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Reconnection associated waves and turbulence in the quasi-parallel terrestrial magnetosheath

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Recent observations by the MMS spacecraft have confirmed that magnetic reconnection can occur not only at large scale boundaries, such as the magnetopause or magnetotail current sheets, but also in the turbulent magnetosheath downstream of a quasi-parallel bow shock. The high resolution MMS field, plasma and particle data allowed to identify the fluid and particle signatures of reconnection in a turbulent environment. It has been found that these signatures resemble the observed features in inflow/outflow, electron- and ion-diffusion regions of reconnection events at large-scale boundaries. Here we investigate the wave generation mechanisms which are expected to occur in different regions of magnetic reconnection. In the turbulent magnetosheath we observe electromagnetic lower hybrid waves in the reconnection inflow and ion-diffusion regions, whistler waves around the reconnection separatrix region and at density gradients. Broad-band electrostatic waves are observed irregularly indicating that their generation mechanisms are not necessarily associated with magnetic reconnection. The comparison of the expected fluid, kinetic and wave signatures provides efficient tools to further strengthen our ability to observe magnetic reconnection in a turbulent environment.