



SPD Thomas Metcalf Award report

Dr. Souvik Bose
Research Scientist

Bio: Dr. Souvik Bose is a research scientist at Lockheed Martin Solar & Astrophysics lab (LMSAL)/Bay Area Environmental Research Institute (BAERI). He received his Ph.D. in 2021 from the University of Oslo, Norway for which he won the IAU best PhD thesis (in the world prize) in 2022. His main research interest lies in understanding the heating of the outer atmosphere of the Sun using ground and space based observations and state-of-the-art advanced numerical simulations. He also uses machine-learning applications to extract meaningful information from high-resolution datasets. He is a part of the IRIS science investigation team and is also involved in the upcoming MUSE mission.



Oral presentation on “*Chromospheric and coronal heating in active region plages*”
S. Bose, B. De Pontieu, V. Hansteen, A. Sainz Dalda, S. Savage and A. Winebarger

The question of what heats the outer solar atmosphere remains one of the longstanding mysteries in astrophysics. Statistical studies of Sun-like stars reveal a correlation between global chromospheric and coronal emissions, constraining theoretical models of potential heating mechanisms. However, spatially resolved observations of the Sun have surprisingly failed to show a similar correlation on small spatial scales. Here we use unique coordinated observations of the chromosphere (from the IRIS satellite) and the low corona (from the Hi-C 2.1 sounding rocket), and machine-learning-based inversion techniques, to show a strong correlation on spatial scales of a few hundred kilometres between heating in the chromosphere and emission in the upper transition region in strong magnetic field regions (‘plage’). Our observations are compatible with an advanced three-dimensional MHD in which the dissipation of current sheets caused by magnetic field braiding is responsible for heating the plasma simultaneously to chromospheric and coronal temperatures. Our results provide deep insight into the nature of the heating mechanism in solar active regions. This study has been published in **Nature Astronomy** 8, (2024), 697–705.

Benefits from the meeting. I am particularly grateful to the Solar Physics division of American Astronomical Society for the Metcalf Travel Award, which supported my participation at the Hinode17/IRIS15/Sphere3 meeting in Bozeman, MT, USA where I presented my research work as a Metcalf lecturer. This provided me with a unique opportunity to have many fruitful discussions with other participants of the meeting and receive critical feedback on my work.