Solar wind-magnetosphere coupling in the form of recurrent substorms with one-hour periodicity

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The magnetospheric substorm is a response mode of the magnetosphere to solar wind driving. It has been shown that substorms can show repetitive behavior (that is, three or more substorms following each other with a quasi-period). The most common period is approximately three hours. A conclusive and satisfactory answer to the cause of this periodicity has not yet been given. Very limited mentioning of a shorter recurrence period, namely around one hour, has sparsely been appeared in the literature. In this presentation, we report on this lesser studied periodicity, giving observational examples from the THEMIS fleet. We compare the observations with global magnetosphere MHD simulations (BATS-R-US) of solar wind-magnetosphere coupling that incorporate kinetic corrections at the reconnection site. The similarity is striking, suggesting that indeed kinetic effects in tail reconnection are responsible - at least in some cases - for this periodic behavior of the magnetosphere.