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Multi-spacecraft observations of quasi-perpendicular shock non-stationarity

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Shock non-stationarity is a known problem within collisionless shock physics. Shock non-stationarity is important because it can influence the fraction of ions that are reflected and accelerated. In simulations, shock surfaces have been shown to fluctuate quasi-periodically with frequency roughly equal to the ion gyroperiod. We present *in situ*, multi-spacecraft observations by the *MMS* spacecraft of shock non-stationarity at the quasi-perpendicular terrestrial bow shock. The spacecraft separation is well below the ion gyroradius. Therefore, we can study the shock on small spatial scales. We present observations, which show time-variability in ion reflection and subsequent shock drift acceleration. Because of the small spacecraft separation and high-time-resolution ion data, *MMS* allows for a detailed study of shock non-stationarity.