GENERAL COMMENT

We have changed the tittle by removing SHORT COMMUNICATION in the beginning so that the manuscript will be labelled so by the journal.

REFEREE 4

1) I would suggest to rewrite the abstract to make it more clear and concise. For example, authors should include some more information about the relationship between evaporation over source regions and river discharges. In addition, I do not understand very well what do the first sentence in the abstract mean: '... and at the same time one where the changes could affect the global climate in similarly asymmetric way with respect to other regions...' (same problem applies later in page 1036, line 26).

Shortened and rewritten also taking into account comments from other reviewers. The first sentence was deleted (Strikethrough text shows what is old and removed and text in red shows what is new and added)

~~" If we could choose a region where the effects of global warming are likely to be pronounced and considerable, and at the same time one where the changes could affect the global climate in similarly asymmetric way with respect to other regions, this would unequivocally be the Arctic. The atmospheric branch of the hydrological cycle lies behind the linkages between the Arctic system and the global climate.~~ Changes in the atmospheric moisture transport have been proposed as a vehicle for interpreting any of the most significant changes in the Arctic region. The increasing moisture over the Arctic during last decades it is not strongly associated with the evaporation that takes place within the Arctic area itself, despite the fact that the sea-ice cover is decreasing. Such increment is consistent is more dependent on ~~but to the fact that~~ the transport of moisture from the extratropical regions to the Arctic that has increased in recent decades, and is expected to increase within a warming climate. This increase could be due either to changes in circulation patterns which have altered the moisture sources, or to changes in the intensity of the moisture sources because of enhanced evaporation, or a combination of these two mechanisms. In this short communication we focus on the assessing more objectively the strong link between ocean evaporation trends and Arctic Sea ice melting. We will critically analyze several recent results suggesting links between moisture transport and the extent of sea-ice in the Arctic, this being one of the most distinct indicators of continuous climate change both in the Arctic and on a global scale. To do this we will use a sophisticated Lagrangian approach to develop a more robust framework on some of these previous disconnecting results, using new information and insights. Results reached in this study seems to stress the connection between two climate change indicators, namely an increase in evaporation over source regions (mainly the Mediterranean Sea, the North Atlantic

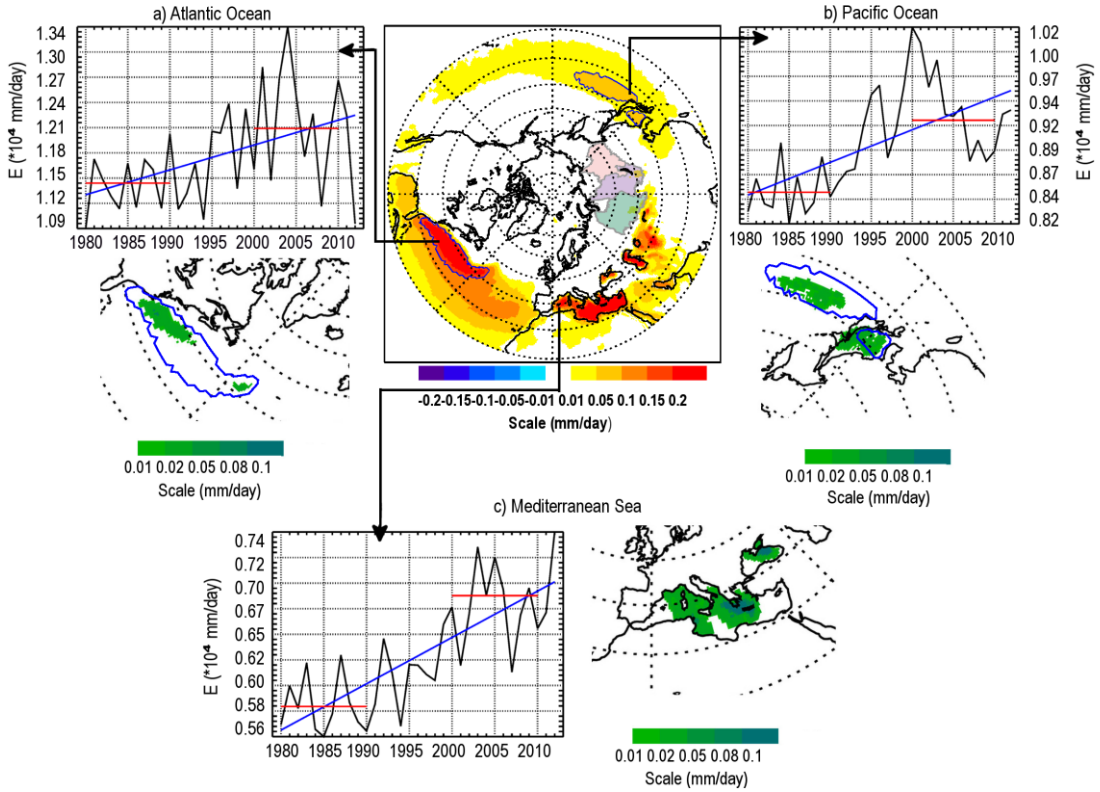
Ocean and the North Pacific Ocean in the paths of the global western boundary currents and their extensions) and Arctic ice melting precursors. ~~Among the many mechanisms that could be involved are hydrological (increased Arctic river discharges), radiative (increase of cloud cover and water vapour) and meteorological (increase in summer storms crossing the Arctic, or increments in precipitation)"~~

2) Some comments related to Figure 1. This figure contains a lot of information but some of it is not clearly explained or, in some cases, I think it is wrongly described.

First, what are blue and red lines in 'temporal series' in lateral panels? I guess blue lines are linear trends (it is no stated anywhere nor any confidence level is provided). Red lines in the same 'temporal series' show the period used in the composites of moisture sources, is this right?

We understand the reviewer's criticism in this regard. Thus we have made an effort to improve the readability of the figure in the revised manuscript also taking into account the suggestions raised by other reviewers.

As the reviewer notes the blue lines are the linear trends and the red lines mark the 10-year periods used on composites. The caption was also modified to state this clearly.



Caption: "Figure 1. (Central panel) Climatological October-March 10-day integrated (E-P) values observed for the period 1979 – 2012, for all the particles bound for the Ob, Yenisei and Lena rivers basins (green, purple and pink areas respectively ~~grey contour line~~ indicate the basin area), determined from backward tracking. Warm ~~Reddish~~ colours represent regions acting as

moisture sources for the tracked particles. Plots in green show the significant positive differences at the 95% level after bootstrap test (1000 interactions) in the composites of the moisture sources of the Arctic river basins between the decades 2001-10 ~~(the highest evaporation)~~ and 1981-90 ~~(the lowest)~~. Temporal series show the evolution of the average evaporation derived from OAFLUX dataset for the main moisture sources for the Arctic river basins (the Atlantic and Pacific sources, those circled with a blue line in the central figure, and for the whole Mediterranean Sea basin). ~~And plots in green show the significant positive differences at the 95% level after bootstrap test (1000 interactions) in the composites of the moisture sources of the Arctic river basins between the decade 2000-10 (the highest evaporation) and the decade 1980-90 (the lowest).~~ The blue lines are the linear trend and the red ones denoted the 10-year periods used on composites."

Anyway, why do authors use 2000-2010 and not the last available decade (2002-2012) in this comparison?

There is nothing magical in using entire decades. Results are similar. We have preferred to use entire decades as done in Yu et al. (2007).

Second, in the caption it is written that 'the main moisture sources for the Arctic river basins (those circled with a blue line in the central figure)' are circled in blue. This is not true for the Mediterranean. In the main text, p1041l4, the same cite to areas circled with a blue line has the same error.

Modified in the caption and in the text

Third, if one looks at the colour scale in figure 1 central map, the Mediterranean (and Caspian and Black seas) seem to be more important as a source of water for the rivers basin than the North Pacific. This is not very clear in the main text (p1040, l16-19).

We modified the text to indicate better the main oceanic sources of moisture for the Arctic.

"The central panel of ~~figure~~ Fig. 1 shows that the main moisture sources are located over the Mediterranean Sea, and the smallers Caspian and Black Seas, as well as the North Atlantic Ocean and to a somewhat lesser degree the North Pacific Ocean in the paths of the global western boundary currents and their extensions ~~the North Atlantic and North Pacific Oceans in the paths of the global western boundary currents and their extensions, as well as the Mediterranean, Caspian and Black Seas~~."

In addition, a reference would be welcome in p1040l21.

We could have been added again Zhang et al. (2012) and Kapsch et al. (2013) but they were intensively referenced before.

3) Finally, I think that it would be easier for the reader to include an additional section with the summary and conclusions which included the last paragraph (from p1041l22).

We added the title "Summary and conclusions" to this last paragraph.

4) Some typos:

p1034l19: '...disconnect ng results...'

p1037l3: 'The main mechanisms...', delete 'The'

P1038l8: through?

p1038l9: What do authors mean with '...more unusual summer storms crossing the Arctic...'? Is it a lower number of summer storms or is it that there are more 'unusual (very intense, very humid...) storms'?

p1039l12: mod-e FLEXPART.

Thanks for spotting these typos; we have corrected all of them and some more.