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

Are the polar and equatorial coronal holes different from the quiet Sun?

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Abstract. Observations of solar polar region are critically important for understanding the solar dynamo and the acceleration of solar wind. We carried out precise magnetic observations on both the polar region and the quiet Sun at the East limb with the Spectro-Polarimeter of the Solar Optical Telescope aboard Hinode to characterize the polar region with respect to the quiet Sun. We also observed equatorial transient coronal holes to compare the magnetic properties with those of the polar coronal hole and the quiet Sun. The histogram of signed magnetic field strength for the quiet Sun is symmetric around zero, showing balanced positive and negative magnetic fields, while the histogram for the polar region is clearly asymmetric, showing a predominance of one polarity. The total magnetic flux of the polar region with intrinsic field strength higher than 300 G is much larger than that of the quiet Sun. Magnetic concentrations in the polar region in general have larger area and larger magnetic flux than those in the quiet Sun. A high-resolution potential field extrapolation shows that the majority of magnetic fields lines from the kG-patches in the polar region are open with a fanning-out structure, while in the quiet Sun, almost all the field lines are closed. We also show that the transient equatorial coronal holes have magnetic properties quite different from those of the polar coronal holes, and are closer to the quiet Sun. We compare magnetic properties of the polar coronal hole, equatorial coronal holes and the equatorial quiet Sun.