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The importance of meteorology and thermodynamic conditions in the development of thermal convection used in cross – country and duration flights with sailplanes

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The aim of this study is to analyze the meteorological conditions for initiation of atmospheric convection in relation with topography, surface albedo and radiative fluxes. For this it is essential to determine the sources of the thermals (chimney or plume) - their locations. The topography, soil cover, meteorology and thermodynamic parameters such as soil, air - temperature and humidity play an important role in the formation of thermals and their development. Their energy is going to be generated by solar radiation. For this study we have chosen the date of 10th of July 2016 and three locations with different geographical conditions: Clinceni airfield, Comana National Park and Alexandria city, all from South of Romania. For these locations there are differences in soil temperatures which can generate spots on the ground and propitious conditions for the formation and growth of thermals. For cross-country and duration flights it is crucial to find these spots on the ground of thermal contrast and to exploit these regions for a good thermal flight. The ERA-Interim reanalysis data for temperature, humidity and radiative fluxes were used in our analysis. In addition, a model to compute surface (soil) temperature, synoptic maps and satellite images were used. In the selected day of July, height vertical variations of the thermodynamic parameters correlated with synoptic patterns have shown initiation of atmospheric convection after the dissipation of thermal inversion and generation of thermals over the area covering the three locations. In similar meteorological conditions, the differences between the thermals over the three locations were minor, however soil temperatures were different. Therefore, the meteorology is very important in the generation of thermals. The presence of these thermals was confirmed by the flight realized in that day with a Jantar Standard high performance glider. The flight was recorded with the use of an IGC recorder. The radio - soundings data (obtained using Hysplit model) of that day also validated the results of the study. This study will be extended for many days and many location in order to determine a relationship between the factors that initiate the convection and thermal generations.