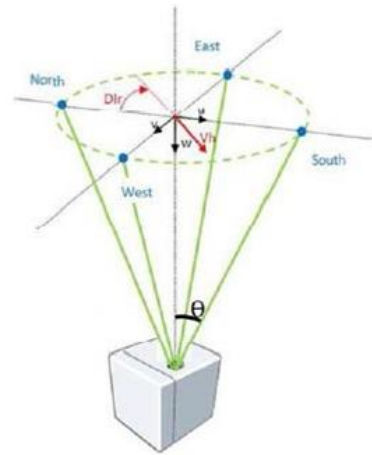


【固定式光達】

WINDCUBE Lidar Remote Sensor，相對於其他量測方式，其具備多項優點，如重量輕(儀器本體僅約 45 公斤)人力可進行移動搬運、安裝方式簡易快速、可設定 12 個量測高層，量測範圍達 40~290 公尺，經由內建軟體，可於電腦畫面直接呈現各高層水平與垂直的風速、風向，WINDCUBE 光達採脈衝式雷射遙測技術，從視窗錐角 28 度依序掃描北(0 度)、東(90 度)、南(120 度)、西(240 度)及垂直向上五個方位的雷射光束，藉由都卜勒原理得到光束徑向粒子移動速度，再以公式電腦運算求得 u 、 v 、 w 三維風速、風向，其防塵防水等級達 IP67 等級，可適用於離岸環境，國外廣泛應用固定式光達於離岸固定平台，進行風場風速風向量測。



本中心曾以固定式光達架設於台灣近岸場址，與海上測風塔相距約 13 公里進行為期約 70 天的量測。短期時間的研究將針對車測中心以及海上測風塔之間的交互模擬。此研究將利用十分鐘數據，將離岸的風資源數據導入 WindSim 模擬軟體，利用海氣象觀測塔之測風數據模擬位於 ARTC 位置的風速、風向；反之利用 ARTC 所測得的測風數據去推斷在海上的海氣象觀測塔的風速、風向。



風場資料比對分析

(固定式光達與浮動式光達比對)

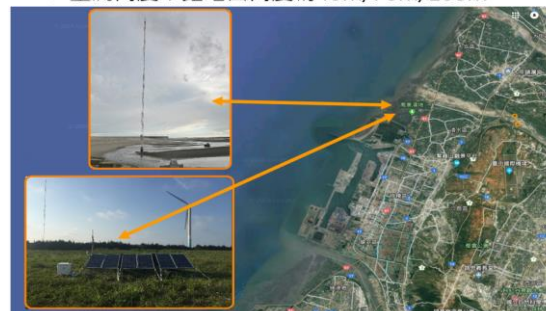
- 比對作業：107年5月22日至6月9日；台中港
- 比對設備：WindCube V2；浮動式光達 AXYS WindSentinel
- 相對位置：兩套光達的位置距離約3公尺
- 量測高度：距地面高度為70m/90m/110m



風場資料比對分析

(固定式光達與陸上測風塔比對)

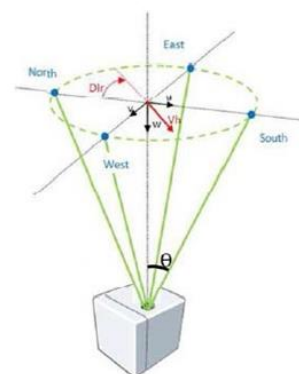
- 比對作業：107年7月6日至今；台中港
- 比對設備：WindCube V2；陸上測風塔
- 相對位置：兩套光達的位置距離約20公尺
- 量測高度：距地面高度為40m/70m/100m



【Lidar Remote Sensor】

The WINDCUBE® is a Lidar (Light Detection and Ranging) used for wind profile measurement from 40m to 200m.

The Lidar sends infrared laser pulses into the atmosphere. Four beams are sent successively in four cardinal directions along a 28° scanning cone angle, followed by a fifth, vertical beam. Laser pulses are backscattered by aerosol particles in the air (dust, water droplets, aerosol, etc.), that move at wind speed. The collected backscattered light allows for the calculation of wind speed and direction using Doppler induced laser wavelength shift. Up to 12 different range gates can simultaneously be measured using the laser pulse time of flight allowing to measure the wind speed at 12 different heights. The backscattered light is converted into an electronic signal and digitized. A dedicated signal processing algorithm computes wind vector components from five consecutive line of sight measurements.



Leosphere software controls the hardware and performs the processing. The user interacts with the WINDCUBE® (measurement configuration and real-time monitoring) through a graphical user interface, Windweb. Windweb can be displayed on any web-browser.

RCETS (Research Center for Energy Technology and Strategy) collected near shore and offshore (13 km away from coast) 70-day wind data by Lidar Remote Sensor. The short-term simulation and interaction between ARTC (Automotive Research & Testing Center) and offshore met mast were analyzed. The research uses simulation program (WindSim) derived from offshore wind resource based on 10-min wind data and constructs the corresponding wind speed and direction model at ARTC. Reversely, it could do that at offshore met mast by data collected from ARTC.

