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Saw-tooth substorms: inconsistency of repetitive bay-like magnetic disturbances with behavior of aurora

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The relationships between the magnetic disturbances in the auroral zone, aurora dynamics and particles injections at the geostationary orbit have been analyzed in detail for 62 repetitive bay-like magnetic disturbances (sawtooth substorms). It is shown that lack of the auroral breakup is typical of the powerful repetitive bay-like disturbances, unlike the isolated ("classical") magnetospheric substorms. In case of sawtooth substorms the aurora in the oval usually demonstrates high activity well before (up to few hours) the magnetic disturbance onset. One of the distinguishing features of the auroral activity is the double oval structure, which is most noticeable near the dusk meridian. The close relation of the auroral behavior to the particle injections at geostationary orbit breaks down. The conclusion is made, that the powerful repetitive bay-like magnetic disturbances display that kind of disturbance, which is regulated by the ionospheric electric field variations unlike to the isolated ("classical") substorms strongly related to the varying auroral particle precipitation.