Dear typesetter,

Figure 2 still does not display properly. The colorbar on the right-hand side does not align with the numbers above it.

TS5: Optical depth is a unitless quantity, please remove these made-up units.

TS6: While not elegant the current sentence does convey the correct message. It can stay as is.

TS10: Authors contributions: K. Lamer developed and implemented the $(GO)^2$-SIM forward-simulator framework on NASA GISS's ModelE3. A. Fridlind, A. S. Ackerman and M. Kelley participated in developing the current version of ModelE3. A. Fridlind extracted the model simulation used in the current study. E. Clothiaux and P. Kollias along with A. Fridlind and A. S. Ackerman actively participated in brainstorming and in revising this work and manuscript lead by K. Lamer.

Also, please find below a few additional manuscript changes approved by the editor.

Changes to the following equations:

Remove the units in equations 15 and 16 (i.e. remove "[mm^6mm^{-3}]").

$$\tau(h) = \sum_{i=0}^{h} \sigma_{\text{copol,total}}(i)\Delta i \tag{21}$$

$$Z_{\text{copol,total,att}}(h) = Z_{\text{copol,total}}(h) - 2\sum_{i=0}^{h}\left[a\left(\text{WC}_{\text{pl}}(i) + \text{WC}_{\text{cl}}(i)\right)\right]\Delta i, \tag{24}$$

$$Z_{\min}(h) = Z_{\text{sensitivity at 1 km}} + 20\log_{10}(h) \tag{25b}$$

$$\beta_{\text{crosspol,cl,detect}} = 1.39\,(\beta_{\text{copol,cl,detect}} + \beta_{\text{crosspol,cl,detect}})^2 + 1.76\,10^{-2}\,(\beta_{\text{copol,cl,detect}} + \beta_{\text{crosspol,cl,detect}}) \approx 0. \tag{26c}$$

$$Z_{\text{copol,species,detect}}(h) = Z_{\text{copol,species}}(h) - 2\sum_{i=0}^{h}\left[a\left(\text{WC}_{\text{pl}}(i) + \text{WC}_{\text{cl}}(i)\right)\right]\Delta i, \quad \text{where } Z_{\text{copol,total,att}}(h) \geq Z_{\min}(h). \tag{27b}$$

And changes to Table 1:

(**a**) Determined using ModelE output hydrometeor mixing ratios

	Simulated hydrometeor-containing grid cells		
	Containing only liquid phase	Containing mixed phase	Containing only ice phase	Relative to total number of simulated grid cells
Frequency of occurrence (%)	2.4	59.8	37.8	43.5

(**b**) Determined using flexible objective thresholds estimated using model output mixing ratios

	Simulated hydrometeor-containing grid cells containing detectable hydrometeor amounts								
	Classified as liquid phase			Classified as mixed phase			Classified as ice phase			Relative to simulated hydrometer-containing grid cells		
	Median	±	½ IQR	Median	±	½ IQR	Median	±	½ IQR	Median	±	½ IQR
Frequency of occurrence (%)	11.3	±	0.6	19.2	±	1.8	68.8	±	3.1	78.3	±	1.8
False positive (%)	0.5	±	0.0	1.1	±	0.3	0.0	±	0.0	1.7	±	0.3
False negative (%)	0.2	±	0.0	Approx. equal to sum of questionable row: (~ 5.2	±	0.9)	1.5	±	0.2	1.7	±	0.3
Questionable (%)	1.4	±	0.0				3.8	±	0.9	5.2	±	0.9
Total error (%)										6.9	±	1.1

(**c**) Determined using fixed empirical thresholds modified from Shupe (2007)

	Simulated hydrometeor-containing grid cells containing detectable hydrometeor amounts								
	Classified as liquid phase			Classified as mixed phase			Classified as ice phase			Relative to simulated hydrometer-containing grid cells		
	Median	±	½ IQR	Median	±	½ IQR	Median	±	½ IQR	Median	±	½ IQR
Frequency of occurrence (%)	12.5	±	0.4	13.1	±	2.4	71.5	±	3.7	78.2	±	1.8
False positive (%)	0.5	±	0.0	0.3	±	0.0	0.1	±	0.0	0.9	±	0.0
False negative (%)	0.1	±	0.0	Approx. equal to sum of questionable row: (~ 6.7	±	1.1)	0.7	±	0.0	0.9	±	0.0
Questionable (%)	1.4	±	0.0				5.3	±	1.1	6.7	±	1.1
Total error (%)										7.6	±	1.1