EGU22-10641, updated on 15 Aug 2022
https://doi.org/10.5194/egusphere-egu22-10641
EGU General Assembly 2022


# Magnetic reconnection and particle acceleration in the solar wind: theory, observations and opinions

**Olga Khabarova**
Pushkov Institute of terrestrial magnetism (IZMIRAN) RAS, Heliophysical laboratory, Troitsk, Moscow, Russian Federation (habarova@izmiran.ru)

The solar wind has historically been considered as a far simpler medium than the solar or magnetospheric plasma. From the beginning of the space era through to XXI century, it has been supposed that all solar wind structures freely expand and can be modeled in 2D. Correspondingly, current sheets have been pictured as thin planar objects carrying the electric current and separating magnetic fields of different directions. Before 2010$^{th}$, Petscheck magnetic reconnection was considered as the only possible mechanism transforming the magnetic energy into the thermal energy at current sheets in the solar wind. Acceleration of particles to suprathermal energies was thought to be impossible there because of too slow inflow speeds. Interpretations of observations totally followed the theoretical dominant paradigm mainly because of the insufficiency of observational material. Things began to change when more and more theoretical and observational studies in magnetospheric and solar physics appeared pointing to the complex character of magnetic reconnection. In particular, ideas about stochastic or turbulent reconnection at current sheets in realistic space plasmas become dominating. In turn, observations of the fine structure of current sheets in the solar wind as well as evidence for local acceleration of energetic particles found with help of modern missions, including Parker Solar Probe, allow re-considering views on solar wind current sheets and better understanding physics of the processes associated with magnetic reconnection.