Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

On Stochastic Ion Heating in the Inner Heliosphere: Radial Trends and Parker Solar Probe Observations MIHAILO MARTINOVIC, KRISTOPHER KLEIN, Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ 85721, USA., BENJAMIN CHANDRAN, Department of Physics Astronomy, University of New Hampshire, Durham, NH 03824, USA, JIA HUANG, Climate and Space Sciences and Engineering, University of Michigan, Ann Arbor, MI 48109, USA, EMILY LICHKO, Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ 85721, USA., JUSTIN KASPER, Climate and Space Sciences and Engineering, University of Michigan, Ann Arbor, MI 48109, USA, MICHAEL STEVENS, Smithsonian Astrophysical Observatory, Cambridge, MA 02138 USA., SOFIANE BOUROUAINE, Department of Aerospace, Physics and Space Sciences, Florida Institute of Technology, 150 W Univeristy Blvd, Melbourne, Fl, 32901, USA — Stochastic heating (SH) is a non-linear plasma heating mechanism, frequently proposed as a candidate to explain the strong heating of the solar wind ions perpendicular to the magnetic field. It is driven by the violation of magnetic moment invariance due to large-amplitude, low-frequency Alfvenic turbulent fluctuations. Using Helios and Parker Solar Probe (PSP) observations, we track the radial variation of SH throughout the inner heliosphere from 0.16 to 1 au. We find that SH is increasingly important as one observes plasma closer to the Sun, specifically that the stochastic heating rate varies as $Q_{SH} \sim r^{-2.5}$. In accordance with theoretical predictions, observations of flattop shaped proton velocity distributions are characteristic for periods where SH is predicted to be a dominant heating mechanism. We also find that Q_{SH} does not significantly vary inside intermittent structures, such as switchbacks regularly measured by PSP.

Mihailo Martinovic
Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ 85721, USA.

Date submitted: 29 Jun 2020 Electronic form version 1.4