The 402th Geodynamics Seminar

Numerical simulation on thermal convection of highly compressible fluid with Depth-dependent thermal conductivity: Implications for the mantle convection of super-Earths

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Abstract

Recently, many extra-solar planets have been discovered by improved observation technologies. Some of these planets, called super-Earths, have small masses (up to 17 times the Earth's) and high mean density (>5000 kg/m^3). Numerical modeling of mantel convection of super-Earth plays an important role in studying the occurrence of plate tectonics and the surface environments on these planets. On the other hand, when considering mantle convection of super-Earths, it is also important to take into account the difference in (hydrostatic) pressure in the mantles. Since super-Earths have high inner pressure, there must exist a strong change in physical parameters and the effect of adiabatic compression. While the effects of physical properties have been intensively studied, those of adiabatic compression have not been well studied in the previous .models of mantel convection of super-Earths. Here we conduct numerical experiments of thermal convection of highly compressible fluid whose thermal expansivity and conductivity are dependent on depth, in order to elucidate mantle convection on super-Earths. By examining the vigor and structures of convection flows, we will discuss the effect of adiabatic compression on the dynamics and thermal evolution of the mantles of super-Earth.

詳細は当センターホームページ：http://www.ehime-u.ac.jp/~grc/をご覧ください
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