We are pleased with the generally positive reviewer remarks and thank the reviewer for the invested time and the very helpful comments provided. These will certainly help us to improve the manuscript.

A pointwise reply to the reviewer's comment is given below.

Main Comments:

1.) *The parameters w1, w2, w3 give weights in the edge cost function, respectively of the wind speed, the collinearity between the wind and edge and finally the deviation from a fixed latitude. The STJ and PFJ solutions issued from the Dijkstra's algorithm are quite sensitive to the chosen parameter (as seen in Fig. 2 using untuned parameters). The untuned parameter values (Table 1) give the largest value to the jet latitude- guidance term. In order to provide realistic values of the jets, an educated guess of w3 (quite close to 1) is provided, coming from minimization of 6 by simulated annealing. It constrains the solution to be quite linked to the Rikus' solution. The weight w3 is probably linked to the flatness of the function x3 around the phi-clim latitude. By using a sharper function (power 8 instead of 4) weighting latitude deviations will lead to a smaller tuned w3. In fact, the optimal weights depend on the range of x1, x2 and x3 and of the particular choices of the functions x1, x2, x3 giving the weights to the edges. More possibilities exist (ex. the wind projection along the edge unitary vector could be used to substitute weights x1 and x2). Authors shall refer to the different possibilities in the method (section 2).*

   We agree with the referee that there exist different possibilities to define the cost function of an edge as for example suggested by the referee to use the wind projection along the edge unitary vector instead of condition X and Y. In addition, it is also possible to use other functions for Z (e.g. a sharper function (power 8 instead of 4)).

   We will rephrase this in the manuscript. We want to add a section to the discussion outlining limitations and possible changes and improvements to the current scheme, which might be test in future work.

   We agree that a sharper function leads to lower values of w3. The current choice still allows free movement within a latitudinal belt of roughly $\pm 20\%$ of the climatological mean and therefore the large value of w_3 is admissible.
   Note that in this case a sharper function means a function of lower order (e.g. quadratic), because the function is normalized by the maximum of the interval (see eq. (4)).

2.) *The method is not clear about the optimization of the pressure level of the jet. At which level are computed the winds entering in the method. Is it varying daily or set fixed? There is no explicit vertical guidance of the jets. How do authors deal with this aspect ?*

   As explained in section 2, we take a vertical average of the 3D wind velocity field resulting in a 2 dimensional field. Hence there is no height dependency, so the optimization of the pressure level of the jet is not required.
   However, in principle including the vertical dimension (3D detection scheme), and thus taking into account the pressure level , could be done in the same way as outlined in the manuscript for 2D.

3.) *Page 8, line 10. In the discussion of Fig. 7 the algorithm does not resolve properly the PFJ and STJ. In fact, there are other not resolved topologically complex situations like when the jet splits into two branches. Authors should comment that providing hints for solving those issues.*

   We would like to stress that fig.7 represents one of the difficult cases and that's also why we show it. Overall, the scheme works very well. Even in fig. 7 one can argue whether or not the jets are properly resolved.
   For example, the STJ core could split between -180 - -100° longitude, but since the wind field between 150°-180° at 40° latitude continuing at -180° longitude and 40° latitude has the stronger velocity, it is the preferable state for the STJ.

In addition, the path of the STJ over western pacific (150°-180°) is clear with very strong winds at a latitude of 40°. The path found by our algorithm over the eastern Pacific (-180° - -100°) is thus a logical extension of that across the date-line. Due to the visualization of the Pacific Ocean on opposite ends of the map in fig 7 it appears that the STJ is not properly resolved over the western Pacific, but this is rather a visual artifact.

It is important to stress that our method is *objective* and hence there are cases the algorithm finds a path, which differs from the path, which one would assume by visual choice.

To account for splitting of the STJ and PFJ, the easiest way would be to calculate not 2 but 4 (or even more) jet stream cores with different climatological jet stream latitudes phi-clim. In cases, where only one path exists, the found jet stream cores would be combined to one path and in other cases, where two paths exist, they would split. We will add this to the discussion section for possible future improvements.

4.) *Section 4.2 about the optimization of parameters is too simplistic. A much detailed description is needed. Some points are not clear. The cost function 6 is varying with time. Therefore parameters w1, w2 and phi-clim minimizing it should also depend on time. However, the parameters are set to fixed values for the cold and for the warm season. Therefore, in order to keep consistency, the cost-function 6 should be a seasonal average. Authors should correct and clarify this point*.

w1, w2 and phi-clim are independent in time and change only for the warm and cold season. There was a typo in eq. (6), the skill function is the sum of all time steps in warm season or cold season:

$$S = \sum_{t=1}^{t_{\mathrm{end}}} \sqrt{(\phi_{\mathrm{Rikus}}(t) - \phi_{\mathrm{mean}}(t))^2}, \qquad (6)$$

whereby $\phi_{\mathrm{mean}}(t)$ is the zonal mean latitude calculated with our algorithm, $\phi_{\mathrm{Rikus}}(t)$ is the jet stream core determined by Rikus' algorithm for time period t and t_{end} is the number of 15-day running mean time step, where Rikus'algorithm finds a jet core.

Technical corrections

We agree with the referee and will rephrase as suggested.