Modeling Aerosol-Cloud Interaction with a Self-consistent Cloud Scheme

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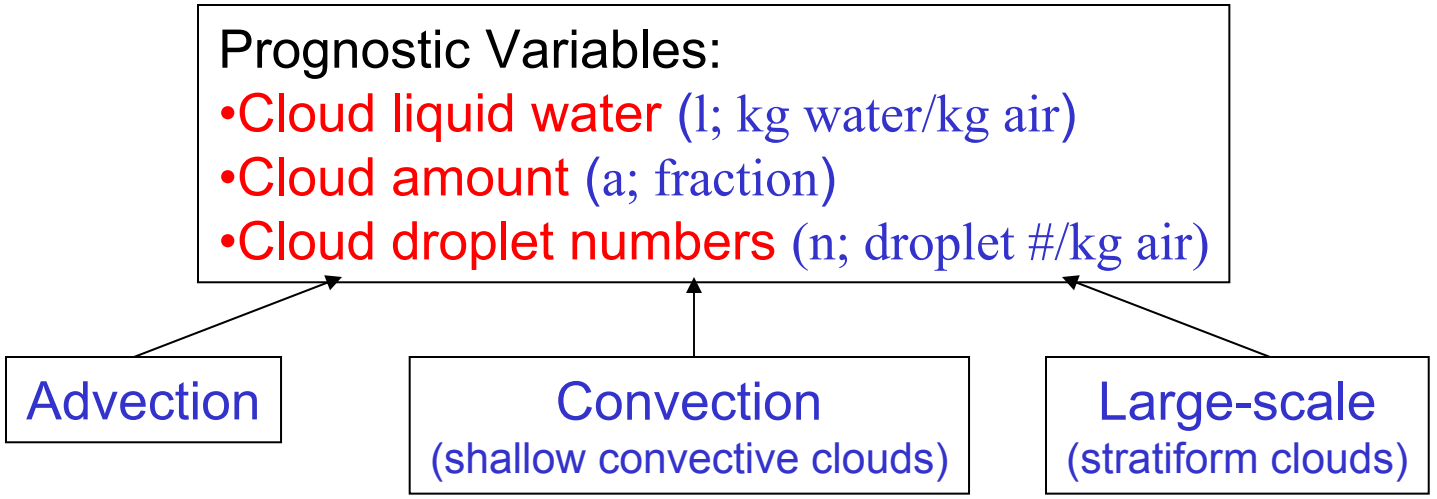
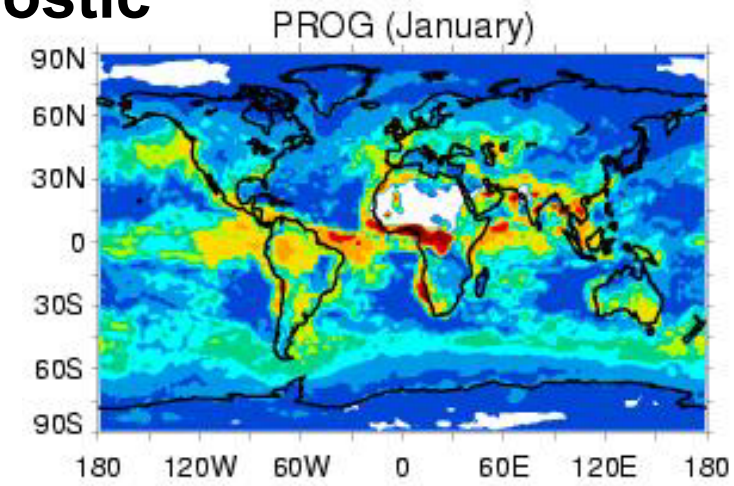
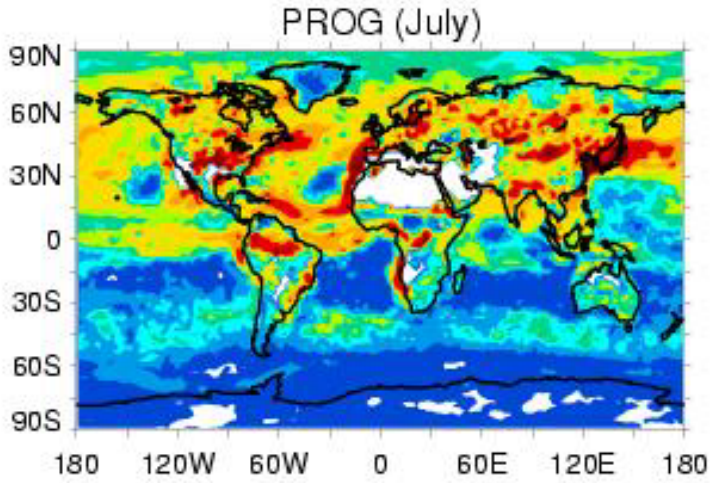


- The source and sink terms for cloud liquid water, amount and droplet numbers are fully consistent;
- The evolution of droplets interacts with model meteorology;
- Droplet activation is determined by the chemical compositions and size distributions of multiple types of aerosols (i.e., sulfate, OC and sea salt) as well as model-resolved updraft velocities.

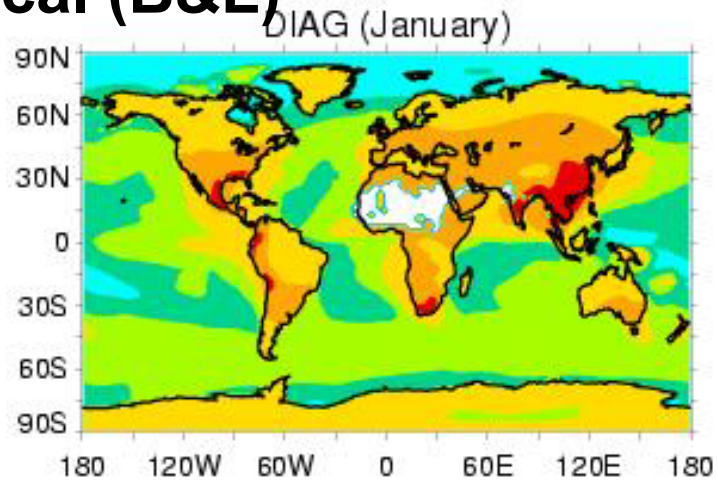
PD In-cloud Droplet Number Concentrations (/cc) at 900 mb

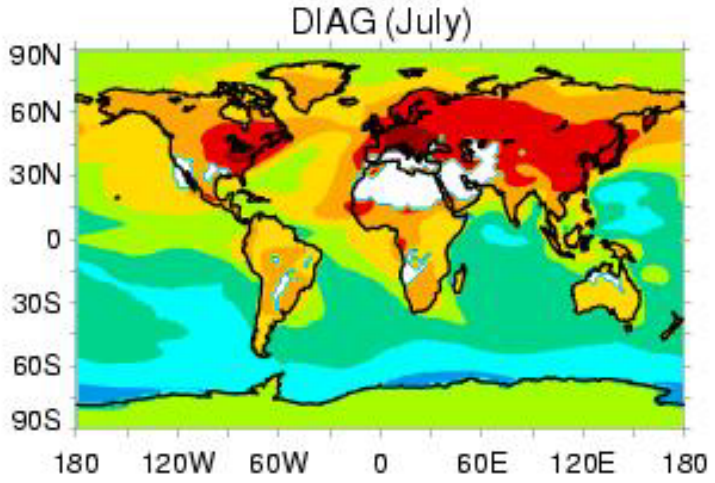
Prognostic

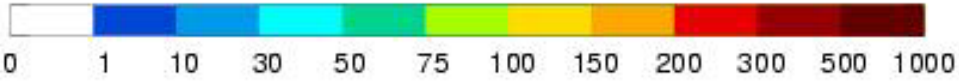




Empirical (B&L)

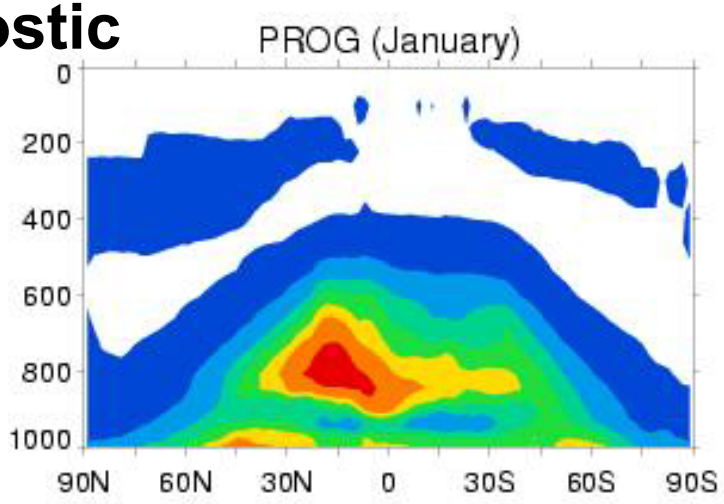


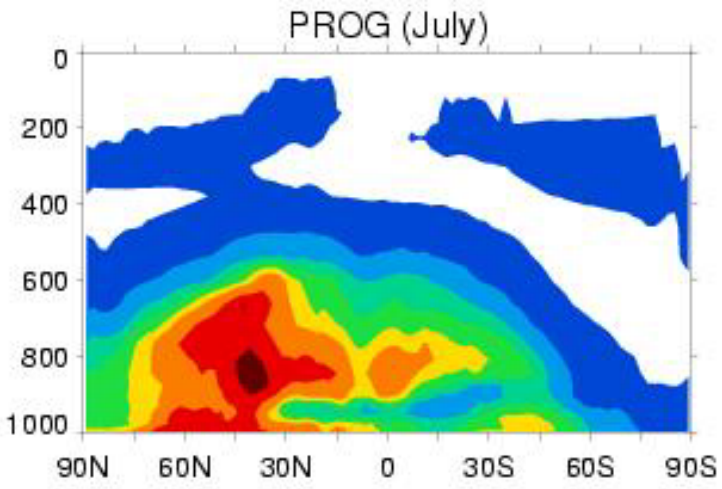




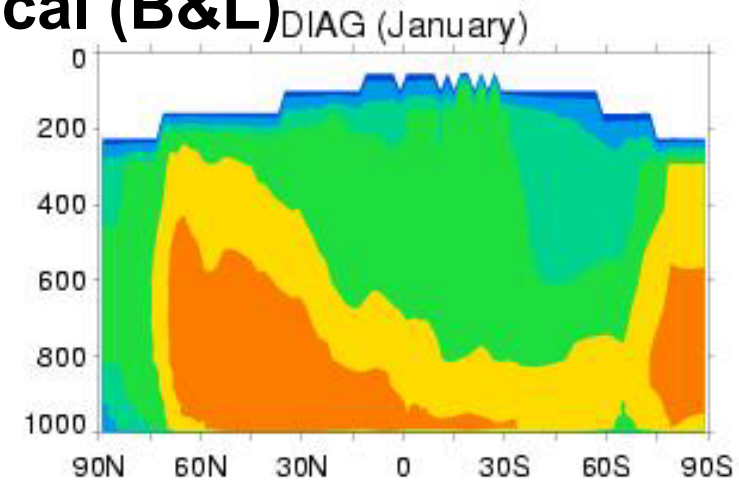
PD Vertical Distribution of In-cloud Droplet Number Concentrations (/cc)

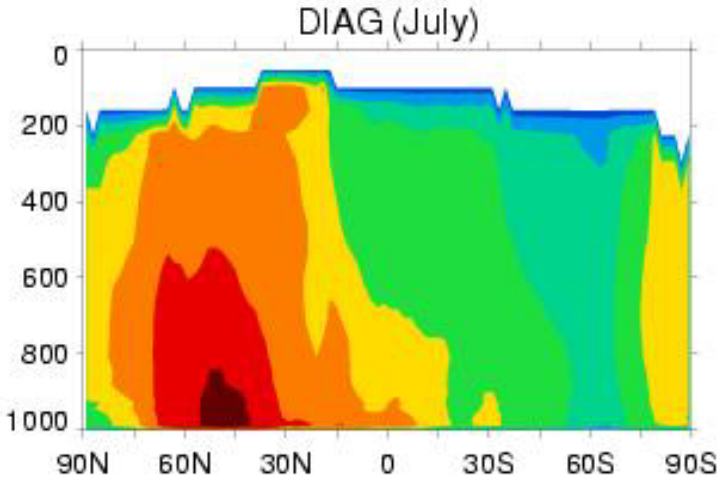
Prognostic

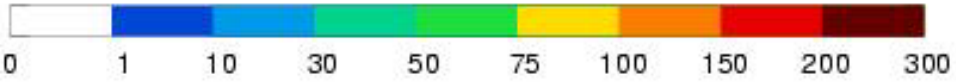




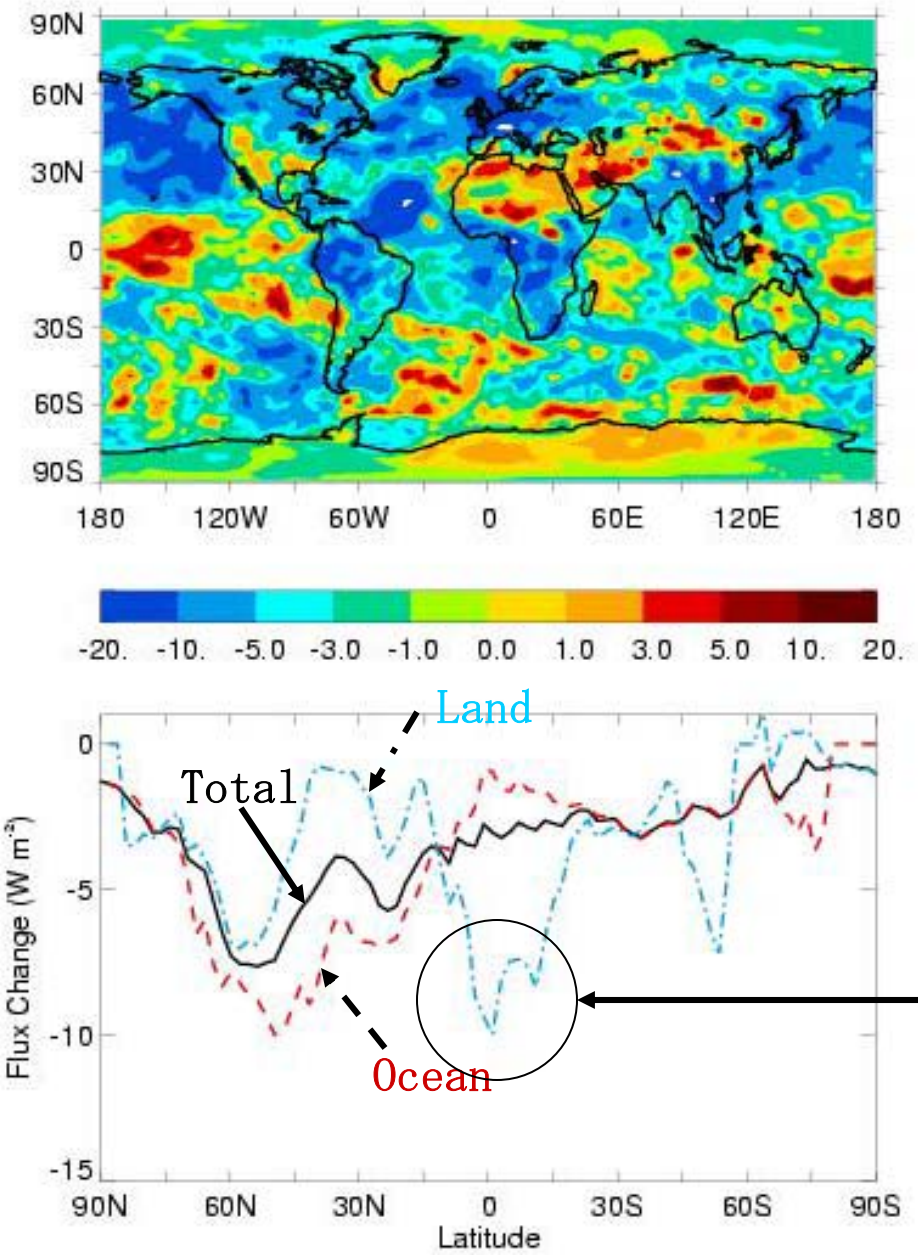
Empirical (B&L)







Flux Changes: 1st & 2nd Indirect Effects



	PI Burden (Tg)	PD Burden (Tg)
Sulfate	0.67	2.44
OC	0.17	1.36

- Annual Mean: -3.6 W/m^2
- NH/SH Ratio: 2.1
- Ocean/Land Ratio: 0.93
- NH Ocean/Land Ratio: 1.4

- Contribution of OC over tropical land
- Annual Mean w/o OC: -2.5 W/m^2