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 2

1) I think the authors can more emphasize, in the title or abstract, the fact that the recent moisture increase over the Arctic is not highly linked with an evaporation within the Arctic. This is because the ice-albedo feedback, which is very well-known and notable hypothesis, argues that an evaporation from the Arctic Ocean that is uncovered by sea-ice is an important source of the wintertime Arctic moisture. However, some of the recent studies showed that the evaporation from the Arctic surface appears not to be an important moisture source (e.g., Graversen et al. 2008; Park et al. 2015).

Graversen, R. G., T. Mauritsen, M. Tjernstrom, E. Kallen, and G. Svensson, 2008: Vertical structure of recent Arctic warming. Nature, 541, 53-56.

Park, D.-S. R., S. Lee, and S. B. Feldstein, 2015: Attribution of the Recent Winter Sea Ice Decline over the Atlantic Sector of the Arctic Ocean. J. Climate, 28, 4027–4033.

We agree with the reviewer's suggestion and have therefore changed by adding the comment in the abstract and in the introduction (last sentence paragraph 3)

IN THE ABSTRACT:

(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)"~~

IN THE INTRODUCTION:

"In particular, changes in the atmospheric moisture have been proposed as a vehicle for interpreting the most significant changes in the Arctic region either due to increase transport from middle latitudes (Lucarini and Ragone, 2011; Zhang et al., 2013) or via enhance local evaporation (Bintanja and Seltan, 2014). However, some of the recent studies showed that the evaporation from the Arctic surface appears not to be an important moisture source (e.g., Graversen et al. 2008; Park et al. 2015)".

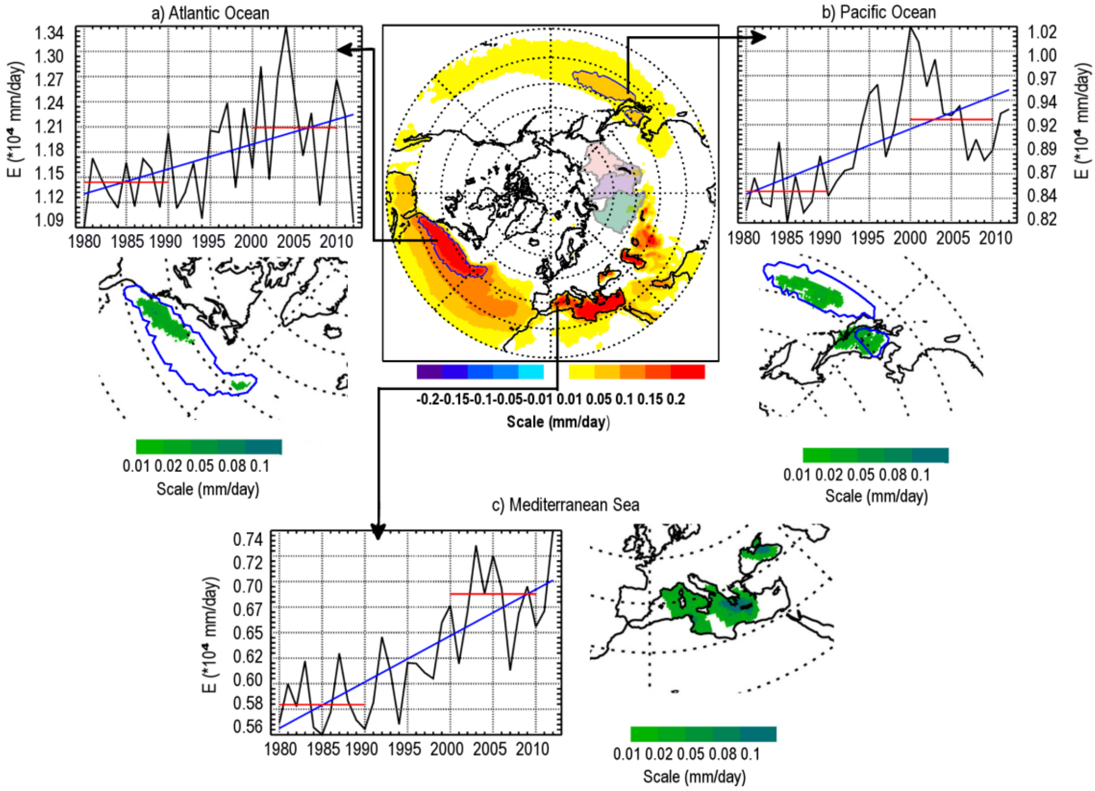
2) Please describe more detailed processes of sea-ice melting due to the Arctic river discharge and moistened Arctic troposphere. For example, a moisture increase over the Arctic can absorb the outgoing long-wave radiation from the surface while reemit the radiation toward the Arctic surface, resulting in the surface warming and sea-ice decline.

We have added the comment in the introduction (THIRD paragraph)

"Nevertheless, the opposite evolution of AST and SIE indices in recent decades emphasize that both phenomena are not independent and, actually, are known to reinforce each other (Tang et al., 2014), as changes in surface albedo (associated with melting snow and ice) tend to enhance warming in the Arctic (Serreze and Francis, 2006) as shown in the recent review paper Cohen et al. (2014). Nevertheless both indicators (AST and SIE) may also respond to other mechanisms including changes in atmospheric circulation patterns (Graverson et al., 2008), ocean circulation (Comiso et al., 2008), or changes in radiative fluxes associated to cloud cover and water vapour content in the atmosphere (Schveiger et al. 2008; Kapsch et al., 2013), though the absorption of the outgoing long-wave radiation from the surface by the increased atmospheric moisture and then remitted toward the Arctic surface, resulting in the surface warming and sea-ice decline (Kapsch et al., 2013). In particular, changes in the atmospheric moisture have been proposed as a vehicle for interpreting the most significant changes in the Arctic region either due to increase transport from middle latitudes (Lucarini and Ragone, 2011; Zhang et al., 2013) or via enhance local evaporation (Bintanja and Seltan, 2014). However, some of the recent studies showed that the evaporation from the Arctic surface appears not to be an important moisture source (e.g., Graversen et al. 2008; Park et al. 2015)."

3) In the manuscript, there are many river basin names, but if someone is not familiar with the basins, it is hard to understand the results. If possible, the authors can represent geographical locations of the basins in Figure 1.

We agree with the reviewer's suggestion, therefore we have re-done the Figure 1 in this way, modified the figure according also to the other reviewer's comments.



New 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."