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The spatial and temporal characteristics of line shaped rain bands over the Hokkaido region during boreal summer

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Line shaped rain bands (LRBs) are severe storm events that cause torrential rainfall and flooding across Japan. Accurately predicting when and where LRBs will occur is challenging for weather forecasters because of their narrow, long shape and complex physical processes. It is thought that the physical characteristics of LRBs will change as global climate changes and temperatures increase, causing them to be more frequent, longer in duration, and more intense. On 24 August 2010, a LRB covered the Hokkaido region from the Japan Sea coast to the middle of the island, and after strong continuous rainfall, caused flooding in several cities. Here we showed that a combination of anomalously warm sea-surface temperatures and positive moisture flux anomaly at lower troposphere are the driving force behind the majority of LRBs in the Hokkaido region by using the Automated Meteorological Data Acquisition System (AMeDAS) radar dataset (taken from 2000 to 2010). We also determined that 21 LRBs were generated in 2010 compared with an average of eight per year for the period 2000-2009. Moreover, LRBs in 2010 lasted up to 251 minutes longer than the 2000-2009 mean duration.