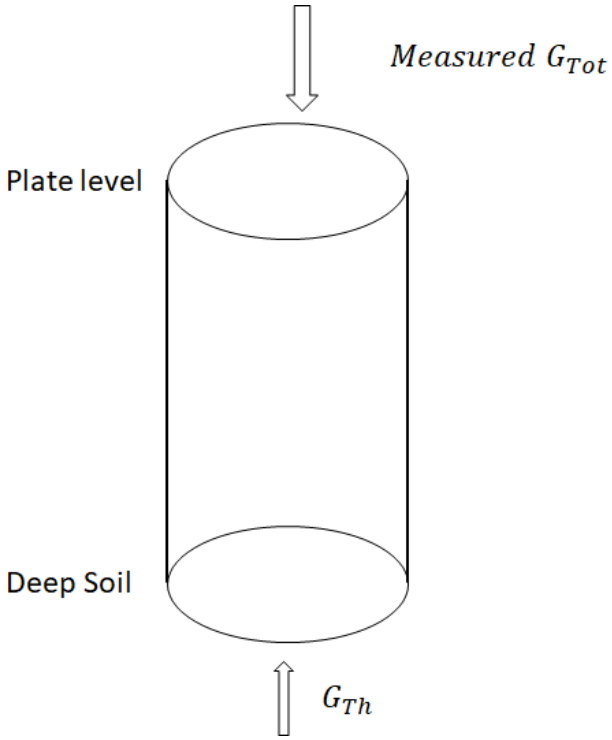

Let's consider a homogeneous soil column between the SHFP depth and the depth where the soil temperature is invariable during the year. Through this column, one-dimensional heat flux is entering or quitting by the upper side and by the lower side.

In piratic, the SHFP depth is 5cm and we can consider the soil temperature as invariable at 1000 cm depth. At the top, in the ideal case, the SHFP measures the total heat flux: G_{Tot}, at the bottom, since the surface heat flux variations were absorbed through the soil column, there is only the geothermal heat flux coming from the deep soil: G_{Th}.

This soil column stores some thermal energy and its variation ΔE between t_0 and t_1 can be calculated integrating entering or quitting heat flux from the top and the bottom:

$$\Delta E = \int_{t_0}^{t_1} (G_{Tot} - G_{Th}) dt$$

If we consider that after one year the soil temperature profile and specific soil capacity profile did not change, it means there is no energy variation stored inside the considered soil column, then the energy balance should be nil:

$$\int_{0}^{365} (G_{Tot} - G_{Th}) dt = 0$$

The non-nil results of this integration represent the imperfection of the SHFP measurements.

These imperfections could have two distinct origins: inhomogeneities boundaries causing non-vertical, lateral, heat exchanges (one-dimensional heat flux does not apply anymore) and not sensed convective heat fluxes.

The geothermal heat flow subtraction is proposed for the missing heat flow parts estimation.