R011-03
C 会場 ：9/27　AM1 （9:00-10:30）
9:30〜9:45

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Response of Pi2 activity to solar wind conditions modelled with an echo state network

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The relationship between solar wind conditions and substorm activity is modelled with an approach based on an echo state network. Substorms are a fundamental physical phenomenon in the magnetosphere-ionosphere system. However, it is difficult to deterministically predict substorm onsets because of complex physical processes underlying substorm occurrences. We treat a substorm onset as a stochastic phenomenon and represent stochastic occurrences of substorms with a nonstationary Poisson process. The occurrence rate of substorms is then described with an echo state network model. We apply this approach to a list substorm onsets identified from time series of the Wp index, which indicates the activity of Pi2 pulsations. We analyse the response of substorm activity to solar wind conditions by feeding synthetic solar wind data into the echo state network. The results showed that the effect of the solar wind speed is important. Even if the interplanetary magnetic field (IMF) is northward, a Pi2 pulsation can often occur under high-speed solar wind conditions. We also observe spiky enhancements in the occurrence rate of substorms when the solar wind density abruptly increases, which might suggest an external triggering due to a sudden impulse of solar wind dynamic pressure. The northward turning of the IMF is also likely to contribute to substorm occurrences, although the effect is minor.