

**Paper and Presentations Supported by the Work Package  
Through Sept. 30, 2021**

**Papers** (published, accepted, submitted)

1. "Understanding Heating in Active Region Cores through Machine Learning. I. Numerical Modeling and Predicted Observables," Barnes, W. T., Bradshaw, S. J., & Viall, N. M., 2019, *ApJ*, 880, 56
2. "Static and Dynamic Solar Coronal Loops with Cross-Sectional Area Variations," Cargill, P. J., Bradshaw, S. J., Klimchuk, J. A., & Barnes, W. T. 2022, *MNRAS*, 509, 4420
3. "Signatures of Type III Solar Radio Bursts from Nanoflares: Modeling," Chhabra, S., Klimchuk, J. A., & Gary, D. E. 2021, *ApJ*, 922, 128
4. "High Resolution Soft X-ray Spectroscopy and the Quest for the Hot (5-10 MK) Plasma in Solar Active Regions," Del Zanna, G., Klimchuk, J. A., et al. 2020, *Frontiers of Astronomy*, submitted
5. "On Doppler Shift and Its Center-to-limb Variation in Active Regions in the Transition Region," Ghosh, A., Klimchuk, J. A., & Tripathi, D. 2019, *ApJ*, 886, 46
6. "Non-thermal Velocity in the Transition Region of Active Regions and its Center-to-Limb Variation," Ghosh, A., Tripathi, D., & Klimchuk, J. A. 2021, *ApJ*, 913, 151
7. "The Distinction Between Thermal Nonequilibrium and Thermal Instability," Klimchuk, J. A. 2019, *Solar Phys.*, 294, 173 (Editors' Choice)
8. "Achievements of Hinode in the First Eleven Years (Nanoflare Heating: Observations and Theory)," Klimchuk, J. A. and Hinode Review Team 2019, *PASJ*, 71 (5), R1 (doi: 10.1093/pasj/psz084)
9. "How Turbulent is the Magnetically-Closed Corona?" Klimchuk, J. A., & Antiochos, S. K. 2021, *Frontiers Astron. Space Sci.*, 8:662861
10. "Cross Sections of Coronal Loop Flux Tubes," Klimchuk, J. A., & DeForest, C. E. 2020, *ApJ*, in press
11. "The Role of Asymmetries in Thermal Non-Equilibrium," Klimchuk, J. A. & Luna, M. 2019, *ApJ*, 884, 68
12. "The Role of Magnetic Helicity in Coronal Heating," Knizhnik, K. J., Antiochos, S. K., Klimchuk, J. A., & DeVore, C. R. 2019, *ApJ*, 883, 26

13. "Nanoflare Diagnostics from Magnetohydrodynamic Heating Profiles," Knizhnik, K. J., Barnes, W. T., Reep, J. W., & Uritsky, V. M. 2020, ApJ, 899, 156
14. "The Distribution of Time Delays Between Nanoflares in Magnetohydrodynamic Simulations," Knizhnik, K.J., & Reep, J.W. 2020, Solar Phys., 295, 21
15. "Spectroscopic Constraints on the Cross-Sectional Asymmetry and Expansion of Active Region Loops," Kucera, T. A., Young, P. R., Klimchuk, J. A., & DeForest, C. E. 2019, ApJ, 885, 7
16. "The Onset of 3D Magnetic Reconnection and Heating in the Solar Corona," Leake, J. E., Daldorff, L. K. S., & Klimchuk, J. A. 2020, ApJ, 891, 62
17. "Shifting and Broadening of Coronal Spectral Lines by Nanoflare Heating," Lopez Fuentes, M., & Klimchuk, J. A. 2018, BAAA, 60, 1
18. "The Coronal Veil," Malanushenko, A., Rempel, M., Cheung, M., DeForest, C., & Klimchuk, J. 2022, ApJ, in press
19. "Hard X-Ray Constraints on Small-scale Coronal Heating Events," Marsh, A. J., Smith, D. M., Glesener, L., Klimchuk, J. A., et al. 2018, ApJ, 864, 5
20. "Flows in Enthalpy Based Thermal Evolution of Loops," Rajhans, A., Tripathi, D., Bradshaw, S. J., Kashyap, V. L., & Klimchuk, J. A. 2022, ApJ, 924, 13
21. "Transition Region Contribution to AIA Observations in the Context of Coronal Heating," Schonfeld, S. J., & Klimchuk, J. A. 2020, ApJ, 905, 115
22. "The Heating of the Solar Corona," Viall, N. M., De Moortel, I., Downs, C., Klimchuk, J. A., Parenti, S., & Reale, F. 2020, in Space Physics and Aeronomy Collection Volume 1: At the Doorstep of Our Sun: Solar Physics and Solar Wind, Geophys. Monograph 258, ed. N. Raouafi & A. Vourlidas (AGU; Wiley), in press (<https://www.essoar.org/doi/abs/10.1002/essoar.10502697.1>)
23. "Using SDO/AIA to Understand the Thermal Evolution of Solar Prominence Formation," Viall, N. M., Kucera, T. A., & Karpen, J. T. 2020, ApJ, 905, 15

### **Presentations**

1. "Understanding the Heating and Cooling Cycles of a Solar Prominence Observed with the Solar Dynamics Observatory (SDO)/Atmospheric Imaging Assembly (AIA)," Alden, C., & Viall, N. (NASA/GSFC intern poster session, Greenbelt, 8/3/18)

2. "Spicules and the Off-Limb Emission from the Transition Region," Andretta, V., Schmit, D., Klimchuk, J. A., Sasso, C., & Fleck, B. (Coronal Loops 9; St. Andrews, 6/11/19)
3. "The Role of Magnetic Helicity in Coronal Heating," Antiochos, S. K., Knizhnik, K. J., DeVore, C. R., & Klimchuk, J. A. (Coronal Loops 9; St. Andrews, 6/11/19)
4. "Forward Modeling and Machine Learning as Tools for Making Meaningful Comparisons Between Observations and Simulations," Barnes, W., Bradshaw, S., & Viall, N. (invited; SDO Science Workshop 2018, Catalyzing Solar Connections)
5. "Evidence for Solar Coronal Heating by Nanoflares Based on Coordinated EUV Spectra Observed with the EUNIS Sounding Rocket and Hinode/EIS," Brosius, J. W., Daw, A. N., & Landi, E. (AGU; San Francisco; 12/9/19)
6. "Evidence of Solar Coronal Heating by Nanoflares Based on Time-Lag Measurements in EUV Light Curves from EIS," Brosius, J. W., & Viall, N. M. (AGU, San Francisco, 12/1/20)
7. "The CubeSat Imaging X-ray Solar Spectrometer (CubIXSS)," Caspi, A., Klimchuk, J. A. et al. (AGU, San Francisco, 12/1/20)
8. "Understanding Heating of the Solar Corona Through Soft X-Ray Spectroscopy," Caspi, A., Klimchuk, J. et al. (Heliophysics 2050 Workshop; 5/3/21)
9. "The CubeSat Imaging X-ray Solar Spectrometer (CubIXSS)," Caspi, A., Klimchuk, J. et al. (SPD; 6/8/21)
10. "Study of Type III Radio Bursts in Nanoflares," Chhabra, S., Klimchuk, J. A., et al. (SHINE, Cocoa Beach, 8/1/18)
11. "Study of Type III Radio Bursts in Nanoflares," Chhabra, S., Klimchuk, J. A., et al. (AGU, Wash. DC, 12/12/18)
12. "Study of Type III Radio Bursts in Nanoflares," Chhabra, S., Klimchuk, J. A., Gary, D. E., & Viall, N. (Coronal Loops 9; St. Andrews, 6/12/19)
13. "Study of Type III Radio Bursts in Nanoflares," Chhabra, S., Klimchuk, J. A., Gary, D. E., & Viall, N. (SHINE, Boulder, 8/6/19)
14. "Study of Type III Radio Bursts in Nanoflares," Chhabra, S., Klimchuk, J. A., Gary, D. E., & Viall, N. (AGU; San Francisco; 12/10/19)

15. "Study of Type III Radio Bursts in Nanoflares," Chhabra, S., Klimchuk, J. A., Gary, D. E., & Viall, N. (Invited talk, 19<sup>th</sup> Annual International Astrophysics Conference 2020; Santa Fe, NM; 03/09/20)
16. "Signatures of Type III Radio Bursts from Small-scale Reconnection Events," Chhabra, S., Klimchuk, J. A., Gary, D. E., & Viall, N. (invited seminar, Naval Research Lab, 11/12/20)
17. "Signatures of Type III Solar Radio Bursts from Nanoflares: Final Results," Chhabra, S., Klimchuk, J. A., Gary, D. E., & Viall, N. M. (AGU, San Francisco, 12/1/20)
18. "Signatures of Type III Radio Bursts from Small-scale Reconnection Events," Chhabra, S., Klimchuk, J. A., Gary, D. E., & Viall, N. (invited seminar, National Solar Observatory, 1/26/21)
19. "Signatures of Type III Radio Bursts from Small-scale Reconnection Events in the Solar Wind," (Chhabra, S., Klimchuk, J. A., Gary, D. E., PSP/Fields Team) (SPD Meeting; 6/7/21)
20. "Signatures of Type III Radio Bursts from Small-scale Reconnection Events in the Solar Wind," (Chhabra, S., Klimchuk, J. A., Gary, D. E., PSP/Fields Team) (Parker Solar Probe I Conference; Johns Hopkins Univ.; 6/14/21)
21. "The Focusing Optics X-ray Solar Imager (FOXSI)," Christe, S., Klimchuk, J. A. et al. (AGU, Wash. DC, 12/12/18)
22. "The Onset of Magnetic Reconnection: Tearing Instability in Current Sheets with a Guide Field," Daldorff, L., Leake, J., Klimchuk, J., Knizhnik, K. (HAO colloquium, Boulder, 4/4/18)
23. "The Onset of Magnetic Reconnection in the Solar Corona," Daldorff, L., Leake, J., Klimchuk, J. A., & Knizhnik, K. (AGU, Wash. DC, 12/14/18)
24. "The Onset of Magnetic Reconnection in the Solar Corona," Daldorff, L., Leake, J., Klimchuk, J., Knizhnik, K. (SHINE, Cocoa Beach, 7/30/18)
25. "The Onset and Development of Magnetic Reconnection in the Solar Corona: Important Physical Details," Daldorff, L., Leake, J., & Klimchuk, J. (AGU; San Francisco; 12/13/19)
26. "Why do Different Current Sheets Reconnect Differently", Daldorff, L. K. S., Leake, J. E., & Klimchuk, J. A. (AGU, San Francisco, 12/1/20)
27. "Automated Analytics of the Solar Corona with Scalable Cloud Based Platforms," Daldorff, L., & Mohammadi, S. (Symposium on Data Science and Statistics; Bellevue, WA)

28. "Exploring Active Region Heating Using a 3D , Volume-Filling Model of the Solar Corona," Downs, C., Mikic, Z., Lionello, R., Winebarger, A. R., Klimchuk, J. A. (Coronal Loops 9; St. Andrews, 6/11/19)
29. "FIERCE Science: Expected Results from a High-Energy Medium-Class Explorer," Glesener, L., Klimchuk, J., et al. (AGU; San Francisco; 12/11/19)
30. "Investigating Power Law Power Spectra as a Diagnostic of Nanoflare Coronal Heating in Active Regions," Ireland, J., Bradshaw, S. J., Viall, N. M., Kirk, M. S. (AGU, San Francisco, 12/1/20)
31. "Simulating Nanoflares of the Sun's Corona," Iyer, A., & Klimchuk, J. (NASA/GSFC intern poster session, Greenbelt, 8/3/18)
32. "Are Coronal Loops Tubes or Ribbons," Iyer, A., & Klimchuk, J. (NASA/GSFC intern poster session, Greenbelt, 8/2/19)
33. "Why is the Solar Corona So Hot," Klimchuk, J. (GSFC presentation to summer interns, 7/2/18)
34. "Understanding Coronal Heating and the Solar Spectral Irradiance," Klimchuk, J. (GSFC Director's Seminar, Greenbelt, 8/17/18)
35. "Magnetic Reconnection and Coronal Heating," Klimchuk, J. A. (invited tutorial, Magnetic Reconnection 2018, Princeton U., 9/7/18)
36. "The Role of Asymmetries in Thermal Non-Equilibrium," Klimchuk, J. A. (AGU, Wash. DC, 12/13/18)
37. "The Onset of Magnetic Reconnection" (invited, Space and Cosmic Ray Physics Seminar, U. Maryland, 9/16/19)
38. "Spicules, Si IV Doppler Shifts, and Their Lack of Center-to-Limb Variation," Klimchuk, J. (GSFC Spectroscopy Club; Greenbelt; 1/29/20)
39. "Heating in Flares and Nanoflares: Theory and Modeling," Klimchuk, J. (SOLFER DRIVE center extended team meeting; on-line; 4/24/20)
40. "Cross Sections of Coronal Loop Flux Tubes," Klimchuk, J. (GSFC Director's Seminar, Greenbelt, 7/17/20)

41. "Heating of the Magnetically Closed Corona," Klimchuk, J. A. (Solar Physics Webinar of Global Reach # 37; 1/15/21)
42. "The Fascinating Phenomenon of Thermal Nonequilibrium," Klimchuk, J. A. (43<sup>rd</sup> COSPAR General Assembly; D2.3-0001-21-oral; 1/ 31/21)
43. "Heating of the Magnetically Closed Corona," Klimchuk, J. A. (invited colloquium; Univ. of St. Andrews; 2/10/21)
44. "Heating of the Magnetically Closed Corona," Klimchuk, J. A. (ISFM Showcase, 3/16/21)
45. "Why is the Solar Corona So Hot?," Klimchuk, J. A. (invited colloquium; Univ. Ionina, Greece; 5/14/21)
46. "Reconnection Rate, Turbulence, and the Connection Between Them," Klimchuk, J. A. (SOLFER DRIVE Center Group 1 seminar; 3/31/21)
47. "Causes and Consequences of Heating in the Magnetically Closed Corona," Klimchuk, J. A. & GSFC/ISFM Team on Coronal Heating (Heliophysics 2050 Workshop; 5/3/21)
48. "Is the Radio 'Haze' Made Up of Multiple Overlapping Type III Bursts?," Klimchuk, J., & Chhabra, S. (PSP/FIELDS team meeting; Space Science Lab, Berkeley; 12/8/19)
49. "The Onset of 3D Magnetic Reconnection in the Solar Corona," Klimchuk, J. A., Daldorff, L. K. S., Leake, J. E., & Knizhnik, K. (Coronal Loops 9; St. Andrews, 6/14/19)
50. "The Case for Spectroscopic Observations of Very Hot Plasmas," Klimchuk, J., Daldorff, L., Liu, Y.-H., Brosius, J., Daw, A. (Triennial Earth-Sun Summit, Leesburg, 5/20/18)
51. "Cross Sections of Coronal Loop Flux Tubes," Klimchuk, J. A., & DeForest, C. E. (AGU, San Francisco, 12/1/20)
52. "Cross Sections of Coronal Loop Flux Tubes," Klimchuk, J. A., & DeForest, C. (SPD Meeting; 6/9/21)
53. "The Onset and Development of Magnetic Reconnection in the Solar Corona: New Insights," Klimchuk, J., Leake, J., & Daldorff, L. (AGU; San Francisco; 12/13/19)
54. "The Role of Asymmetries in Thermal Non-Equilibrium," Klimchuk, J., & Luna, M. (Triennial Earth-Sun Summit, Leesburg, 5/20/18)

55. "The Role of Asymmetries in Thermal Non-Equilibrium," Klimchuk, J. A., & Luna, M. (Coronal Loops 9; St. Andrews, 6/13/19)
56. "Intermediate Timescale Solar Spectral Irradiance Variability and its Impacts," Klimchuk, J. A., & Schonfeld, S. (invited, Towards Future Research on Space Weather Drivers, San Juan, Argentina, 7/5/19)
57. "Power-law Statistics of Driven Reconnection in the Magnetically Closed Corona," Knizhnik, K., Uritsky, V., Klimchuk, J., & DeVore, C.R. (Triennial Earth-Sun Summit, Leesburg, 5/20/18)
58. "Constraints from Hinode/EIS on the Expansion of Active Region Loops Along the Line of Sight," Kucera, T. A., Young, P. R., Klimchuk, J. A., & DeForest, C. (AAS, St. Louis, 6/2019)
59. "Are Coronal Loops Really Cylindrical," Kucera, T. (GSFC Director's Seminar, Greenbelt, 7/17/20)
60. "Spectroscopic Constraints on the Dimension of Active Region Loops Along the Line of Sight," Kucera, T. A., Young, P. R., Klimchuk, J. A., & DeForest, C. (AGU, San Francisco, 12/1/20)
61. "Simulating the Onset of 3D Coronal Magnetic Reconnection," Leake, J., Daldorff, L., & Klimchuk, J. (NSO/IAF; Maui, HI; Feb. 2020)
62. "The Onset of Magnetic Reconnection in the Solar Corona," Leake, J., Klimchuk, J., & Daldorff, L. (Triennial Earth-Sun Summit, Leesburg, 5/20/18)
63. "The Effect of Nanoflare Heating on Coronal Spectral Lines," Lopez Fuentes, M., & Klimchuk, J. A. (AGU, Wash. DC, 12/12/18)
64. "EUV Spectral Lines and the Nanoflare Model of Coronal Heating," Lopez Fuentes, M., & Klimchuk, J. A. (Towards Future Research on Space Weather Drivers, San Juan, Argentina, 7/3/19)
65. "Spectral Line Plasma Diagnostics of Nanoflares," Lopez Fuentes, M., & Klimchuk, J. A. (62<sup>nd</sup> Annual Meeting of the Astronomical Society of Argentina, 10/14/20)
66. "Exploration of Different Active Region Heating Models," Mikic, Z., Downs, C., Lionello, R., Klimchuk, J. A., & Winebarger, A. (Workshop on Impacts of Solar Spectral Irradiance Variability on Intermediate Timescales; USRA, Columbia, MD, 12/9/18)
67. "Exploration of Different Active Region Heating Models," Mikic, Z., Downs, C., Lionello, R., Klimchuk, J. A., & Winebarger, A. (AGU, Wash. DC, 12/13/18)

68. "Volume-Filling Simulations of Coronal Loops Heated by Nanoflares," Plowman, J., Barnes, W., Bradshaw, S., Caspi, A., Deforest, C., & Klimchuk, J. A. (Coronal Loops 9; St. Andrews, 6/11/19)
69. "Volume-filling Simulations of Coronal Loops Heated by Nanoflares," Plowman, J., Klimchuk, J., et al. (AGU; San Francisco; 12/13/19)
70. "A Conceptual Mission to Achieve Ultra High-Resolution Imaging of the Solar Corona," Rabin, D., Klimchuk, J. A. et al. (AGU, Wash. DC, 12/13/18)
71. "Photon Sieves: Just a Catchy Name?," Rabin, D., Klimchuk, J. et al. (Director's Seminar, 1/27/21)
72. "Probing Coronal Microscales," Rabin, D., Klimchuk, J. et al. (Heliophysics 2050 Workshop; 5/3/21)
73. "Flows in Enthalpy Based Thermal Evolution of Loops," Rajhans,A., Tripathi, D., Bradshaw, S., Kashyap, V., & Klimchuk, J. A. (SHINE Conference; 8/3/21)
74. "Flows in Enthalpy Based Thermal Evolution of Loops," Rajhans,A., Tripathi, D., Bradshaw, S., Kashyap, V., & Klimchuk, J. A. (European Solar Physics Meeting, Sept. 2021)
75. "Flows in Enthalpy Based Thermal Evolution of Loops," Rajhans,A., Tripathi, D., Bradshaw, S., Kashyap, V., & Klimchuk, J. A. (XVIIth Hvar Astrophysical Colloquium; Sept. 2021)
76. "Relaxing the Assumption of Subsonic Flows in Enthalpy Based Thermal Evolution of Loops," Rajhans,A., Tripathi, D., Bradshaw, S., Kashyap, V., & Klimchuk, J. A. (16<sup>th</sup> European Solar Physics Meeting; 9/6/21)
77. "Studying Coronal Heating with Data Driven Active Region Modeling using GX Simulator," Schonfeld, S., & Klimchuk, J. A. (Coronal Loops 9; St. Andrews, 6/11/19)
78. "Studying Coronal Heating with Data Driven Active Region Modeling," Schonfeld, S., & Klimchuk, J. A. (SHINE, Boulder, 8/6/19)
79. "Study of Coronal Heating with Data Driven Active Region Modeling using GX Simulator," Schonfeld, S., & Klimchuk, J. A. (AGU, Wash., DC, 12/13/18)
80. "The Sensitivity of AIA Observations to Coronal Heating Parameters", Schonfeld, S. J., & Klimchuk, J. A. (AGU, San Francisco, 12/12/19)
81. "The Sensitivity of AIA Observations to Coronal Heating Parameters," Schonfeld, S. J., & Klimchuk, J. A. (SPD, 8/19/20)



82. "Solar EUV emission from the Transition Region and Corona in the context of Coronal Heating," Schonfeld, S. J. (Invited, 2020 Annual Meeting of the APS Mid-Atlantic Section, 12/5/2020)
83. "Anticipated Particle-Acceleration and Plasma-Heating Results from the FOXSI SMEX Mission," Shih, A., Klimchuk, J. A. et al. (AGU, Wash. DC, 12/12/18)
84. "Combined Next-Generation X-ray and EUV Observations with the FIERCE Mission Concept," Shih, A., Klimchuk, J., et al. (AGU; San Francisco; 12/11/19)
85. "Updates on the Fundamentals of Impulsive Energy Release in the Corona Explorer (FIERCE) Mission Concept," Shih, A. Y., Klimchuk, J. A. et al. (AGU, San Francisco, 12/1/20)
86. "Fundamentals of Impulsive Energy Release in the Corona," Shih, A., Klimchuk, J. et al. (Heliophysics 2050 Workshop; 5/3/21)
87. "Doppler and Non-thermal Motions in Transition Region of Active Regions," Tripathi, D., Ghosh, A., & Klimchuk, J. A. (Coronal Loops 9; St. Andrews, 6/13/19)
88. "Avalanche models of coronal loop heating and cooling: is the Sun heated by a domino effect?", Uritsky, V. (Physics Colloquium, Catholic University of America, 2019)
89. "Can Nanoflare Heating Define the Coronal Loop Size," Uritsky, V., Knizhnik, K., & Klimchuk, J. (GSFC Director's Seminar, Greenbelt, 7/17/20)
90. "Can Nanoflare Heating Define the Coronal Loop Size?", Uritsky, V. M., Knizhnik, K., & Klimchuk, J. A. (AGU, San Francisco, 12/1/20)
91. "From the Sun to Solar Wind: The Perplexing Solar Corona and the Space Environment it Creates," Viall, N. (Public Lecture at the Library of Congress; Washington, DC; 11/7/19)
92. "Using SDO/AIA to Understand the Thermal Evolution of Solar Prominence Formation," Viall, N., Kucera, T., & Karpen, J. (SDO Science Workshop 2018, Catalyzing Solar Connections)
93. "Diagnosing Coronal Heating with the Time-lag Method Applied to Spectroscopy," Viall, N., Klimchuk, J., Chamberlin, P., & Brosius, J. (9<sup>th</sup> Coronal Loops Workshop, St. Andrews, 6/11/19)
94. "Observations of solar coronal rain in null point topologies," Viall, N. M., Mason, E. I., & Antiochos, S. (ISSI Team Meeting; St. Andrews, 6/10/19)