

Discussion of Extremes & Summer 2018

Brian Hoskins

**Professor of Meteorology, University of Reading
Chair Grantham Institute, Imperial College London**

Outline

How do we define the Extreme(s) of Summer 2018?

Almost simultaneous daily extremes: a large amplitude wave around the NH

Persistent warmth over two months or more in W European region:

persistent anticyclone there with jet poleward & weakened

Importance of dry land at the start of the summer

With global warming, is this “the new normal”?

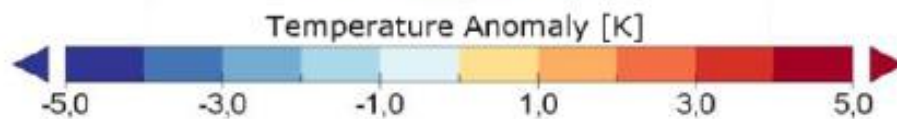
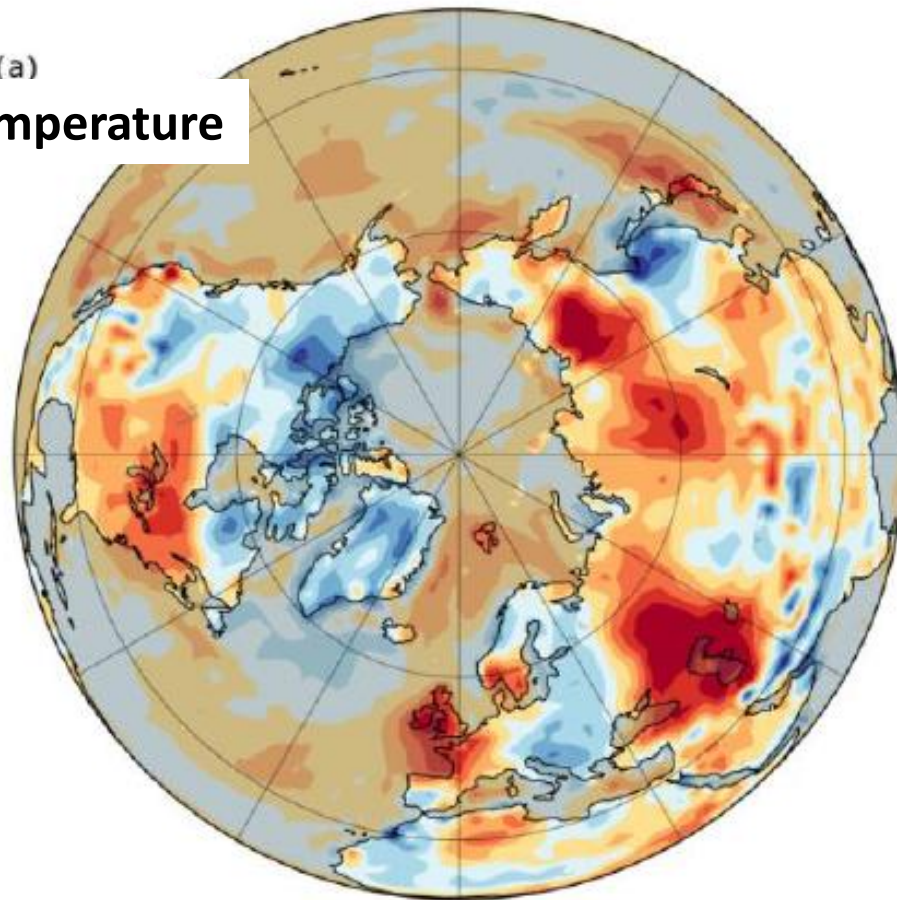
Can climate models simulate the processes that lead to extremes:

recurrent blocking and amplified, persistent waves?

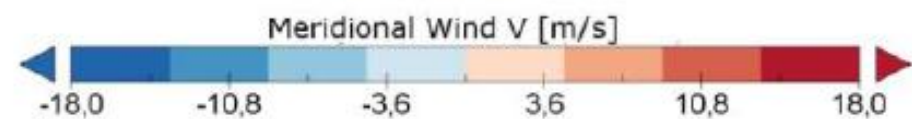
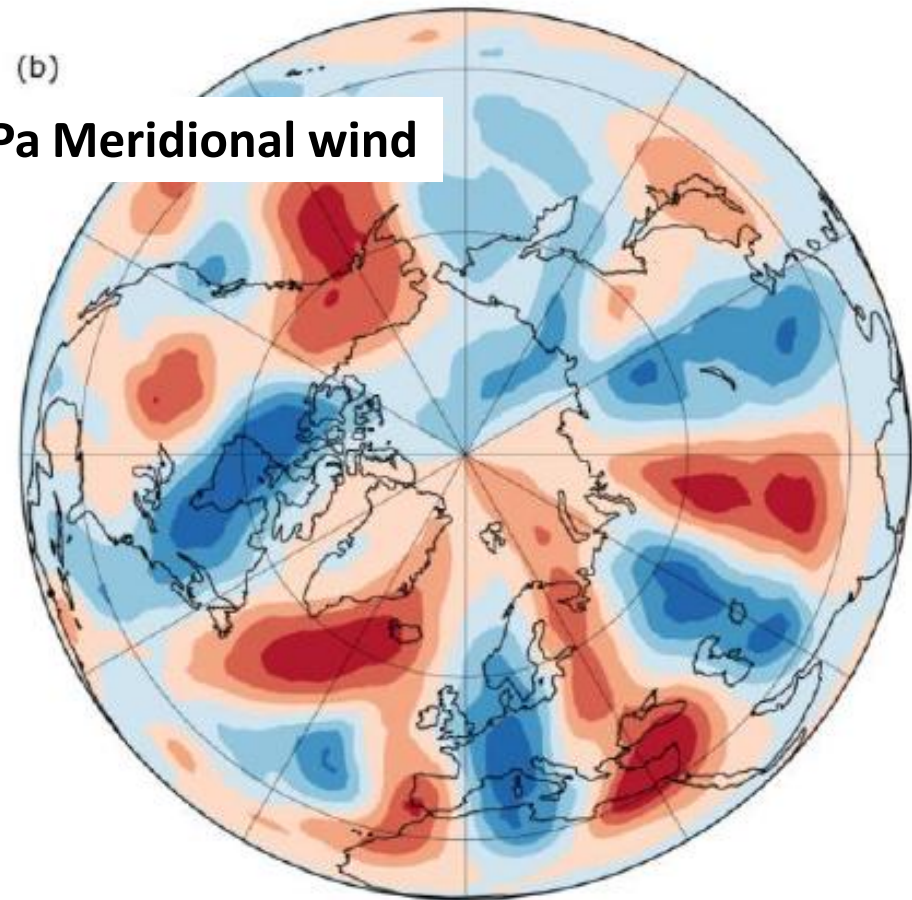
Anomalies 15 days around 1 July 2018

Kornhuber et al 2019

(a)
Surface Temperature

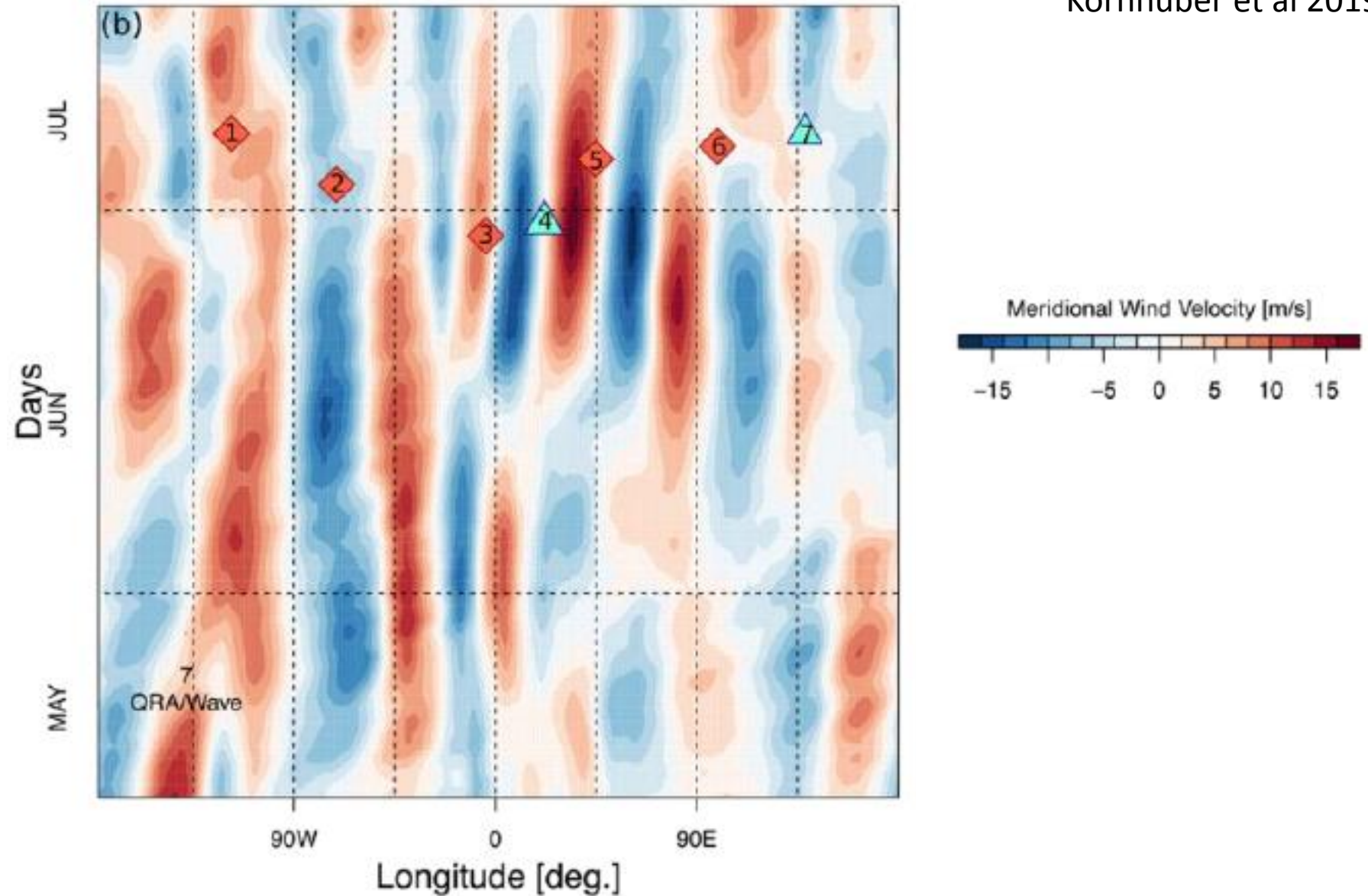


(b)
250hPa Meridional wind



Hovmoller of 250hPa v 37.5N-57.5N

Kornhuber et al 2019



Outline

How do we define the Extreme(s) of Summer 2018?

Almost simultaneous daily extremes: a large amplitude wave around the NH

Persistent warmth over two months or more in European region:

persistent anticyclone there with jet poleward & weakened

Importance of dry land at the start of the summer

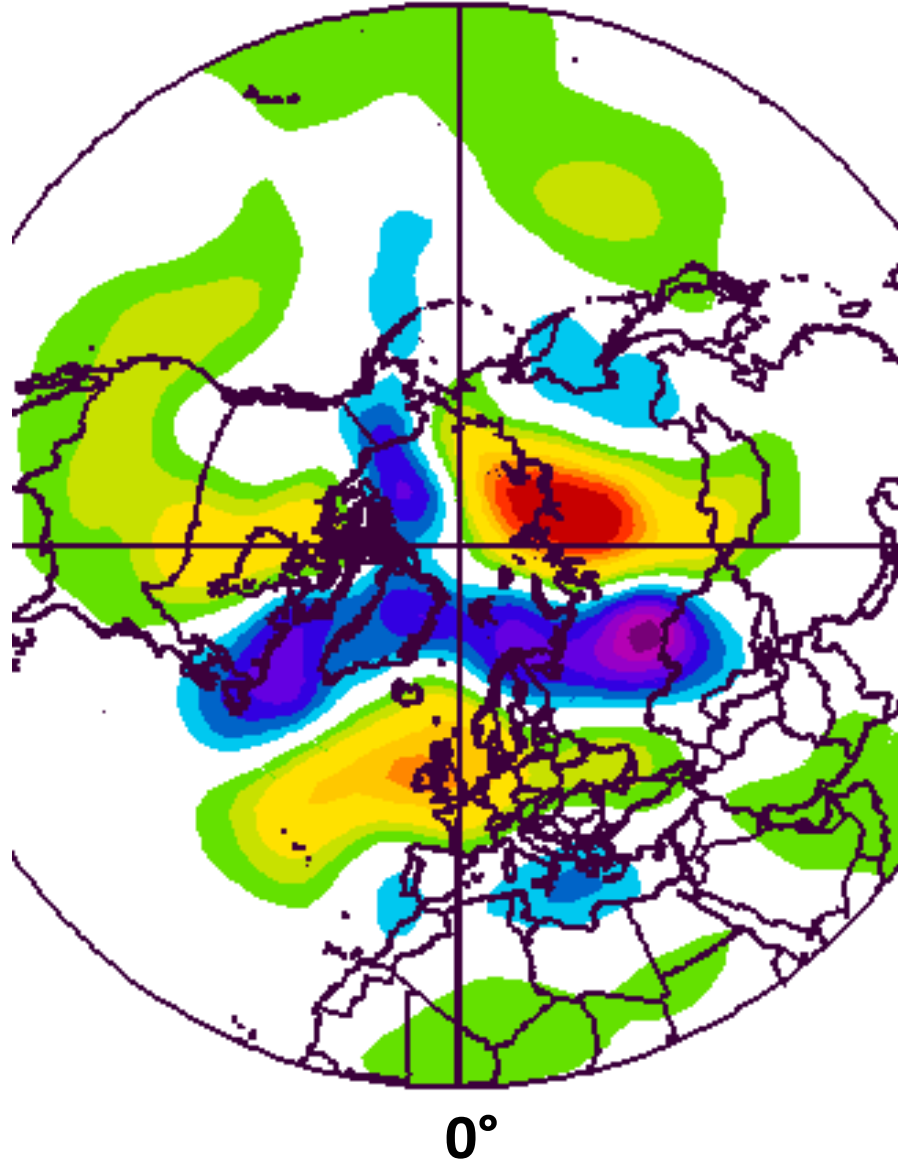
With global warming, is this “the new normal”?

Can climate models simulate the processes that lead to extremes:

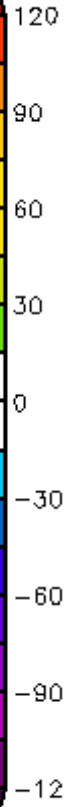
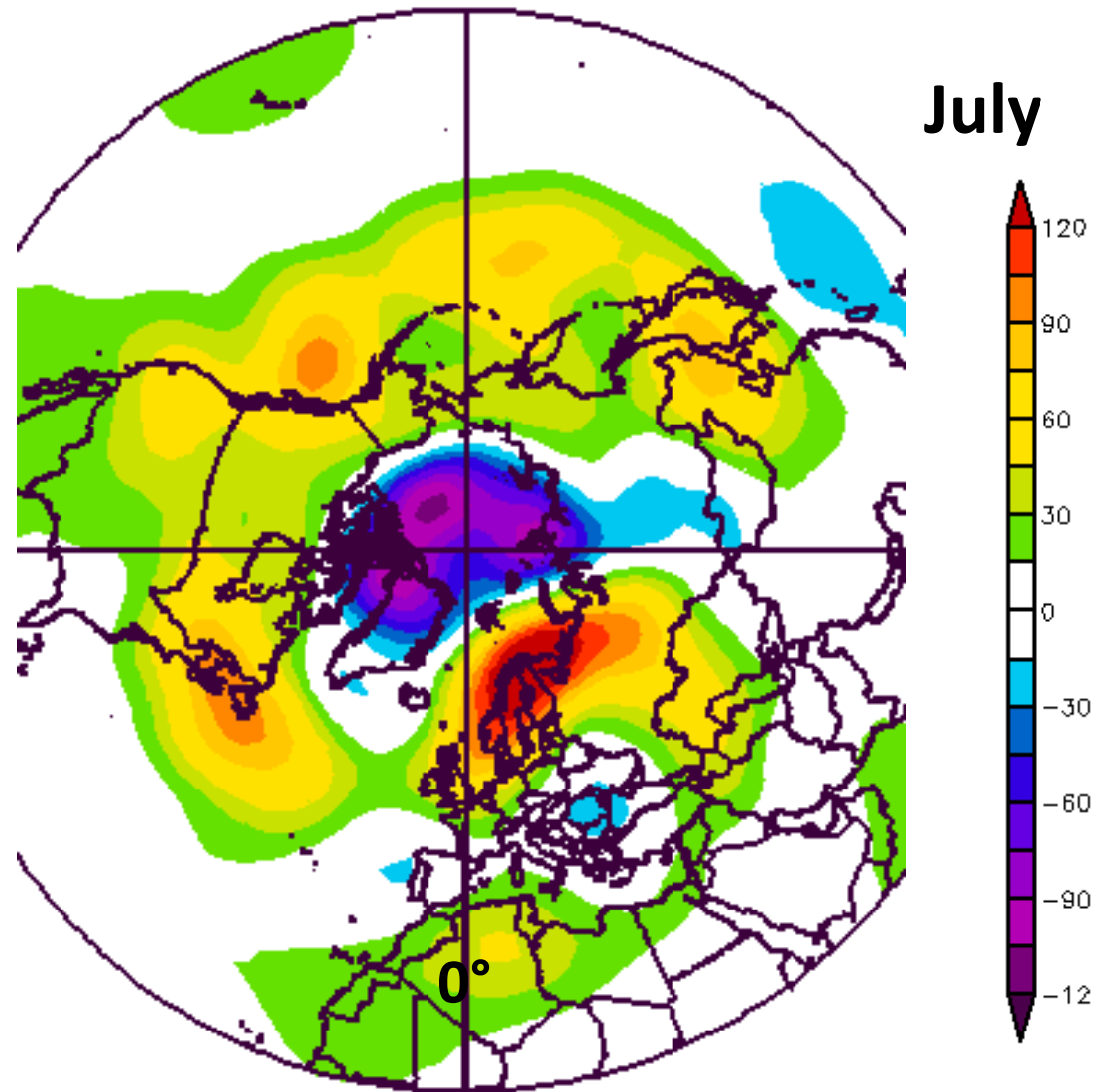
recurrent blocking and amplified, persistent waves

500Z Anomalies for June & July 2018

June



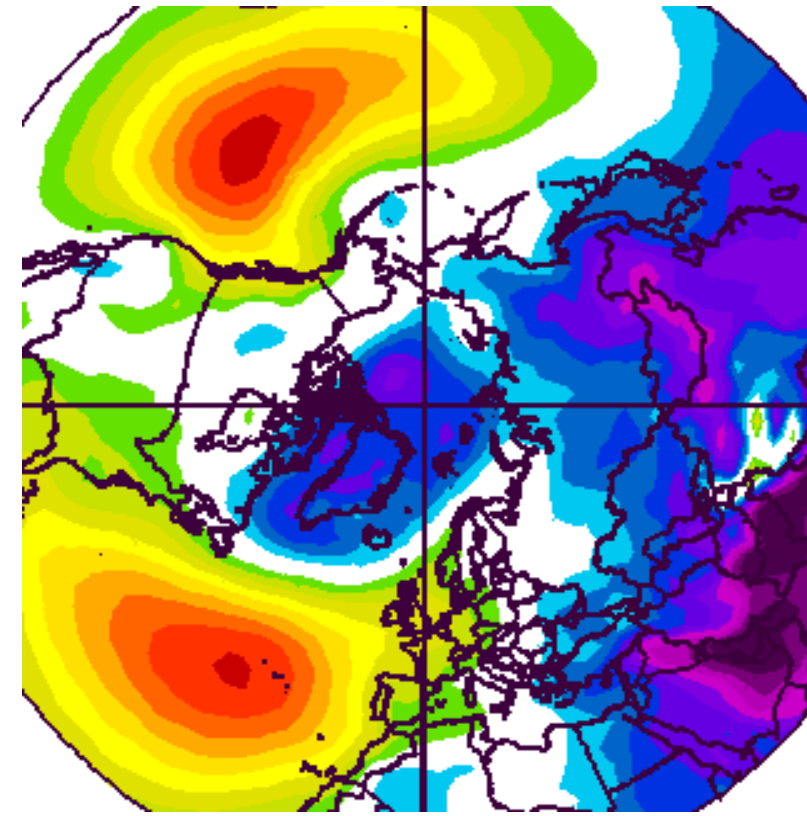
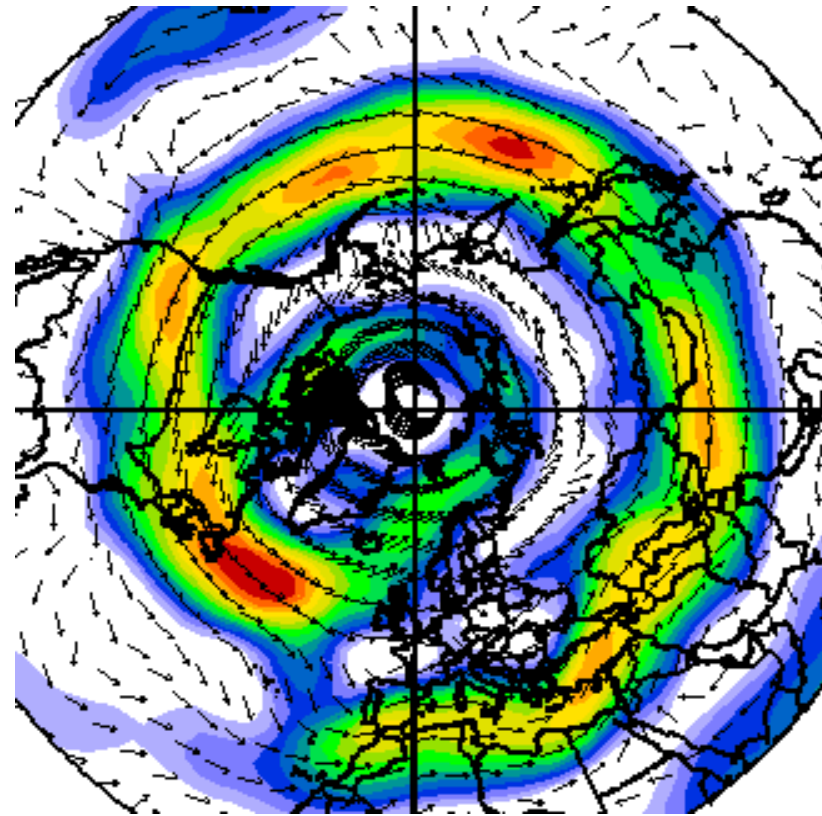
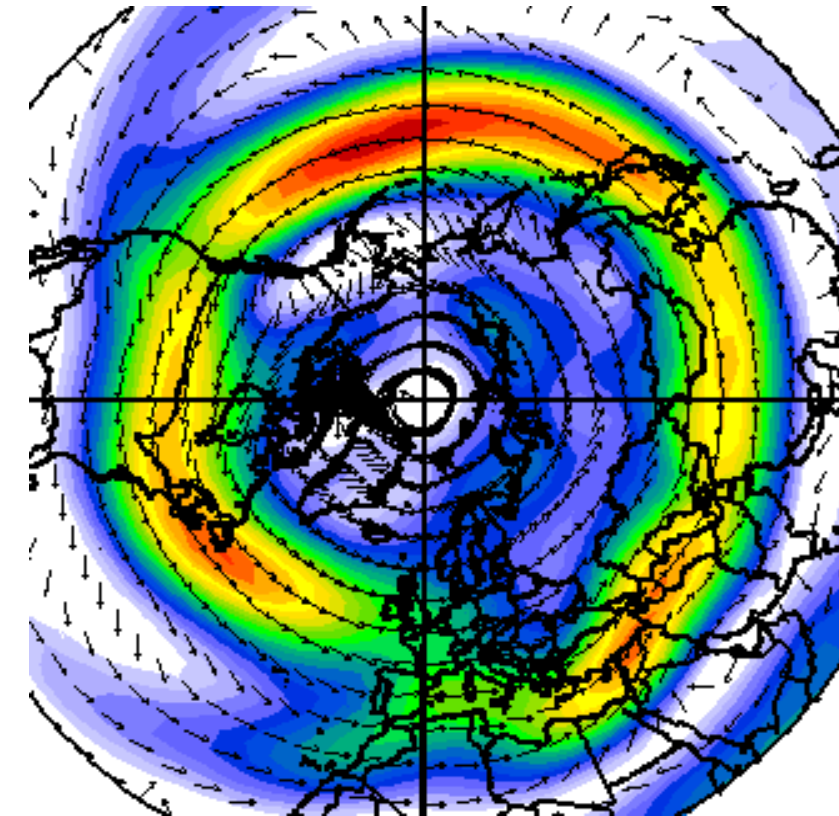
July



June & July 2018

300hPa winds

MSLP



Climatology

2018

Outline

How do we define the Extreme(s) of Summer 2018?

Almost simultaneous daily extremes: a large amplitude wave around the NH

Persistent warmth over two months or more in W European region:

 persistent anticyclone there with jet poleward & weakened

 Importance of dry land at the start of the summer

With global warming, is this “the new normal”?

Can climate models simulate the processes that lead to extremes:

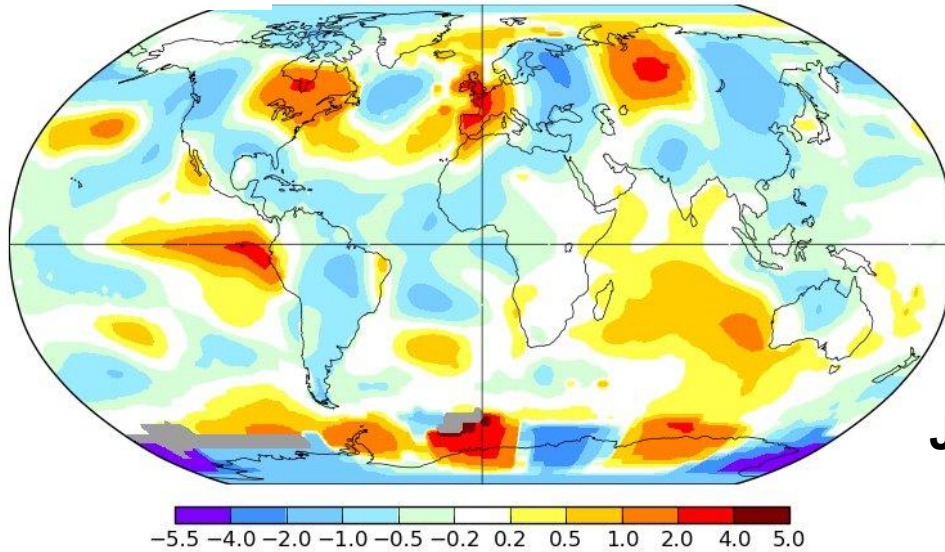
recurrent blocking and amplified, persistent waves?

Two hot Junes in the UK: 1976 & 2018

June 1976

L-OTI(°C) Anomaly vs 1951-1980

-0.15

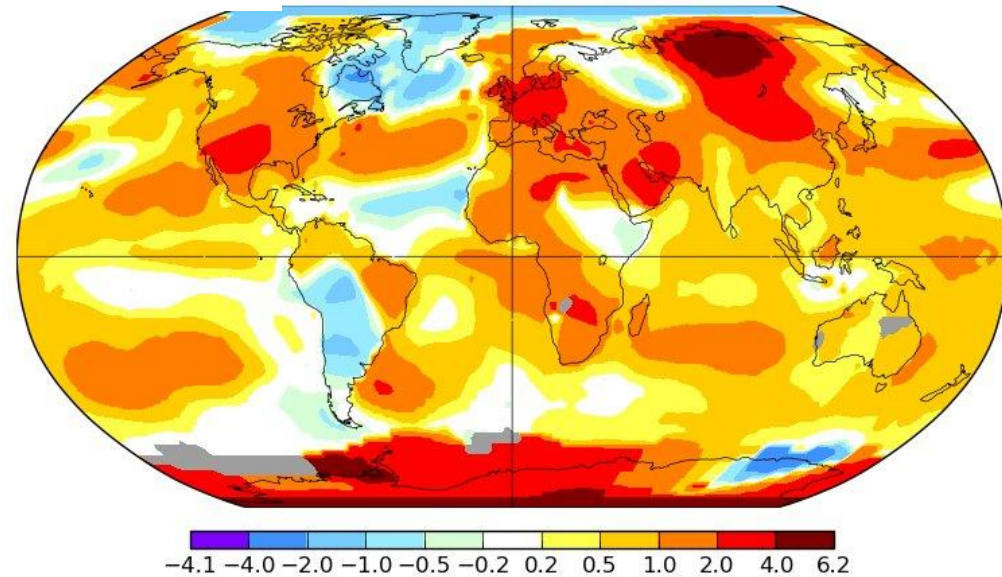


T_s anomalies both from 1951-80 background

June 2018

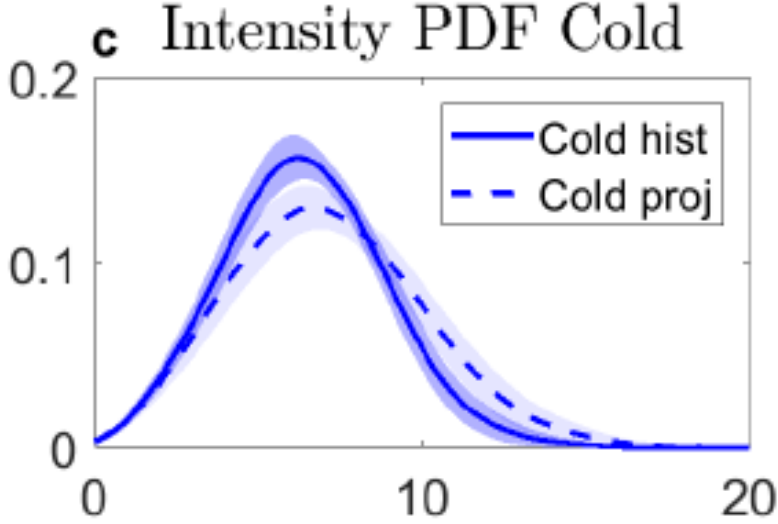
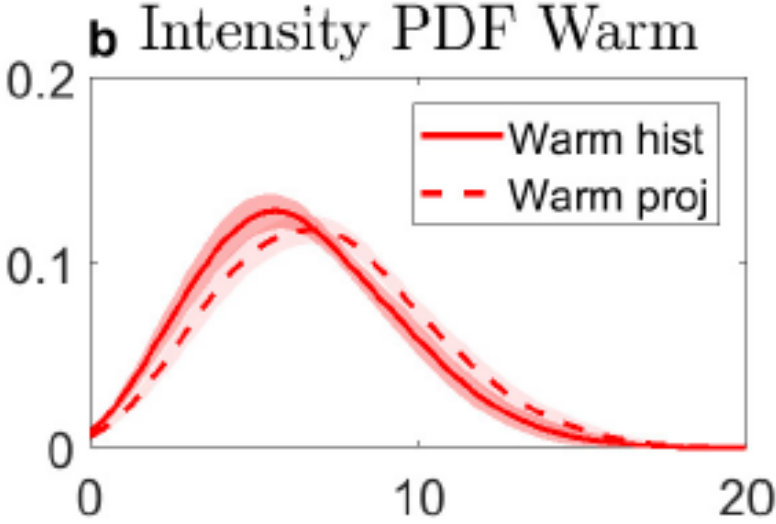
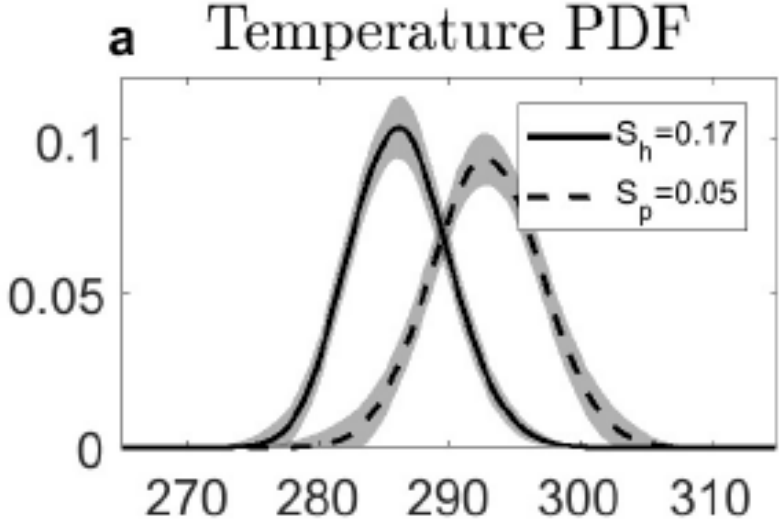
L-OTI(°C) Anomaly vs 1951-1980

0.78



CMIP5 Model Simulations of W European Summer Temperatures at end of 20th and 21st Centuries

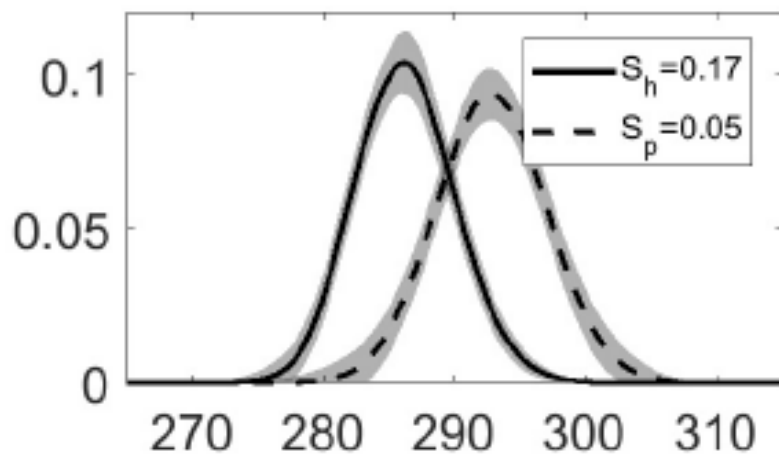
Tamarin et al 2019?



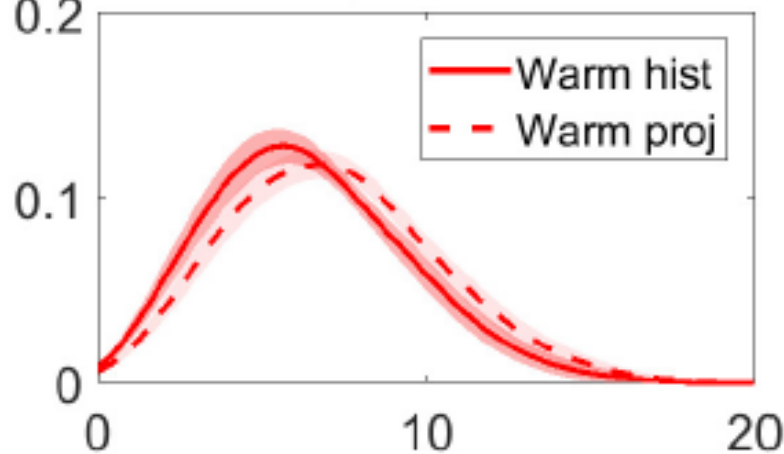
CMIP5 Model Simulations of W European Summer Temperatures at end of 20th and 21st Centuries

Tamarin et al 2019?

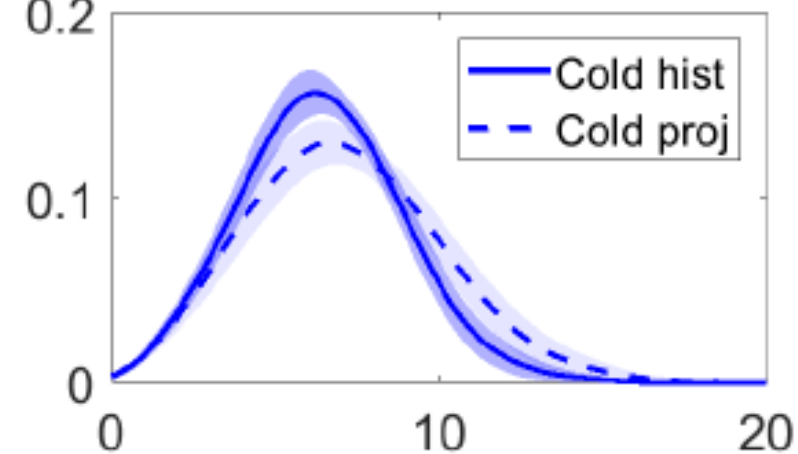
a Temperature PDF



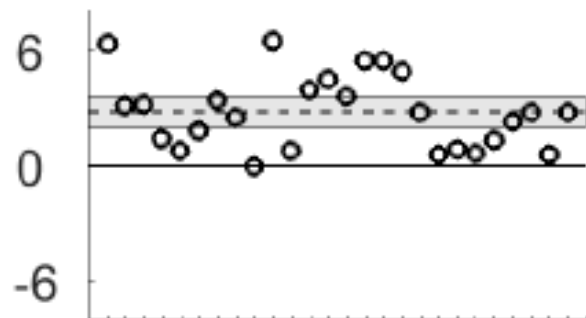
b Intensity PDF Warm



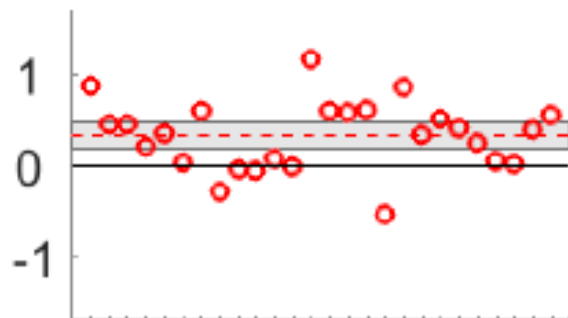
c Intensity PDF Cold



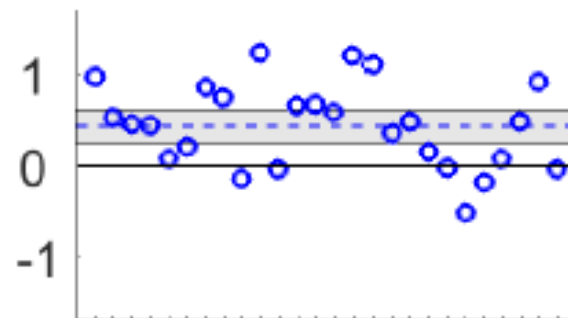
d $\overline{T'^2}$ change



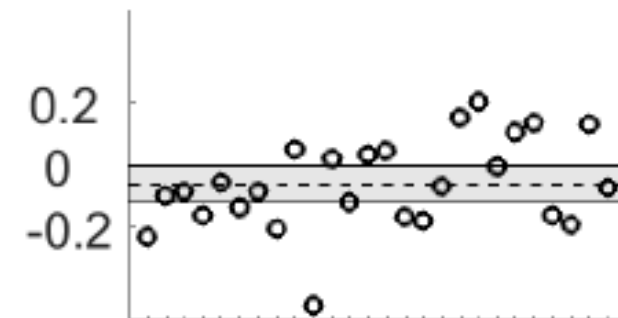
e $|T'|$ Warm change



f $|T'|$ Cold change

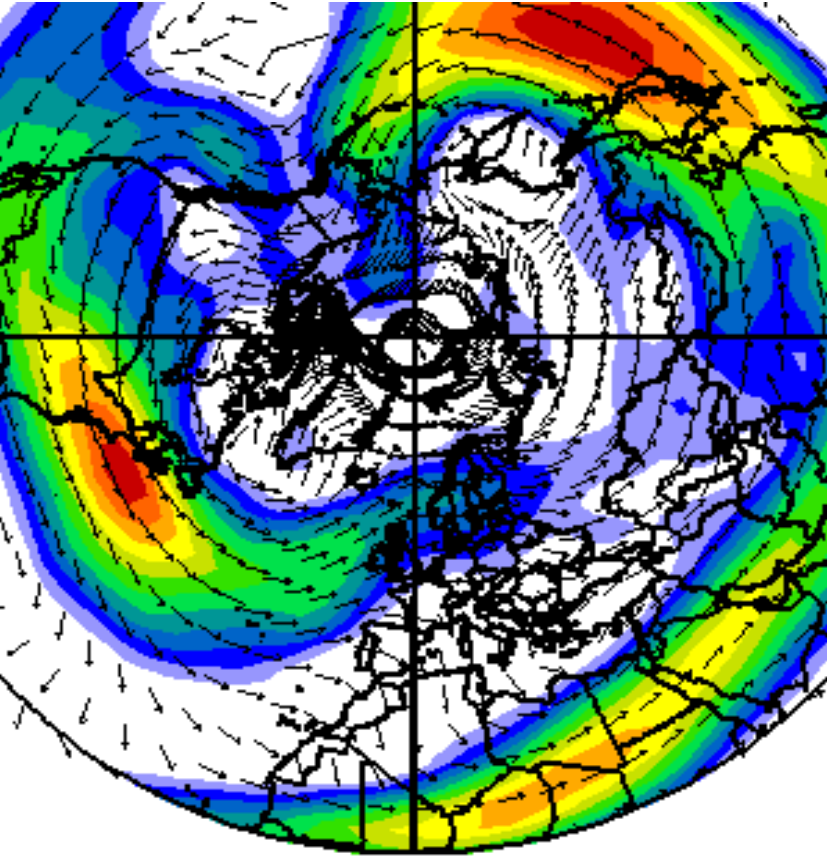


g Skewness change

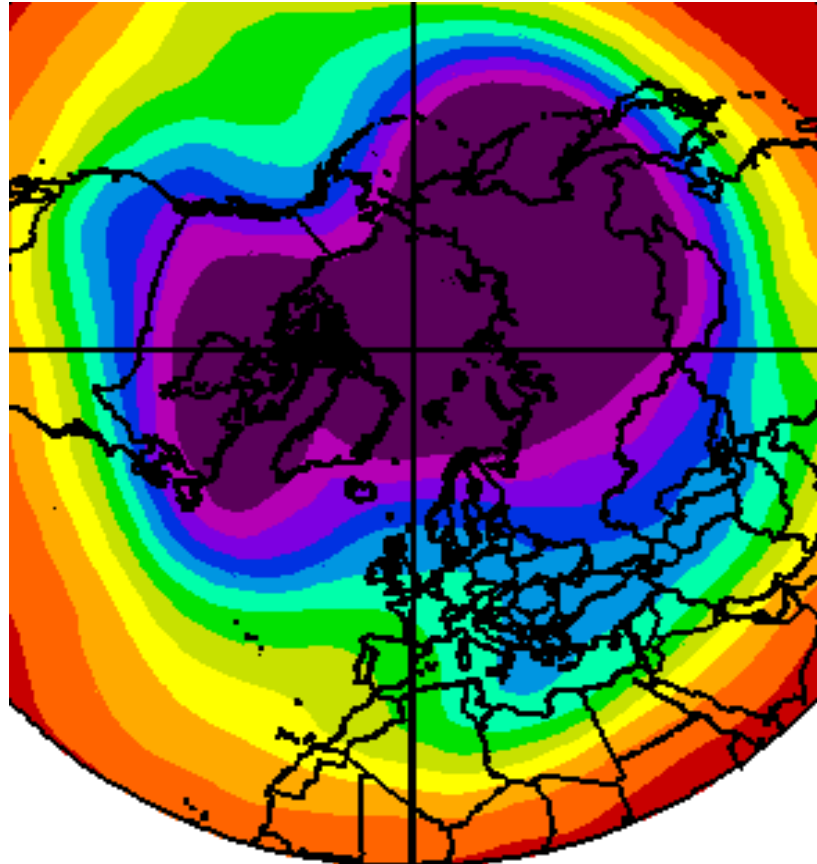


Feb 2019: Record high UK temperatures

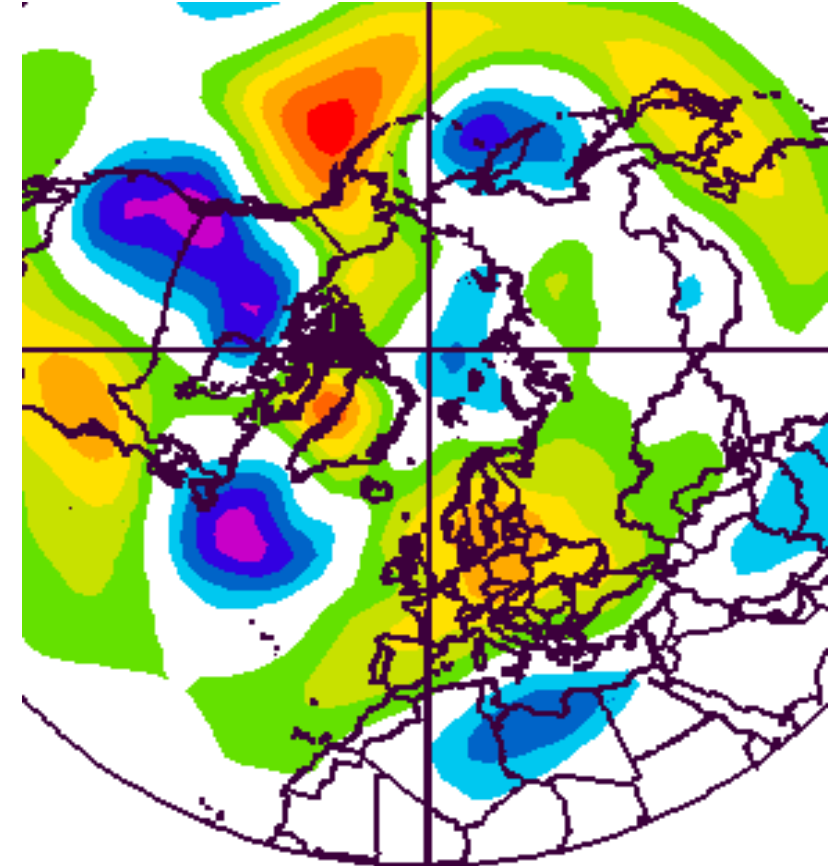
500hPa wind



500hPa T



500hPa T anomaly



European record monthly rainfall in Crete ~ 1250mm

Outline

How do we define the Extreme(s) of Summer 2018?

Almost simultaneous daily extremes: a large amplitude wave around the NH

Persistent warmth over two months or more in W European region:

persistent anticyclone there with jet poleward & weakened

Importance of dry land at the start of the summer

With global warming, is this “the new normal”?

Can climate models simulate the processes that lead to extremes:

recurrent blocking and amplified, persistent waves?