Please find below an answer to additional comments reported in blue.

R2Q2 - In the literature two-parameter (shape and scale, product of which is mean particle diameter) gamma probability density functions were shown to give a reasonable fit to observed distributions of snow particle diameters (Budd, 1966; Schmidt, 1984), also used by Déry and Yau (1999). Apparently MAR is using a different parameterisation. For completeness and comparison, what is the distribution parameter lambda of the chosen exponential functions after Lin et al.(1983) used in this study, i.e. lambda or 1/lambda (=mean)? Presumably these have been fitted to observations in Antarctica, which ones? Please add this information on the chosen parameter, as it would help comparing to other models.

Please note that λ_s (Eq. 3) doesn't constitute an input parameter of the model but is rather dynamically determined through computation of the snow particle ratio and the air density. However, the intercept parameter n_0 is empirically fixed to $3 * 10^8\ m^{-4}$. Note that this value has not been fitted to any observed data and is more generally relative to the horizontal resolution and size of integration domain adopted in this study. The average diameter of (drifting-) snow particles in MAR can indeed be estimated by computing $1 / \lambda_s$ which typically yields values 2 to 6 times above the mean diameter reported in Déry and Yau (1999). Such a diameter also stands for any snow particle in the atmosphere since the model does not discriminate the source of snow particles (originating either from clouds or from the ground, Amory et al., 2021). Thus, we suggest modifying the main manuscript L154 as follows.

"This formulation is based on the assumption of an exponential distribution for particle size n_s (Eq. 2):

$$n_s = n_0 exp(-\lambda_s D_s) \qquad Eq.\ 1$$

n_0 being a constant representing the intercept parameter of the distribution. n_0 is empirically determined and was set to $3 * 10^8\ m^{-4}$ in our study. D_s corresponds to the particle diameter (expressed in m) and λ_s the dispersion parameter (expressed in m^{-1}). λ_s is determined as followed:

$$\lambda_s = \left(\frac{\pi * \rho * n_0}{\rho_a * q_s}\right)^{\frac{1}{4}} \qquad Eq\ 2.$$

with ρ the snow particle density (100 $kg\ m^{-3}$), ρ_a is the air density ($kg\ m^{-3}$) and q_s the snow particle ratio (expressed in kg of snow per kg of air).

Sublimation is then computed as a function of the air temperature, snow particle ratio and relative humidity, so that sublimation only occurs in a subsaturated environment, with respect to ice (Lin et al., 1983, their eq. 31, p. 1072)."

References:

Amory, C., Kittel, C., Le Toumelin, L., Agosta, C., Delhasse, A., Favier, V., & Fettweis, X. (2021). Performance of MAR (v3. 11) in simulating the drifting-snow climate and surface mass balance of Adélie Land, East Antarctica. *Geoscientific Model Development*, *14*(6), 3487-3510.

Déry, S. J., & Yau, M. K. (1999). A bulk blowing snow model. *Boundary-Layer Meteorology*, *93*(2), 237-251.

Lin, Y. L., Farley, R. D., & Orville, H. D. (1983). Bulk parameterization of the snow field in a cloud model. *Journal of Applied Meteorology and climatology*, *22*(6), 1065-1092.