

Supporting Information for

**Exploring the Interplay Between Cloud-Planetary Boundary Layer Coupling, Meteorology, and Aerosol Effects on Deep Convective Clouds**

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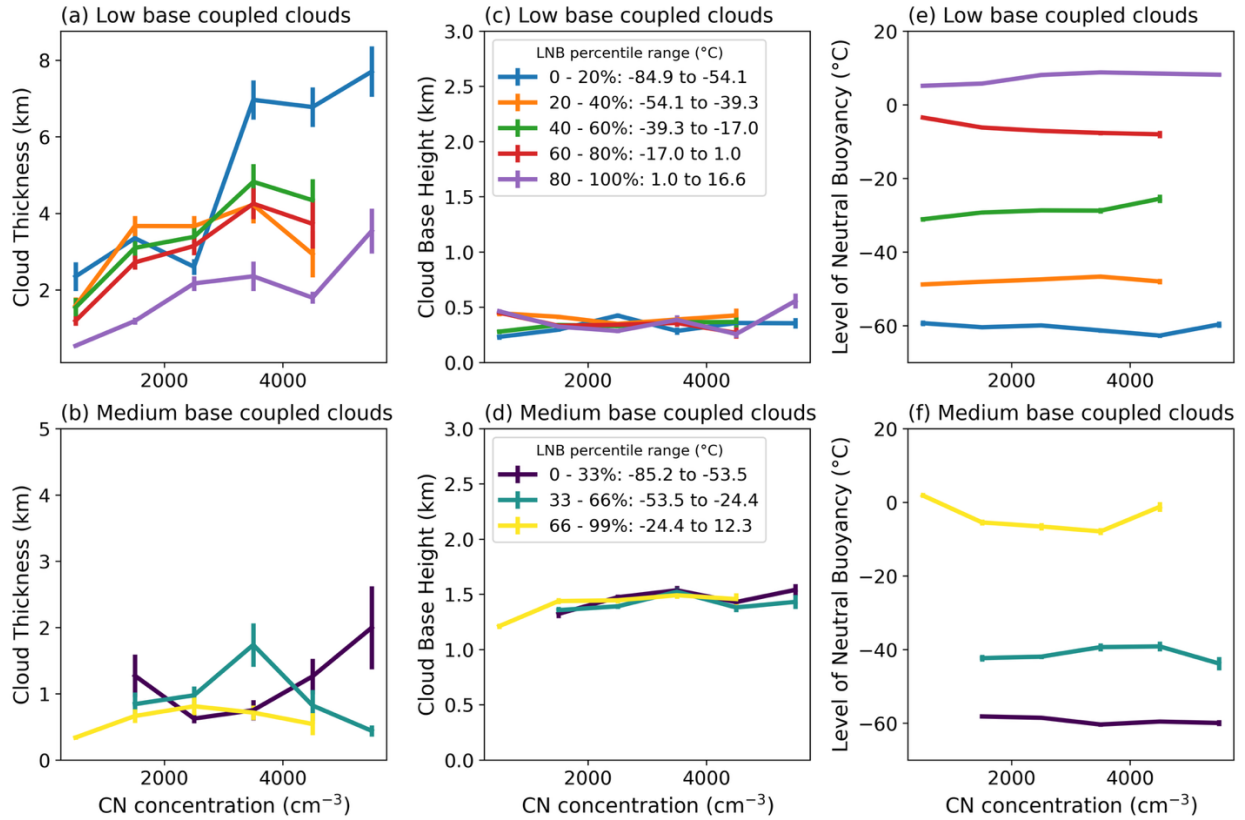
**Contents of this file**

Figures S1 to S6

**Introduction**

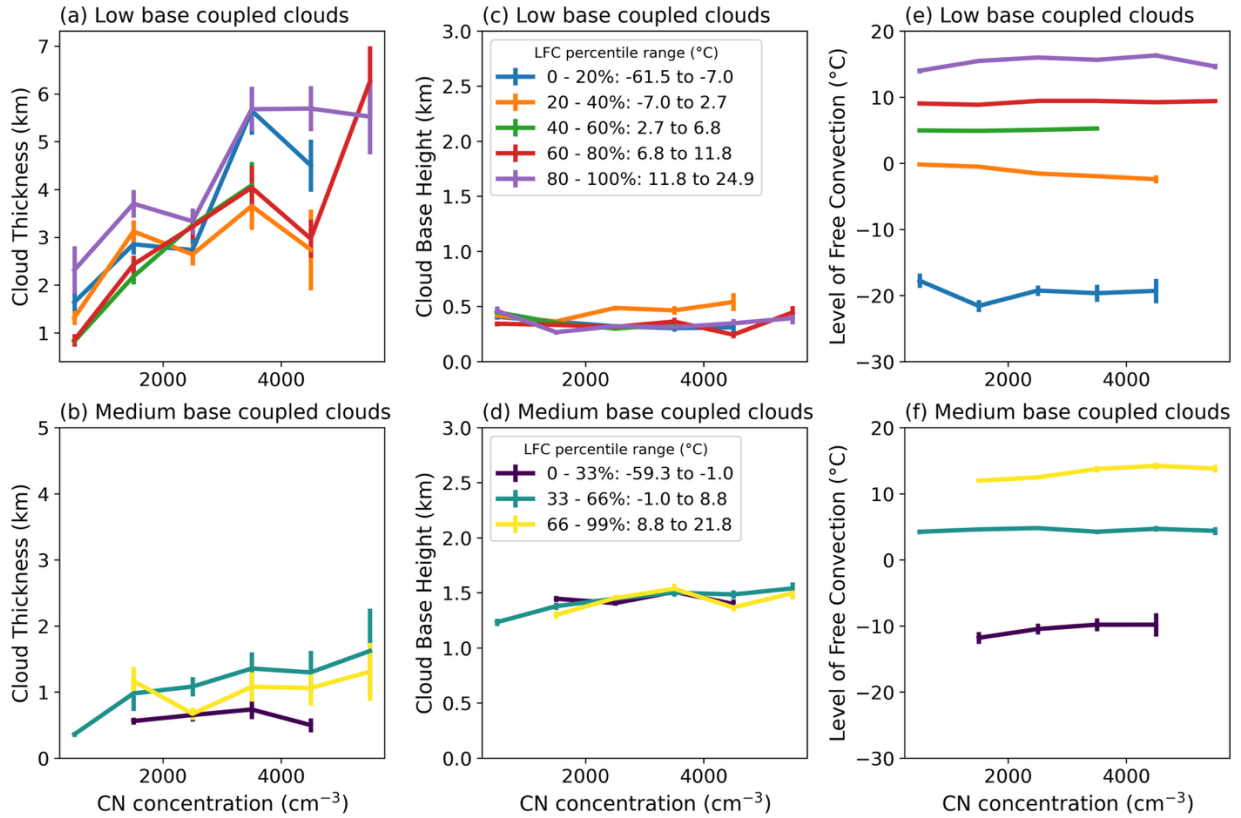
This supporting information provides the same figures as Figures 5,6, and 9 in the main article, but for the Level of Neutral Buoyancy (LNB) and the Level of Free Convection (LFC).

## JGR atmospheres



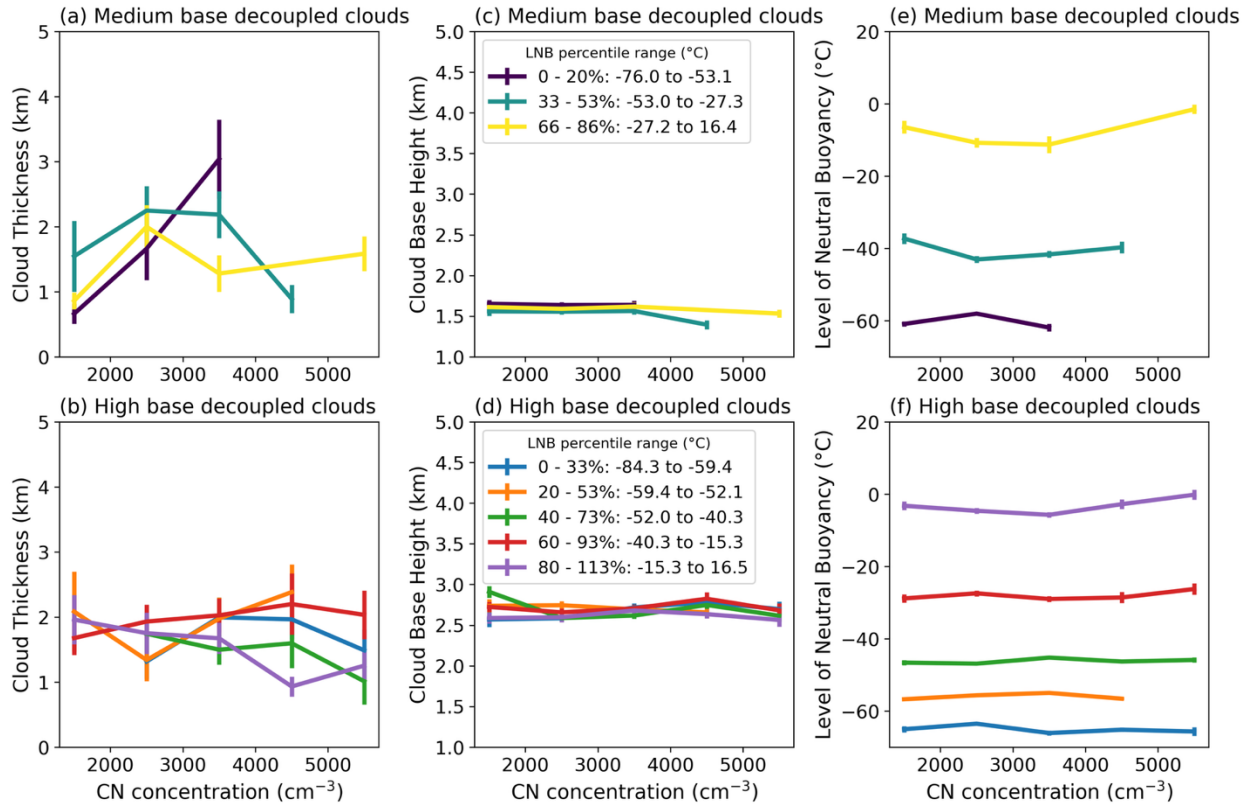
**Figure S1** Cloud thickness variations with aerosol number (CN) concentration for different Level of Neutral Buoyancy (LNB) percentiles for (a) low-base coupled clouds and (b) medium-base coupled clouds. Cloud base height variations with CN concentration for different LNB percentiles for (c) low-base coupled clouds and (d) medium-base coupled clouds. LNB variations with aerosol concentration for the different LNB percentiles for (e) low-base coupled clouds and (f) medium-base coupled clouds. For each aerosol and LNB interval, mean values are shown only when the sample size exceeds 20.

## JGR atmospheres



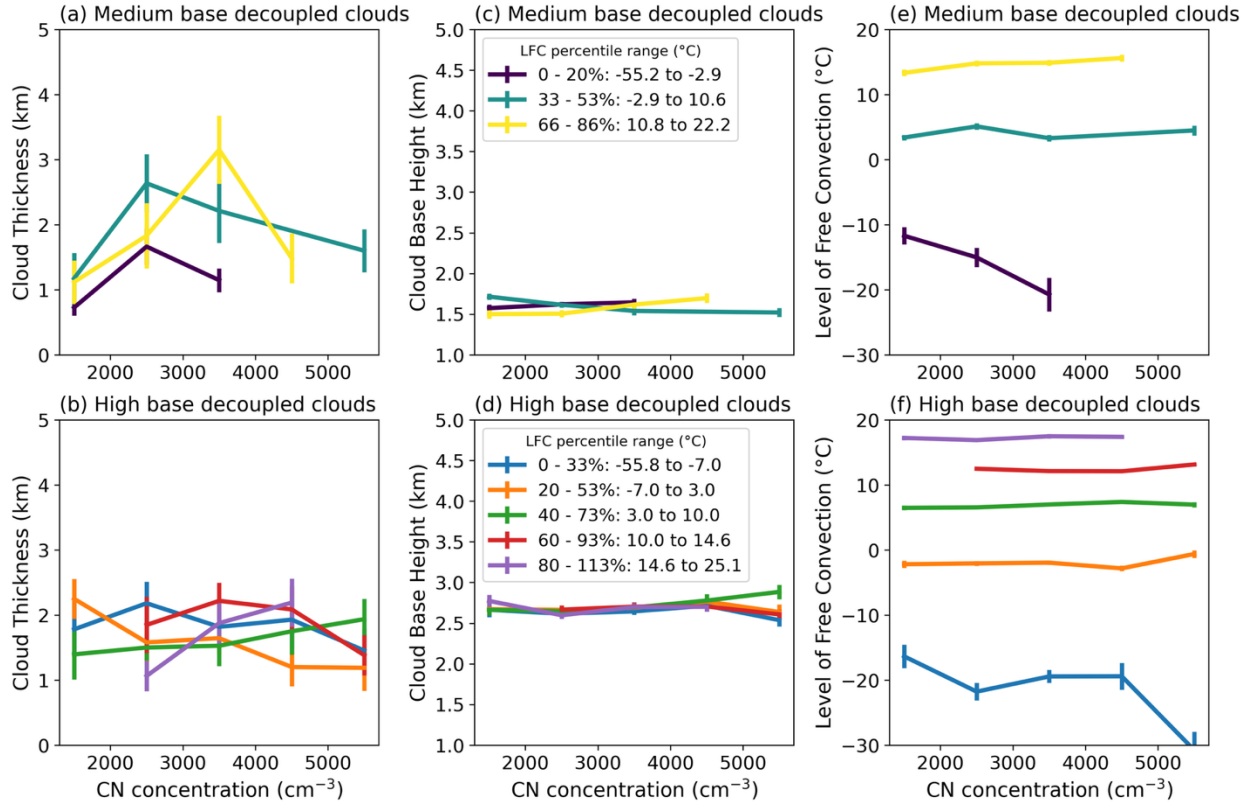
**Figure S2** Cloud thickness variations with aerosol number (CN) concentration for different Level of Free Convection (LFC) percentiles for (a) low-base coupled clouds and (b) medium-base coupled clouds. Cloud base height variations with CN concentration for different LFC percentiles for (c) low-base coupled clouds and (d) medium-base coupled clouds. LFC variations with aerosol concentration for the different LFC percentiles for (e) low-base coupled clouds and (f) medium-base coupled clouds. For each aerosol and LNB interval, mean values are shown only when the sample size exceeds 20.

## JGR atmospheres



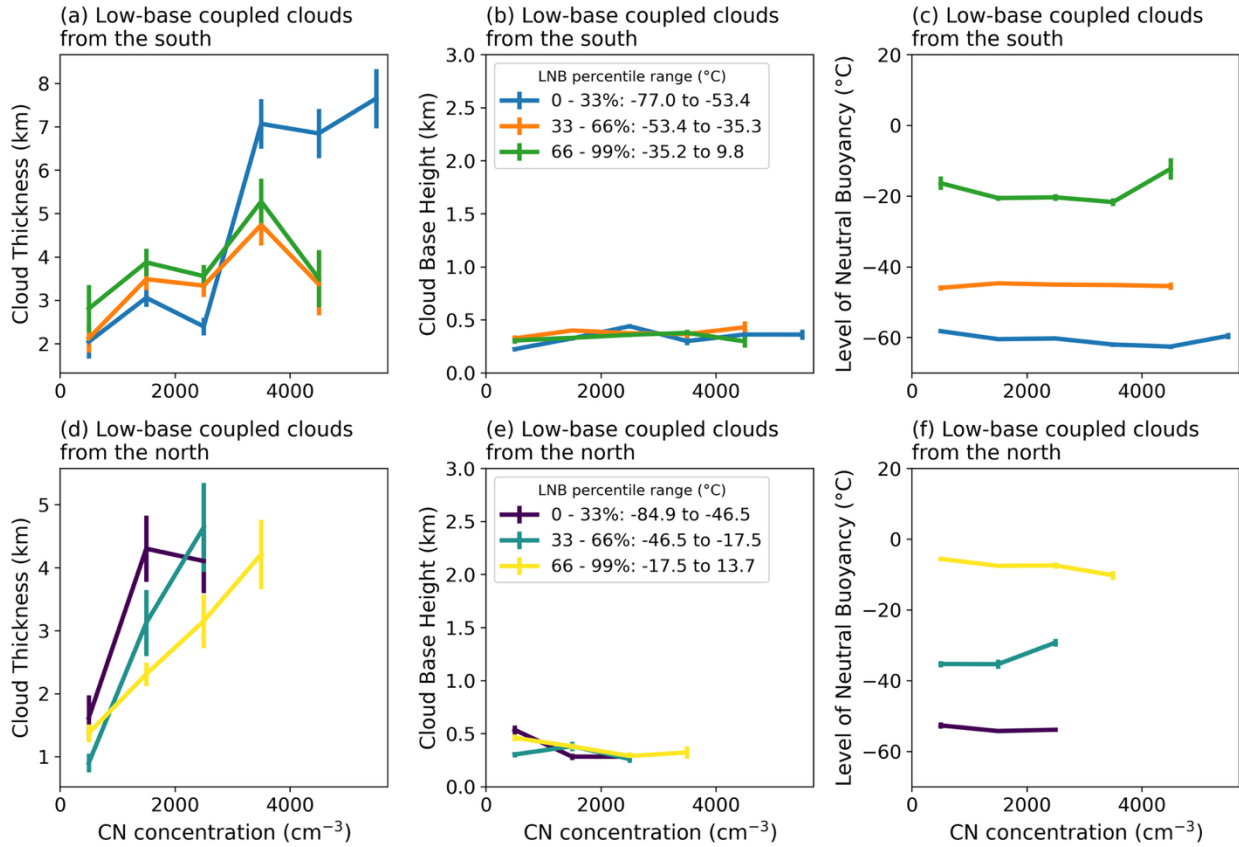
**Figure S3** Cloud thickness variations with aerosol number (CN) concentration for different Level of Neutral Buoyancy (LNB) percentiles for (a) low-base decoupled clouds and (b) medium-base decoupled clouds. Cloud base height variations with CN concentration for different LNB percentiles for (c) low-base decoupled clouds and (d) medium-base decoupled clouds. LNB variations with aerosol concentration for the different LNB percentiles for (e) low-base decoupled clouds and (f) medium-base decoupled clouds. For each aerosol and LNB interval, mean values are shown only when the sample size exceeds 20.

## JGR atmospheres



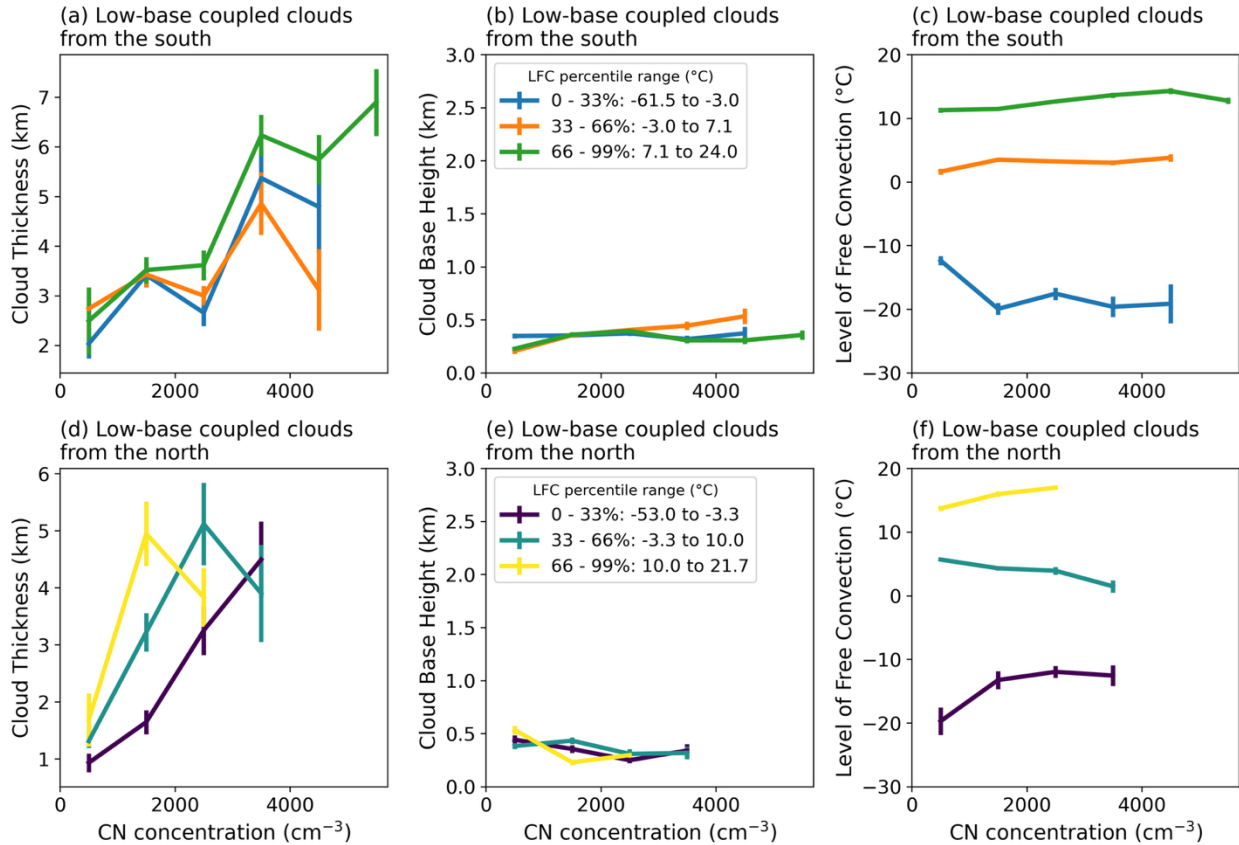
**Figure S4** Cloud thickness variations with aerosol number (CN) concentration for different Level of Free Convection (LFC) percentiles for (a) low-base decoupled clouds and (b) medium-base decoupled clouds. Cloud base height variations with CN concentration for different LFC percentiles for (c) low-base decoupled clouds and (d) medium-base decoupled clouds. LFC variations with aerosol concentration for the different LFC percentiles for (e) low-base decoupled clouds and (f) medium-base decoupled clouds. For each aerosol and LNB interval, mean values are shown only when the sample size exceeds 20.

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**Figure S5** Cloud thickness variations with aerosol number (CN) concentration for different Level of Neutral Buoyancy (LNB) percentiles for (a) low-base coupled clouds from the south and (b) low-base coupled clouds from the north. Cloud base height variations with CN concentration for different LNB percentiles for (c) low-base coupled clouds from the south and (d) low-base coupled clouds from the north. LNB variations with aerosol concentration for the different LNB percentiles for (e) low-base coupled clouds from the south and (f) low-base coupled clouds from the north. For each aerosol and LNB interval, mean values are shown only when the sample size exceeds 20.

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**Figure S6** Cloud thickness variations with aerosol number (CN) concentration for different Level of Free Convection (LFC) percentiles for (a) low-base coupled clouds from the south and (b) low-base coupled clouds from the north. Cloud base height variations with CN concentration for different LFC percentiles for (c) low-base coupled clouds from the south and (d) low-base coupled clouds from the north. LFC variations with aerosol concentration for the different LFC percentiles for (e) low-base coupled clouds from the south and (f) low-base coupled clouds from the north. For each aerosol and LFC interval, mean values are shown only when the sample size exceeds 20.