Answer to Referee 1 (D. G. Barber)

We thank the referee for his constructive criticism which helped to improve the manuscript.

1. Paragraph -1 in introduction (P15). You state that there is evidence for negative trends outside of summer and fall – you should cite some of these papers.
The first paragraph reads now:
"Arctic sea ice extent has strongly decreased in the last decade (Stroeve et al., 2012; Meier et al., 2012). This is most pronounced in summer and early autumn, during the period of sea ice melt, but there is increasing evidence for a negative trend also during the remaining seasons (Stroeve et al., 2012)."

2. Last paragraph if section 2 you state - We define the polynya length as the cumulative open water path along the yellow area. You should state which value of SIC you used as your definition of open water.
To clarify the calculation method we write now:
"We define the polynya length as the cumulative open water path along the yellow area in Fig. 1a, starting at the northwestern edge of Svalbard. Here, we consider pixels with ice concentrations below 70% as open water areas. The polynya length is then the distance to the ice edge, i.e. the first pixel exceeding 70% ice concentration."

3. Figure 3D shows both a linear and a non linear fit between ERA 2m temps and mean polynya length. I would suggest you remove the linear relationship as it clearly is more a non linear relationship; the residuals for the linear will be biased upwards; it also fit with your text explanation better to just show the non linear.
Done.

4. I would have liked to have seen how far south this effect could be observed (i.e., what is the regional rather than just the local effect) – I suggest a short paragraph summarizing this would be useful – either in your discussion of the case studies or even just in the conclusions.
This is indeed an interesting point. Therefore, we expanded our analysis to two additional points east of Svalbard. These results are also included in Fig. 3d. The Spearman rank correlations gradually decrease from 0.76 to 0.52 and 0.42 further to the south-west. Further downstream, all air temperatures are nearly in equilibrium with the water temperatures and no significant correlations can be found. We describe these results in the last paragraph of Sect. 3 (, which is now in the newly introduced Sect. 4):
"To estimate how far south air temperatures are influenced by the polynya size, we repeat the calculations for two additional points further downstream. They are located north-west of Svalbard at 79.5° N, 4.5–7.5° E (P2 in Fig. 1a) and at 78.75° N, 2.25–5.25° E (P3 in Fig. 1a). The results are also shown in Fig. 3d. The Spearman rank correlation gradually decreases to rs = 0.52 at P2 and rs = 0.42 at P3. Thus, an effect is still visible more than 200 km downstream. At ERA-Interim grid-points even further to the south, the air temperatures are nearly in equilibrium with the water temperatures and no significant correlations can be found."

5. I would also suggest making reference to a similar work but in the Canadian Arctic – R. L. Raddatz , R. J. Galley , L. M. Candlish , M. G. Asplin & D. G. Barber (2013): Integral Profile Estimates of Sensible Heat Flux from an Unconsolidated Sea-Ice Surface, Atmosphere-Ocean, DOI:10.1080/07055900.2012.759900
We modified the introduction of the last paragraph in Sect. 3 (now new Sect. 4) and also included results from the recently published study by Onarheim et al. 2014:
"It is also interesting to consider the impact of polynyas on local atmospheric temperatures (e.g. Raddatz et al., 2013; Ebner et al., 2011; Fiedler et al., 2010). Using ERA-Interim data, Onarheim et al. (2014) found an air temperature increase of 7K in the Whaler's Bay Polynya between 1979 and 2012 associated with the observed decrease in sea ice cover. The close connection between the size of the Whaler's Bay Polynya and the local temperature in the polynya region can be seen in Fig. 3d."