

ANSWERS TO THE COMMENTS

Thank you for revising the manuscript again. This is a much improved version. However, there are still certain things to be clarified for making a publication on ACP. Please consider the referee comments and the following to revise your manuscript, and submit it.

Authors thank the co-editor and reviewer for time and effort spent on evaluating the manuscript and providing suggestions which greatly improved the quality of the paper.

ANSWERS TO CO-EDITOR'S COMMENTS

Page 1

Line 06: We have analyzed wind velocities measured ...

A. “time series of” has been removed from the text now. (See line 06)

Lin 06: GPS acronym should be expanded.

A. Acronym for GPS has been given now. (See line 06)

Line 07: GPS radiosonde, which is continuously flown for 120 h with an interval of 6 h

A. The sentence has been re-written as “We have analyzed wind velocities measured with high resolution Global positioning System (GPS) radiosondes which have been flown continuously for 120 h with an interval of 6 h from Hyderabad.” (See lines 6 – 7)

Line 09: to get the fluctuations from measurements? What are these fluctuations?

A. Backgrounds are supposed to be removed to obtain fluctuations from time series or height series. For example, if it is a time series of winds, then mean of the time series is removed from each individual observation to get the fluctuations.

When we consider the height series of the same parameter, polynomials are removed to obtain the fluctuations.

Line 13: acceptable results? How do we know that these are acceptable or not?

A. “Acceptable” – we meant the results are comparable with the other reports. Now we have deleted the word “acceptable”. (See line 13)

Line 13: The FIR1 filter also...

A. “The” has been added before “FIR1 filter also...” now. (See line 13)

Line 17: delete large

A. The word “large” has been deleted now. (See line 17)

Line 26: “are present”, where?

- A. When number of waves are present in the data which requires proper filtering to retain the monochromatic wave needed for the particular study.

Line 30: uncertainties in their calculations or estimates

- A. Uncertainties are in the estimates.

Line 30: for errors or error sources

- A. Error sources (Please refer to paper by Zhang et al., 2004).

Page 2

Line 01: This limits (not defeats)

- A. The word “defeats” has been replaced with “limits”. (See line 1)

Line 02: of hodograph

- A. The word “the” has been removed. (See line 2)

Line 02: in fact “the method can be used”, not capable of doing it

- A. “capable of retrieving” has been changed to “used to retrieve”. (See line 2)

Line 04: In this study, we attempt to reduce the uncertainties associated with...., write something like this.

Line 04: you cannot overcome, but minimize

- A. The sentence has been modified as “In this study, we have attempted to reduce uncertainties associated with hodograph method in delineating the characteristics of IGW from wind velocities obtained with radiosonde measurements.” (See lines 4 – 5)

Line 05: The instrument measures wind velocity. You compute the perturbations or fluctuations afterwards

- A. “velocity fluctuations” has been changed as “wind velocities”. (See line 5)

Line 10—11: remove “provided by the manufacture” and then give a reference.

- A. “provided by the manufacture” has been removed and a reference has been given. The reference is also added in the reference list now. (See lines 10 – 11)

Line 15: interpolation / smoothing will not give you high resolution. You are just interpolating the values in between and that’s all.

- A. The resolution of the radiosonde data is very high (~4 – 10 m) which may contain some noise as well. Interpolation with a resolution of 50 m helps us to reduce the noise and smooth the profile. The resolution of 50 m is good enough to extract gravity wave parameters. If you permit, we would like to retain this sentence. The sentence has now

been modified as “This method is useful to smooth the profiles and to maintain a good height resolution to delineate gravity wave parameters.” (See lines 14 – 15)

Line 21: in low latitudes

A. The word “over” has been replaced with “in”. (See line 20)

Line 23: continuous data with appropriate data gaps? Why?

A. IGW over Hyderabad is ~ 40 h. We would like to have a data gap of 5 h which is an exact fraction of 40. But the experiment was a part of a campaign at national level and we have to adjust the timings of flights for a gap of 6 h. The data gap (6 h) is enough to observe IGW with good accuracy by FFT.

Line 26: contain

A. The word “contains” has been replaced with “contain”. (See line 25)

Line 27: data are

A. The word “is” is replaced with “are”. (See line 26)

Line 29: delete “in the present work”

A. “in the present work” has been deleted. (See line 28)

Line 34: Further details of these filters

A. The word “The” has been replaced with “Further”. (See lines 32)

Line 37—38: “A Butterworth.....” for this particular study, not in general.

A. “for this particular study” has been added now. (See line 36 – 37)

Page 3

Line 04: “the wide band of”

A. The word “sufficiently” is deleted. (See line 4)

Line 05: recommended the application of

A. The word “usage” has been replaced by “application”. (See line 5)

Line 06: temperature measured by

A. The word “perturbations” has been deleted. (See line 6)

Line 09: Perhaps, satisfies the criteria for applying the hodograph method

A. The word “perhaps,” has been added. (See line 9)

Line 10: “are quite noisy”

A. “found to be” has been removed. (See line 10)

Line 24: space after the bracket

A. Space has been given now. (See line 19)

Line 27: between 20 and 28 h

A. “20 – 28 h” has been replaced with 20 and 28 h. (See line 24)

Line 28: for Hyderabad and belong to

A. “of Hyderabad and belongs to” has been changed to “for Hyderabad and belong to”. (See line 24)

Line 29: , respectively

A. A comma has been added before “respectively”. (See line 26)

Line 31: delete “Next”

A. “Next” has been deleted. (See line 28)

Line 33: delete “but by using...filter”

A. “but by using...filter” has been deleted. (See line 30)

Line 37: “producing good result”? How do we know that these results are good? Please justify with a relevant sentence/statement.

A. The sentence has been modified as “The Butterworth filter shows a sharp cut-off and also requires a much lower filter order than the corresponding FIR1 filter.” (See line 33 – 34)

Page4:

Line 02: are broader

A. It has been incorporated. (See page 3, line 38)

Line 06: depicts different fits

A. “the” has been deleted. (See line 4)

Line 07—08: show good agreement

A. “close” has been replaced with “good”. (See lines 5 – 6)

Line 08: what are appreciable differences?

A. Fluctuation profiles by removing 2nd, 4th, 5th and 9th order polynomials from original profile are shown together (see figure below). It clearly shows that fluctuations obtained by removing 4th and 5th orders match quite well whereas the other two do not.

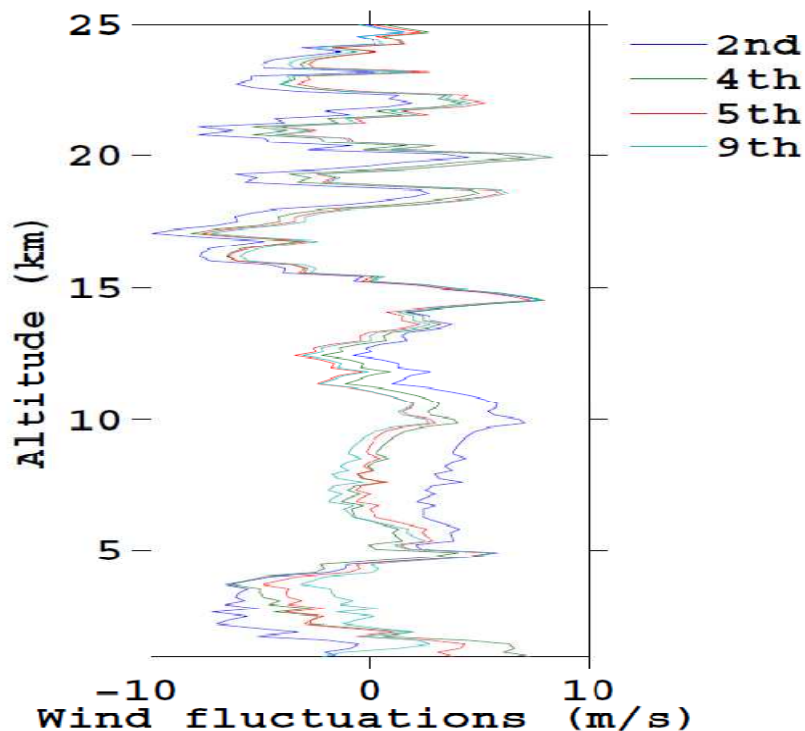


Figure: Vertical profiles of wind velocity fluctuations for different order polynomial fit removals.

Line 09: “and hodographs are made.”

A. “plotted” has been changed to “made”. (See line 7)

Line 09: subsequently not consequently

A. “consequently” has been changed to “subsequently”. (See line 7)

Line 14: very, not extremely

A. “extremely” has been changed to “very”. (See line 11)

Line 16: delete: “instead of ...filter.”

A. “instead of ...filter” has been deleted. (See line 15)

Line 19: for both wind components. If you use “respectively”, then you need to write the “respective” components too.

A. The word “respectively” has been deleted. (See line 17)

Line 19: “It is shown that”, remove clear. Let the readers decide whether this is clear to them or not.

A. “It is clearly observed” has been changed to “It can be seen that”. I request the editor to agree with this change. (See line 17)

Line 25: you can only reduce or minimize the uncertainty not remove it completely.

A. The word “removed” has been changed to “minimized”. (See line 23)

Page 5

Line 01: five-day balloon measurements are OK for characterizing IGWs?

Please make a general statement on the measurements here. Characterization comes afterwards. People could also use the data for other purposes (not only for identifying IGWs studies).

A. The data gap of 6 h and the total duration (5 days) have been mentioned which is sufficient information for people working with waves to know what kinds of waves can be studied with such data. We have only done the experiment to study IGW and characterize it with Hodograph method. I, therefore, request you to retain the summary as it is.

Line 31: comma after Australia

A. A comma has been placed after “Australia”. (See line 31)

Line 37: space before source

A. A space has been given before “Source”. (See line 37)

Page 6

Line 03, 05, 07, etc., hyphen not minus sign

A. Minus sign has been replaced with hyphen wherever it is appropriate.

Line 29: comma after systems

A. A comma has been placed after “systems”. (See line 37)

Line 36: comma before but

A. A comma has been placed before “but”. (See page 7, line 4)

These are some examples for language /syntax corrections. Please read and do other corrections. Thank you.

The paper has been thoroughly read and the corrections have been made as per the editor’s suggestion.

Answer to referee #2, Vladimir Gubenko:

The equations and sentences have been changed as per the suggestion of the reviewer.

(See page 3, lines 13 – 24)