

## MAJOR REVISION OF FRANCEY & FREDERIKSEN MS bg-2015-404

The Revision addresses:

- Initial comments and subsequent review by Anonymous Referee #1 (C7413 and our response, C7935)
- Discussion comments posted by reviewer Prabir Patra (RC6469 and response, AC6863)
- Discussion comments by Ben Poulter (C7009 and response, AC7771)
- Comments by Associate Editor Sönke Zaehle

The scientific content of our contribution has been strengthened as a result of Discussion and we are very grateful for the reviews/comments, and for the online review process.

While the main thrust of the paper, relating changes in IH CO<sub>2</sub> gradient ( $\Delta C$ ) to winds in the equatorial upper atmosphere duct ( $u_{\text{duct}}$ ), is unchanged, the potential of isotopic measurements to inform on the nature of the IH exchange is significantly improved.

We have taken seriously the suggestion of Anonymous Referee #1 about the presentation, and have clarified the discussion throughout the paper by extensive restructuring and rewording that are not specifically tracked here; rather the main changes to scientific content are summarised below.

As initially suggested by Anonymous Referee #1 we have transferred the figure from Supplementary Information to become the new Figure 2.

Also, the discussion of the isotope information is moved from section 2 to section 6, the old Figure 2 (new Figure 6) is plotted with more appropriate variables that more effectively convey the original message. The Table has been removed.

Figure 3 is new and it addresses the question of timing of the 2009-2010 step in relation to a SH savanna response to rainfall raised by Poulter and Patra.

There is an extended/modified reference list.

We have included the CSIRO data in Supplementary Information, also the plot of unpublished modelling included in C7771.

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