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## ***Interactive comment on “Global distributions of overlapping gravity waves in HIRDLS data” by C. J. Wright et al.***

**C. J. Wright et al.**

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### General Comments

[relevance to modellers] As the reviewer states, current parameterisations tend to formulate gravity waves in a very different form, and our results may not be trivially applicable to these. However, newer models, in particular in the context of NWP, can often directly resolve the majority of the lengthscales visible to HIRDLS, but do not reproduce the observed structure of the wave field very well (work in prep by lead author, figures can be supplied on request). Our results are therefore perhaps more directly applicable in this context of trying to diagnose inaccuracies in the resolved-wave field rather than

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in the parameterised field. Text to this effect has been added to the introduction.

[monsoon] To quantify the correspondence with the monsoon, we correlated the time series in equatorial regions with outgoing longwave radiation derived from HIRS measurements. In regions (q) and (r), correlations with Ls waves were  $\sim 0.7$ . Correlations were lower in other regions containing monsoons as defined by Li and Zeng (2002, GRL, doi:10.1029/2001GL013874),  $\sim 0.5$ , but these regions do not correspond terribly well geographically with Li and Zeng's and are less intense than the core monsoon regions of (q) and (r). Mention of this has been added to the text.

#### Minor/Technical Comments

[P4336-4337] Section 2.1 did perhaps go into too much detail, although we feel some discussion of this is important. Some text has been removed to make the discussion briefer without removing potentially useful information.

[P4337] Semi-agreed after checking: the OED defines the primary meaning of collocate as to “be habitually juxtaposed with another with a frequency greater than chance” and the primary meaning of co-locate as to “share a location or facility with something else”, with collocate being a variant spelling of the hyphenated form. Our meaning is closer to the latter, so to split the difference we’ve added a hyphen.

[P4338] The attached sketch illustrates the treatment of the data at this stage. The HIRDLS profile extends from the surface to 80 km altitude, but with the region below  $\sim 15$  km dominated by *a priori* rather than signal. To this data, we add twenty levels of zero-padding at each end of the profile - as the S-Transform is based upon the Fourier transform, signals may potentially wraparound from one end of the series to the other, which this zero-padding prevents. However, an abrupt edge between data and the zero-pad region may lead to Gibbs ringing in the resulting transform output, which we would like to minimise. By including the *a priori* region (red on the sketch) at the lower

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bound, we provide a softened edge to the dataset here, hopefully ameliorating this effect. Ideally, we would like to do so at the upper bound as well, but to do so would be to discard useful data, and in any case data quality is much lower at these altitudes due to the reduced instrument resolution, making the Gibbs ringing effects a less significant issue. This will tend to low-bias results at the bottom of our analysis range, and mention of this has been added to the text.

[P4339 L21] The 's' has been removed from the end of 'each quantised values'. The 'base-10' has been left in the sentence to avoid any possible ambiguity.

[P4340 L6] Fixed. A text search also located another 'the the' elsewhere in the document, which has also now been removed!

[P4340 S3.1] The ordering of figures 1, 2 and 3 is a moderately tricky choice. As the reviewer notes, the text in section 3 refers to "figures 1 and 3" well before the introduction of figure 2 in section 5.1.1. However, the full discussion of these figures takes place within section 5, and the order is internally consistent here (i.e. it follows the order 1,2,3). Consequently, on balance we have left the figures in their original order. We're not fundamentally committed to this choice though (both choices seem equally valid to us for different reasons), and are thus happy to change it or for it be changed by the journal if the reviewer(s) or editor feel especially strongly about it!

[P4340 L23] 'equivalent to' has been replaced with 'almost identical to'.

[P4353 L4 and L10] Both 'hence's have been removed.

[P4358] This paragraph has been replaced in response to technical criticisms of the content by reviewer 1.

[P4363 L11] The latter two 'both's have been removed.

[P4371] The asterisked numbers are used on the first, twelfth and thirteenth rows of the table.

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[P4372] Figures 1 and 2 have been redrawn with varied line styles and thicknesses to make the individual lines more distinct. Additionally, in figures 8, 9 and 10, dark/light green has been replaced with black/grey.

[P4376] Line contours have been added to figure 5(a), and also to figures 6 and 7 just in case!

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, 15, 4333, 2015.

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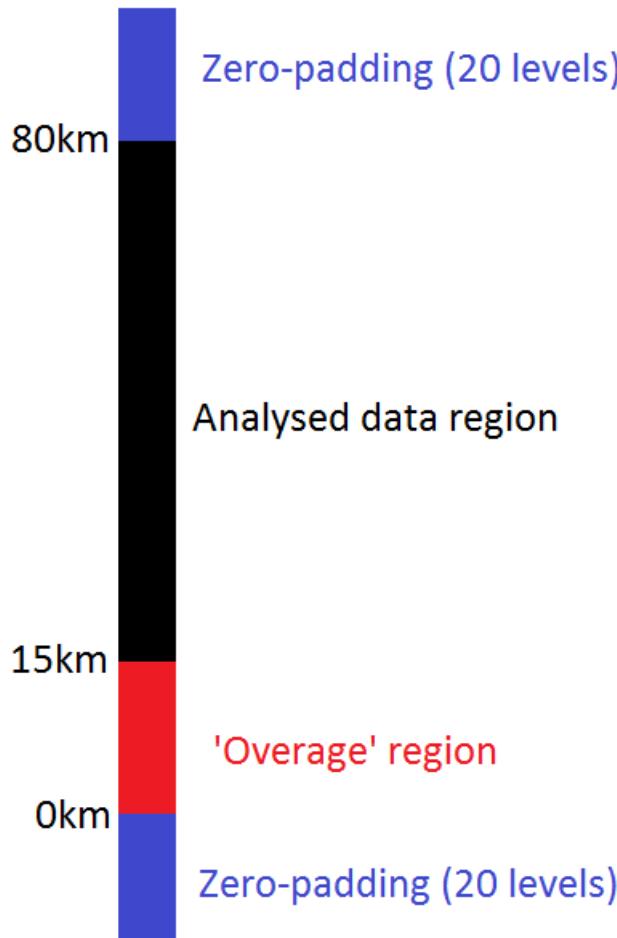
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