Geophysical Research Abstracts
Vol. 18, EGU2016-17263, 2016
EGU General Assembly 2016

The role of the cold sector of extratropical cyclones in setting atmospheric mean state features of the Gulf Stream basin.

Benoît Vannière, Arnaud Czaja, Helen Dacre, and Tim Woollings
Imperial College London, London, United-Kingdom

The mechanism by which the Gulf Stream SST front anchors a band of precipitation on its warm edge is still a matter of debate and little is known about how synoptic activity contributes to shape precipitation mean state pattern. In this talk, we introduce a new indicator for the cold sector of extratropical storms based on low-level PV. This indicator is used in ERA interim data to separate the cold sector contribution to precipitation and vertical wind from the contribution of the rest of the storm. We find that cold sector precipitation forms a band following the SST front closely. In contrast, the enhanced ascent on the warm edge of the front is set primarily by the warm sector and cannot be directly related to the precipitation band as proposed by previous studies. Numerical sensitivity experiments of an extratropical cyclone passing over different sets of SST further confirms that the anchoring effect of the SST front on precipitation comes exclusively from the cold sector. These results lead us to revisit the atmospheric boundary layer model proposed to describe air-sea interactions over the Gulf-Stream SST gradient. Finally, we explore the role of the cold sector convection in restoring baroclinicity in the wake of an extratropical cyclone.