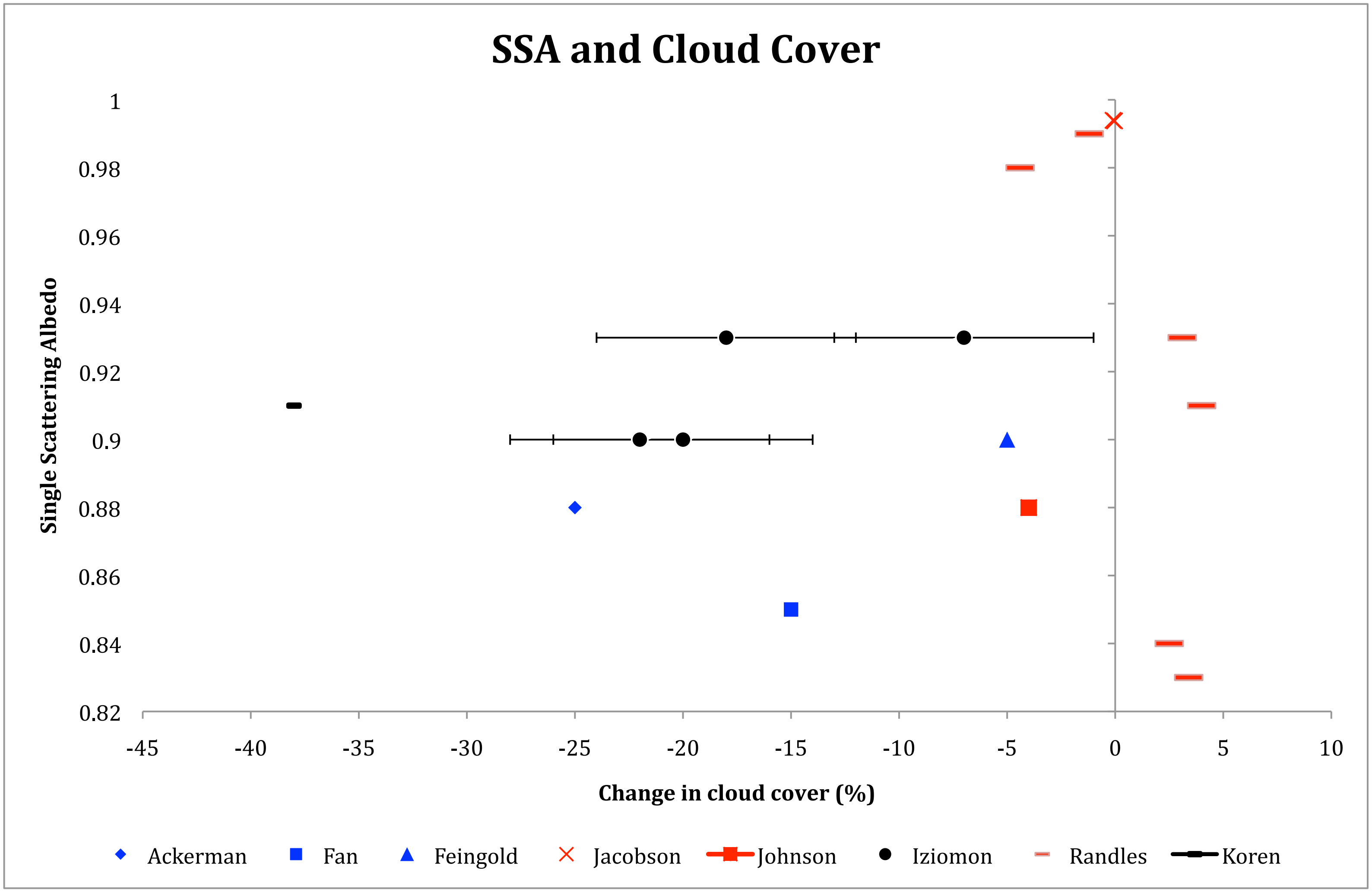
Liliana Nunez SSA and Cloud cover SIO 209

Ackerman et al 2000	LES INDOEX Trade Cumulous (soot and sulfate)	Calculated SSA (0.88)	Absorbing aerosols in BL reduced the RH, increased entrainment rate, and stabilized the BL, resulting in decreased daytime cloud fraction by 25-40%
Iziomon et al 2003	Observations at SGP CF ARM Cattle pasture and wheat fields in OK. (Smoke dominated haze)	SSA derived from observations (.9-.93)	Optical properties of SSM vs VSM and LSM vs MSM compared meteorological conditions. MJJ had increased smoke frequency. Compare the local seasonal direct radiative forcing for smoke haze ranges from -0.25 (winter) to -3.14 (spring) Wm-2. May and July presented SSA 0.93 and 0.90.
Koren et al 2004	1 dimensional Radiation Model and MODIS measurements Amazon basin (Smoke)	Calculated SSA (0.91)	Above the optical depth of 1.3 there is no cloud present. Varied SSA to demonstrate the sensitivity of the forcing to the value of SSA is linear. Aerosols stabilize atmosphere by cooling surface and heating atmosphere. Reduced solar flux reduces RH. Heating of BL increases saturation water vapor and high particle concentration competing for condensed water both reducing supersaturation probability. Reduction of 38% CC.
Brioude et al 2009	Satellite (GOES) and MODIS measurements incorporated in FLEXPART model, simulated Biomass and anthropogenic passive tracers.	Prescribed SSA = 0.85	With in 500km of coast AAs above marine BL increase CC (for high RH and low LTS conditions) aerosols increase LTS which decrease entrainment of dry air from above, increasing RH in BL. > 500km from coast AAs occurred within the BL and caused a decrease in CC.
Fan et al 2008	Spectral bin CRM coupled with radiation and land surface. Houston, TX, Deep convective clouds	Prescribed SSA (0.85)	The absorbing aerosols cooled the surface, increasing RH below BL, heating in BL caused an increase in RH in BL decreasing temperature lapse rate. Stabilizing atmosphere and decreasing convection. -15% CC
Feingold et al 2005	LES Amazonia (soot and ammonium sulfate)	Calculated SSA (0.90)	AAs in BL increase BL stability, but also reduce surface heating and SH flux. BUT smoke emitted at the surface, decreases stability and promotes convection for cloud formation
Menon et al 2002	GISS GCM Over India an Asia Constant SSTs (BC and sulfate)	Prescribed SSA (0.85) to match with INDOEX	Higher aerosol loadings increase convection, increase precip, and increase cloud cover. Does not agree with local observations. Increased precip in southern China coincide with observations. Globally there is a 0.09% decrease in CC.
Jacobson 2006	GATOR-GCMOM a parallelized and one-way nested global-through urban scale gas, aerosol, transport, radiation, general circulation, mesoscale, and ocean model.	SSA determined through Mie theory (~0.99)	3-D evolution of BC from emission to inclusion. BC cloud absorption increase water vapor, decrease precipitation, and decrease cloud fraction. The increase in water vapor further contributed to warming. Creating a feedback loop. -0.03% to -0.1% CC
Randles and Ramawasay 2008	Atmospheric-land GCM (GFDL) China low clouds (SO4, BC, OC, dust, and sea salt)	SSA determined off-line using Mie theory	Fixed SSTs and varied SSAs. At high OD stabilized atmosphere due to absorption is overcome by low level convergence and increased vertical motion. Since aerosols are off-line don't, model dynamics are not coupled. According to authors varied SSAs account for this.
Johnson et al 2005	LES vs NCAR-SCCM Used FIRE for meteorological setup (soot and ammonium sulfate)	SSA from FIRE (0.88)	LES is more accurate since SCCM simulations result in a semi direct effect a factor of 5 smaller. SCCM has a poor representation of physical processes, (entrainment and boundary layer decoupling) that determine LWP. SSA= 0.88 reduced CC by 4%



In the figure Red markers correspond to GCMs, Blue markers correspond to Regional scale models, and Black markers correspond to local scale model and observations.