The scope of this particular thesis is the development of a new model concerning the estimation of potential evapotranspiration. Evaporation and evapotranspiration constitute the main components of the hydrological cycle and their estimation demands a number of hydrometeorological data. The method, which describe with accuracy the phenomenon is Penman- Monteith's method of combination, while for its assessment the average temperature, relative humidity, sunshine and wind's velocity are demanded. The simultaneous existence of these four measurements is quite often absent from meteorological stations and a number of experts, due to complexity of the methods, looked for simplified mathematical expressions so as to describe the phenomenon.

International bibliography recommends a breadth of mathematical equations, that whether rely upon the simplification of the methods or originate from empirical observations and mainly inguire temperature as entry data.

In the specific thesis, it is given an account of a new parametrical equation that relies on adaptation, depending on the method of minimal square, in a measured sample according to Penman-Monteith's method. The mathematical equation is described through this analogy.

$$E = \frac{aS_o - b}{1 - cTa}$$

a,b,c: Parameters which are calculated through the method of minimal square
So: The extraterrestrial radiation that can be easily calculated
Ta: The average temperature

This new analogy was applied in 37 meteorogical stations in Greece (Figure 1) from 1/1968 to 12/1989, in monthly step. The results are satisfactory enough, as high applications measures, concerning the data of the stations, appear.

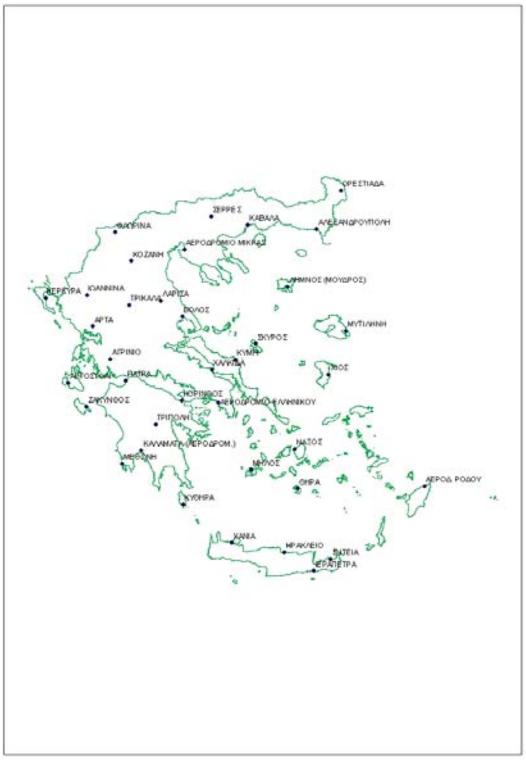

Figure: Meteorological station

The initial parametrical equation, which was formulated, was further simplified into one, defining as a resylt an analogy optimization and the final form of the equation is the following:

$$E = \frac{aS_0}{1 - 0.02344T} \quad (2)$$

Moreover, a bibliographical review, concerning the main evaluation methods of potential evapotranspiration took place and by comparing the results with the new parametrical equation, we observe that they are close to that of Penman-Monteith's method.

The final part of the thesis deals with a geographical interpolation of the parameters, so as to infer the parameters all over the Greek region and the potentiality of using widely the new parametrical equation. The geographical interpolation, with the use of G.I.S, becomes with the deterministic method of Inverse Weight Distance.

On the one hand, in figure 2 it is depicted the modification of parameter a concerning the parametrical equation 2, while on the other hand the territorial modification of a,c parameters, referring to the mathematical form of the equation is presented:

$$E = \frac{aS_0}{1 - cT} \quad (3)$$

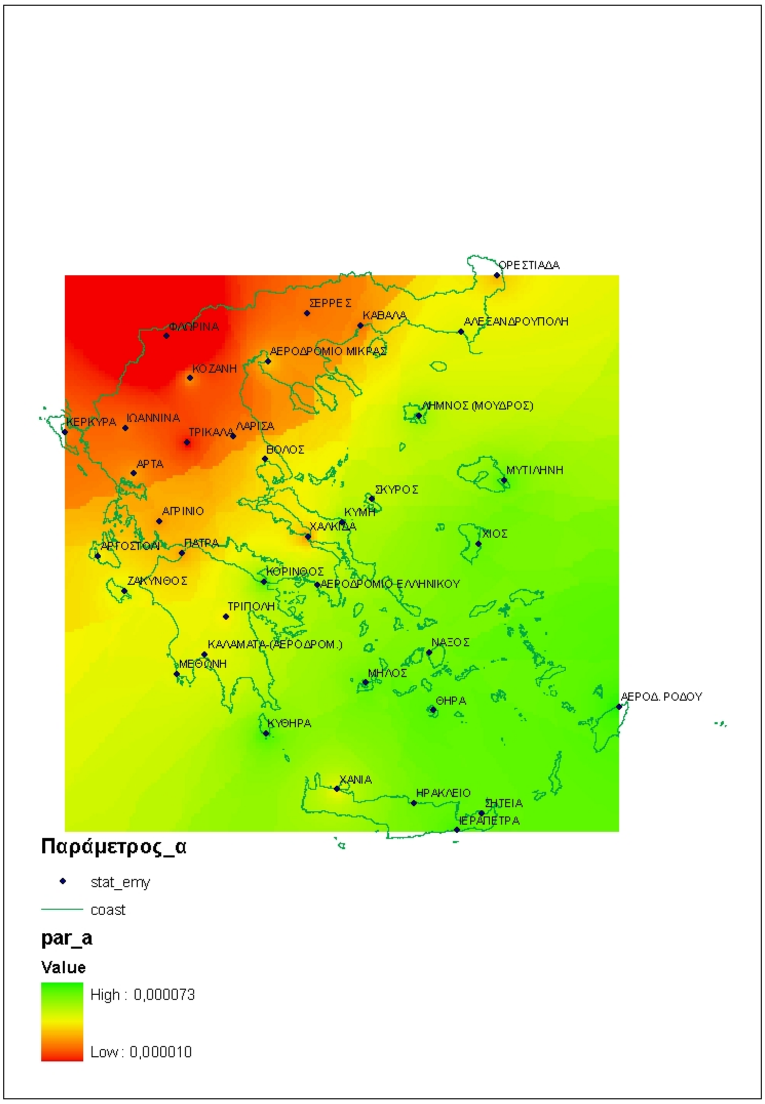

Figure 2: Geographical interpolation of parameter a for the equation 2

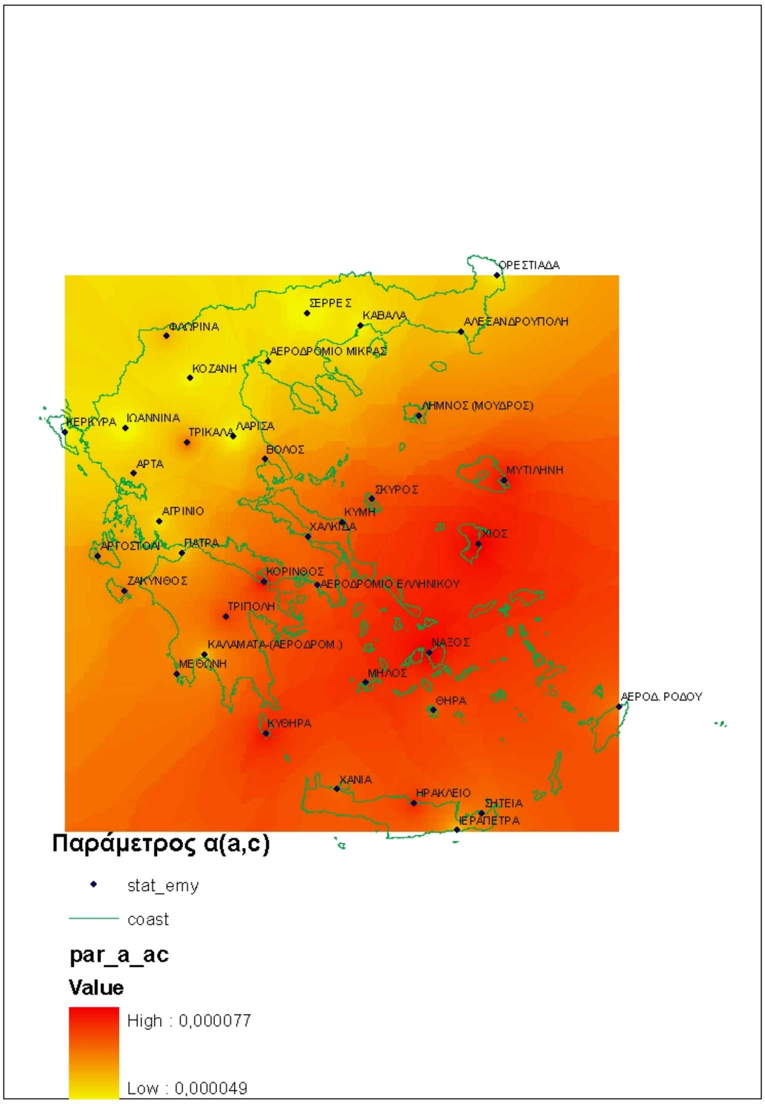

Figure 3: Geographical interpolation of parameter a for the equation 3

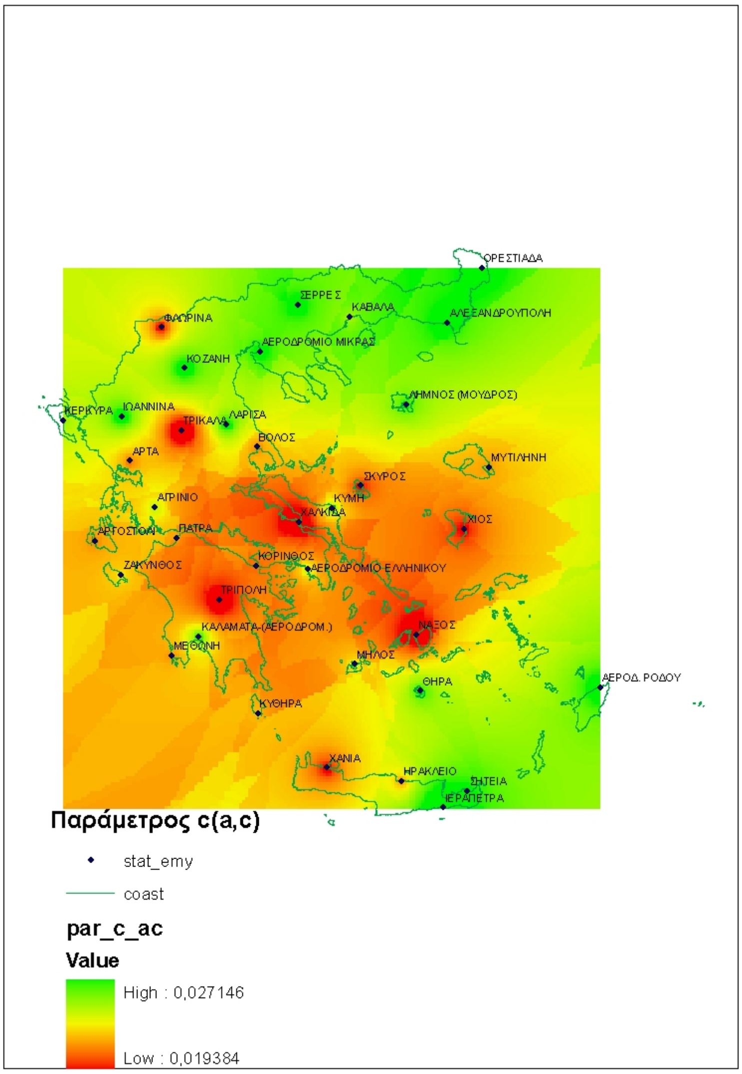

Figure 4: Geographical interpolation of parameter c for the equation 3