Snowball Earth Condition in AGCMs: Effect of Season and Continental Distribution.

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Using Atmospheric General Circulation Model (AGCM) coupled with a slab ocean (50m depth water), the snowball condition is investigated by searching the response of the earth to solar constant and CO2 change systematically. The studies with and without season as well as that with and without continents our also compared. The system is under the partially ice covered condition (some ice on the earth and open ocean exists) for a broad range of external forcing, ex. 15 per cent of present solar constant and is consistent with other GCM studies. The response of AGCM to external forcing is quite different from that of EBM (energy balance models) in case the ice edge locates at mid to low latitude, preventing the system from falling into snowball condition. The reason for the persistent ice edge of AGCM compared to conventional EBM is partly due to the role of latent heat transport and also the seasonality.