

September 25, 2024

ISEE Award in 2024

Award Winner:

Dr. KD Leka (Senior Research Scientist, NorthWest Research Associates)

Dr. Sung-Hong Park (Researcher, Korea Astronomy and Space Science Institute)

Title : Outstanding contribution to space-earth environmental research through prediction and understanding of solar flares

Solar flares are the major cause of space weather disturbances, and their prediction is important for mitigating the social impact of space weather. In addition, research into predicting solar flares plays a role in understanding not only solar activity but also various plasma phenomena. For this reason, research institutes and agencies around the world have developed different solar flare prediction methods for forecasting operations. However, no efforts have been made to compare these methods based on unified standards, which has hindered the improvement of space weather forecasts.

To conquer this situation and further develop solar flare prediction and space weather forecast, Drs. KD Leka and Sung-Hong Park organized the ISEE International Workshop "Benchmarks for Operational Flare Forecasts" in FY2017. This workshop produced excellent results, including the first quantitative comparison of solar flare forecast models operated around the world using a common method and the development of new indices to evaluate the time series of flare forecasts. All three papers of this workshop reported by Drs. KD Leka and Sung-Hong Park as principal authors have received high international acclaim and are playing a major role in improving solar flare prediction.

Besides, Dr. KD Leka hosted the ISEE International Workshop "What is a Magnetic Flux Rope? Do we know it when we have one?" in FY2022 and developed a new methodology to identify magnetic flux ropes as precursors to solar eruptions. In addition, Drs. KD Leka and Sung-Hong Park have produced numerous research results and have also made significant contributions to the training of graduate students.

As described above, Drs. KD Leka and Sung-Hong Park are internationally renowned researchers and have made outstanding contributions to space-earth environmental research through ISEE's joint usage/research programs. For this reason, we have decided to award the 2024 ISEE Award (Institute for Space-Earth Environmental Research Award) to Drs. KD Leka and Sung-Hong Park.

Related ISEE Joint Usage/Research Programs

FY2017 ISEE International Workshop "Benchmarks for Operational Flare Forecasts"

FY2022 ISEE International Workshop "What is a Magnetic Flux Rope? Do we know it when we have one?"

Publications of the awarded research

Leka KD, Park S-H, Kusano K, Andries J, Barnes G, Bingham S, et al. A Comparison of Flare Forecasting Methods. II. Benchmarks, Metrics, and Performance Results for Operational Solar Flare Forecasting Systems. *Astrophys. J. Suppl. Ser.* 2019; 243: 36. doi:10.3847/1538-4365/ab2e12

Leka KD, Park S-H, Kusano K, Andries J, Barnes G, Bingham S, et al. A Comparison of Flare Forecasting Methods. III. Systematic Behaviors of Operational Solar Flare Forecasting Systems. *Astrophys. J.* 2019; 881: 101. doi:10.3847/1538-4357/ab2e11

Park S-H, Leka KD, Kusano K, Andries J, Barnes G, Bingham S, et al. A Comparison of Flare Forecasting Methods. IV. Evaluating Consecutive-day Forecasting Patterns. *Astrophys. J.* 2020; 890: 124. doi:10.3847/1538-4357/ab65f0

Other related publications

Leka KD, Dissauer K, Barnes G, Wagner EL. Properties of Flare-imminent versus Flare-quiet Active Regions from the Chromosphere through the Corona. II. Nonparametric Discriminant Analysis Results from the NWRA Classification Infrastructure (NCI). *Astrophys. J.* 2023; 942: 84. doi:10.3847/1538-4357/ac9c04

Park S-H, Leka KD, Kusano K. Magnetic Helicity Flux across Solar Active Region Photospheres. II. Association of Hemispheric Sign Preference with Flaring Activity during Solar Cycle 24. *Astrophys J.* 2021; 911: 79. doi:10.3847/1538-4357/abea13

Park S-H, Leka KD, Kusano K. Magnetic Helicity Flux across Solar Active Region Photospheres. I. Hemispheric Sign Preference in Solar Cycle 24. *Astrophys J.* 2020; 904: 6. doi:10.3847/1538-4357/abbb93

Leka KD, Barnes G, Wagner E. The NWRA Classification Infrastructure: description and extension to the Discriminant Analysis Flare Forecasting System (DAFFS). *Journal of Space Weather and Space Climate.* 2018; 8: A25. doi:10.1051/swsc/2018004

Leka KD, Barnes G, Wagner EL. Evaluating (and Improving) Estimates of the Solar Radial Magnetic Field Component from Line-of-Sight Magnetograms. *Solar Phys.* 2017;292: 36. doi:10.1007/s11207-017-1057-8

Graduate student training outcomes

Lin P. H., Kusano K, Leka KD. Eruptivity in Solar Flares: The Challenges of Magnetic Flux Ropes. *Astrophys J.* 2021; 913: 124. doi:10.3847/1538-4357/abf3c1

Lin, P. H., Kusano, K., Shiota, D., Inoue, S., Leka, K.D, and Mizuno, Y. A New Parameter of the Photospheric Magnetic Field to Distinguish Eruptive-flare Producing Solar Active Regions, *Astrophys. J.* 2020; 894: 20. doi:10.3847/1538-4357/ab822c.

Kang, Yeongmin, Kaneko, Takafumi, Leka, KD, and Kusano, Kanya, Data-driven MHD Simulation of the Formation of a Magnetic Flux Rope and an Inclined Solar Eruption, *Astrophys. J.* 2024 (in press). doi:10.3847/1538-4357/ad6a54

Career summary of the award winners:

Dr. KD Leka (Senior Research Scientist, NorthWest Research Associates)

Received a Ph.D at the University of Hawai'i in 1995. Postdoctoral Fellow at the National Center for Atmospheric Research (NCAR) from 1994 to 1997, followed by Research Associate at National Oceanic and Atmospheric Administration (NOAA), Space Environment Center from 1997 to 1998. Research Scientist in NorthWest Research Associates (NWRA) from 1998 to 2003, and the current position from 2003. Since 2017, she has concurrently served as a designated professor at the Institute for Space-Earth Environmental Research (ISEE), Nagoya University.



Dr. Sung-Hong Park (Researcher, Korea Astronomy and Space Science Institute)

Received a Ph.D. at the New Jersey Institute of Technology in 2010. Postdoctoral researcher at the Korea Astronomy and Space Science Institute (2010-2014), the National Observatory of Athens (2014-2015), and Trinity College Dublin (2015-2017). Designated assistant professor at the Institute for Space-Earth Environmental Research (ISEE), Nagoya University, from 2018 to 2021. Research scientist at Stanford University from 2021 to 2022, and the current position from 2022.

