

## Relevant changes introduced in the manuscript

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**(Title)** The word “Linear” has been added.

**(Sect. 1, l. 19–35)** The cloud feedback mechanism as function of cloud altitude has been expanded and reworded (answer to Referee #1).

**(Sect. 2, l. 59–68)** Details on the version of L1 radiances and cloud fraction data have been added (answer to van Dienenhoven).

**(Sect. 2, l. 80–88)** Details on the accuracy of the Independent Pixel Approximation have been added (answer to Referee #1).

**(Sect. 2, l. 125–145)** The paragraphs have been rewritten, adding considerations on calibration and how the time series have been joined (answer to van Dienenhoven and Referee #1).

**(Sect. 3, l. 164–182)** Details about the linear trend model have been added. The derivation of the linear trend model used in the manuscript from the trend model described by Mieruch et al., 2008 has been made explicit (answer to Referee #1).

**(Sect. 3, l. 202–213)** Reasoning about the applicability of a linear model is added, together with references to literature for the periodicity of ENSO (answer to Referee #2).

**(Sect. 4.2, l. 342–363)** Reasoning about the influence of aerosol production, insulation modulation and water vapor production has been added (answer to Referee #1).

**(Conclusions, l. 400–403)** The claim about the influence of aerosols and water vapor on CTH trend has been relaxed (answer to Referee #1).

**(Tab. 1, page 17)** Footnotes have been added about instrumental details.

**(Fig. 5, page 21)** The right plot has been added to the figure with the trend PDF over the Central East Pacific (answer to Referee #2).

**(Fig. 6, page 21)** New figure showing the applicability of the linear model to regress CTH time series (answer to Referee #2).

**(Fig. 8, page 22)** The figure has been replaced, after less smoothing has been applied to the time series (answer to Referee #1).

**(Fig. 14, page 27)** Two new maps have been added to the figure (bottom row), that portray cloud fraction trends at a continental scale over North Africa and Arabian Peninsula (answer to Referee #1).