# Solar wind-substorm intensity connection revisited

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While the intensity distribution of substorms is an essential issues in space physics, it had not been studied due to difficulties in identifying every substorm for a long period with reliable and definite criteria. In 2016, we made a database of substorm onsets and intensities for 10 years from 2005 to 2014 using the favorable wave and planetary (Wp) index to identify almost all of the substorm onset events and AL index for substorm intensity determination. Then, the distribution of substorm intensity (|AL|index at substorm) was statistically studied. The results showed that substorm intensities consist of two groups with log-normal distribution: small substorms termed group-S substorms with an intensity peak around 100 nT and larger substorms termed group-L substorms with an intensity peak around 250 nT (Morioka et al., JpGU Meeting 2016). In this presentation, we revisit a problem, what determines the intensity of substorms. Our statistical study showed that the empirical magnetopause distance r0 is highly correlated with the intensities of group-L and storm-time substorms, as well as the solar wind electric field Em. Both the solar wind pressure (Pd and Pm) and erosion of the earth's magnetic field by IMF Bz constrain the magnetosphere, determine the magnetopause location, and compress the plasma sheet. Thus, r0 can reflect the tail current intensity. Under these considerations, we statistically re-examine the relationship of r0 and Em with the substorm intensity to discuss the problem what determines the substorm intensity.