

Meteo-Dron: un nuevo dron de bajo coste para la monitorización meteorológica y fenómenos de tiempo severo

A new low-cost unmanned aerial vehicle (Meteo-Dron) for monitoring upper air weather data and severe weather phenomena

C. Azorin-Molina (1), A. Pirooz (2), N. Kay (3), J. Gómez-Reyes (1), C. Calvo-Sancho (1)

(1) Centro de Investigaciones sobre Desertificación, Consejo Superior de Investigaciones Científicas (CIDE, CSIC-UV-GVA), Laboratorio de Clima, Atmósfera y Océano (CLIMATOC-LAB), Valencia, España. (2) National Institute of Water and Atmospheric Research (NIWA), New Zealand. (3) The University of Auckland (UOA), Auckland, New Zealand

RESUMEN

In the framework of the ThinkInAzul programme, the WIND-COAST project is a joint collaboration between the CSIC, NIWA and UOA aimed at designing and developing a new inexpensive “Meteo-Dron” for monitoring weather data across the low and mid-levels of the troposphere (up to 5,000-7,000 m a.s.l.). The Meteo-Dron is based on a DJI Matrice 350 RTK drone, equipped with the LI-550 TriSonica Mini Wind & Weather Sensor as its size and weight make it perfect for Unmanned Aerial Vehicle (UAV). The Meteo-Dron reports wind speed, direction, air temperature, humidity, pressure, tilt, and compass data. The prototype has already been tested and calibrated in the wind tunnel of UOA to correct motion errors and evaluate its performance in different conditions of wind and turbulence. Field campaigns already started in September 2024 in New Zealand and Spain, first by flying the Meteo-Dron near a 10-m weather station from NIWA. The Meteo-Dron has potential in the long-term to be the substitute of existing operational radiosonde systems such as sounding balloons, which are very expensive and have relatively high environmental impact. The use of Meteo-Dron will lead to better real-time monitoring and forecasting of extreme weather events, in a more sustainable and less costly way. For instance, this novel equipment could improve convection-permitting models by sampling water content with high accuracy; e.g., HARMONIE does not properly estimate this parameter and the potential energy available to develop deep convection. Therefore, its ability to monitor wind storms and capabilities to improve the nowcasting of severe weather could be very useful for different socioeconomic sectors. For instance, the Meteo-Dron can have a wide range of applications, as e.g. being used by the General Directorate for the Prevention of Forest Fires in Valencia, supporting both the extinguishing and emergency management tasks.