image from given input and the corresponding output image. In this study, we trained three models with HMI images in 2014 and test them with HMI images in 2015. We find that the RCAN model achieves higher quality results than the other two methods in view of both visual aspects and metrics: 31.40 peak signal-to-noise ratio(PSNR), Correlation Coefficient (0.96), Root mean square error (RMSE) is 0.004. This result is also much better than the conventional bi-cubic interpolation. We apply this model to a full-resolution SDO/HMI image and compare the generated image with the corresponding Hinode NFI magnetogram. As a result, we get a very high correlation (0.92) between the generated SR magnetogram and the Hinode one.

[포 SS-07] Development of a flux emergence simulation using parallel computing

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The solar magnetic field comes from the solar interior and is related to various phenomena on the Sun. To understand this process, many studies have been conducted to produce its evolution using a single flux rope. In this study, we are interested in the emergence of two flux ropes and their evolution, which takes longer than the emergence of a single flux rope. To construct it, we develop a flux emergence simulation by applying a parallel computing to reduce a computation time in a wider domain. The original simulation code had been written in Fortran 77. We modify it to a version of Fortran 90 with Message Passing Interface (MPI). The results of the original and new simulation are compared on the NEC SX-Aurora TSUBASA which is a vector engine processor. The parallelized version is faster than running on a single core and it shows a possibility to handle large amounts of calculation. Based on this model, we can construct a complex flux emergence system, such as an evolution of two magnetic flux ropes.

[포 SS-08] Taxonomic Classification of Asteroids in Photometry with KMTNet

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In order to gather clues to surface mineralogy of asteroids, we classify their taxonomy based on their reflected spectra. It is remarkable that a large number of asteroids plotted in the proper orbital element space with distinct colors according to their taxonomic types reveal the dynamical evolution and the structure in the near-Earth space, the main-belt and beyond. Although we have ~1×10^6 known objects, no more than ~3×10^3 of them are properly classified taxonomically as visible-near infrared spectroscopy is costly. On the other hand, multi-wavelength broadband photometry in the visible region provides a rather inexpensive alternative tool for approximate taxonomy. Thus we have conducted multi-band observations systematically using Korea Microlensing Telescope Network (KMTNet) with BVRI and griz filters since back in 2015. We then applied aperture photometry with elliptical apertures to fit the trails of objects during the exposures, and classified them with the principle component indices of Ivezic et al. (2001). We will make use of our new, three dimensional asteroid classification scheme for the next step.

[포 SS-09] A New Method for Coronal Force-Free Field Computation That Exactly Implements the Boundary Normal Current Density Condition

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Previously we developed a method of coronal force-free field construction using vector potentials. In this method, the boundary normal component of the vector potential should be adjusted at every iteration step to implement the boundary normal current density, which is provided by observations. The method was a variational method in the sense that the excessive kinetic energy is removed from the system at every iteration step. The boundary condition imposing the normal current density, however, is not compatible with the variational procedure seeking for the minimum energy state, which is employed by most force-free field solvers currently being used. To resolve this problem, we have developed a totally new method of force-free field construction. Our new method uses a unique magnetic field description using two scalar functions. Our procedure is non-variational and