

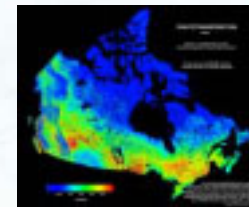
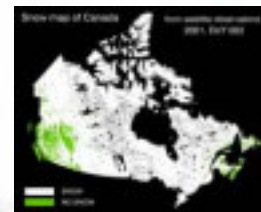
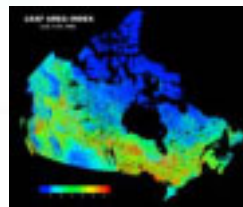
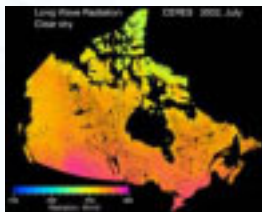


# Monitoring water and energy budgets for climate change impact assessment



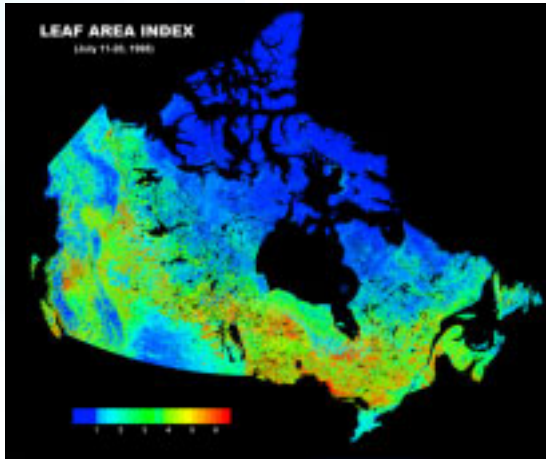
## Monitoring water and energy budgets

- Approximately half of the precipitation over Canada leaves the land surface as evapotranspiration.
- Forests are responsible for a dominant share of evapotranspiration over Canada and significantly reduce winter time albedos so as to modify the rate and timing of snow melt.
- Increasing temperature and  $\text{CO}_2$  concentrations will impact both carbon and water cycles over Canada's forests and the watersheds containing them.
- This presentation describes how satellite observation of surface radiation budget and forest structure are being applied to consistently quantify these impacts over Canada.

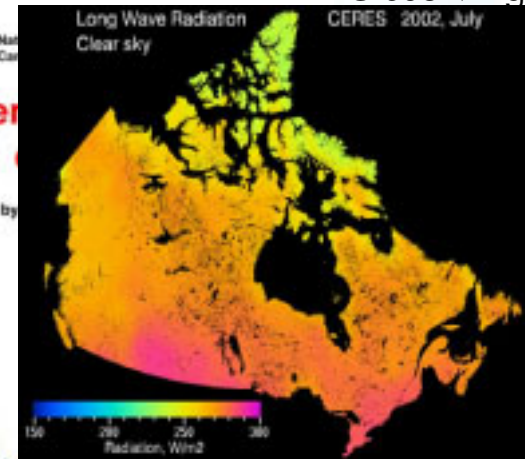


## Water and energy budgets from satellite observations

Mapping



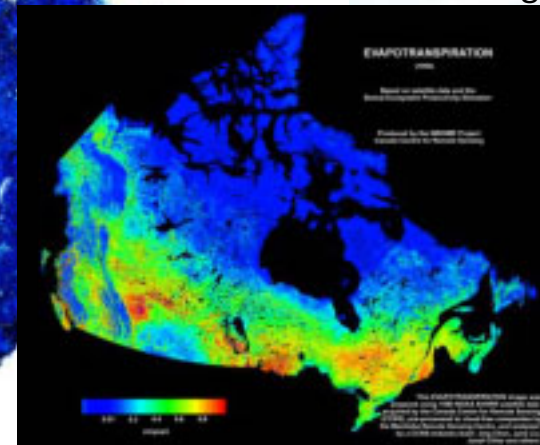
Observing



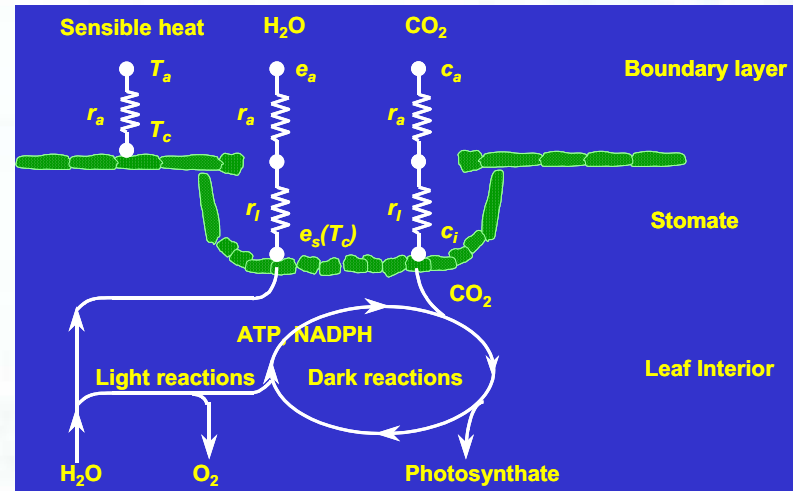
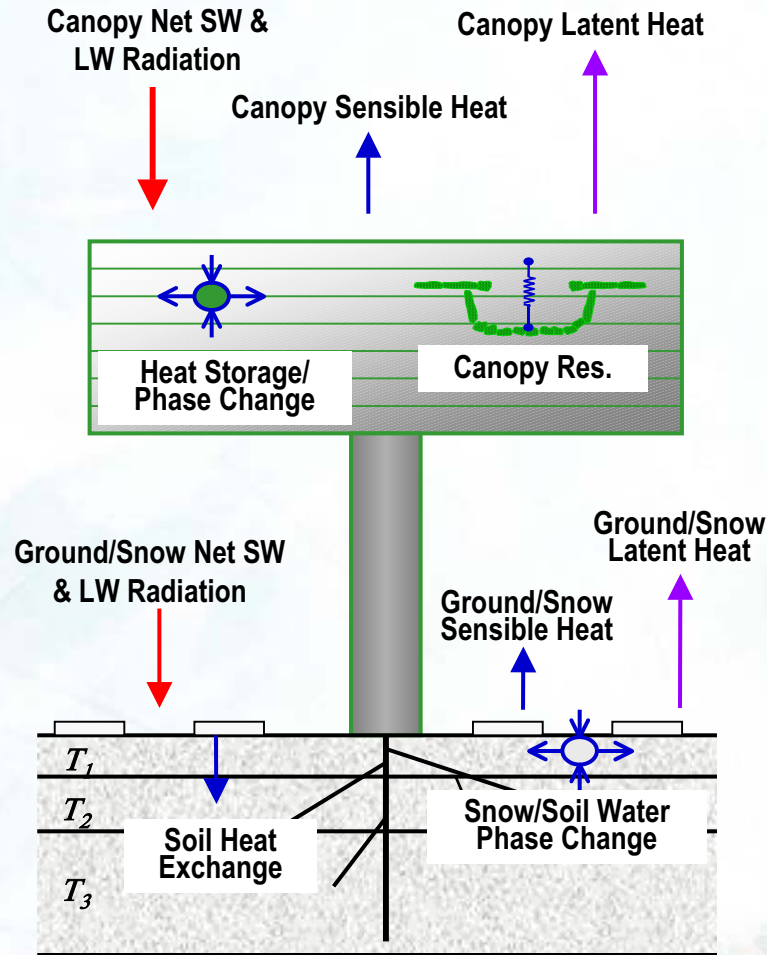
Monitoring



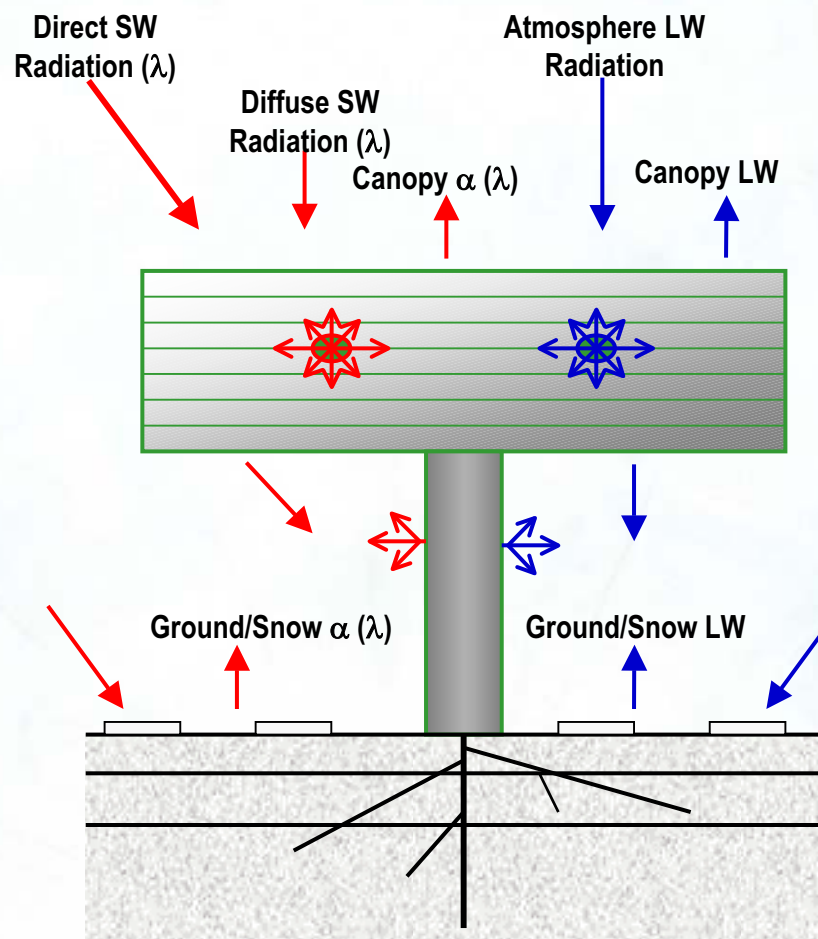
Modelling



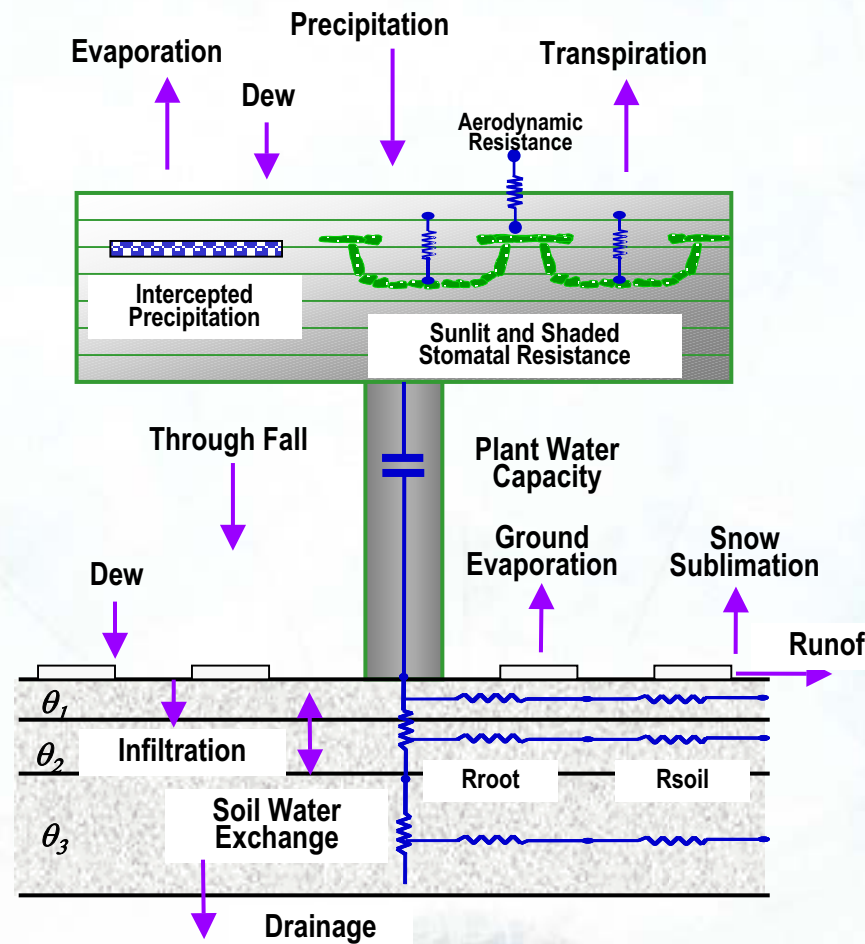
## Ecosystem Energy Balance



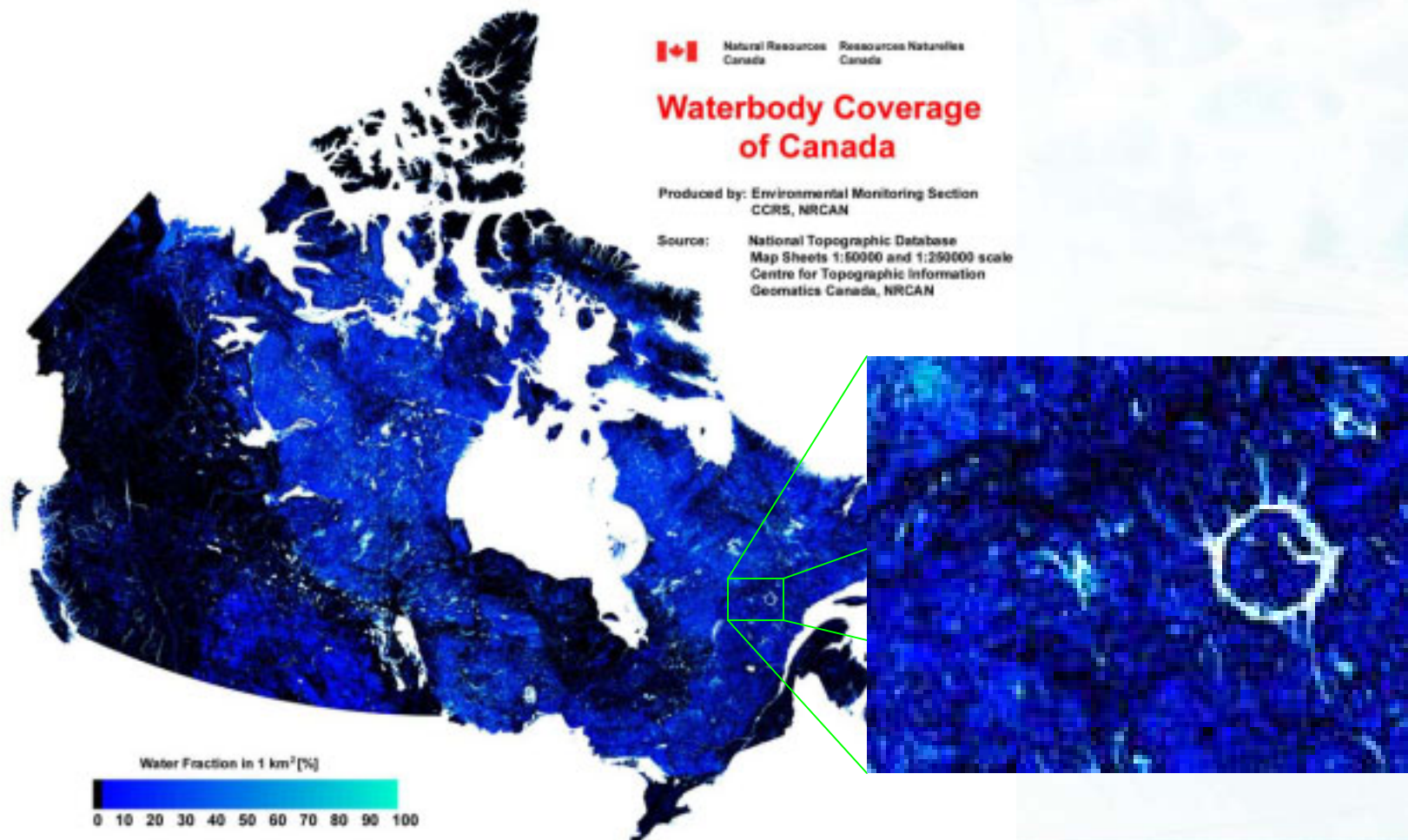
# Ecosystem Radiation Balance



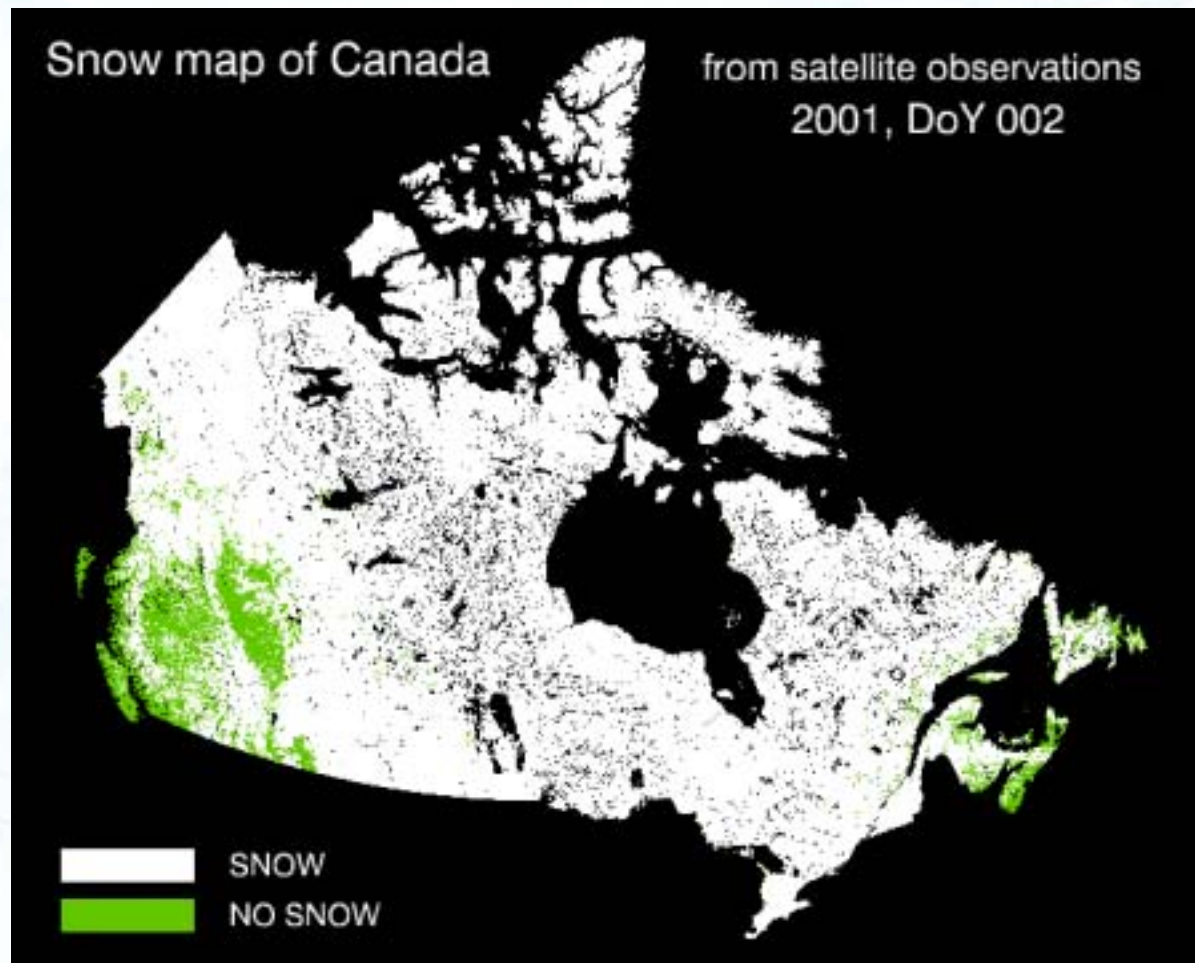
# Ecosystem Water Balance



## Water Body Coverage @1km

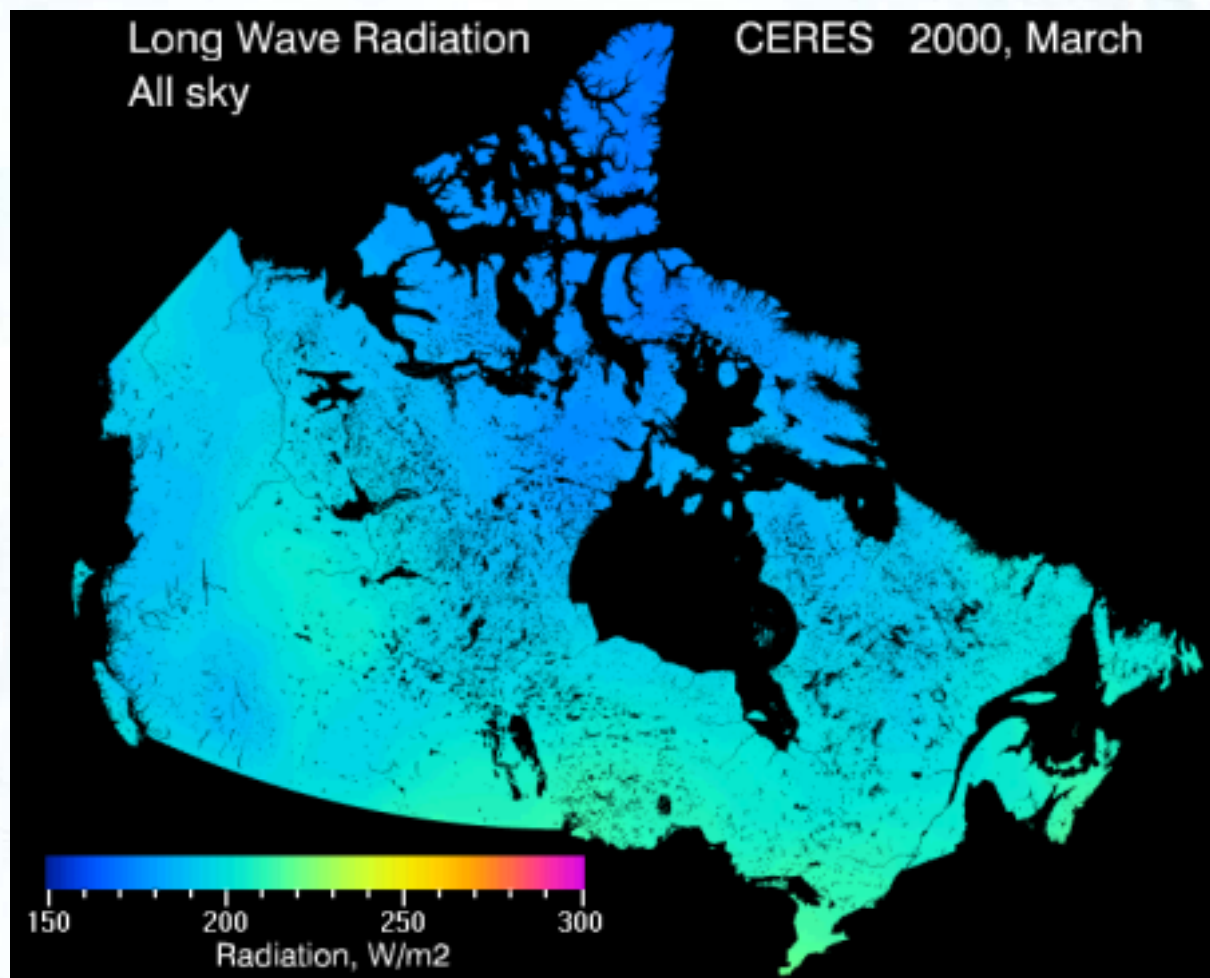


# Snow cover

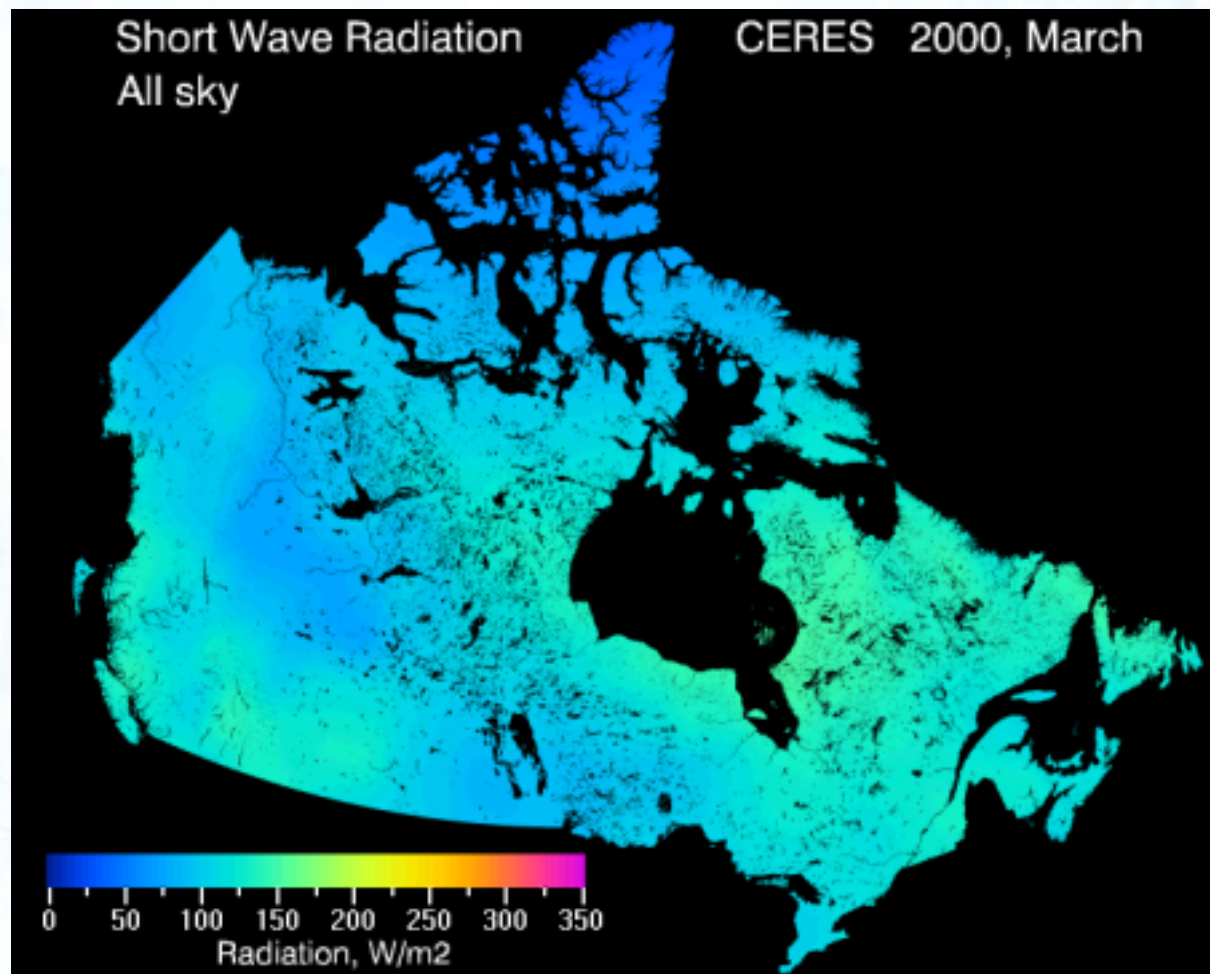




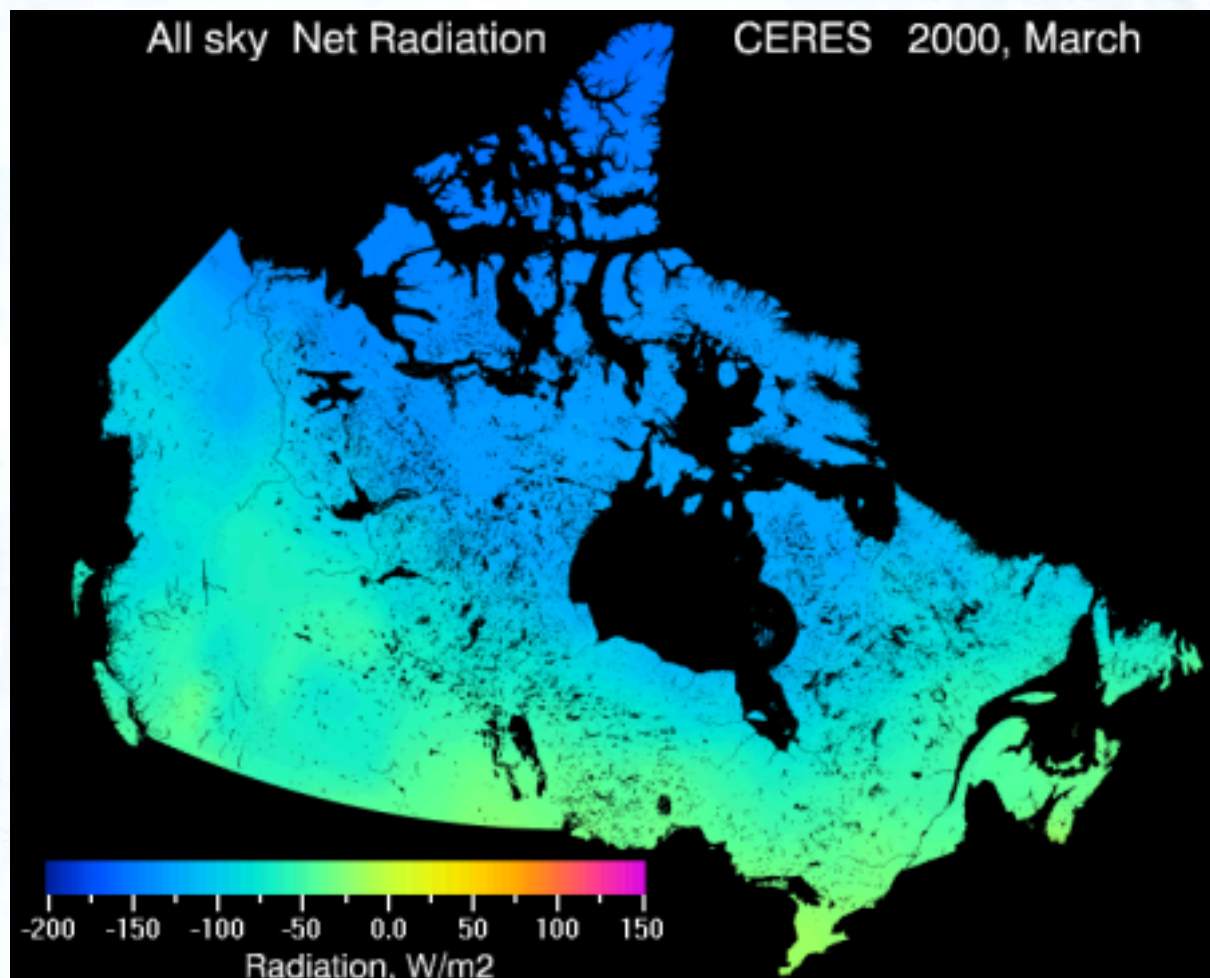
# Earth radiation budget from satellites



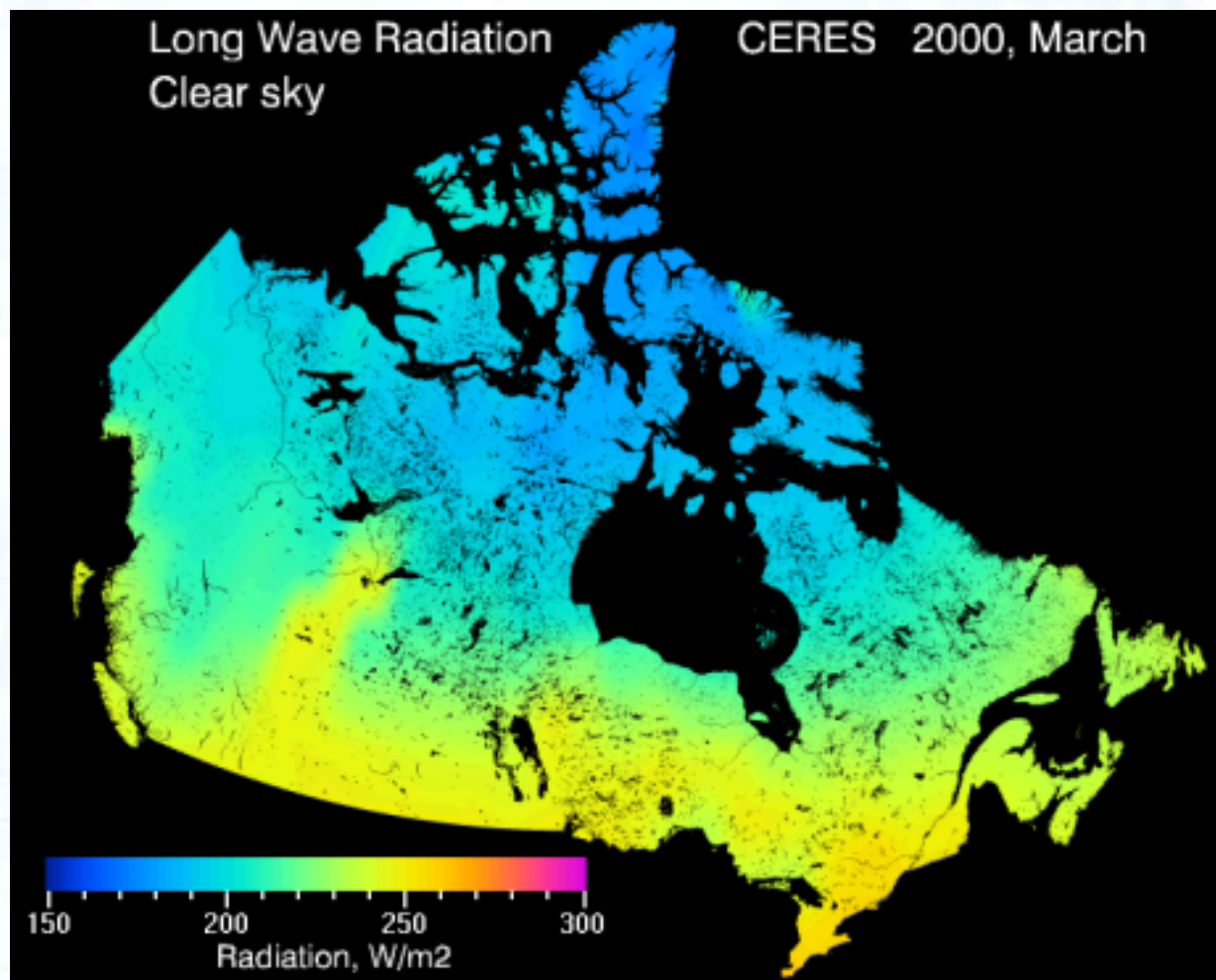
## Earth radiation budget from satellites



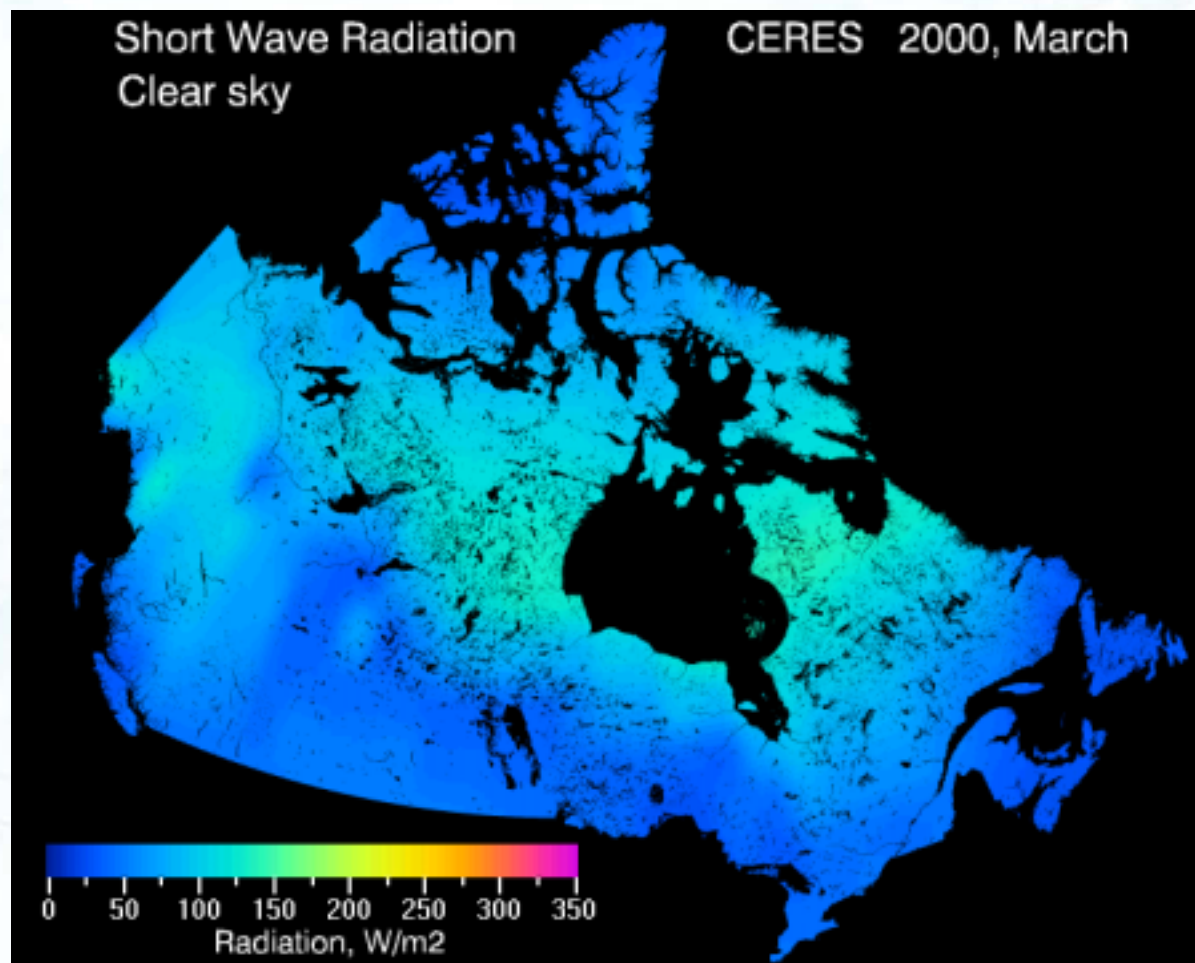
# Earth radiation budget from satellites



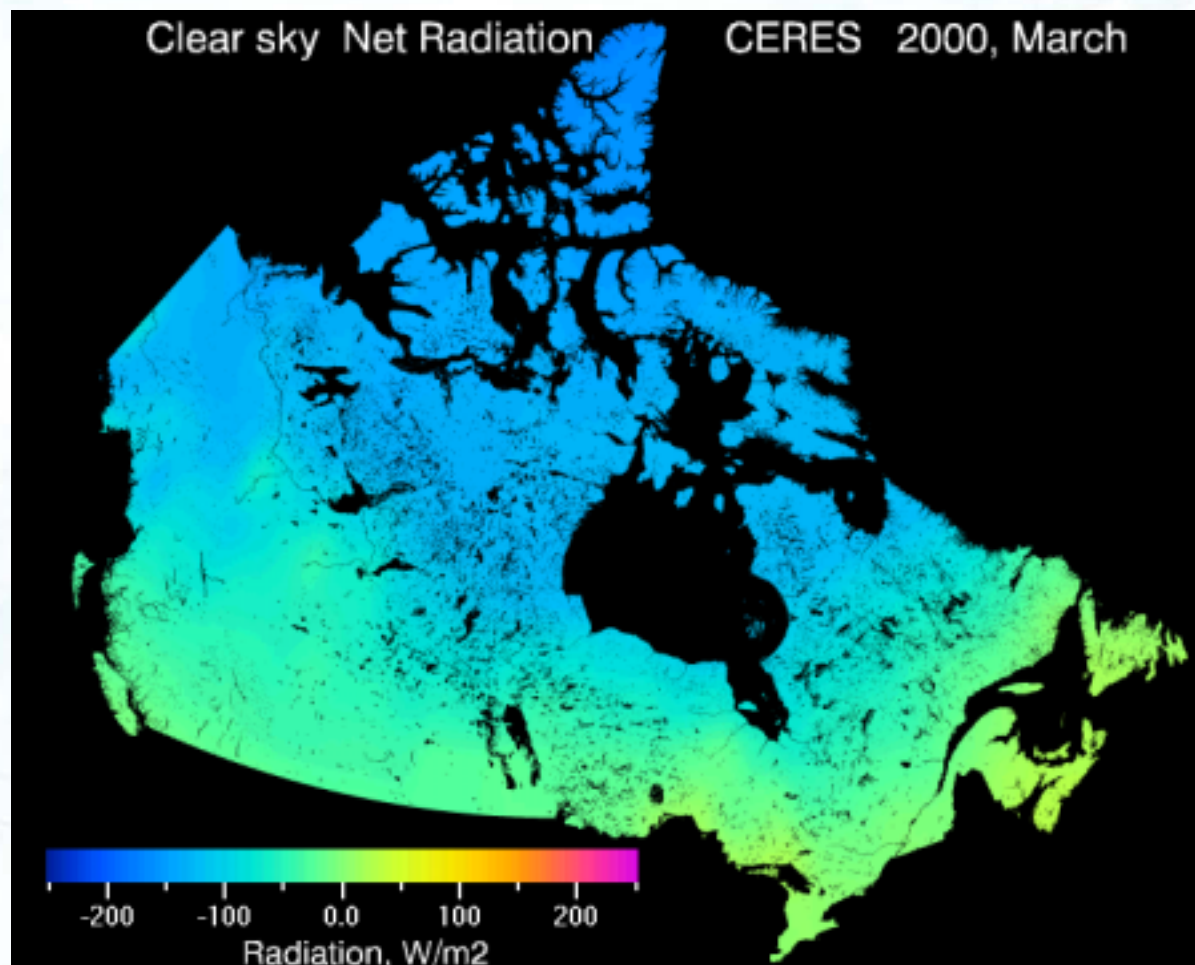
## Earth radiation budget from satellites



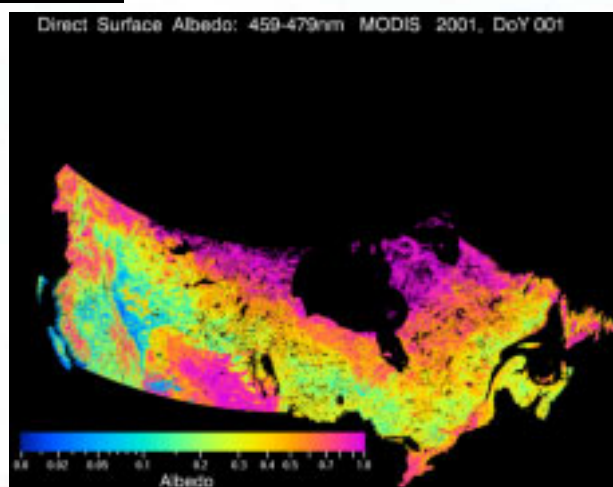
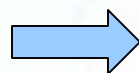
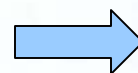
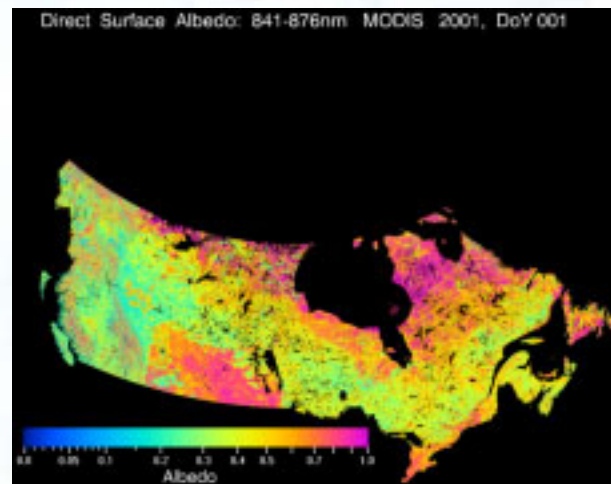
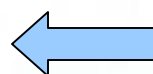
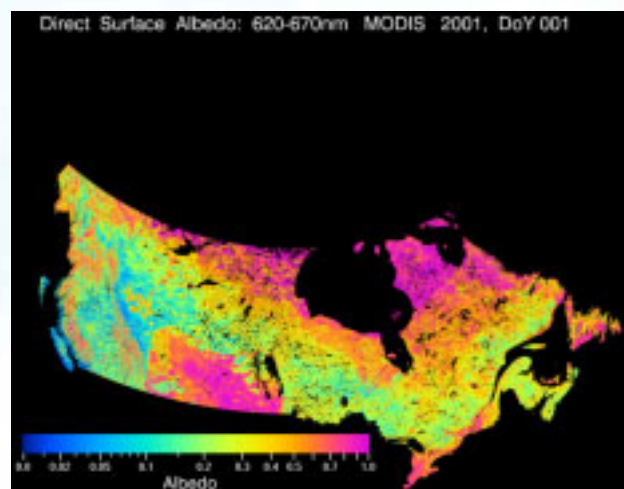
## Earth radiation budget from satellites



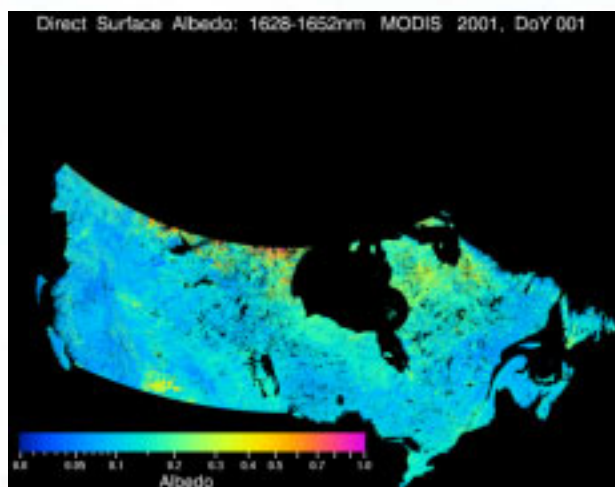
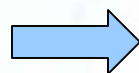
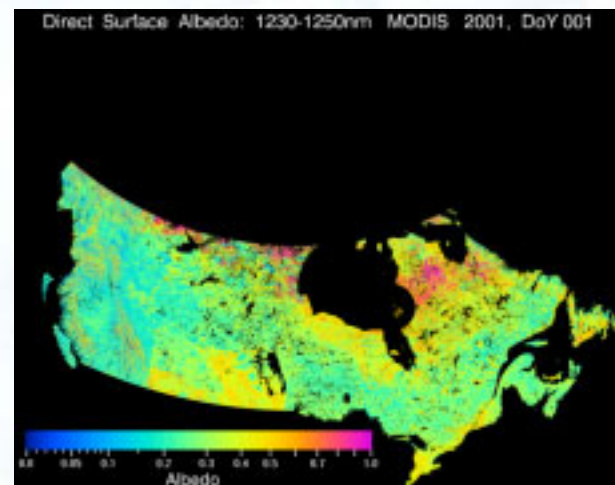
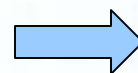
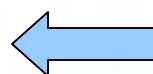
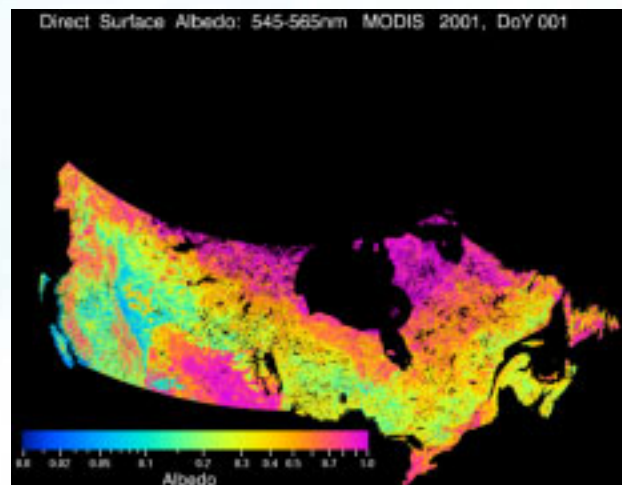
# Earth radiation budget from satellites



## Surface albedo observed from space

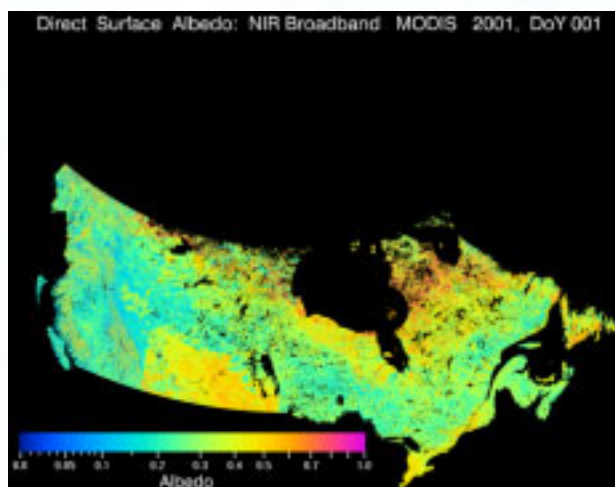
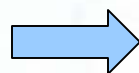
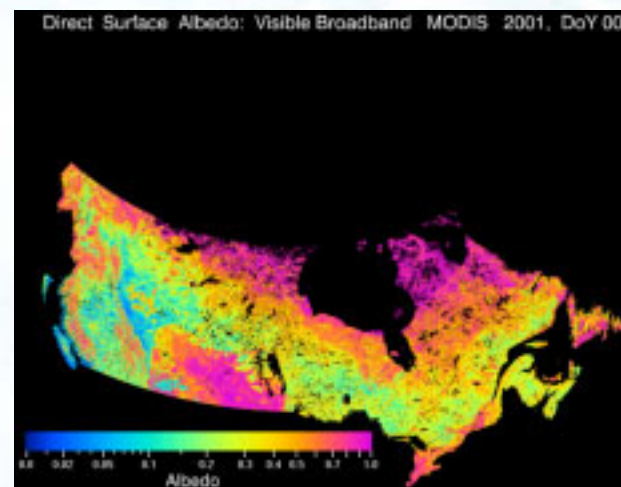
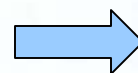
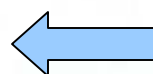
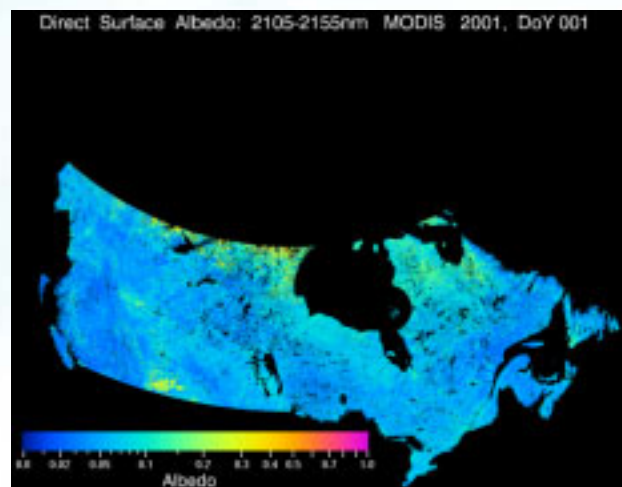


## Surface albedo observed from space



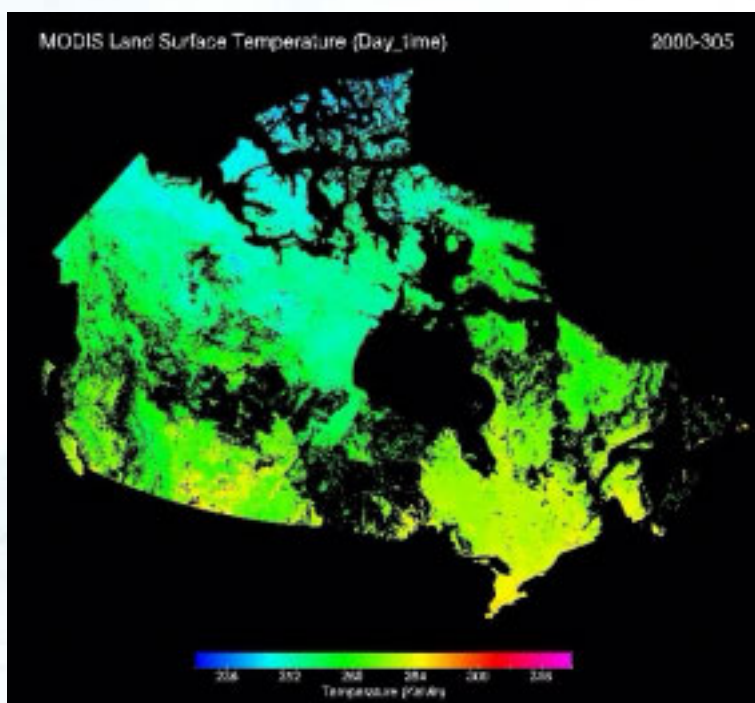


## Surface albedo observed from space

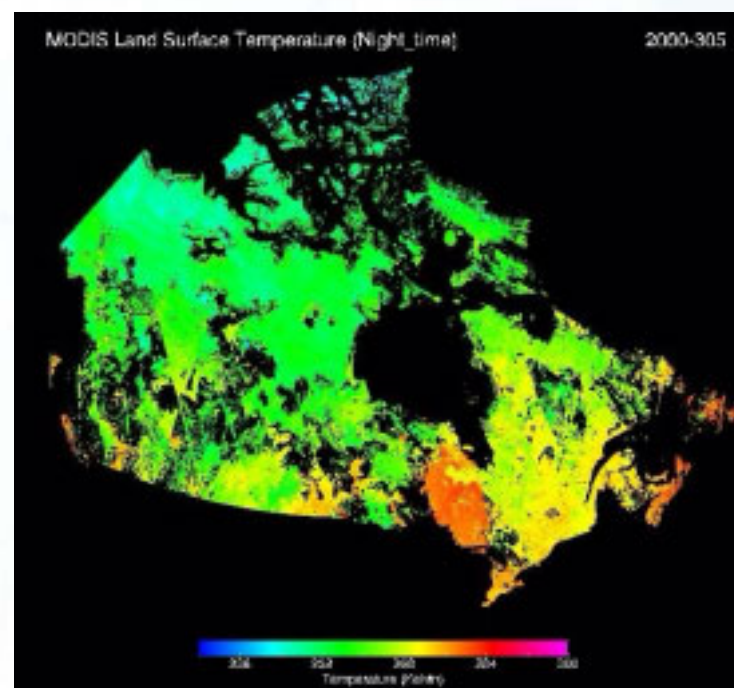


# Land surface temperature from space

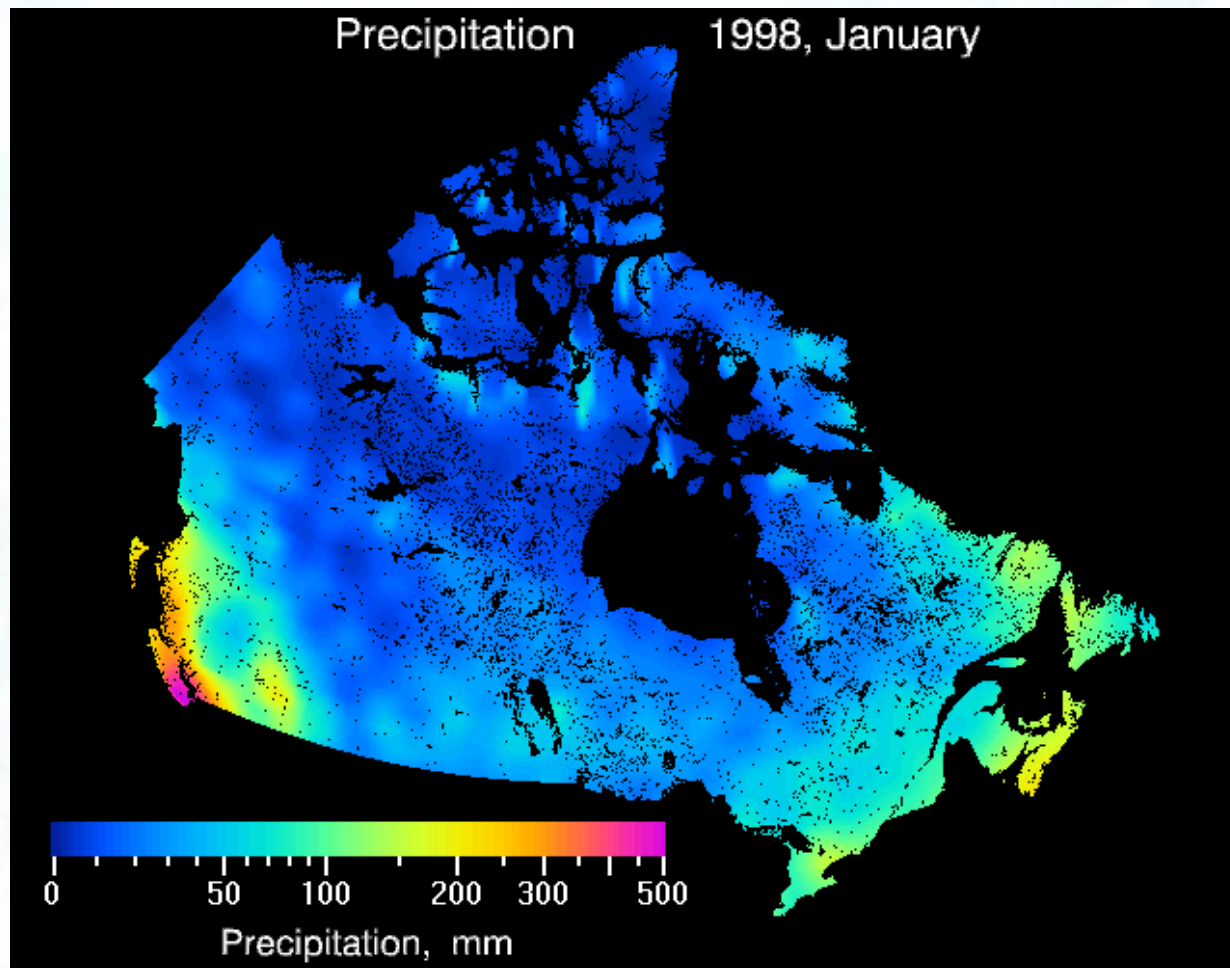
Day time



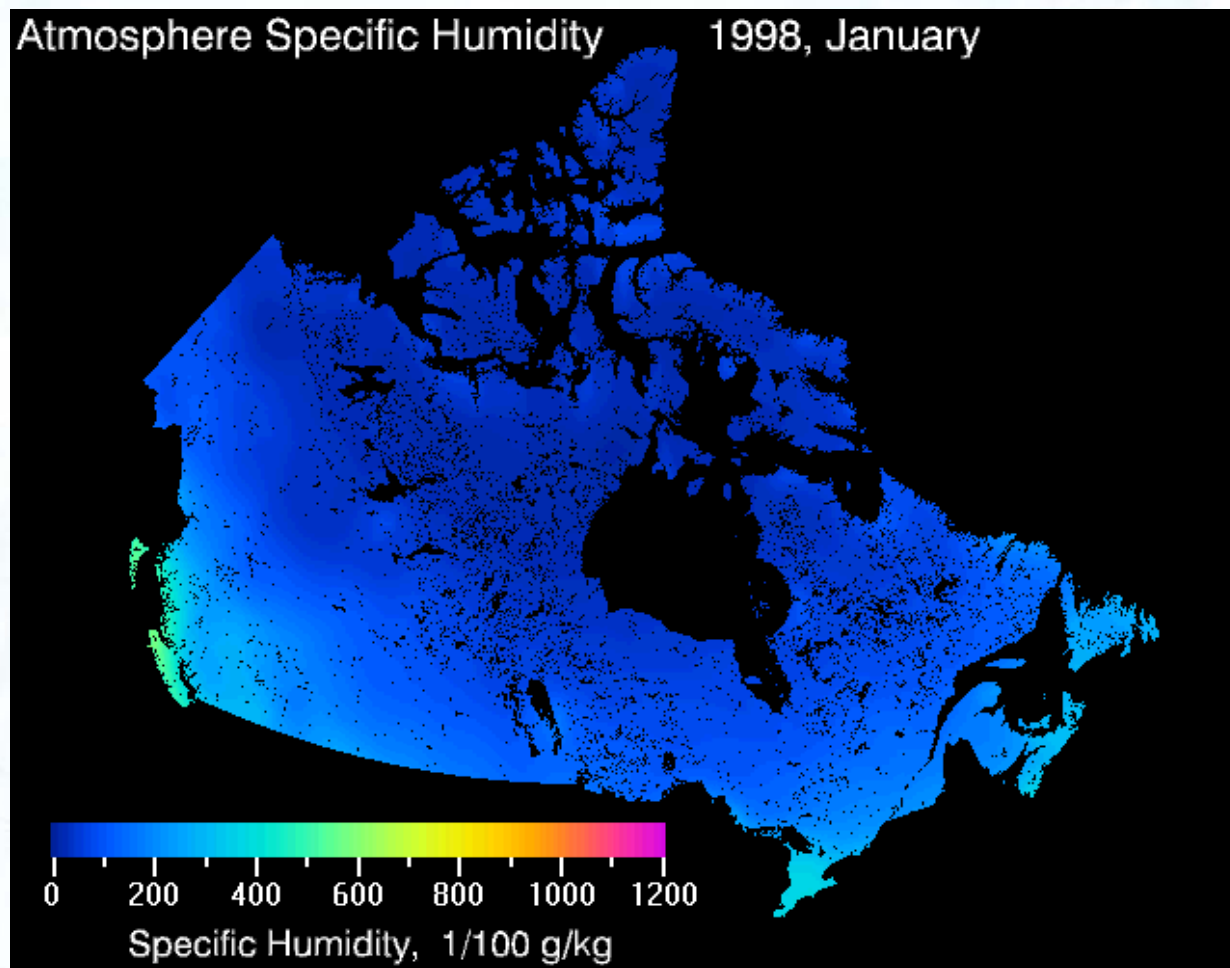
Night time



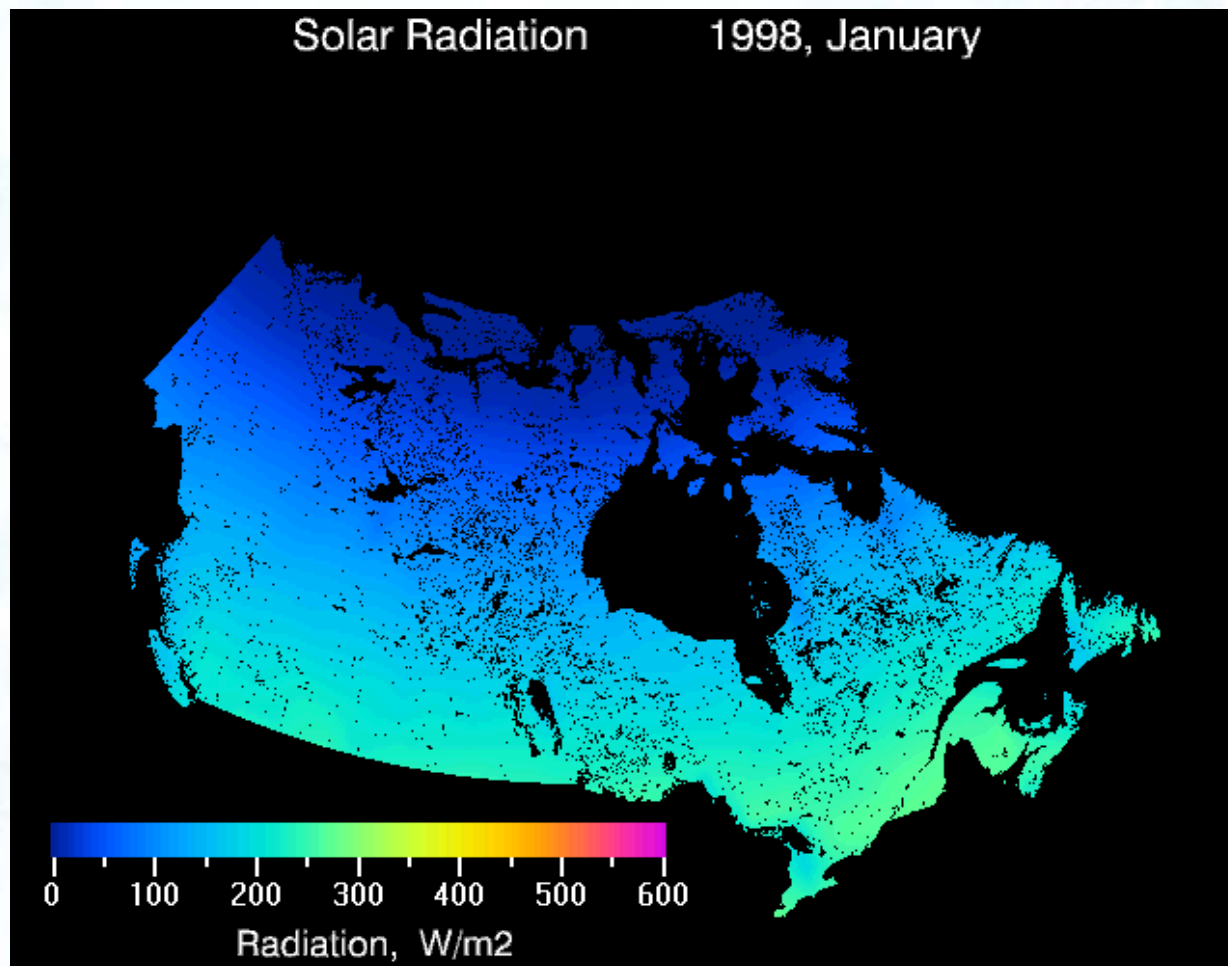
## Surface meteorology input fields



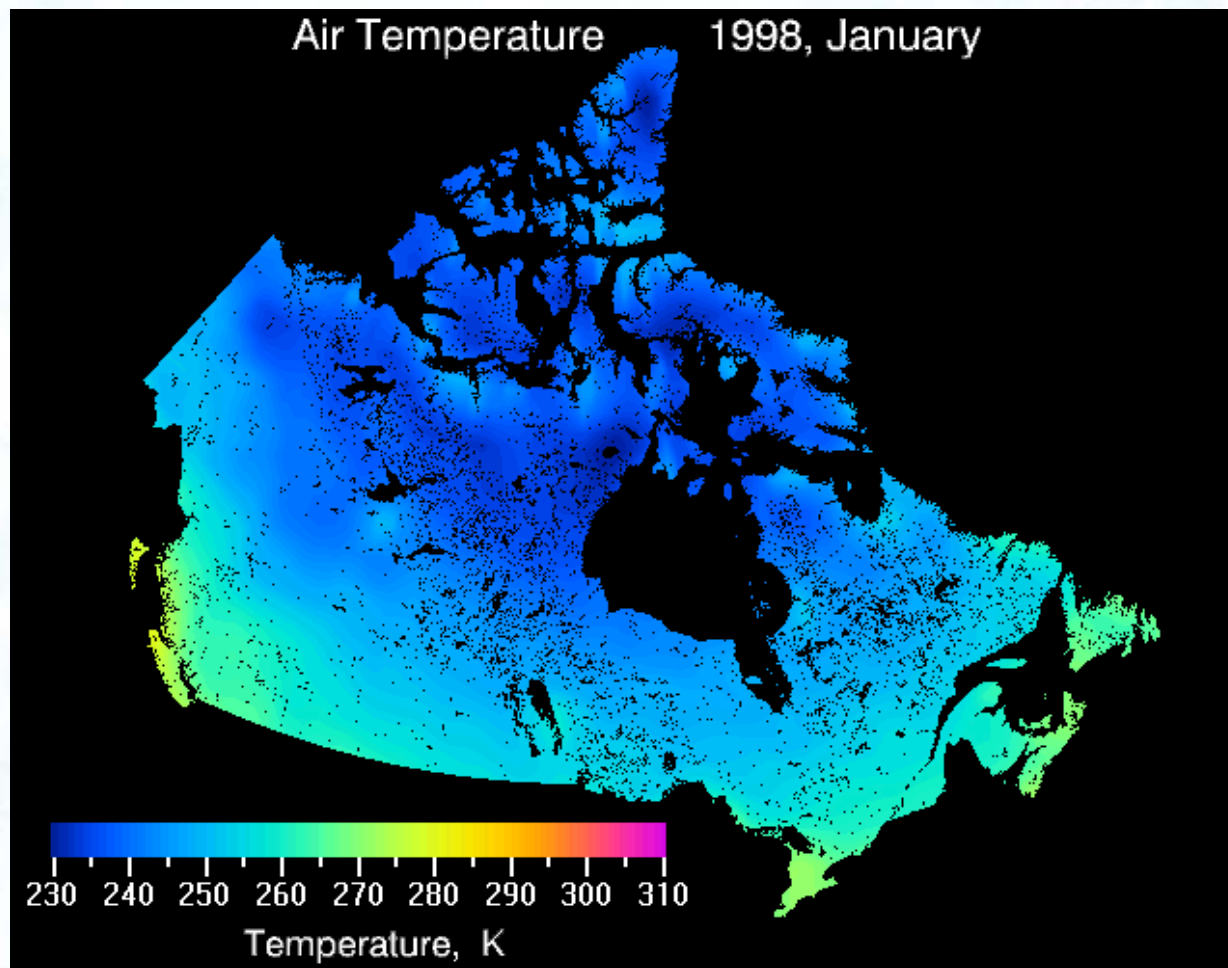
## Surface meteorology input fields



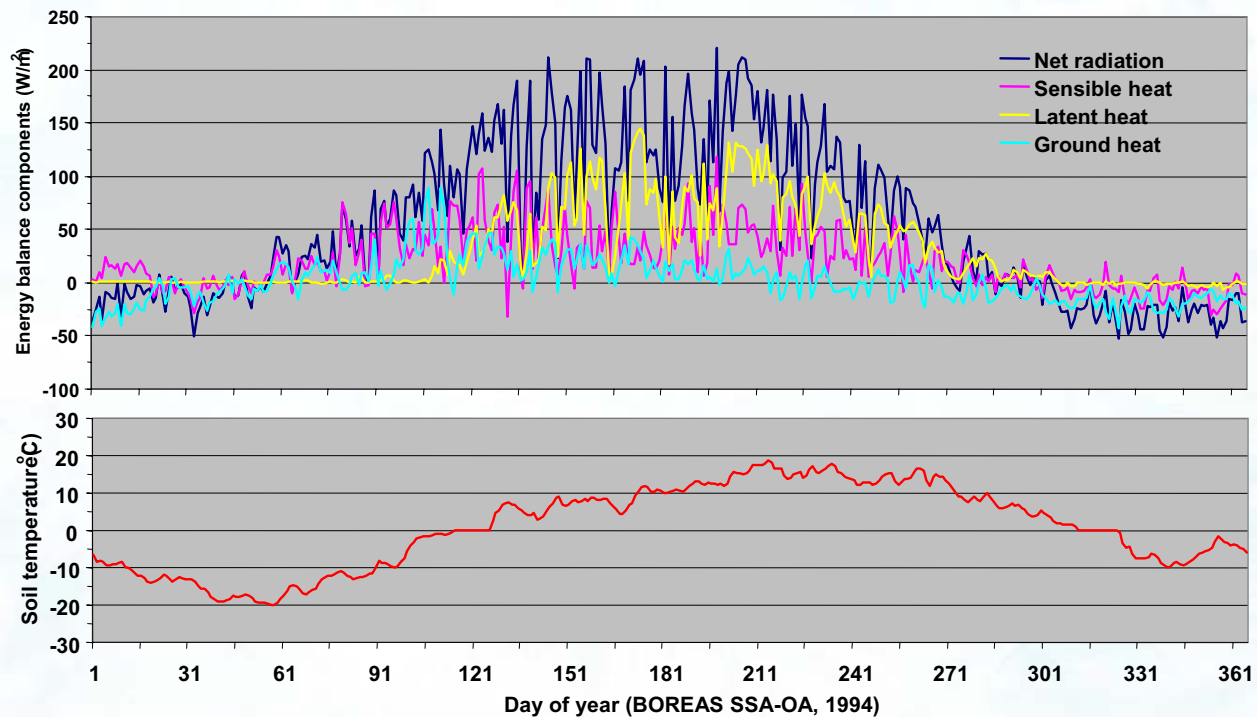
## Surface meteorology input fields



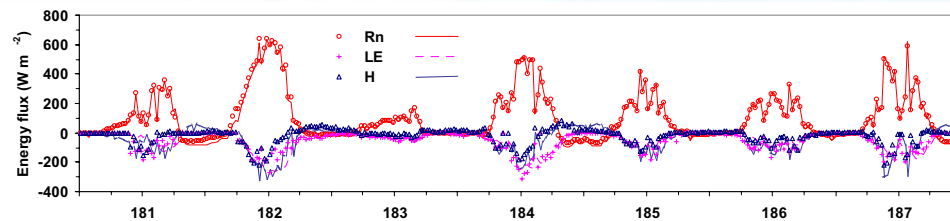
## Surface meteorology input fields



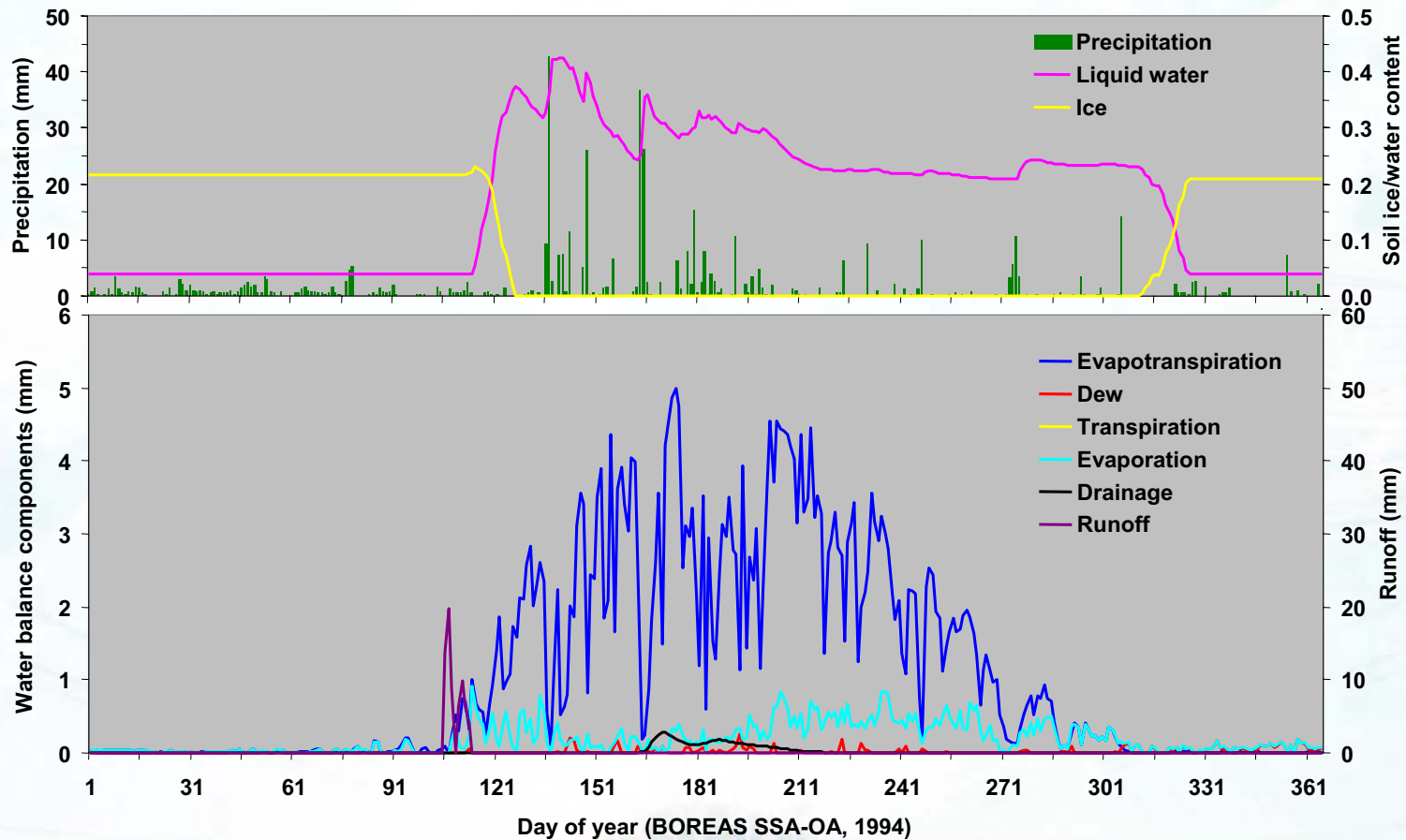
## Sample Results – energy balance



Test with flux tower measurements

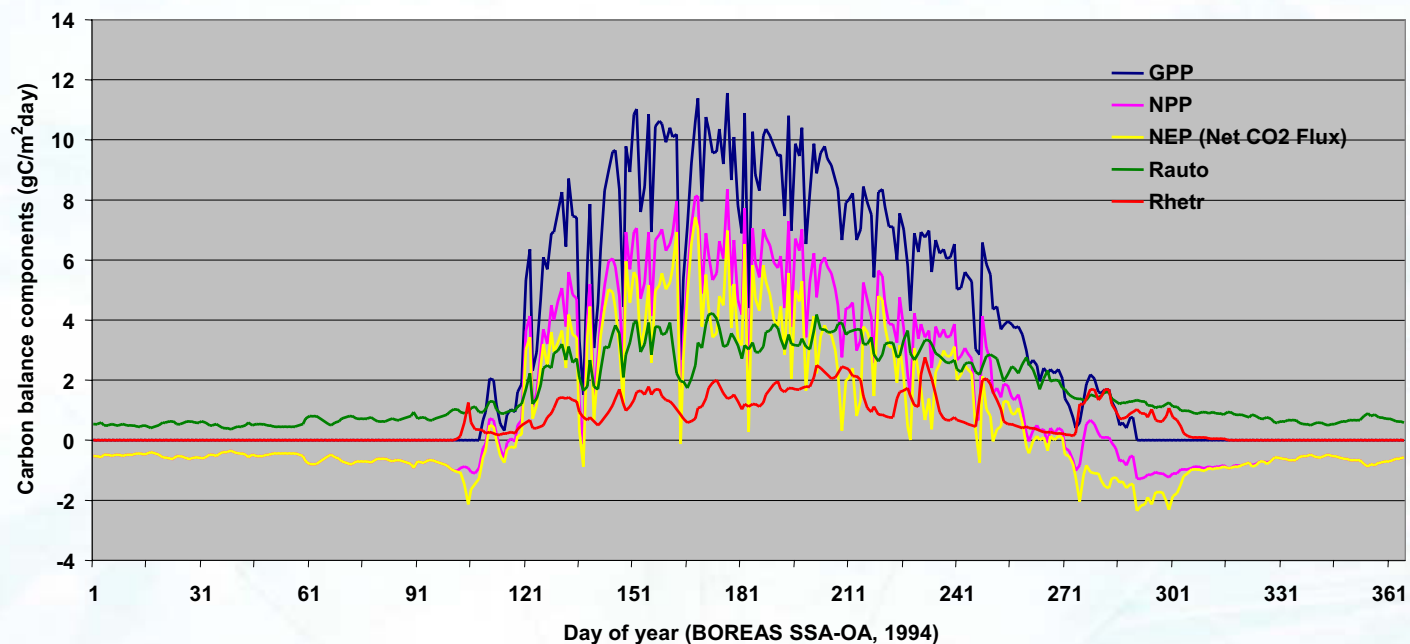


## Sample Results – water balance

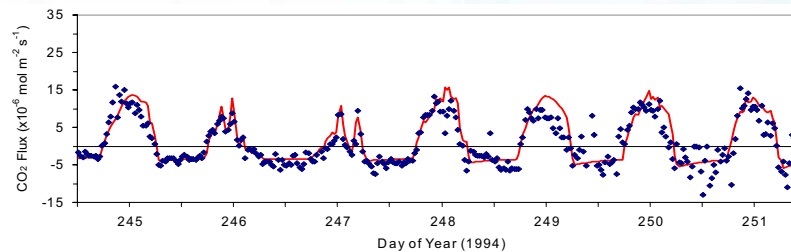




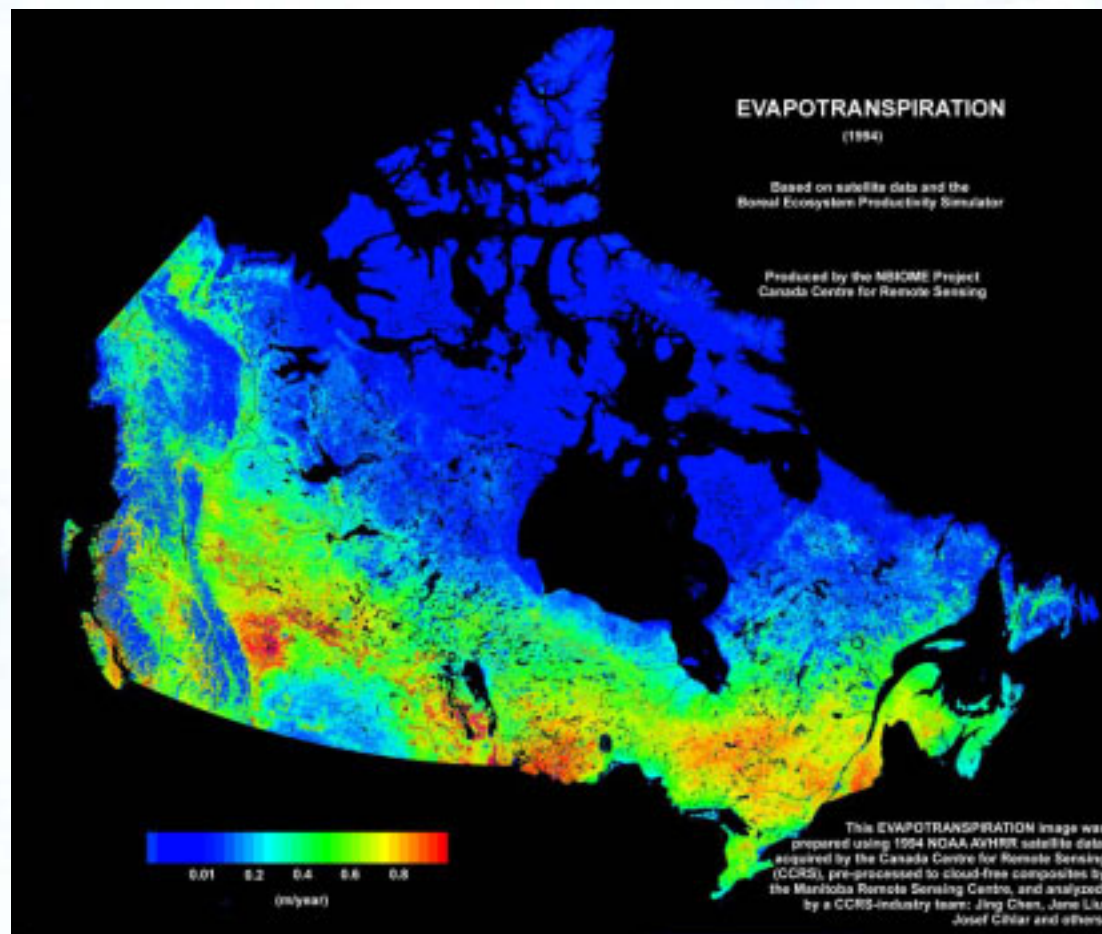
## Sample Results – carbon balance



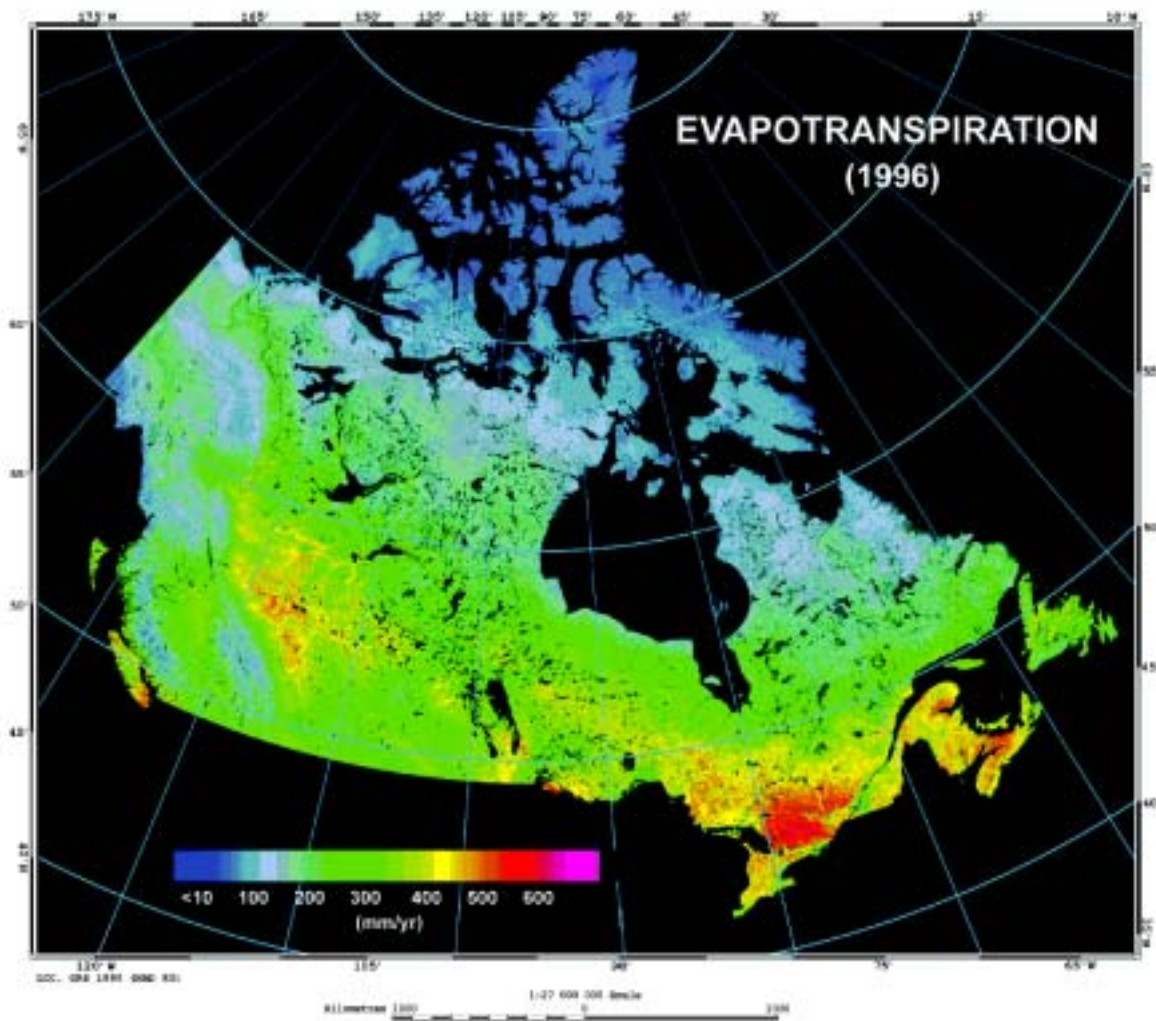
Test with flux tower measurements



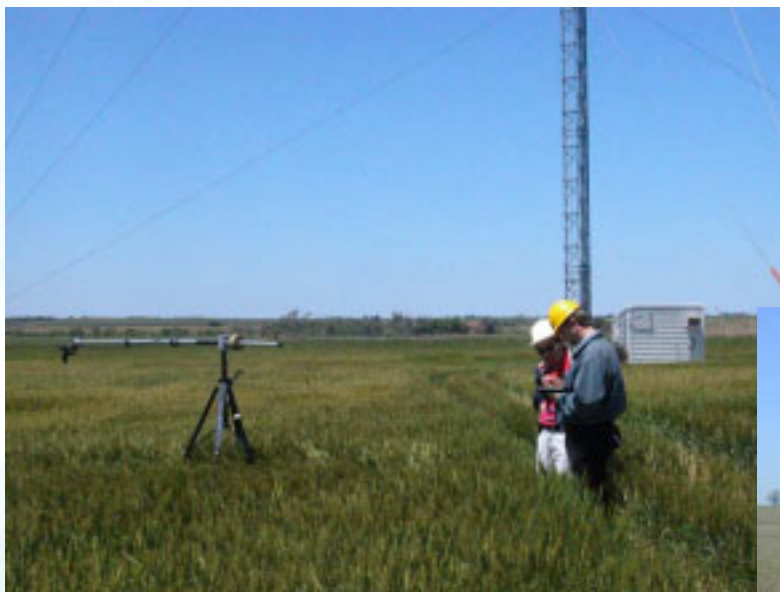
## Canada Wide Actual ET



# Monitoring water and energy budgets



## In-situ field measurements



Validation of  
Satellite products



# Monitoring water and energy budgets



Agence spatiale  
canadienne

Canadian Space  
Agency



Gouvernement  
du Canada

Government  
of Canada

Canada