Complexity in geyser effusion activity and its causes: Onikobe geyser, Miyagi prefecture.

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The Onikobe geyser regularly effuses hot water every ca. 10 minutes, and each effusion is triggered by a removal of cold water at the top of hot water in the conduit, leading a sudden de-pressurization and violent boiling of the water in the conduit. Such effusion mechanism has been already known, but the geyser sometimes exhibit unstable effusions: short (60 s) and long (90s) effusion randomly appears. In this study, we investigate such activity of the Onikobe geyser from a long-term (1 year) observation data. We examine time intervals between two neighboring effusions from temperature data at the top of vent of hot water. The results show that time intervals of effusion from January to middle of April 2006 are almost constant at about 18 min. The time interval suddenly became short, and unstable effusions continued until the end of May. After stable effusions from June to August, during which effusions having 10-15 time intervals were observed, unstable effusion started again from September. We compare the amounts of precipitation and snow accumulation at neighboring AMEDAS stations. When there was sufficient amount of snow accumulation from January to April, the time intervals are long and constant. Unstable effusions often appeared for several days after sufficient amount of precipitation were observed from September to December. These correlations strongly suggest that unstable effusions appear when ground water originating from precipitation or snow comes into hot-water system of the geyser.