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The Relation between the Filament Eruption and the Shock in the Radial Direction

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Moreton Waves are thought to be caused by the interaction between a coronal shock wave (initiated by a flare or Coronal Mass Ejection) and the chromosphere. We performed numerical modeling of the Moreton wave event on 2010/2/7, and compared observations with simulations (Tamazawa et al. 2010 autumn ASJ meeting, M36a). From our simulation results we found that a piston-driven shock best describes this event. As a filament eruption was observed during this event, we suggest that the filament eruption created a piston-driven shock to drive the Moreton wave. Based on this suggestion, data analysis of filament eruptions observed at Hida Observatory of Kyoto Univ. was performed, the results suggesting that if the angle between filament eruption and the solar surface is small, a Moreton wave is more likely to occur (Yamaguchi et al. 2012 spring ASJ meeting, M27a). A parameter survey of piston-driven shocks using simulations yielded similar results (Tamazawa et al. 2012 autumn ASJ meeting, M42a). One implication of these results is that an eruption with large angle to the solar surface is more likely to create a strong shock in the radial direction, which may be related with the interplanetary shock. We report the parameter survey of eruptions and shocks and discuss the necessary conditions for the formation of the filament eruption and the interplanetary shock.