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# Downslope-windstorm-type flows in Arizona's Meteor Crater - Initial findings from METCRAX II

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The experimental part of the Second Meteor Crater Experiment (METCRAX II) was conducted at the Barringer Meteorite Crater in northern Arizona in October 2013 to study the nocturnal development of downslope-windstorm-type flows in the crater basin. The almost circular and approximately 1.2-km wide and 170-m deep crater is located on a large and homogeneous plain, which slopes slightly upwards to the southwest. During nighttime katabatic flows develop on the plain on a regular basis under clear-sky conditions. As the southwesterly drainage flow approaches the crater, part of it flows over the approximately 40-m high crater rim and into the basin. Under certain conditions a deep wave is produced in the lee of the crater rim resulting in a downslope-windstorm-type flow and strong warm-air intrusions over the inner upstream crater sidewall. During these events increased wind speeds and turbulence are encountered over the southwest sidewall and temperatures in the southwest part of the basin can be more than 5 K higher than over the basin center. During the most pronounced events the temperature differences across the crater can extend more than 100 m above the crater rim.

The field experiment was designed to measure the katabatic approach flow over the surrounding plain, the flow over the crater rim and the flow response inside the crater basin, making use of multiple in-situ and remote sensing instruments. Seven overnight Intensive Observational Periods (IOPs) were conducted during the one-month experimental period. Soundings taken in the crater basin revealed variations in strength, horizontal and vertical extent and persistence of the warm-air intrusions during the IOPs. Initial analysis suggests that subtle changes in the flow over the crater rim can produce significant changes in the flow response within the crater leading to warm-air intrusions. In addition, regular oscillations in the basin surface temperatures indicate a sloshing of the crater-floor inversion caused by the flow coming over the crater rim.