

PAPER	SPECIFICS OF STUDY	FINDINGS
Kohler, 1936 (“The nucleus in and the growth of hygroscopic droplets”)	Evaporate 2kg of hoar-frost and <b>determined Cl content</b> ; used optics to <b>measure droplet size</b> ; thermodynamic analysis to look at <b>condensation</b>	$[Cl]_{\text{rain droplet}} \cong [Cl]_{\text{cloud droplet}}$ ; $d[Cl]/dz < 0$ ; “selection” of droplet size – large ones grow first at expense of smaller
Twomey, 1974 (“Pollution and planetary albedo”)	Theoretical approach to <b>relate optical thickness to cloud albedo</b> ; observed data over several hours from Southeast Australia used to examine <b>effects of pollution on # of cloud nuclei</b>	Pollution → addition of cloud nuclei → increase solar reflection; cloud reflectance dominant role in planetary albedo; <b>Albedo <math>\propto</math> optical thickness</b> (thickness is DOMINANT in determining albedo); # cloud nuclei $\uparrow$ → optical thickness $\uparrow$ → <b>increase in reflected solar (net cooling)</b>
Albrecht, 1989 (“Aerosols, cloud microphysics, and fractional cloudiness”)	Q: <b>How do aerosols affect fractional cloudiness</b> of marine Sc and cumulus? Used optical array probe to estimate <b>droplet concentrations</b> ; GOES images to detect <b>ship tracks</b> ; Used model simulation to <b>calculate fractional cloud amount</b>	Over ocean, $\uparrow$ CCN $\rightarrow$ $\downarrow$ droplet size $\rightarrow$ $\downarrow$ drizzle production $\rightarrow$ $\uparrow$ Cloud liquid water and cloudiness. Increase in cloud lifetime leads to <b>increase in reflected solar (net cooling)</b>

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Lenton & Vaughan, 2009 (“The radiative forcing potential of different climate geoengineering options”) – cited Albrecht, 1989	Theoretical considerations of <b>radiation budgets and radiative transfer</b>	Climate geoengineering best considered as <b>COMPLEMENT</b> to mitigation of CO <sub>2</sub> emissions, not an <b>ALTERNATIVE</b> ; up to <b>-4Wm<sup>-2</sup> radiative forcing</b> on century timescale
Kazil et al. 2010 (“Aerosol nucleation and its role for clouds and Earth’s radiative forcing in the aerosol-climate model ECHAM5-HAM”) – cited Twomey, 1974	Used <b>aerosol-climate model ECHAM5-HAM</b> , implemented new scheme for “neutral and charged nucleation” of H <sub>2</sub> SO <sub>4</sub> and H <sub>2</sub> O based on empirical studies	Overall radiative effect of nucleation is <b>-2.55Wm<sup>-2</sup></b> (-2.18 over oceans, -0.37 over land; discrepancy partially due to larger surface area of oceans)
Petters & Kreidenweis, 2007 (“A single parameter representation of hygroscopic growth and condensation nucleus activity”) – cited Kohler, 1936	Relate particle dry diameter and CCN activity using “ <b>single hygroscopicity parameter</b> ” κ; use a <b>modeling approach</b> based on Kohler theory	<b>Hygroscopicity parameter can be used to model CCN activity</b> of atmospheric particles

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<p>Ackerman et al. 2008 (“Large-Eddy Simulations of a Drizzling, Stratocumulus-Topped Marine Boundary Layer”) – cited Albrecht, 1989</p>	<p>Model simulations initialized by aircraft measurements which measured aerosol concentrations, wind, moisture, etc; comparison of several simulations</p>	<p>Mean LWP well reproduced; mean entrainment rate lower; including drizzle leads to decrease in LWP for nearly all model simulations</p>
<p>Lohmann et al. 2010 (“Total aerosol effect: radiative forcing or radiative flux perturbation?”) – cited Twomey, 1974</p>	<p>Attempt to quantify feedbacks induced by interactions of aerosols with clouds and radiation; use “radiative flux perturbations” (RFP) method, using various GCMs</p>	<p>Feedbacks and interactions that are fast compared to global warming timescales should be included in anthropogenic feedback estimates;</p>