

Author	Specifications	Assumptions/caveats	Results/Findings	Type
Ghan <i>et al.</i> -1995	Lagrangian size-resolving parcel model	Limitations of the droplet growth equation are not accounted. The effects of mixing processes are neglected.	Comparisons with detailed numerical solutions indicate typical differences of 50% for number fraction of aerosols activated for each type.	1
Ghan <i>et al.</i> -1998	Size-resolving aerosol model	Salt and sulfate are externally mixed. Salt film drop and jet drop modes are well mixed t/o MBL. Initial aerosols are in thermodynamic equilibrium.	$N_{ac} \propto [\text{sea-salt}]$ if $N_{\text{sulfate}}$ is low and $w$ is strong, but $N_{ac} \propto 1/[\text{sea-salt}]$ if otherwise. Activ. of accum. mode of sea-salt = $N_{ac}$ increase, reduc. $S_{\text{max}} = N_{ac}$ decrease.	2
Abdul-Razzak & Ghan (ARG) -2000	Numerical sim., param. of lognormal dist. of aerosol.	(Multimodes) particles with $Sc_{\text{Max}} < S_{\text{max}}$ will be activated. Kinetic limitations on the activ. process is neglected.	Comparisons of param. activ. of 2 competing aerosol modes with detailed num. sim. of the activ. process yields agreement to within 10% of detailed numerical simulations.	3
ARG (2002)	Extension of ARG (2000)	$\sigma = 1$ . Initial particles are in equilibrium with $RH = 1$ . Chem. comp. of the free trop. aerosol is pure $(\text{NH}_4)\text{HSO}_4$ .	Agreement for meas. size dist. with size-dependent comp. is almost as good as to within 10% of detailed numerical computations, except when $w < 0.1$ m/s.	
Nenes & Seinfeld -2003	Theoretical work (population-splitting); GCM, parcel model	Aerosol chem. comp. within each part of the size dist. is uniform and indep. of the other sections. $N_a$ across a section is linear.	Activation ratio vs $w$ shows that the new param. is superior to the existing param., and the result of which is as robust as and close to the parcel model.	
Fountoukis & Nenes -2005	Continued Nenes and Seinfeld (2003), with new param.	CCN are completely soluble, diffusivity of $\text{H}_2\text{O}_{(g)}$ onto droplet is indep. of their size, $0.001 < a_c < 1$ .	The modification to include accomodation coeff. ( $a_c$ ) doesn't increase comput. cost, but substantially improve the param. performance.	
Chen & Penner -2005	3D meteorological fields; radiative transfer model.	Single lognormal size dist. with mode radius $r_m = 0.05 \mu\text{m}$ , $\sigma = 2$ , and $N_{a,\text{tot}} = 1000 \text{ cm}^{-3}$ . Pure $(\text{NH}_4)_2\text{SO}_4$ aerosol.	Change in aerosol size dist. modifies $N_a$ and hence activation ratio. $w$ contributes to influencing indirect forcing ( $0.2 - 0.4 \text{ W/m}^2$ ).	
Ming <i>et al.</i> -2006	param. linking $N_c$ to aerosol size dist., chem. comp., and $w$ ; parcel model	Pure $(\text{NH}_4)_2\text{SO}_4$ aerosol for base case, 20% soluble organics and 80% $(\text{NH}_4)_2\text{SO}_4$ for a test case.	For $0.03 < w < 10$ m/s, $N_c$ predicted by param. are in good agreement with the detailed parcel simulation, with avg error $-4 \pm 26\%$ . Organics lowers surface tension and enchances activ.	
Shipway & Abel -2010	Subgrid param. for numerical models; adiab. parcel model.	Soluble fraction of aerosol part. are dist. within the part. volume. Diffusivity of water onto droplet is indep. of droplet size.	Activated fraction vs $w$ shows param. curves lie close to parcel model results for all $w$ , in clean and polluted air.	
Ghan <i>et al.</i> -2011	Review, compare-contrast different parametrizations.	# of nucleated drop det. by # of part. with $Sc < S_{\text{max}}$ , which det. activation. Kinetic limitations for drop nucleation is neglected.	More complex param. perform better under a wider variety of nucleation conditions. Larger differences are found for Ming scheme.	

Type	Na (cm <sup>-3</sup> )	r <sub>m</sub> (μm)	σ
1	100	0.05	2
2	1000	0.08	1.4
3	1000	0.05	2

## (Number) Fraction of Activation

