Interactive comment on “Sea ice inertial oscillation magnitudes in the Arctic basin” by F. Gimbert et al.

Anonymous Referee #2

Received and published: 27 July 2012

A typical feature of sea ice dynamics is that the inertial oscillation are evident in pack ice of low concentration, but those oscillations are damped in a compat pack ice regions due to the floe-floe interaction. This manuscript present an interesting method to determine magnitude of inertial oscillation based on ice trajectories, motivated by the assumption that existence of inertial oscillation is also an indicator of internal stress of pack ice. The method used in this manuscript is new, it is feasible and interest for a scientific community and the text reads well. This manuscript deserve to be published in the TC after minor revision.

Specific comments

1) p2181, l27. Equation (1) is not necessary. You can introduce f -parameter together with the momentum balance equation (2).

As we refer to equation 1 later in the text, we find it more straightforward to keep it.

2) p2182, l16. Equation (2) is erroneous. Typo in the Coriolis force notation, instead of logical operator there should be a cross product operator.

We intended the logical operator '^' to be the cross product operator, but we agree with the reviewer that 'x' is more widely accepted, so the modification has been done.

You should express that term as f k × Ui and introduce f later in the text.

We thank reviewer 2 for pointing out this mistake, as we forgot to include *f* in equation (2). However, we still need to keep Ω, i.e. the angular rotation velocity of the earth, since the notation *f* in the paper does not refer, as often done in other studies, to the Coriolis parameter, but simply to the frequency, in cycles/day, of the inertial oscillations. The Coriolis parameter, in our case, is then equal to Ω f. This precision for f has been added in the updated version of the paper, on page 4 and line 12.

Also note that the first term in right hand side should include hi term.

Corrected. We thank reviewer 2 for having detected this mistake.

3) p2189, l8. Please, specify explicitly width of time window and number of data points used in fft-calculations.

We thank reviewer 2 for this suggestion. Information about time window width was given line 4 of p2190, but it is a good idea to recall it. The width of the time window is equal to 3 days, which corresponds to a number of data points in fft-calculations equal to 3*8 = 24. These precisions have been added after equation (5) (on page 11 line 5).

4) Equations (6) and (7) are not necessary, you could describe selection of data point used in the analysis without any formalism.

Ok, thanks for the comment; this formalism was a little 'heavy'. Thus, equations (6) and (7) have been removed and the description is done in the text (page 11 - line 19-21).

5) p2190, l12. Does this mean that you fo is varying ?, i.e. it depends on the latitude of buoy.

Yes, we make f_0 to vary by accounting for the latitude. This precision has been added in the text (last line of page 11).

6) p2190, equation (10). Where the constant value 1.27 comes from ? I don't understand reason for that, if Wcur term in the denominator is substituted in the equation (10) then the constant value 1.27 is eliminated.

This is right; however, the normalization by 1.27 is required in equation 11 to really compute the mean of the norm. The alternative, as suggested by the reviewer, is to get rid of the factor 1.27 in both equations 10 and 11, but then we need to define a term in 11 that is not rigorously equal to the norm. So we prefer to have the proper norm in equation 11, at the cost of having to perform a normalization by 1.27 in 11 and a 'denormalization' by the same factor in 10.

7) Most of the text reads well, but there are some needs to improve linguistic form of the manuscript. For example, terms like "pluri-annual", "adimensional" , "intimate link between", "highly cohesive ice cover" and "assembly of floes" are better to express terms like "long term", "nondimensional", "strong interaction between", "compact ice cover" and "floe field".

OK, these terms have been replaced by the proposed one.