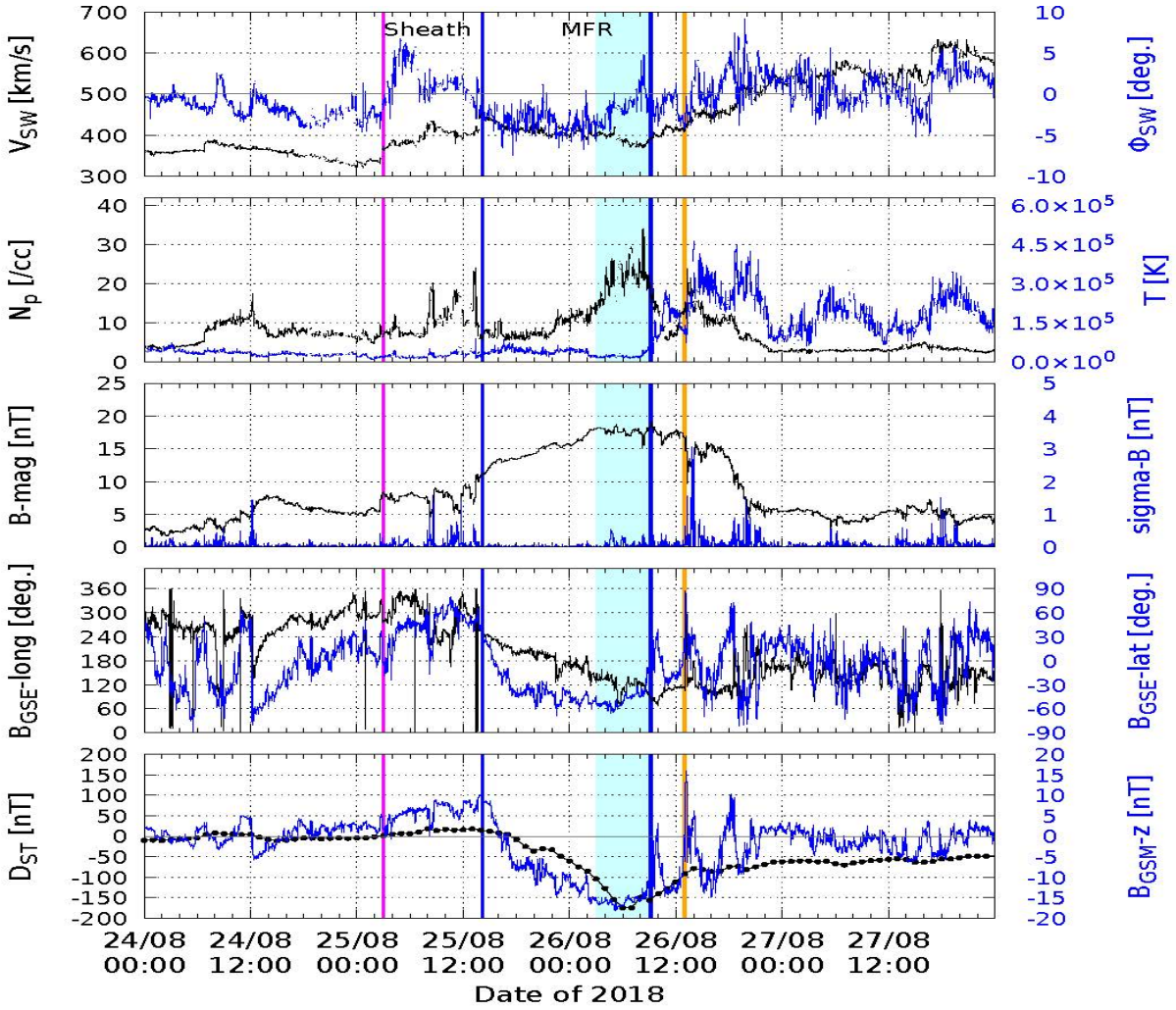
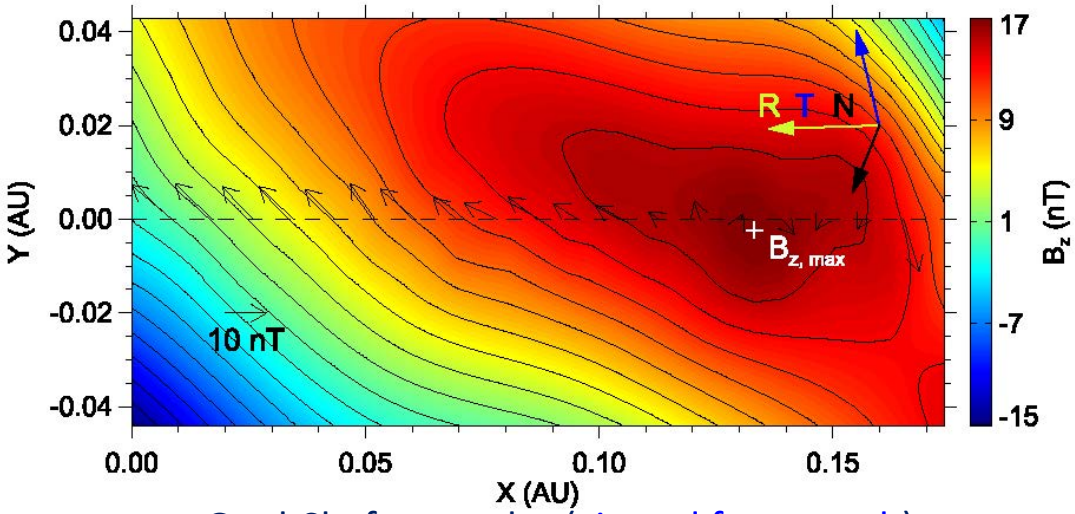
Overview of August 2018 event



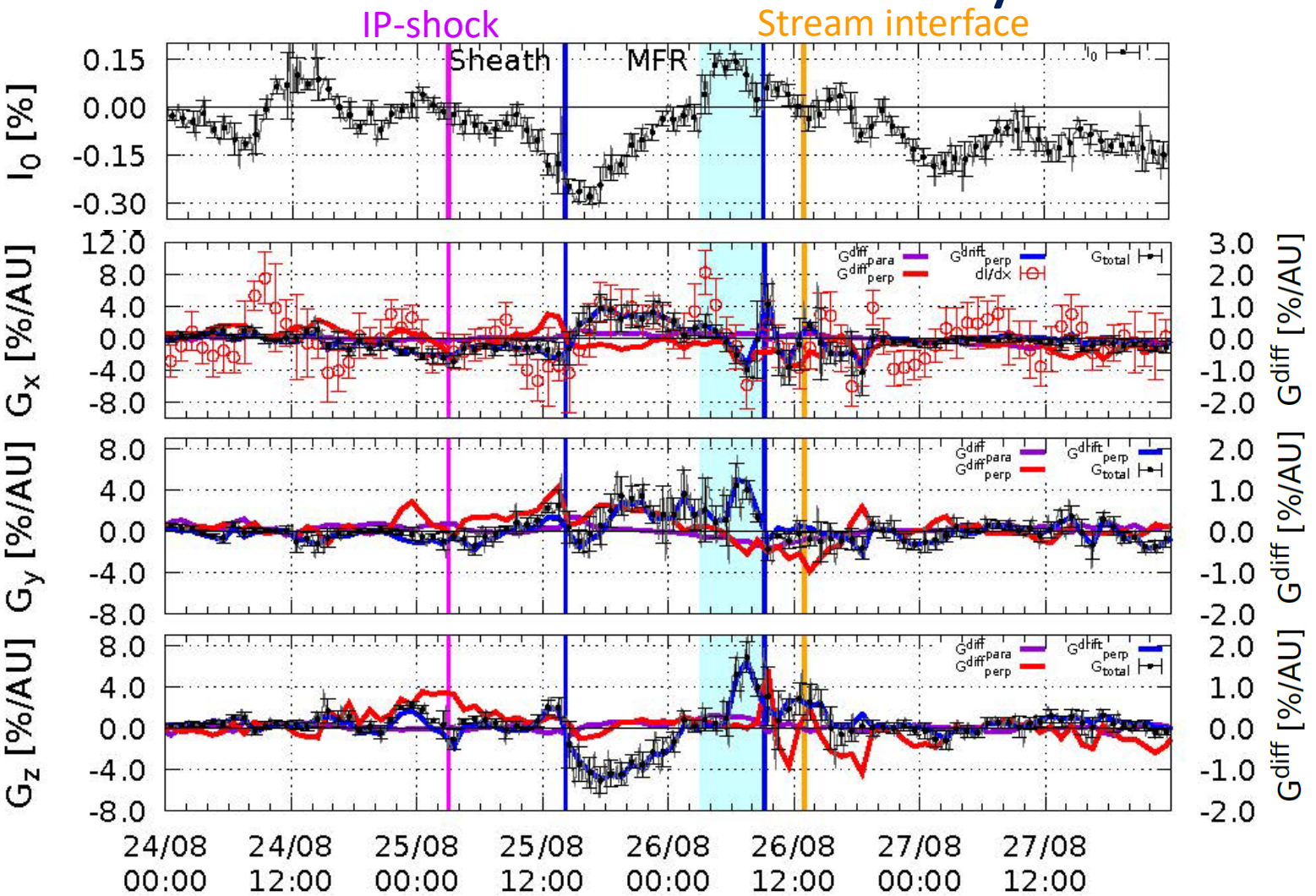
One-minute solar wind parameters during four days between 24 and 27, August 2018. The purple vertical line indicates the IP-shock, while a pair of blue vertical lines delimits the MFR period reported by Chen et al. (ApJ **884** 2019). B-magnitude, plasma density and pressure became maximum near the trailing edge of MFR indicated by the blue shaded period.

- This event became geoeffective, nevertheless it was caused by a weak shock in slow solar wind.
- It is likely that this event became geoeffective because the magnetic flux rope (MFR) was accompanied by a corotating interaction region and compressed by the high-speed solar wind following the MFR.
- We analyze this event with cosmic ray (CR) data to see this.

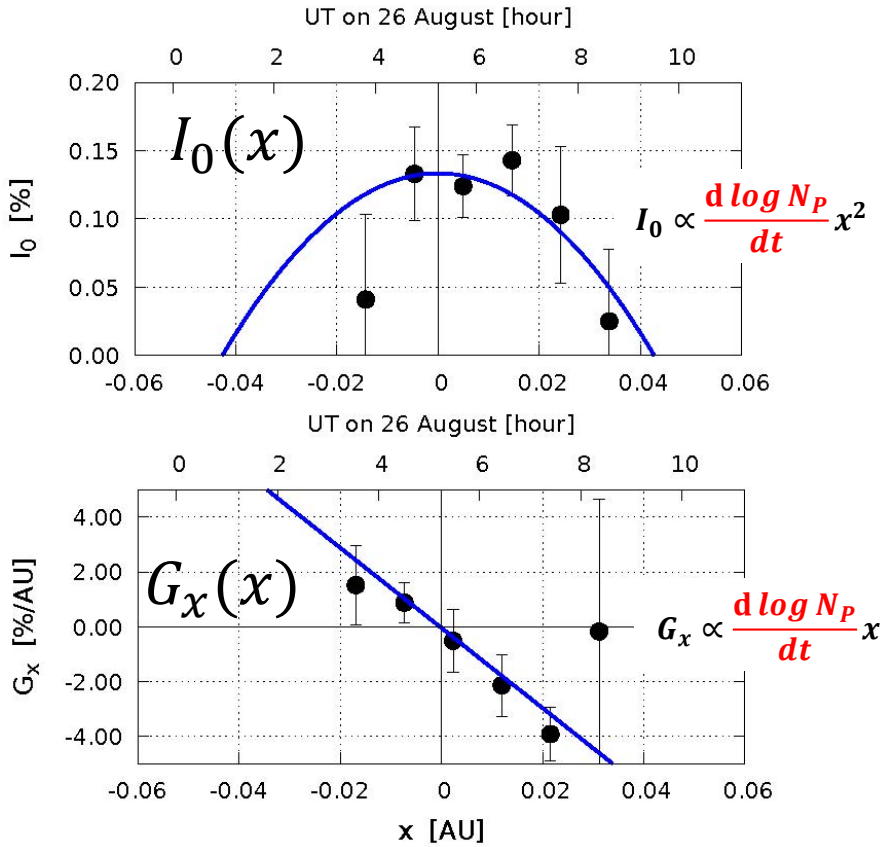


Grad-Shafranov plot (viewed from south) by Chen et al. (ApJ **884** 2019)

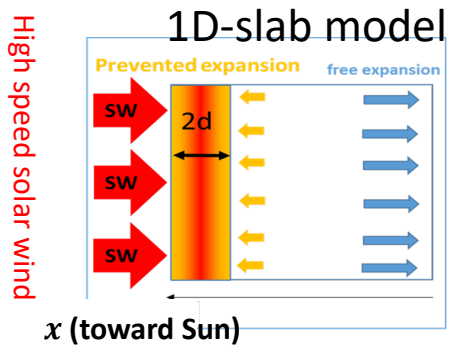
Results: GCR density and density gradient



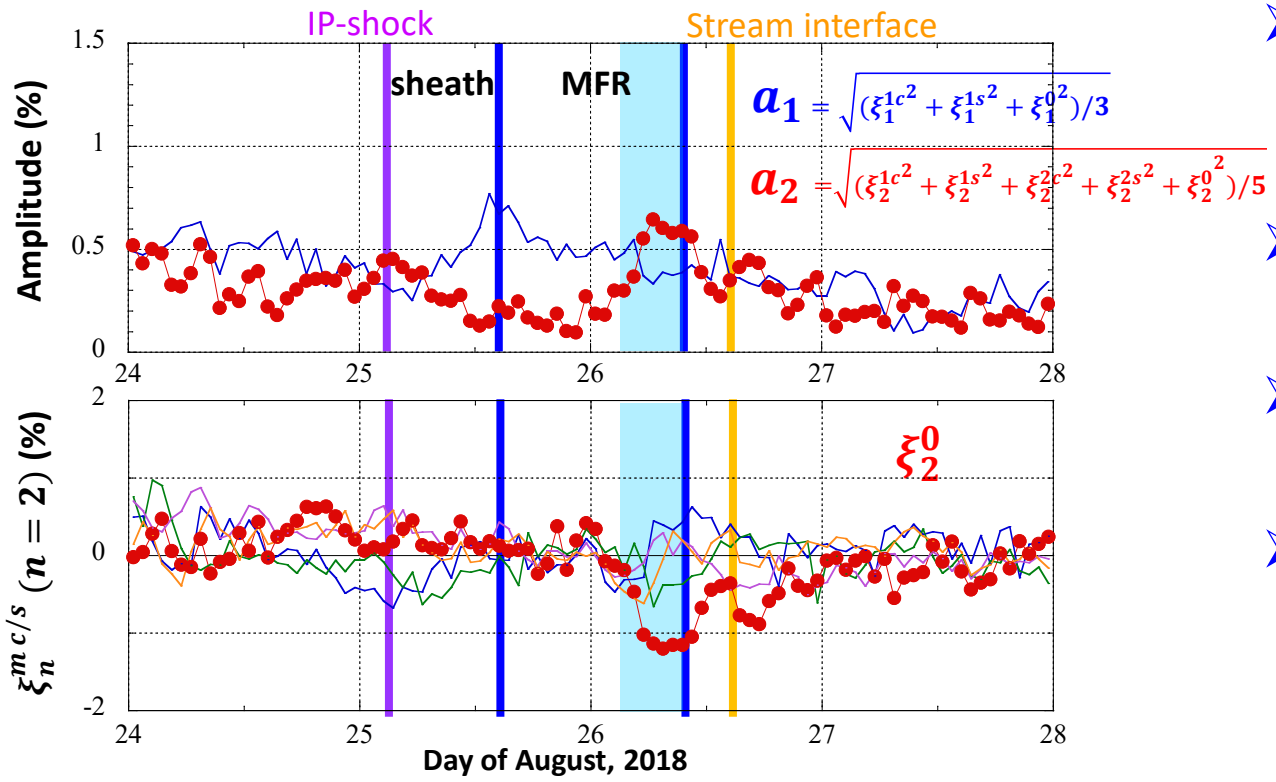
Best-fit density ($I_0(t)$) and three GSE components of the density gradient ($\boldsymbol{G}(t)$) at 60 GV derived from the best-fit first-order anisotropy. Grey curve in each panel represent 10-minute value, while black dots show hourly average with errors deduced from the dispersion of 10-minute values. Purple and red curves show the contributions to $\boldsymbol{G}(t)$ from the parallel and perpendicular diffusions on the right vertical axis, while blue curves show the drift contribution.



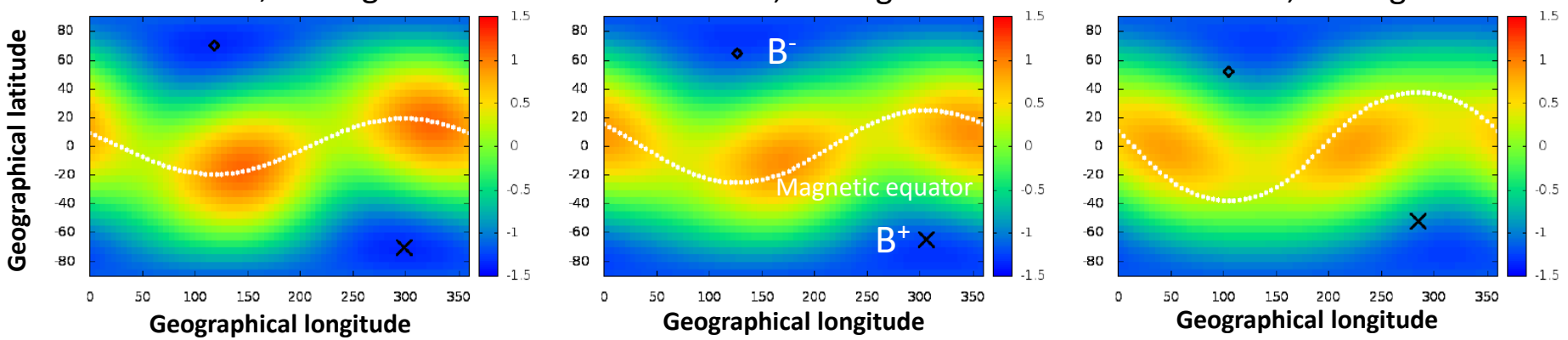
$I_0(t)$ (upper panel) and $G_x(t)$ (lower panel) observed in the blue-shaded period near the trailing edge of the MFR.



Results: Second-order anisotropy



- During the blue shaded period, the amplitude of the second-order anisotropy (red curve) exceed the amplitude of the first-order anisotropy (blue curve).
- Negative ξ_2^0 dominates among five components when $\boldsymbol{B}$ directs south with latitude ~-60°.
- 2D contour map indicates intensity enhancement at 90° pitch angle
- This indicates the betatron acceleration in the compressed $\boldsymbol{B}$ and/or CRs leaking along $\boldsymbol{B}$ toward southwest of Earth where CR population is lower.



2D contour map of CR intensity representing the best-fit second-order anisotropy during the blue shade period.