

Nishi, A., and H. Kusaka, 2019: Effect of mountain convexity on the locally strong “Karakkaze” wind. *J. Meteor. Soc. Japan*, **97**, 787-803.

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Plain Language Summary: This study numerically examined how the local wind “Karakkaze” in the Kanto Plain of Japan was affected by a convex feature (a semi-basin around Maebashi) in the mountain range by using idealized numerical simulations. The results revealed that a strong-wind region appeared within and leeward of the semi-basin. In contrast, weak-wind areas appeared adjacent to the strong-wind region. These results were consistent with the basic features of the observed surface wind pattern of the Karakkaze. This study also showed the atmosphere and terrain conditions which produced the local strong winds in the leeward of the semi-basin from sensitivity experiment.

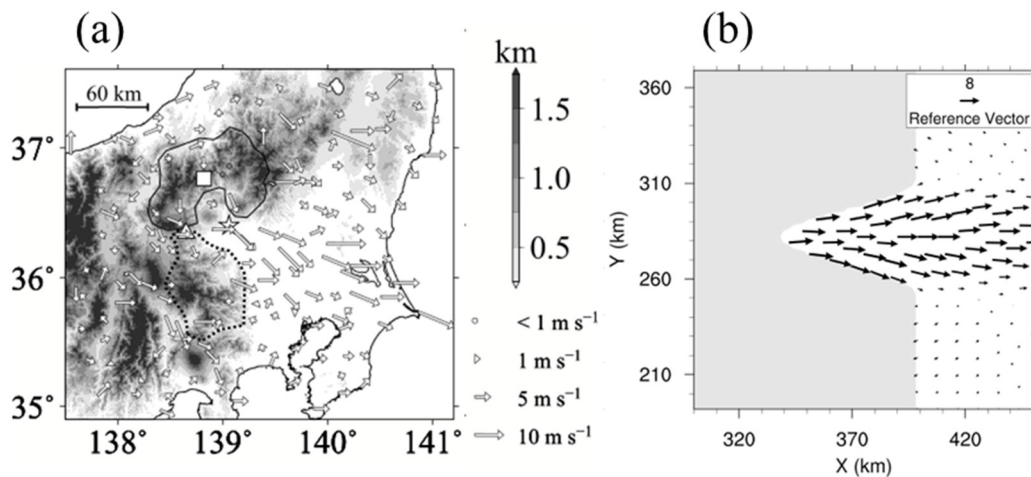


Figure. 1. (a) Surface wind distribution of typical cases of the Karakkaze (1200 LST on 19 February 2002). Data from the automated meteorological data acquisition system (AMeDAS) provided by the Japan Meteorological Agency. The shading shows terrain height. The star, triangle, and square in (a) show the location of Maebashi, Usui saddle, and Mikuni saddle, respectively. The black and dotted black lines show the Mikuni and Kanto mountains, respectively. (b) Horizontal cross section of winds at $z = 10 \text{ m}$ from the idealized numerical simulation.

- The Karakkaze blew because downdrafts over the leeward of the semi-basin of the mountain range transferred the momentum of westerly winds from upper air to near the ground.
- Locally strong winds appeared within and leeward of semi-basin only when the Mountain Fluid number (the inverse of dimensionless mountain height) was in the range 0.42–1.04.
- Locally strong winds appeared within and leeward of the semi-basin when the aspect ratio of convex feature (ratio of the wave amplitude to the wavelength of the convex feature) exceeded about 0.5.