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# Preliminary observation result of urban boundary layer at Taipei 101 Skyscraper

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Taipei 101 Skyscraper (508 m), the secondary tallest commercial building around the world, is the metropolis landmark of Taipei, Taiwan. The minute-resolution of wind field, air temperature and humidity sampled at the northeastern corner of 34th (151 m) and 82th (353 m) balconies are collected from January of 2011 until now for studying urban meteorological boundary layer. 31 sets of balloon-borne radiosondes near Taipei 101 Skyscraper were launched for comparison. Meanwhile, a CFD model (STREAM) was used to simulate the wind flow surrounding 101 Skyscraper.

As expected, the measured wind field could be distorted strongly by the building. Comparing with radiosonde data, the wind direction measured at Taipei 101 skyscraper has 70∼90 degrees clockwise turn (SN) under the prevailing northeastern (NE) wind flow. The measured wind speed at 101 Skyscraper also has ∼50% reduction compared to radiosonde measurement, and the ratio of speed reduction from different wind directions was simulated by STREAM model well. In addition, the wind speed at 151m is larger than the measurement at 353m significantly. This near-surface wind jet phenomenon was diagnosed through STREAM model. We found the hill topographic effect 1.2 km Southeastern away 101 Skyscraper and the surrounding high buildings are the major factors to form this wind jet.

Temperature measurement at 101 Skyscraper has highly linear regression ($R > 0.98$) with radiosonde temperature data. The minimum difference of air temperature between two-layer of 101 Skyscraper happens in the early morning, 04:00 LST (hot season) to 08:00 LST (cold season). Significant temperature inversion phenomena (below 353 m) were always observed at cloudless breeze days, no matter what the seasons.

The Particulate Matter (PM) measured by Taiwan Environmental Protection Agency (EPA) in Taipei Basin (15 sites) and our temporary measurements at 101 Skyscraper balconies near noon were collected, too. It showed that PM10 density at 353m height might reduce to ∼70% of the ground level. But PM2.5 was seemed well-mixed in the near-surface urban boundary layer.