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Spectroscopic Study of Heating Distributions and Mechanisms Using Hinode/EIS

This study aims to reveal the heating mechanism in coronal loops by observationally deriving the relation among the heating flux F_{H}, the magnetic field B_{base}, and the loop half-length L_{half}. While the previous studies investigated the heating mechanism assuming some parameters (e.g., heating scale height), this study directly derives the parameters from the observations. F_{H} is obtained by the heating distributions derived from *Hinode*/EIS, B_{base} is derived from *SDO*/HMI, and L_{half} is determined by *SDO*/AIA. We estimate the heating distribution by applying a Bayesian analysis to the electron temperature and electron density distributions derived by spectroscopic data from *Hinode*/EIS; we define the heating distribution decreasing with a heating scale height s_{H} toward the loop-top with a heating rate E_0 at the transition region. We obtain s_{H}=4.3–22 Mm for our analysis of 18 loops with L_{half}=24–107 Mm, suggesting the heating concentration near the lower part. Compared to the previous studies using the imaging data, s_{H} is comparable, but E_0 and F_{H} are approximately an order of magnitude larger. We confirm that using the imaging data leads to the underestimation of the electron density due to the assumption of plasma volume, and consequently the underestimation of E_0 and F_{H}. From F_{H}, B_{base}, and L_{half} of 18 loops, we obtain $\beta = 1.04^{+0.18}_{-0.36}$ and $\lambda = -0.99^{+0.04}_{-0.05}$ in $F_H \propto B^{\beta}_{\mathrm{base}} L^{\lambda}_{\mathrm{half}}$; Mandrini et al. (2000) expressed the heating models as the power-law relation and tried to classify them by β and λ. This presentation discusses the heating models allowed by the derived β and λ.

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