Hinode-3: 3rd Hinode Science Meeting
Hitotsubashi Memorial Hall, Tokyo
1–4 December, 2009

Local helioseismology of the polar region dynamics by Hinode/SOT

Kaori Nagashima
Graduate University for Advanced Studies / NAOJ

Junwei Zhao
Stanford University

Alexander G. Kosovichev
Stanford University

Takashi Sekii
NAOJ / Graduate University for Advanced Studies

Abstract. To study the dynamo mechanisms in the Sun, we need to understand the solar interior dynamics. It is known that there are various flows: convection, differential rotation, and meridional circulation, which are responsible for generation and transport of magnetic fluxes on the Sun. In this work, we use the unique high-resolution capability of Hinode/SOT to study the large-scale subsurface flows in the polar regions. For example, it has been pointed out that the behaviour of the supergranular convection in the polar regions may differ from that in the low-latitude regions, because of the difference in the way the Coriolis force affects the flow. Also, recent numerical simulations showed that the differential rotation at high latitudes may significantly vary with time, and that the meridional circulation may form reverse cells. Although foreshortening makes it difficult to observe the polar region in detail, we use the high-resolution Hinode/SOT observations of the polar regions during the periods of the highest inclination of the solar axis to the ecliptic to investigate the supergranulation, differential rotation and meridional flows in subsurface regions by time-distance local helioseismology. We compare the results with the previous time-distance measurements at lower latitudes from SOHO/MDI, and discuss the implications for the solar dynamics and dynamo mechanisms.