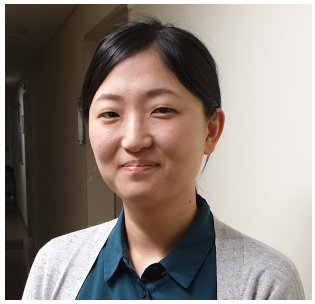
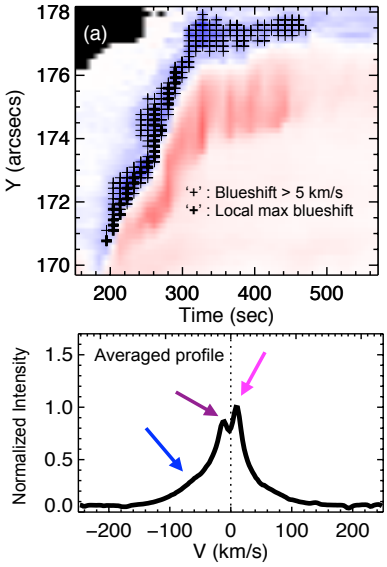
Thomas R. Metcalf Travel Award Report 2019
The 10th IRIS Meeting, 4-8 November 2019 in Bangalore India



Akiko TEI

I am a PhD student and JSPS research fellow at the Astronomical Observatory and the Department of Astronomy, Graduate School of Science, Kyoto University, Japan. My research interests are Solar flare physics, spicule physics, and coronal and chromospheric heating mechanisms and I have studied solar flares and solar spicules, mainly using the spectroscopic data taken by ground and space observations. I will be defending my PhD in the beginning of 2020.

Abstract of Invited Talk: "Observations and Modeling of Chromospheric Lines during a Solar Flare" by A. Tei, J. Kasparova, P. Heinzel, K. Shibata, T. Nakamura, J. Okamoto, T. Sakaue, T. Kawate, A. Asai, S. UeNo, K. Ichimoto



Top: Evolution of the measured Doppler velocity in the Mg II h line. Bottom: Averaged profile of the blueshifted Mg II h line.

During the coordinated observations of AR 12205 with the Interface Region Imaging Spectrograph (IRIS) and the Domeless Solar Telescope (DST) at Hida Observatory, we observed a C-class flare on November 11, 2014. We investigated the temporal and spatial evolution around a moving flare kernel, using the spectral data in the Si IV, C II, and Mg II h and k lines from IRIS and the Ca II K, Ca II 8542 A, and H-alpha lines from DST. In the Mg II h line, the leading edge of the kernel showed intensity enhancement in the blue wing and asymmetry between the blue peak and red one. Then, the drastic change of the intensity in the red wing occurred. The blueshift lasted for 9-48 s with a speed of about 10 km/s and it was followed by the strong redshift with a speed of up to 50 km/s detected in the Mg II h line. The strong redshift was a common property for all six lines but the blueshift prior to it was found only in the Mg II lines. A cloud modeling of the Mg II h line suggests that the blue wing enhancement, together with the peak asymmetry, can be caused by a cool chromospheric upflow.

We have modeled the evolution of the chromospheric lines during the impulsive phase of the flare, using the non-LTE radiation-hydrodynamics code FLARIX and the radiative transfer code MALI. We showed that a non-thermal electron beam heating can cause an upflow of cool plasma pushed up by expanding hot plasma owing to the deep penetration of non-thermal electrons into the chromosphere.

Acknowledgements

I would like to thank the Solar Physics Division of the American Astronomical Society and Science Organizing Committee of the IRIS-10 meeting for the Metcalf Travel Award and the invitation to deliver the talk. I was inspired by meeting with researchers and students around the world. I was able to receive useful comments on my talk and beneficial discussions on my studies from other participants in the meeting.