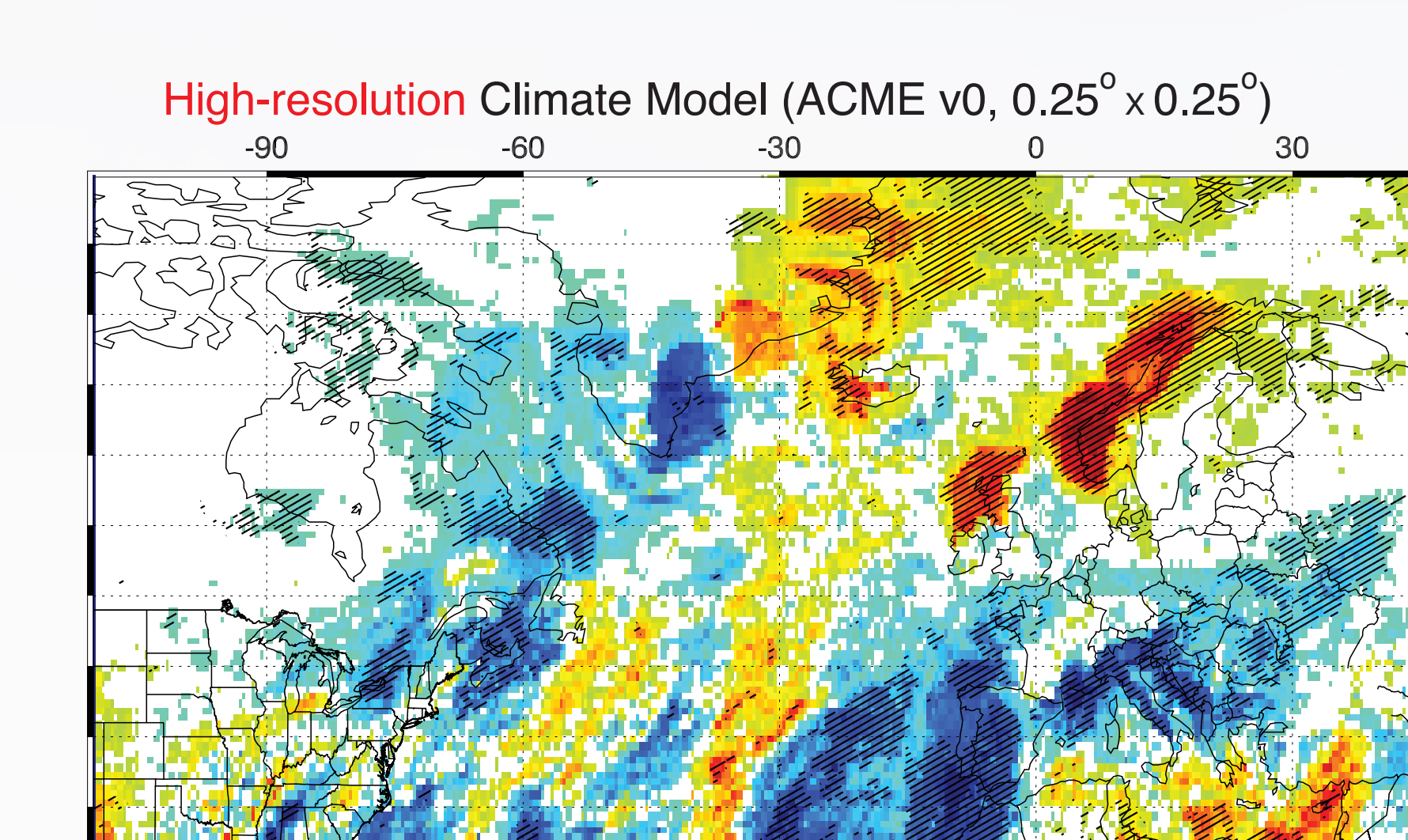
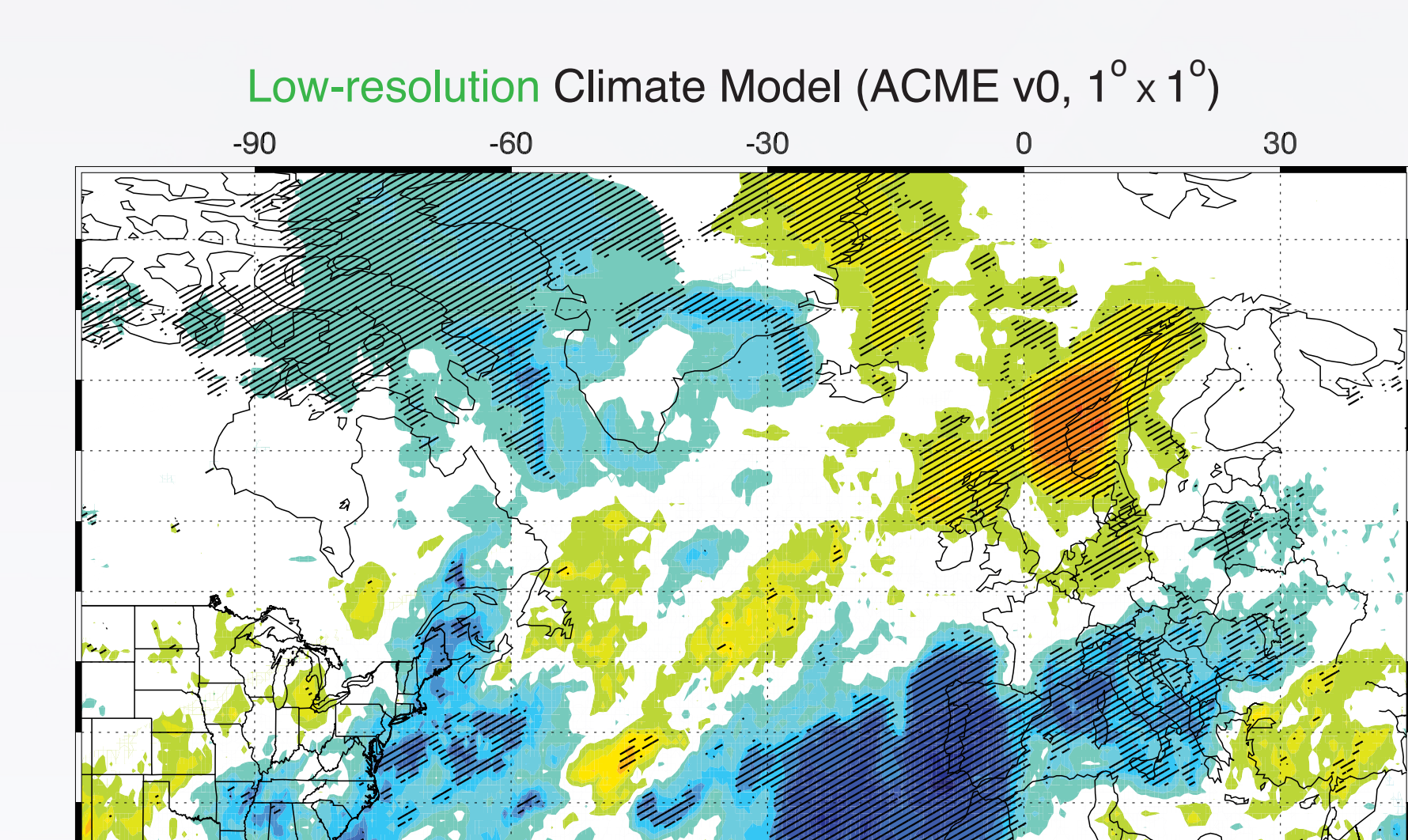
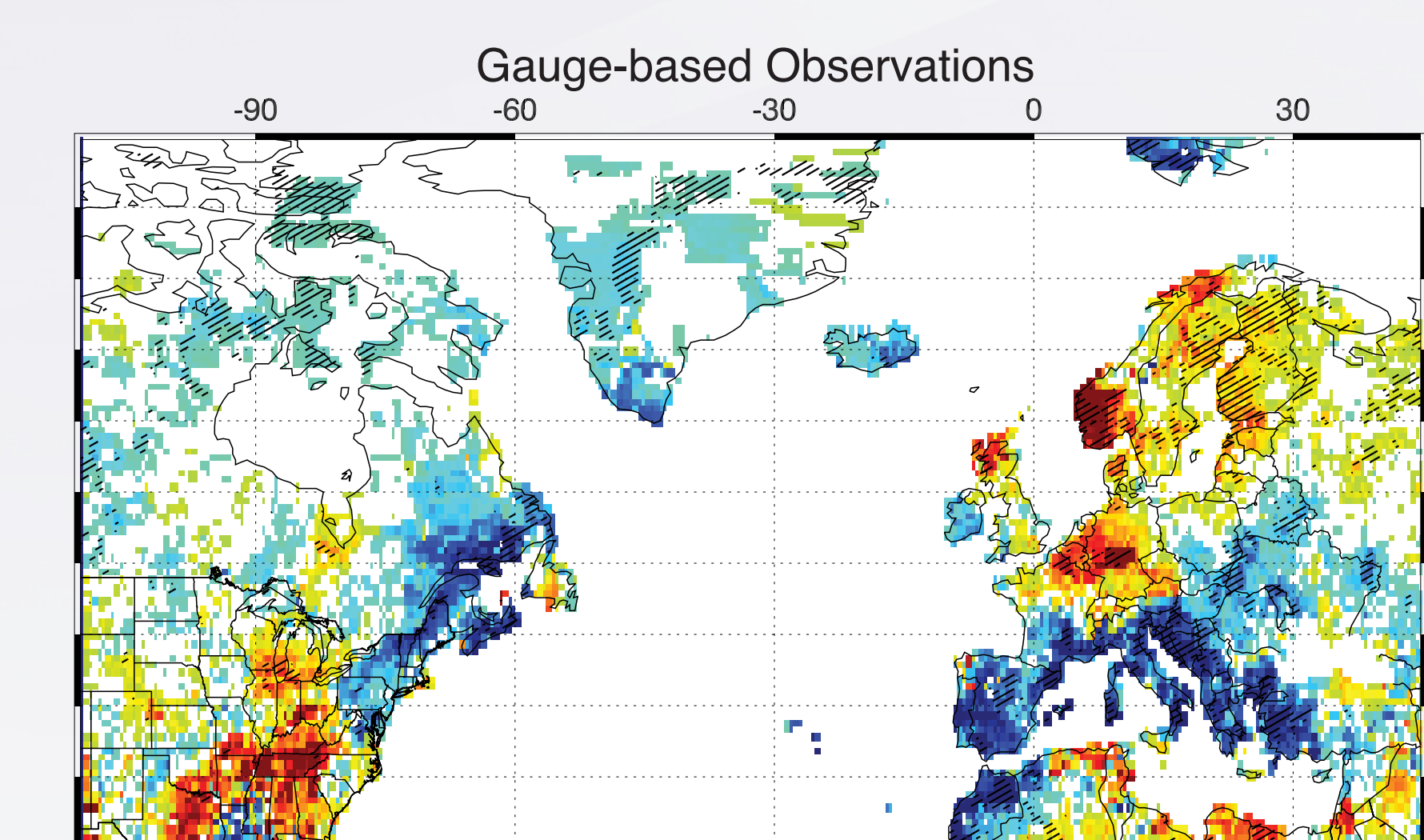
Impact

Stationary Extremes:



Location Parameter of the Generalized Extreme Value distribution fits of winter maximum of precipitation at each grid point with sampling using a regionalization framework. High resolution model simulates better stationary extremes statistics.

NAO Teleconnections:



NAO Teleconnections. Positive NAO phases are associated with stronger winter extreme precipitation events in Northern Europe and milder extremes over Western Europe. High resolution model simulates NAO teleconnections better over Europe.

Summary:

High resolution model generates stronger extremes, stronger than CPC in many regions.

High resolution model seems to better capture impact of NAO on extremes

- Due to stronger extremes?
- Better response to NAO?

Similar techniques can be used to quantify the impacts of ENSO, AMO, PDO, etc. on extremes.