



## **aiRthermo: an R Package designed to help students understanding atmospheric thermodynamics**

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During the last years the members of the group have been using the R computer language both for research and lecturing as well. Some of the topics that are currently being taught using R are “Physics of the Atmosphere” and “Satellite Oceanography and Meteorology” at the MSc level. The R language allows the students performing powerful data analysis tasks in the same computer language that they can use during their future research.

One of the topics that is taught to students from the “Physics of the Atmosphere” course is atmospheric thermodynamics. A core part of this curriculum consists in studying computations involving buoyancy, evolutions of particle given an ambient sounding and atmospheric stability, amongst others. During the last five years, these concepts have been taught to students using standard R functions. However, in order to improve the performance of the code and in order to produce a library that can also be of interest to researchers as well, we have ported substantial parts of the code to a C extension that is called from R, developing this way “aiRthermo”.

This package allows the user (currently our students) to perform simple computations regarding the density of dry and moist air, conversion between different moisture indices, and, particularly, adiabatic and pseudoadiabatic evolutions of air parcels given an ambient sounding, leading this way to estimations of several instability indices (K, Total-Totals, Lifted Index or CAPE/CIN, amongst others). Through the use of this library, the students are training in the analysis of convective instability and different homework, such as numerical computations of the Föhn effect. Since the evolution of the lifted particle can be returned to the calling routine by the software, the students are able to improve their understanding of the topic. The code in aiRthermo is currently being made available to other researchers through CRAN, and we hope that this helps other students/professors to benefit from its use.