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WORKSHOP ON REMOTE SENSING TECHNIQUES WITH APPLICATIONS TO AGRICULTURE, WATER AND WEATHER RESOURCES

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FLUXES IN THE ATMOSPHERE

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FLUXES IN THE ATMOSPHERE

The soil-air interface is the critical place where the distribution of the energy input to the system takes place. The short wave radiation from the sun is partly reflected at the top of the atmosphere, part absorbed by the atmosphere itself and also there is a part reflected by the surface of the planet. The net amount of shortwave that arrives to the mentioned surface is distributed as sensible heat into the ground and into the air. There is another partition for latent heat and it depends on the amount of moisture availability.

The way the temperature and fluxes behave at the surface and the lowest layers of the atmosphere is the next: basically the sun heats up the soil and the soil warms up the air. Once the air in contact with the soil is heated up, mainly by conduction and molecular diffusion, this air, lighter than the layer on top of it, begins to rise (convection). This kind of turbulent transport speeds up the processes and the air lowest tens of meters are mixed up due to rising and sinking columns.

While this process is going on, the so called temperature inversion (see figure), begins to reduce its temperature excess, compared with the lower air layer. The second part of the figure shows the temperature profile after local noon.

Another variable to watch is the wind. The air in movement is slowed down due to the friction against the surface. From the early morning it will begin to slow down because is "connected" with the ground. During the night the wind accelerates because it moves over colder air. There is not turbulent mixing.

In the graphical output of a boundary layer model you will see different curves.

In the main part of the screen there are two yellow lines:

- The left one shows the wind speed vs height.

- The right one depicts the vertical temperature profile.

The green curve is the dew point or the mixing ratio (moisture).

The red curves show the previous yellow curves.

In the inset the fluxes are represented.

- Solar radiation

- Net radiation

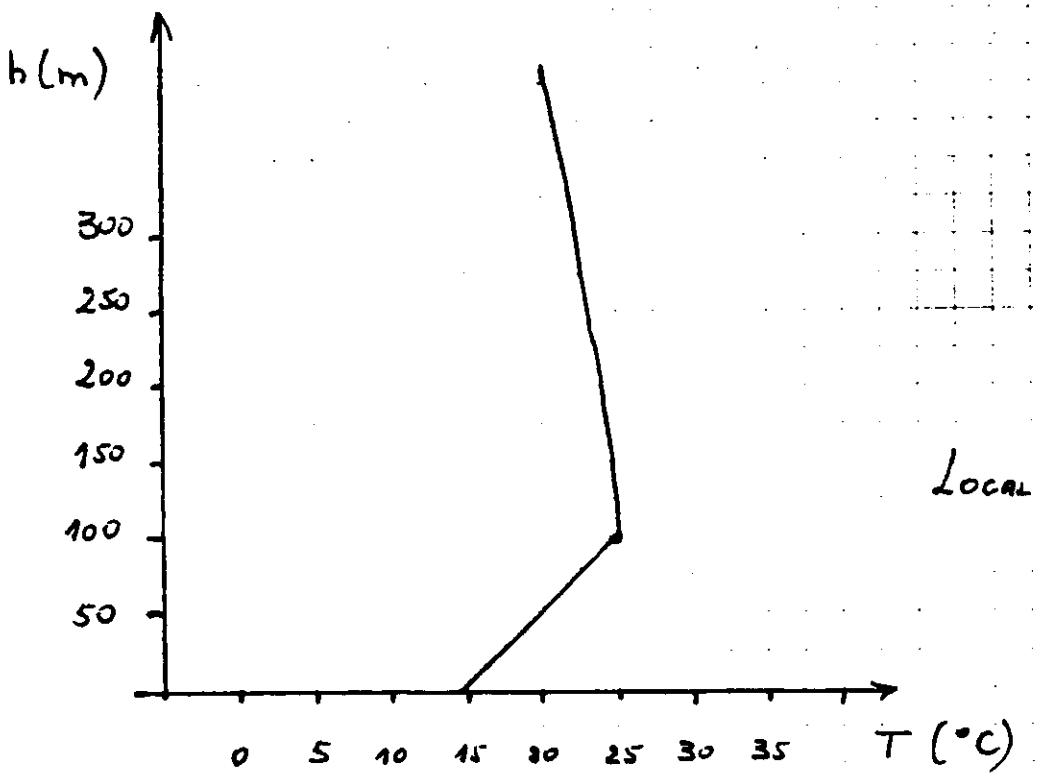
- IR radiation

- Sensible heat into the air

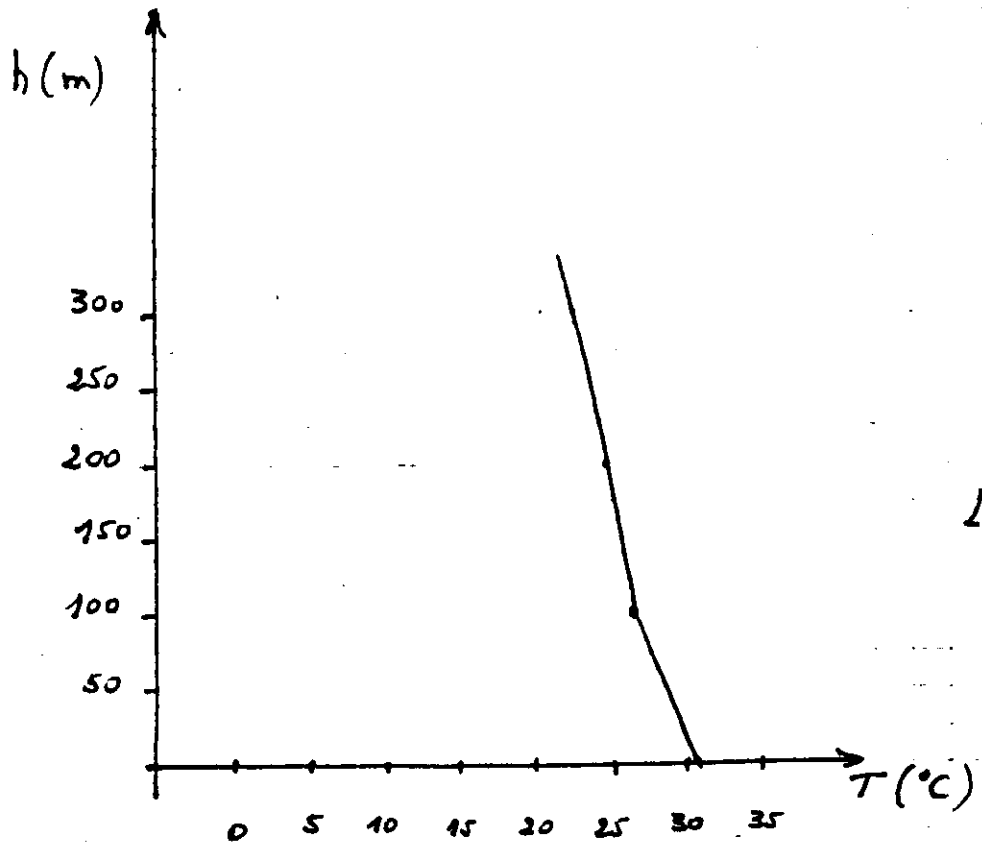
- Sensible heat into the ground

- Latent heat

We hope that with this demonstration you will be fully convinced that in order to interprete surface data indirectly the boundary layer must be taken into account to relate in a unique way all the surface variables and parameters.



Local Time 6 a.m.



Local time: 1 p.m.