

# **The Characteristic Analysis on Wind and Ramp Event at the Southwestern Coastal and Offshore Regions in Korea**

Beom-Keun Seo<sup>1</sup>, Yoon-Jin Lim<sup>1</sup>, Hang-Sook Park<sup>1</sup>, Yeon-Hee Kim<sup>1</sup>, Baek-Jo Kim<sup>1</sup>,  
and Young-Joo Kim<sup>2</sup>

<sup>1</sup> *Applied Meteorological Research Division, National Institute of Meteorological Research, Seogwipo, Republic of Korea.*

<sup>2</sup> *Research Planning and Management Division, National Institute of Meteorological Research, Seogwipo, Republic of Korea.*

Wind ramp events are characterized by sudden and large changes (increases or decreases) in wind speed. These ramp events can cause a rapid fluctuation of wind energy and reduction of wind turbine durability. This study analyzes the characteristics of the wind ramp events at the southwestern coastal and offshore regions in Korea in 2014. The used data are wind speed and wind direction at 80 m height of wind LIDAR in coastal area and meteorological towers at coastal and offshore area. The annual average wind speeds at the coastal and offshore areas are 4.8 m/s and 6.2 m/s, respectively. Winds of 4 m/s or more to generate wind energy at offshore area are distributed more than at coastal area. The average monthly wind speed of December in the two regions is highest. The frequency distribution of rated wind speed is more than 10 % and about 8 % at the offshore and coastal areas, respectively. In general, the ramp-up events often occur at day time. The ramp-down events occur at sun rise and sun set. Monthly time series of ramp event numbers show clear seasonable cycle, but it is presented that May is one of the months that has higher ramp event frequency, especially in coastal area. Also, ramp events are influenced by the synoptic weather phenomena. The ramp-up events are the ramp-down events more often appear at the period of synoptic low and high over the Korea Peninsula, respectively.

**Key words:** Wind Energy, Ramp events, Coastal and offshore areas

**Acknowledgement:** This study has supported by the NIMR/KMA R&D program "Advanced Research on Applied Meteorology".