Long-Term Visual Monitoring Revealed Importance of Sea Wind in Causing Sudden Showers in Japanese Mountain Basin

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Weather in mountainous area is changeable and difficult to predict, compared with that in the flat plains, because of the fluctuant local factors that influence the weather. Only little has been studied for the mountainous weather. Matsumoto basin is a mountain basin located 180 kilometers west-northwest of Tokyo. In this basin, east-west-lined shower clouds occasionally occur and move to the north. I decided to study this pattern and the local weather around this basin with a long-term visual monitoring, in addition to the AMeDAS (Automated Meteorological Data Acquisition System) data. From Jul. 11, 2018 to Sep. 4., time lapse cameras at 5 different points around the basin monitored the clouds. The surface wind patterns have been classified using the shortest path algorithm on the data taken at 22 AMeDAS points around the basin from 2010 to 2017. The relationships between the states of clouds and the wind pattern have concluded that the formation of clouds is caused by the valley wind. From Aug. 9, 2018 to Aug. 16, daily changes of atmospheric instability was monitored on a mountain ridge (2,310m high). These changes have shown that the clouds development is caused by moist air brought by sea wind. Those monitored and radar precipitation data have shown that the lined-clouds are caused by cold outflow from clouds above the mountains and go north by generating new ones by itself. Also, it was shown that sea wind is concluded as important for causing sudden showers in a mountain basin.

Awards Won:
American Meteorological Society: Third Award of $500