Université de Lille

FACULTÉ DES SCIENCES ET TECHNOLOGIES

International Master 2 Atmospheric Sciences: Research Training 2022-2023

Laboratory: LPCA

Supervisor: DIEUDONNÉ, Elsa

Tél : 03.28.65.82.70, E-mail : elsa.dieudonne@univ-littoral.fr

Collaborator: SOKOLOV, Anton

Eventually CaPPA Work Package: WP4. Improving the understanding of aerosol source distribution, transport and physico-chemical transformation using advanced merging of remote sensing with atmospheric modeling

Frequency and seasonality of Low-Level Jets (LLJs) in the English Channel based on weather model data

Low-altitude wind maxima, also called Low-Level jets (LLJs), are a common weather phenomenon encountered all over the world, under all types of climate and at all seasons. LLJs have a deep impact on pollutant dispersion, power generation by wind turbines and airport activities because the strong wind shear around the jet generates a lot of turbulence in the air flow.

When a North-East wind enters the English Channel, a LLJ can form due to the difference in ground altitude and surface roughness between sea and land. This phenomenon has been demonstrated by a modelling study in 2003 (Capon, 20023; Meteorol. Applications, 10, 229-237), but this work was based on a 24-hour simulation only. However, wind profile observations above Dunkerque have shown North-East LLJs to be the most frequent LLJ direction (Dieudonné et al., 2022; European Meteorol. Soc. Annual meeting, doi.org/10.5194/ems2022-33), suggesting that this Channel jet may be a rather frequent phenomenon.

The purpose of this training is to determine the frequency of occurrence and seasonality of the English Channel jet on the weather reanalysis data from the European Center for Medium Weather Forecast (ECMWF ERA5 reanalyzes at 0.25° / 1-hour resolution). This will also allow to identify a few case studies in various weather conditions that can be modelled at a finer resolution using the weather model MESO-NH (0.5 km /15 min resolution).

Key words: Atmospheric dynamics; Low-Level Jet (LLJ); weather reanalyzes and models