Year	Author	Main points
2011	Ghan et al.	1. Why nucleation parameterization(air parcel model Vs parameterization)(many aerosol bins, long integration of small time step to get Smax) 2. Comparison of popular parameterizations (multiple assumptions, comparing two schemes in one GCM) 3. Future direction: organics as CCN; external mixture observed from single particle spectrumeter, impact on convective clouds, nucleation inside the cloud
2000	Abdul-Razzak and Ghan	1. Parameterization development (Smax correlating parameters to large number of air parcel model simulations) 2. Comparison with detailed numerical approaches 3. Limitation (no kinetic process, organic compound, only two modes)
2003	Nenes and Seinfeld	1. Aerosol size distribution : sectional 2. Population splitting (close to critical size or not) 3. Smax is explicitly determined, not from correlation of parcel model
2006	Ming, Ramaswamy, Donner et al.	1. Smax is prognostic thru iterations 2. Comparison with air parcel model : important for heavy aerosol loading and small updraft velocity condition.
1995	Chuang and Penner	1. Sulfate size distribution with three mode 2. Empirical relationship that links Nd = wNa/(w+c*Na), in which parameter is determined by detailed parcel model.
2008	Kivekas, et al.	1. Aerosol size distribution: submicron volume concentration and its number-to-volume concentration ratio 2. Comparisons with Nenes and AGB, comparison with field data 3. Computationally cheap

Year	Author	Model	Main points
2008	Morrison and Gettlemen	CAM3	1. Aerosol's impact on stratus in GCM 2. Bulk Vs two-moment (number and mixing ratio) 3. Number concentration is prognostic, can simulate indirect effect 4. cloud particle size is reduced over land compared with bulk scheme
2007	Ming, Ramaswamy, Donner et al.	GFDL_AM2	1. Prognostic Nd scheme, in addition to LWP and amount. 2. Activation as a source of Nd. 3. show negative biases over the mid-latitude land, owing to the neglect of sub-grid variations of large-scale ascents and inadequate convective.
2011	Song and Zhang	CAM3.5	1. MG2008 scheme in the convective clouds 2. Single column model results examined with tropical field campaign data 3. Stratus precipitation is enhanced with new scheme
2011	Wang, Gahn, et al.	MMF	1. Model that embeds a cloud-resolving model (CRM) within each vertical column of a GCM grid 2. Explicit-cloud parameterized-pollutant : uses statistics of cloud properties(stratus and cumulus) resolved by the CRM (Explicit-Cloud) to drive aerosol and chemical processing by clouds on the GCM grids 3. Aerosol indirect forcing is low (0.7W/m2) compared with CAM5, with much less LWP increase and less CCN increase from PI to PD