Physical and geochemical processes in the snowball Earth during the Late Proterozoic

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A snowball Earth during the Late Proterozoic is investigated by using a one-dimensional energy balance climate model combined with a carbon cycle model. I found that the snowball Earth stage would be the longest in the snowball Earth event, and the other stages, such as the runaway cooling stage, the deglaciation stage, and the climate recovery stage have much shorter characteristic timescales. Because of geothermal heating from the seafloor, the ocean would not freeze completely. Only a 1000 m of the surface ocean should be freezed. If the Earth had really fell into the global glaciation, there may be evidence for dissolution of carbonates at the time just after the Deglaciation stage, which might imply a high pCO2 level expected from the model.