Impacts of agriculture on climate

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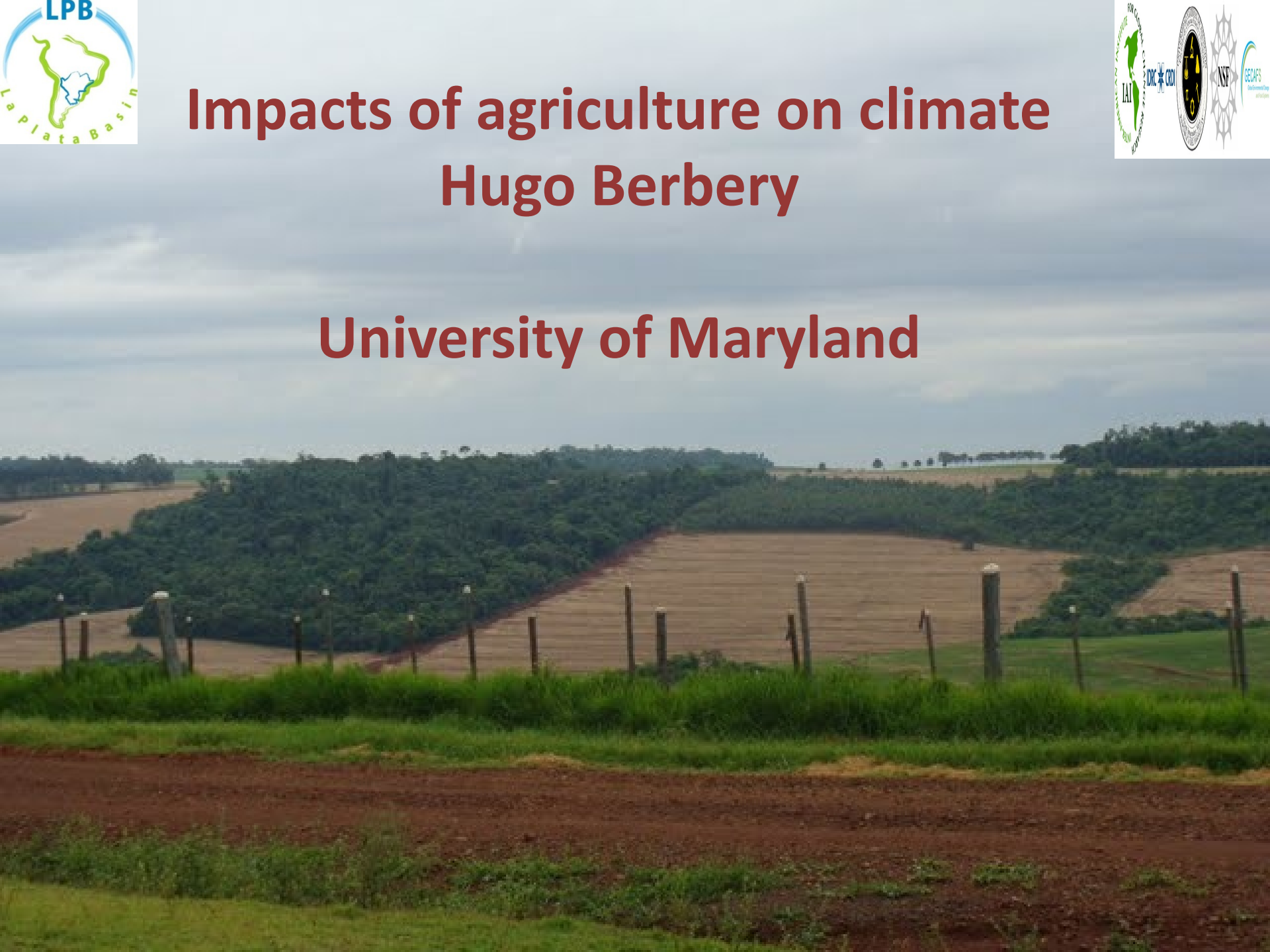
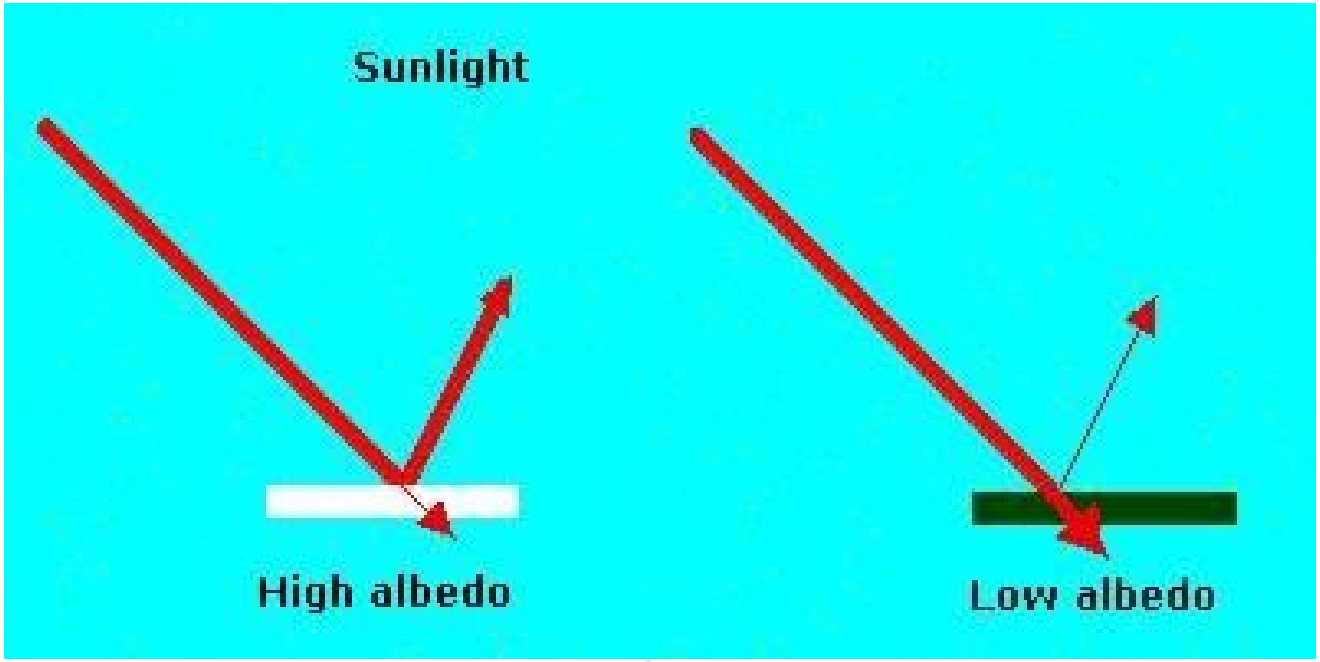
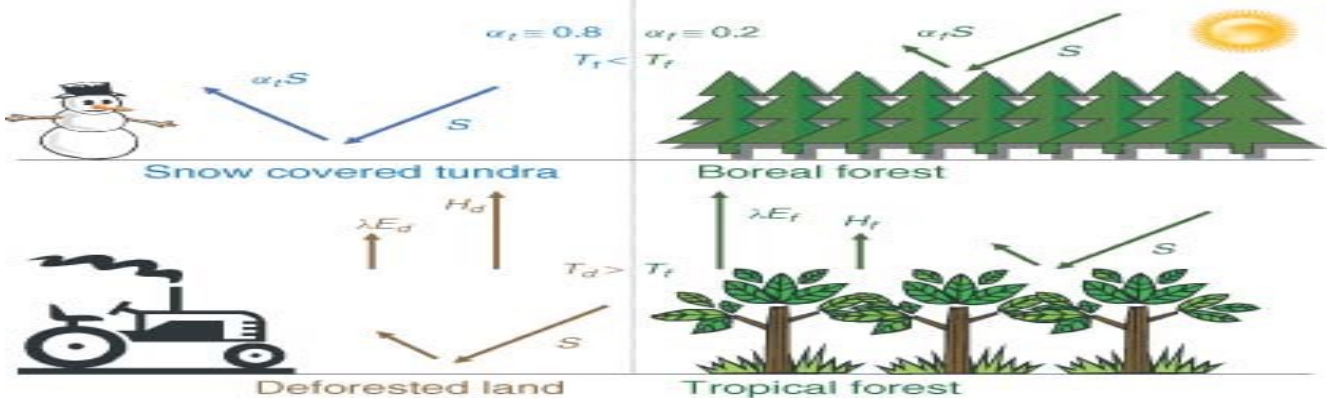


Efecto de la superficie en la radiacion del sol (albedo)

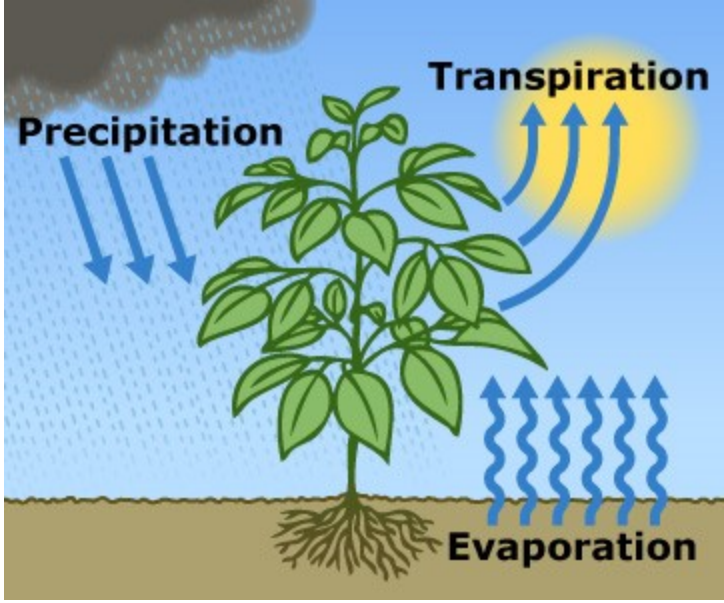


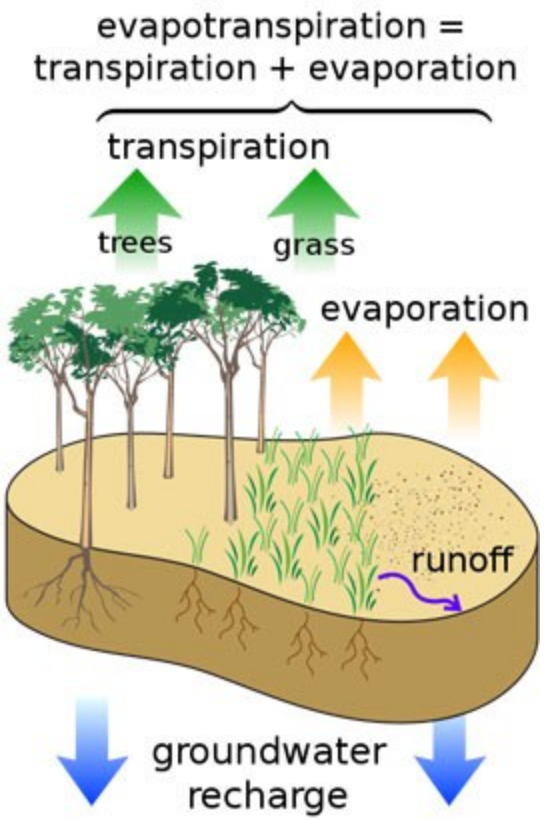


La tasa de evapotranspiracion (EVT) depende de factores climaticos, como temperatura, luz solar, viento y humedad.

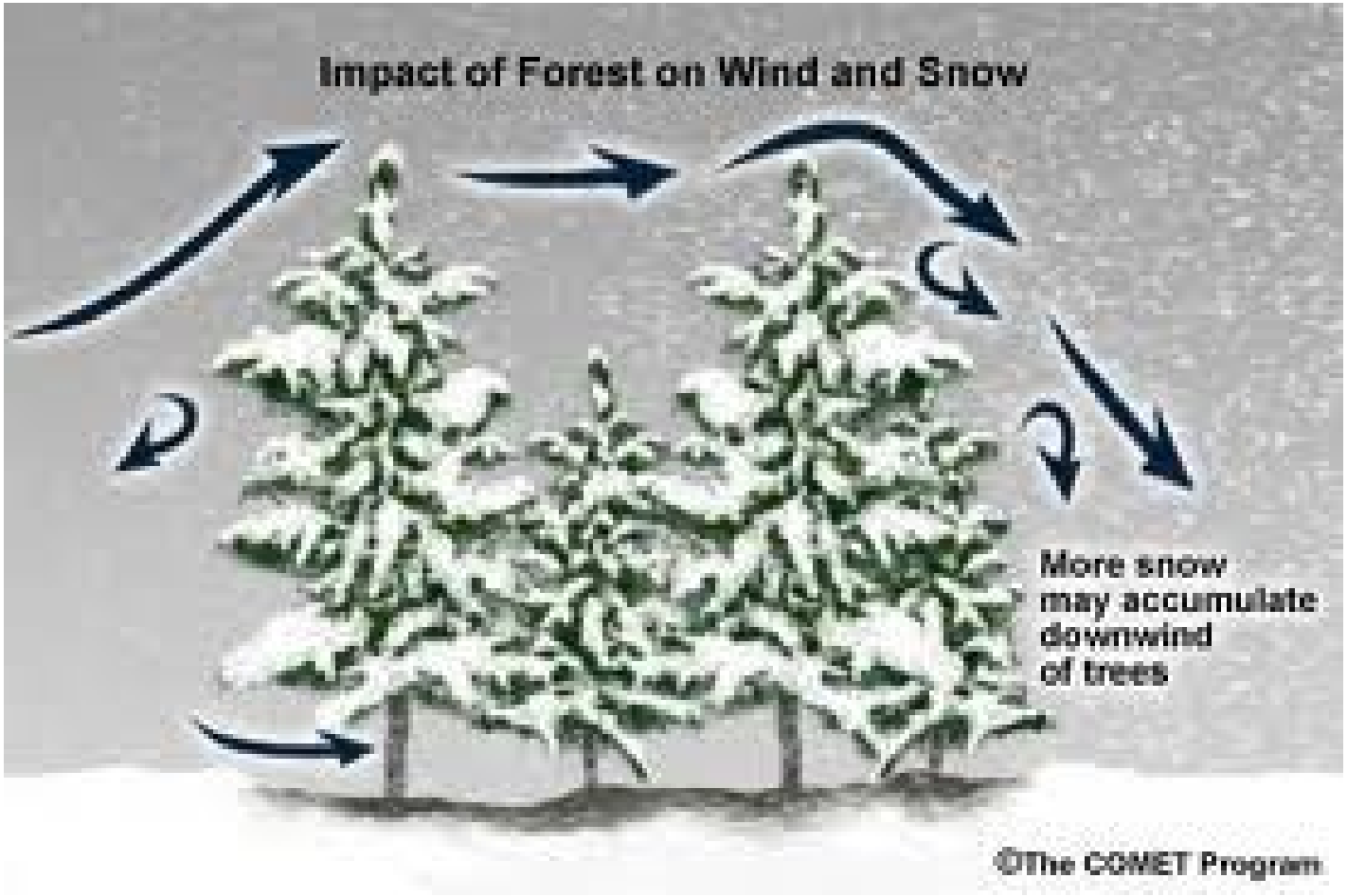
EVT tambien depende de la especie de planta, porque las especies dependen de su abilidad de regular agua y adaptarse al stress inducido por la falta de agua.

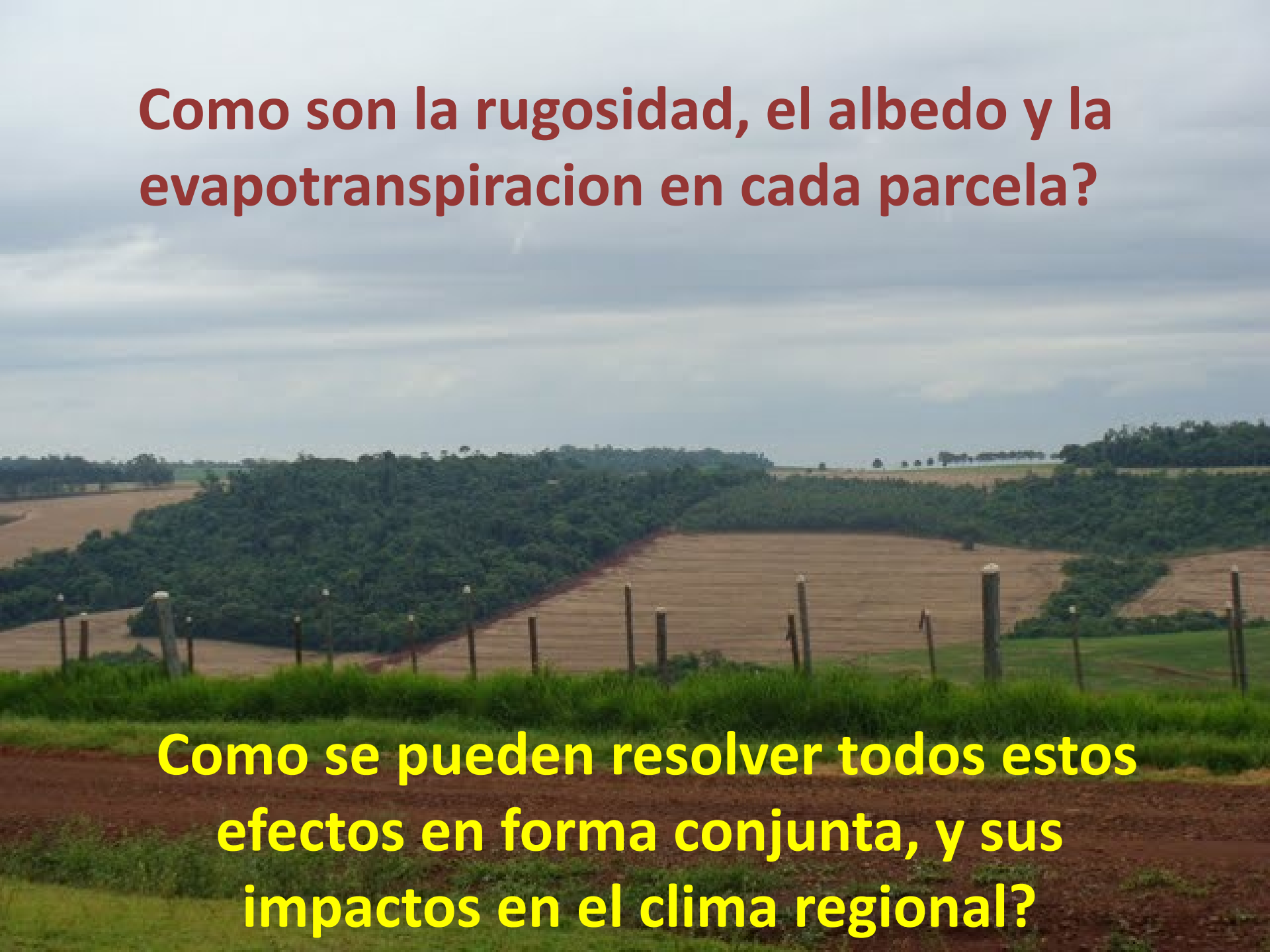
El grado de cobertura vegetal, asi como la profundidad de las raices son elementos importantes tambien.



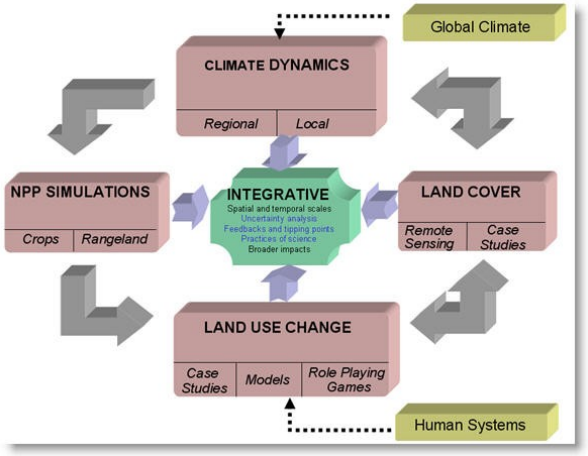


La rugosidad de suelo afecta a los vientos en capas bajas




Como son la rugosidad, el albedo y la evapotranspiracion en cada parcela?
Como se pueden resolver todos estos efectos en forma conjunta, y sus impactos en el clima regional?

Los ingredientes de un modelo regional



$$\frac{dU}{dt} = fV - K\frac{\partial S}{\partial X} - RT\left(\frac{\partial q}{\partial X} + \frac{G_1}{G_0}\frac{\partial q}{\partial Z}\right) + F_X \qquad (15)$$

$$\frac{dV}{dt} = -fU - K\frac{\partial S}{\partial Y} - RT\left(\frac{\partial q}{\partial Y} + \frac{G_2}{G_0}\frac{\partial q}{\partial Z}\right) + F_Y \qquad (16)$$

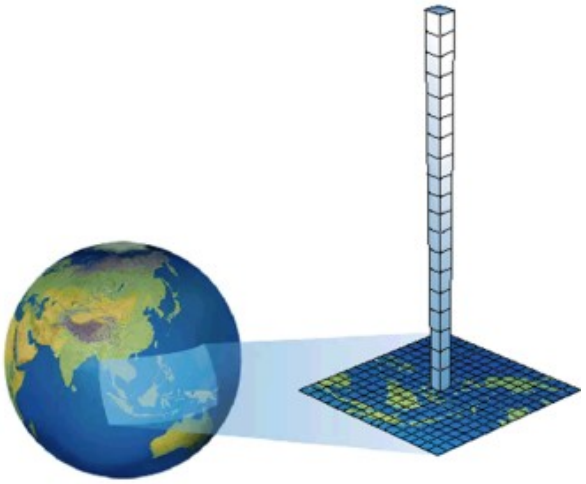
$$\frac{dw}{dt} = -g - \frac{RT}{G_0}\frac{\partial q}{\partial Z} + F_z \qquad (17)$$

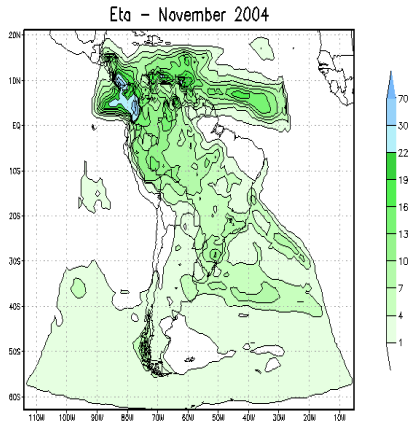
$$(1-\kappa)\frac{dq}{dt} = S(F_1U + F_2V) - S\left(\frac{\partial U}{\partial X} + \frac{\partial V}{\partial Y}\right) - \frac{1}{G_0}\left(\frac{\partial G_0 W}{\partial Z}\right) + \frac{L}{T} \qquad (18)$$

$$\frac{dT}{dt} = \kappa T\frac{dq}{dt} + L \qquad (19)$$

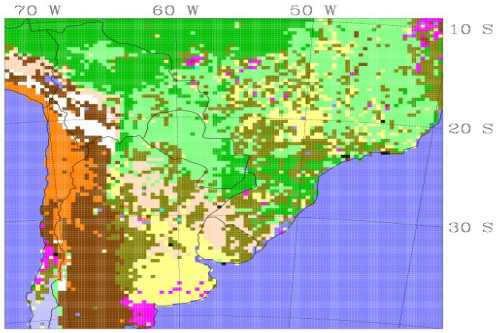
$$\frac{dM}{dt} = E \qquad (20)$$

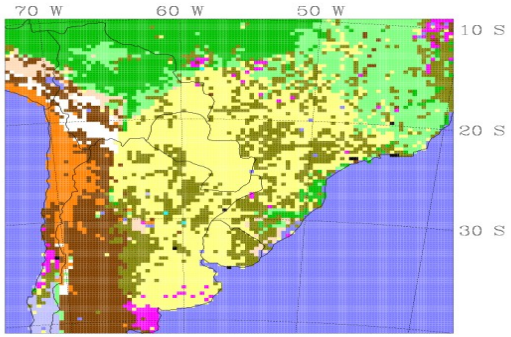
$$W = \frac{S(G_1U + G_2V) + w}{G_0}, \qquad (21)$$

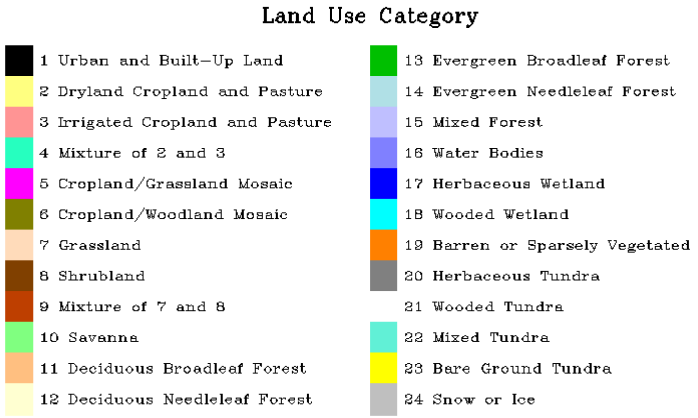


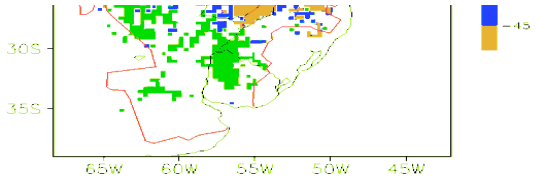


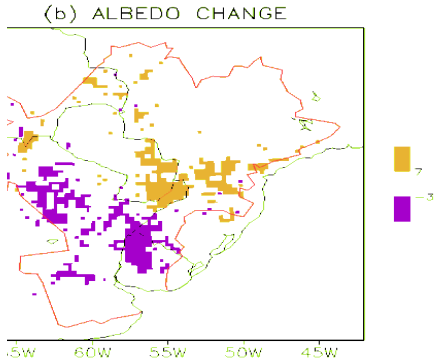
Un ejercicio:
Supongamos que toda la Cuenca del Plata estuviera cubierta por cultivos

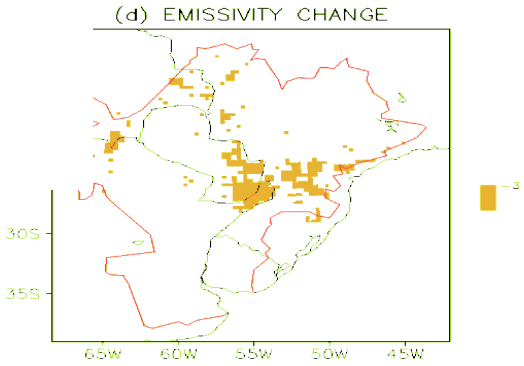






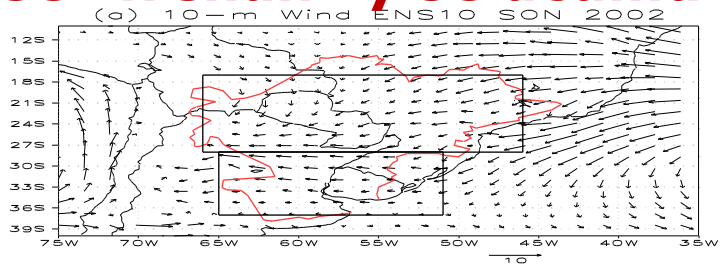


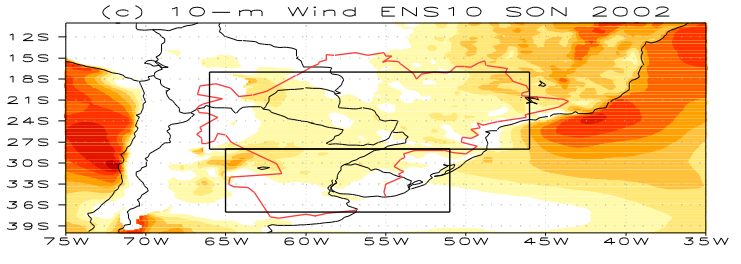


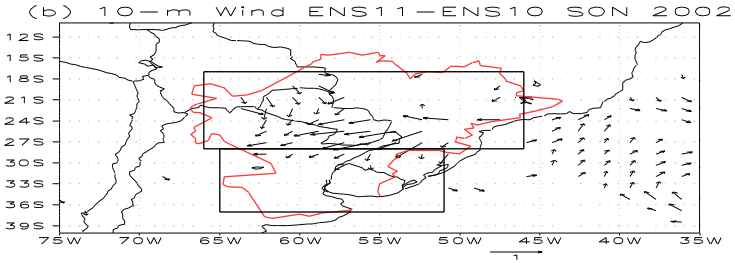


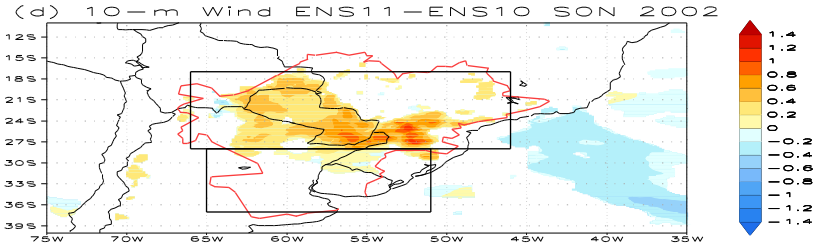
Como era de esperar, los vientos en niveles bajos son afectados por la reduccion de la rugosidad:

En la zona norte de la cuenca, los vientos se aceleran y sacan humedad de la region. En la zona sur, los vientos se "frenan" y se acumula humedad



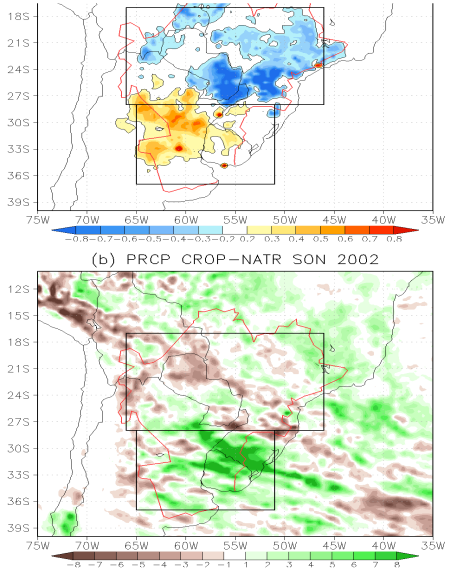




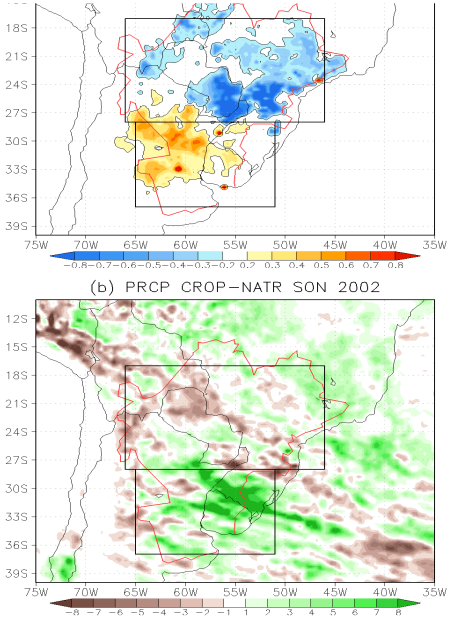


Model land cover and its modification

Two-meter temperature differences between CROP and NATR experiments



Precipitation differences between CROP and NATR experiments



Hemos presentado evidencia de que la agricultura puede cambiar al clima de una region.

Pero recuerden que estas son simulaciones idealizadas.

Agyuje

Gracias!