The k-means cluster analysis of the Arctic sea ice and the Northern Hemisphere climate variability

Neven S. Fučkar[1] (neven.fuckar@ic3.cat) and Virginie Guemas[1,2]

[1]Institut Català de Ciències del Clima (IC3), Barcelona, Spain; [2]Centre National de Recherches Météorologiques/Groupe d'Etude de l'Atmosphère Météorologique, Météo-France, CNRS, Toulouse, France

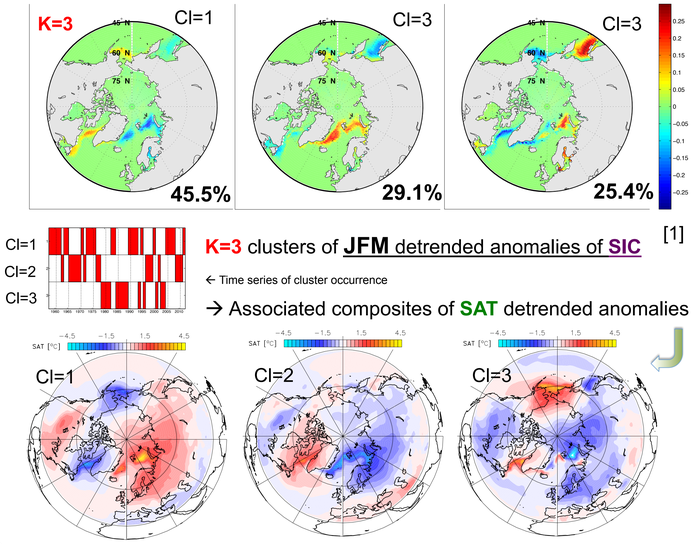
MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

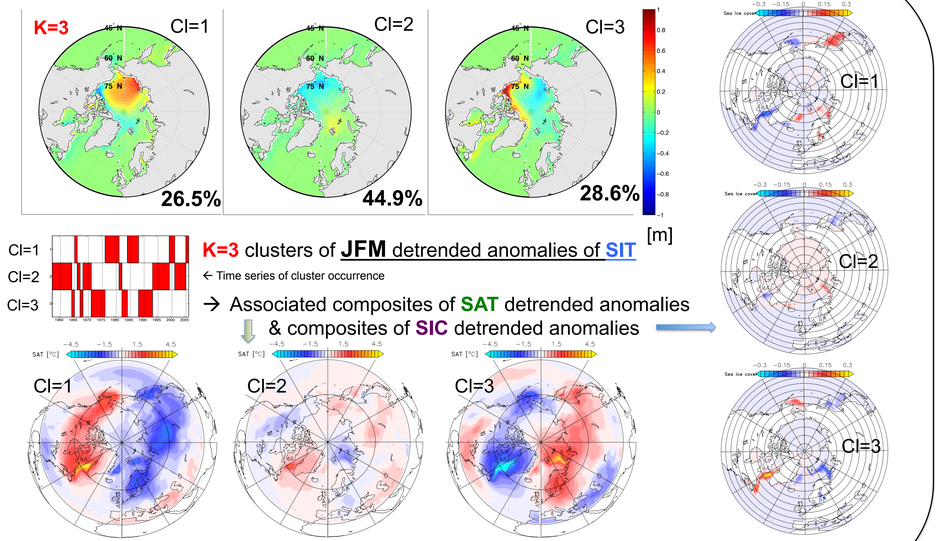
SEVENTH FRAMEWORK PROGRAMME

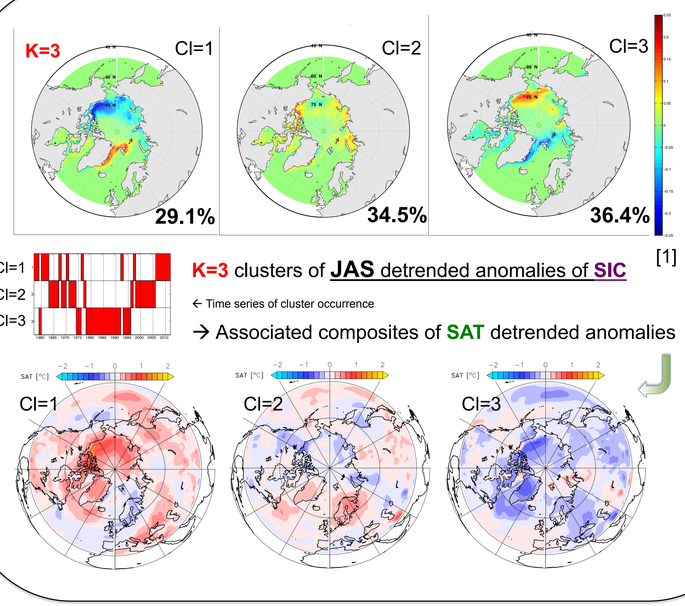
- Classification methods potentially offer a more suitable framework for determination of the key modes of sea ice and climate variability than EOF

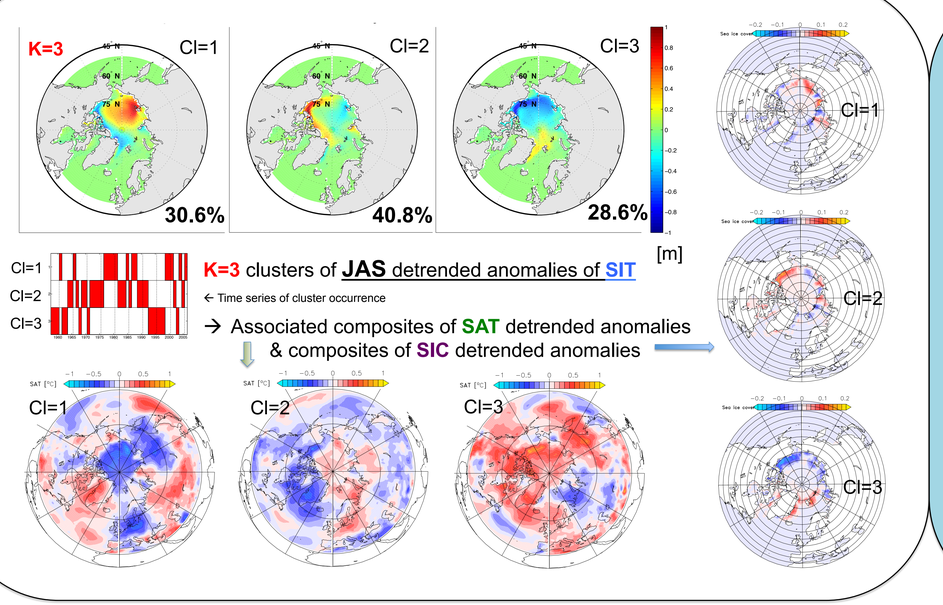
⇒ focus on the k-means cluster analysis:
Nonhierarchical classification method that finds patterns of variability and their discrete times of occurrence to minimize the variance between the elements of a given cluster and maximizes the variance between different cluster patterns

Data: sea ice thickness (SIT) from IC3 sea ice reconstruction with NEMO3.2 (1958-2006), and HadISST sea ice concentration (SIC) and JRA-55 surface air temperature (SAT: 1958-2012)









- Cluster patterns of growing (JFM) and melting (JAS) seasons are more similar for sea ice thickness (SIT) than for sea ice concentration (SIC)

- Cluster patterns of both SIC and SIT have a stronger influence on the NH surface air temperature (SAT) during JFM (with higher internal variability) than during JAS

- SIC composites of SIT clusters have high resemblance with SIC clusters in both JFM (more substantial) and JAS seasons