



# Climate predictive drivers for the Mediterranean region

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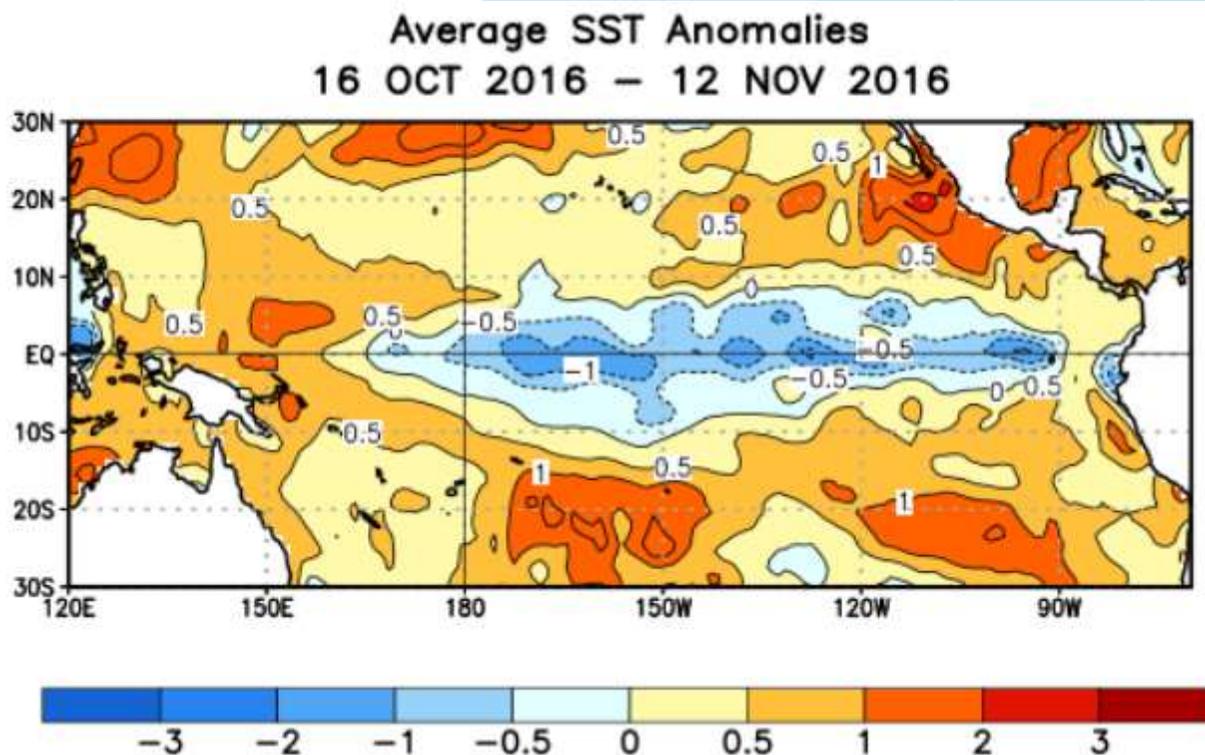
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# Overview

- SSTs
  - Tropical SSTs
    - El Nino
    - Tropical Atlantic Variability
  - North Atlantic
    - Lagged SSTs (May SSTs)
    - Present SSTs (cold blob)
  - Decadal variability in oceans
- Snow cover
- Arctic Sea ice
- Lower Stratosphere
- Other factors: global warming

# El Niño

El Niño will likely be in a weak negative phase). La Niña is slightly favored to persist (~55% chance) through winter 2016-17.



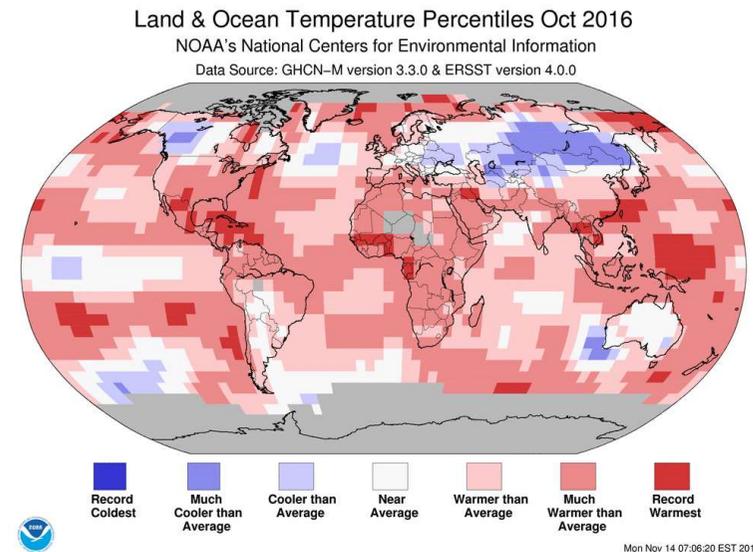
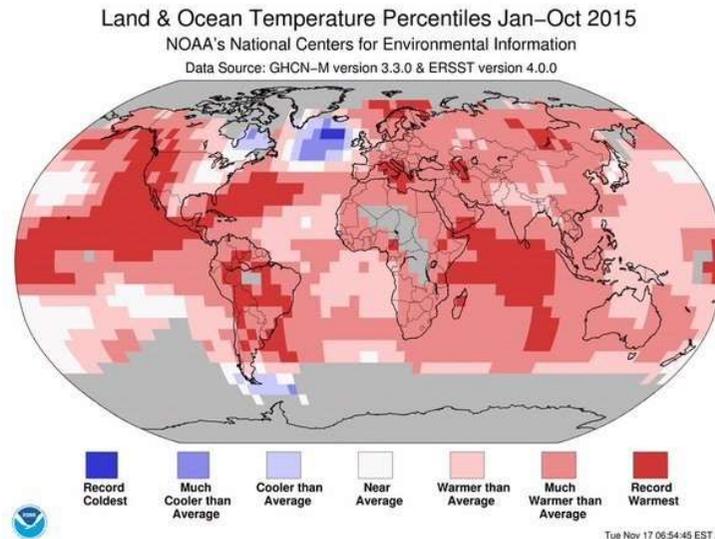
Source: [http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/lanina/enso\\_evolution-status-fcsts-web.pdf](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf)

Positive NAO?

# Temperature/Cold Blob in the North Atlantic

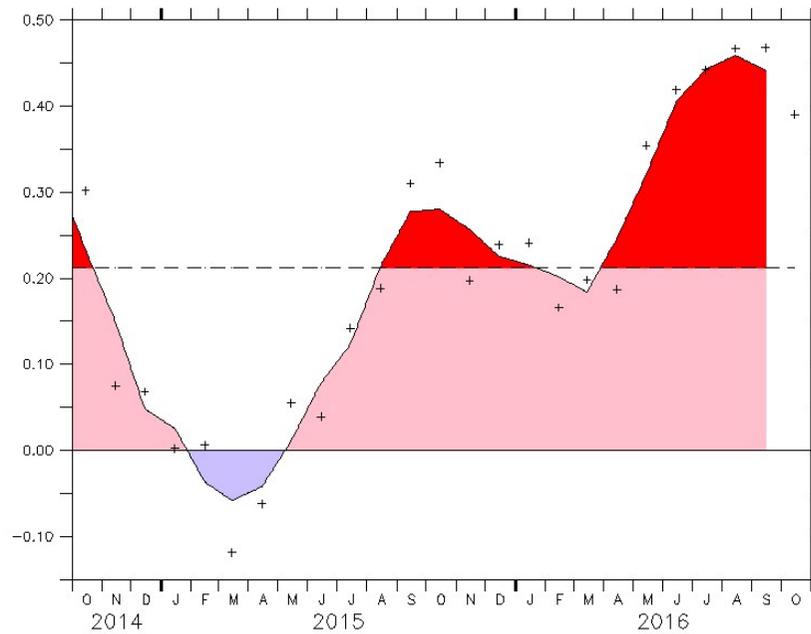
October 2016

October 2015



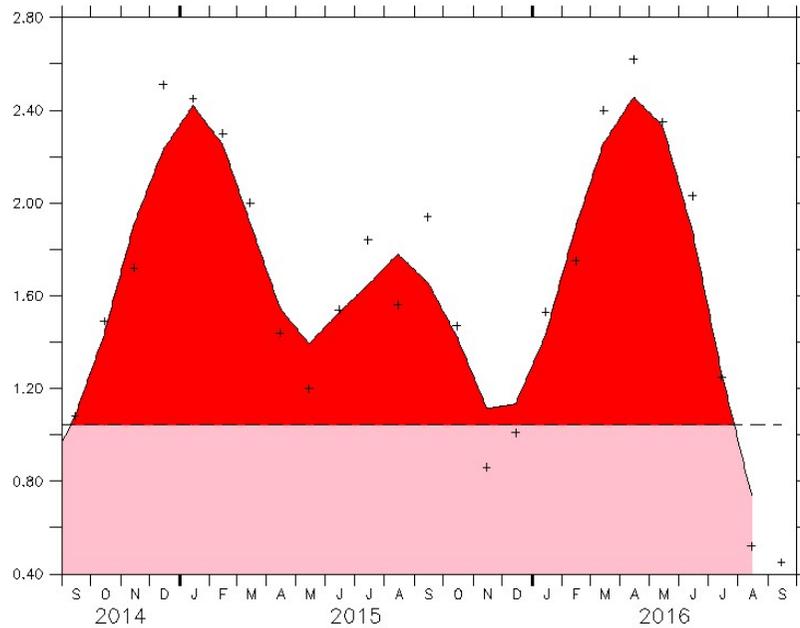
1. Reduced cold blob in 2016 compared to 2015. Possible effects on the jet stream position in the Atlantic-European area. Impact on winter conditions over Europe?
2. Please note the contrast in temperature anomalies in Siberia (very cold) and Arctic (very warm) which could influence the jet stream position in the NH.

# AMO phase



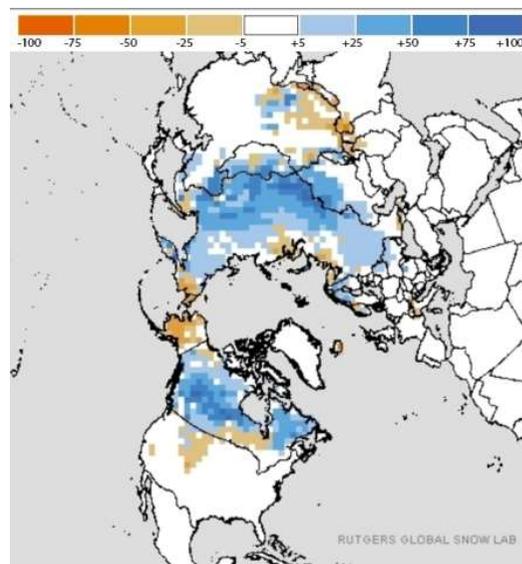
Source: <http://stateoftheocean.osmc.noaa.gov/atm/amo.php>

# PDO phase

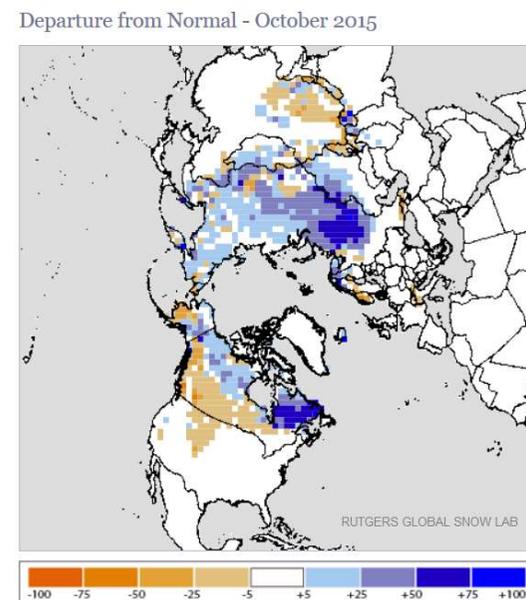


Source: <http://stateoftheocean.osmc.noaa.gov/atm/pdo.php>

## Snow cover anomalies 2016



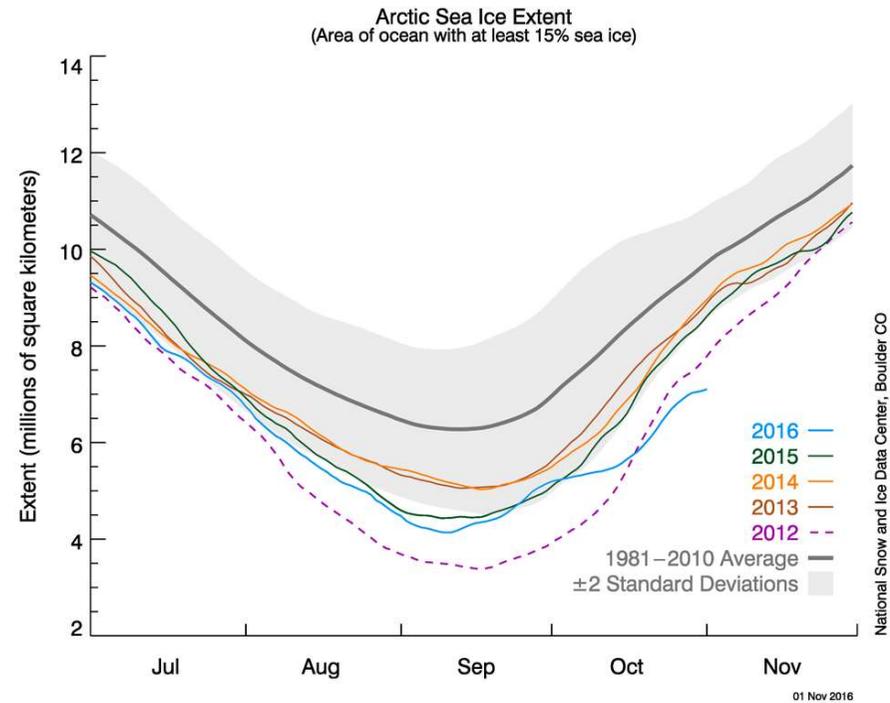
## Snow cover anomalies 2015



Source: Rutgers University (USA)  
<http://climate.rutgers.edu/snowcover>

Extended snow cover over the Southern Siberia seems consistent with the negative AO/NAO.

# October Arctic Sea Ice



Source: NSIDC (USA)

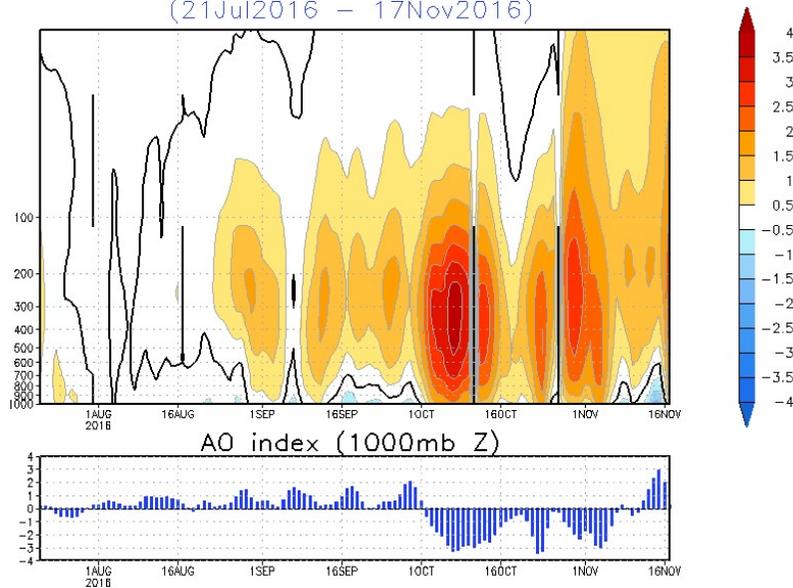
[http://nsidc.org/data/seaice\\_index/](http://nsidc.org/data/seaice_index/)

Negative anomalies in the ice extent over Arctic regions are usually related with atmospheric blockings over Europe and Asia.

# Conditions in the stratosphere

## Weak Polar vortex

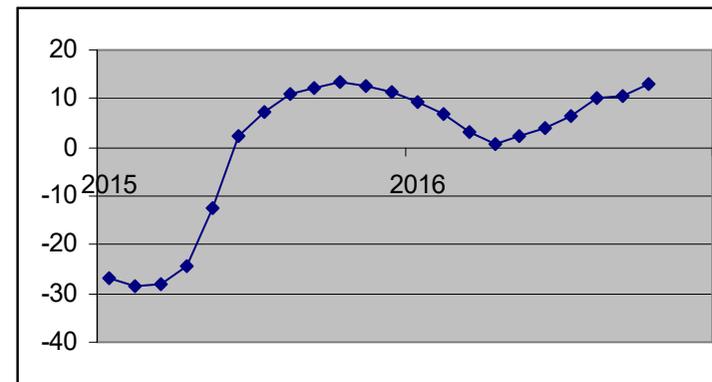
Normalized GPH anomaly (65°N–90°N)  
(21Jul2016 – 17Nov2016)



Source: CPC (USA)

[http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily\\_ao\\_index/hgt.shtml](http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/hgt.shtml)

## Easterly QBO



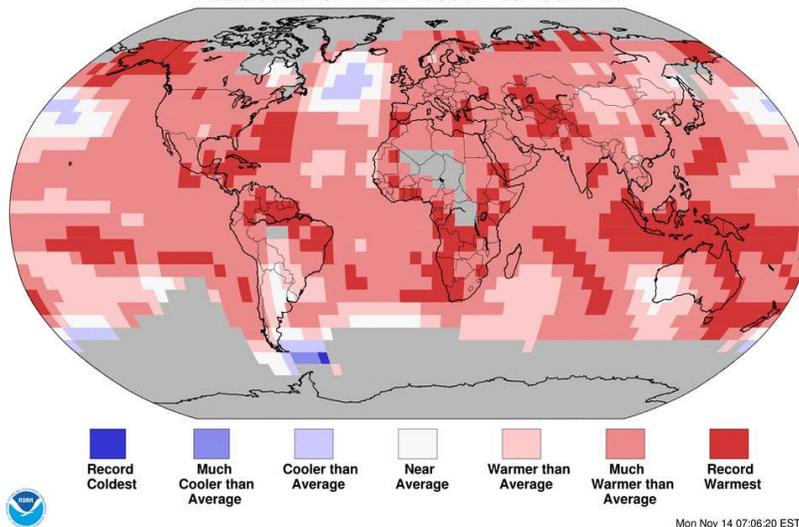
Source: NOAA

<http://www.esrl.noaa.gov/psd/data/correlation/qbo.data>

Weak polar vortex and easterly QBO are consistent with blocking circulation prevalence over the NH in winter (e.g. severe winter conditions over regions in Europe). However, we do not know if the weak polar vortex will persist into the winter.

# Global warming

Land & Ocean Temperature Percentiles Jan–Oct 2016  
NOAA's National Centers for Environmental Information  
Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0



Source: NOAA

2016 is virtually certain the hottest year in archives. 2016 is very likely to be in the top 10. What could tell us these information about the prospects for the winter 2016-2017 in the MedCOF region? Unfortunately, not very much. On these scales, natural variability is still stronger than the GHG-forced one.



## Preliminary (tentative) conclusions

Phenomenon/Mechanism/factor	Atmospheric blocking events in Atlantic/European area	Zonal circulations	Stratospheric warmings	NAO phase	Shifts in the jet stream position/intensity over Atlantic/European area
Weak La Nina				positive?	
Positive NAT SST index				negative	yes
<b>Cold blob in the North Atlantic</b>					<b>Northward over the Atlantic?</b>
Positive AMO					
Positive PDO					yes
May SST		enhanced		positive	Northward over Europe?
More snow cover extent in Eurasia	enhanced		?	negative	Southward over Europe?
Reduced Arctic sea ice concentration	enhanced			negative	yes
Strong/Weak polar vortex		enhanced /diminished (first part of the winter)		Positive/negative	Northward /Southward over Europe?
Easterly QBO		reduced		negative	Southward over Europe?