

Yoshino, K., 2019: Low-level wind shear induced by horizontal roll vortices at Narita International Airport, Japan. *J. Meteor. Soc. Japan*, **97**, 403-421.

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Plain Language Summary: Aircraft making landing and takeoff at Narita International Airport in Japan frequently report low-level wind shear (LLWS) with turbulence when the prevailing wind is southwesterly, which is crosswind to the runway direction. This study used observational data by a landing aircraft at the runway 16R and a single-Doppler lidar to demonstrate the existence and structure of horizontal roll vortices (HRVs) causing the LLWS encountered by the aircraft.

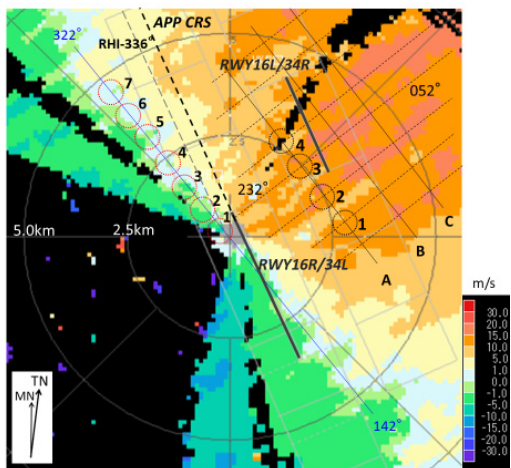


Figure 1. 1°-elevation PPI scan of Doppler velocity when the aircraft landed at the runway16R indicated by “RWY16R/34L”. The black thin dot lines indicate centerlines of the high-speed wind bands oriented 232°-052°. The numbered red circles on the blue thin solid line indicate the flow toward the lidar (FTL).

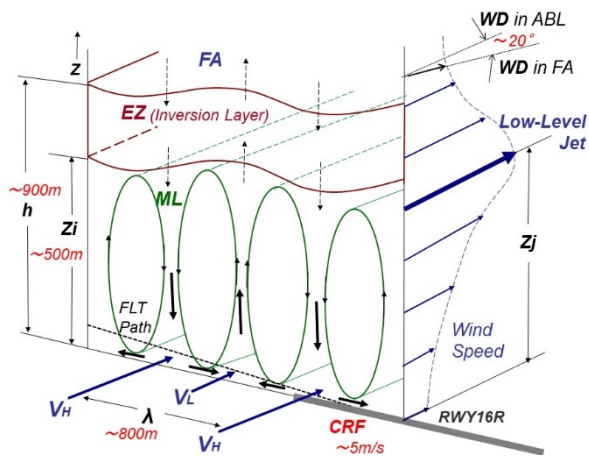


Figure 2. Schematic of the atmospheric boundary layer and the HRVs observed at Narita Airport when the southwesterly prevailed. The label *FA* represents the free atmosphere, *EZ* the entrainment zone, *ML* the convective mixed layer, *CRF* the cross-roll flow, V_H the high-speed wind band, V_L the relatively low-speed wind band.

- A single-Doppler lidar detected various features of the HRVs such as high-speed wind bands, cross-roll flows (CRFs) perpendicular to the roll axes, and bands of Doppler spectrum width (DSW) minimum.
- The CRFs formed the LLWS in the scale of about 400m between the runway threshold and the touch down point.
- The bands of DSW minimum with high-speed wind may be used as indicators of downdrafts in the HRVs since the downdrafts transport less turbulent air with large momentum of the low-level jet in the upper convective mixed layer.