

TOOLS FOR
PREDICTING
WEATHER AND
CLIMATE CHANGE

Weather and Climate

South Asia and sub-Saharan Africa are large land masses affected by seasonal and cyclical weather

- **Monsoon season**
- **Drought**
- **Severe weather events**



Weather and Climate

Farmers make decisions based on their own best guess as to when the rains will come

- Type of crop to grow
- Fertilizer applications
- Timing: planting, harvest



Weather and Climate

- The committee learned that tools for predicting weather are lacking in SSA and SA and need to be built around local information.
 - **Models and algorithms (formulas) are needed to associate global and regional scale satellite measurements with local weather events**
 - **Requires collecting data (rainfall, temperature, land effects, wind, etc.) at the local level**

Several satellite-based tools have become available in the last decade:

- TRMM—satellite-based precipitation radar for rain measurements of tropical weather systems
- AMSR-E—detects radiation related to cloud water, sea surface winds, soil moisture, etc. to better understand cycling of water from oceans to atmosphere to precipitation on land
- MODIS—imaging spectrometers that generate global maps of land surface characteristics, including 11 different categories of vegetation
- GRACE—detects tiny changes in gravity fields related to the movement of water (e.g., melting of ice)

Model Development

Satellite data alone is not enough.

Global and regional data needs to be incorporated into models that measure the effects of land surface, temperature, pollution, vegetation, etc. on climatic and atmospheric chemistry.

NOAH-Land Surface Model is one example developed for temperate zones.

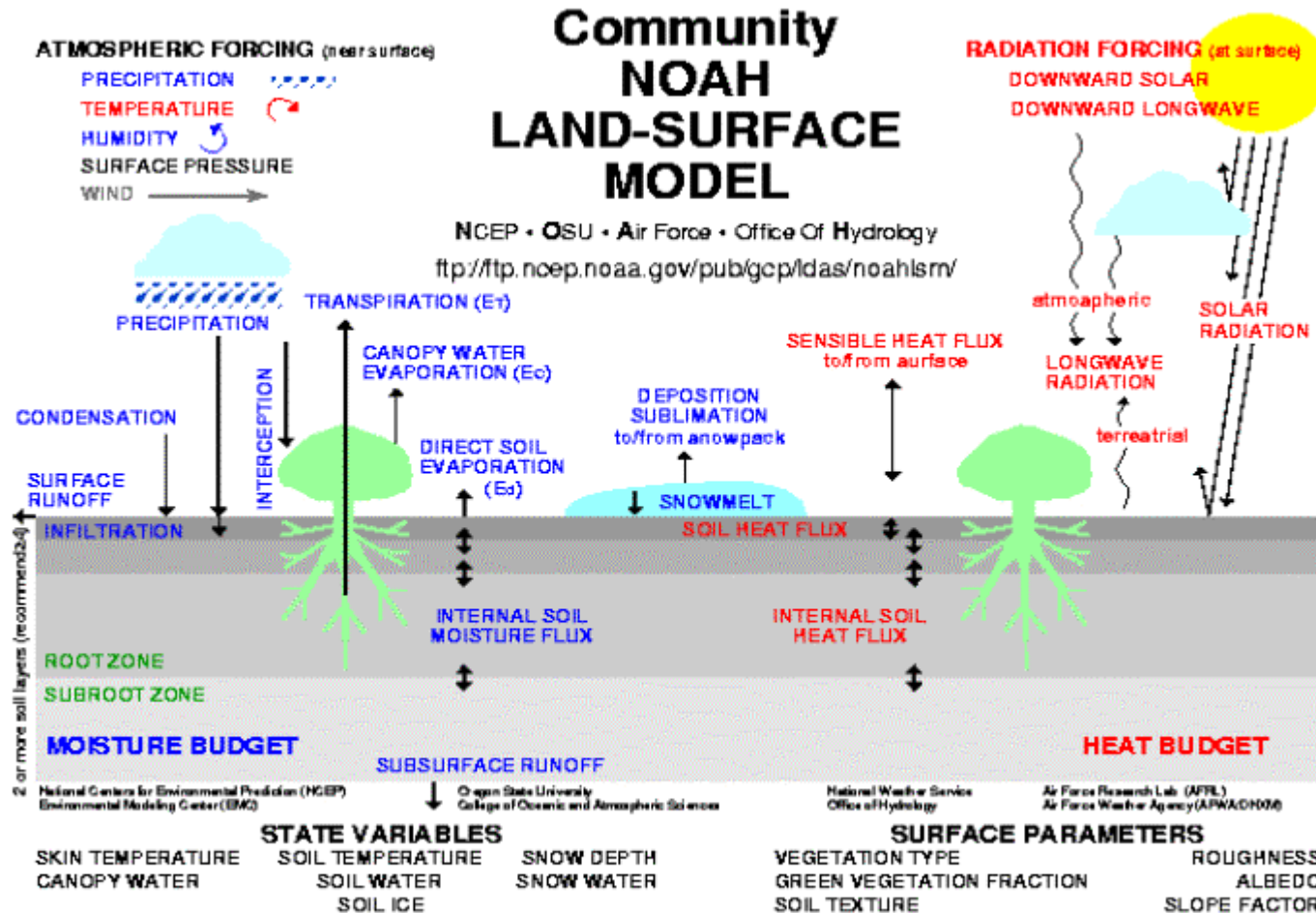


Figure 1. Schematic of the NCEP community NOAH land-surface model of multi-layer soil, vegetation, and snowpack.

Models need data

- **Infrastructure (ground radars, other ground based monitoring sites). There are fewer rain gauge stations in the Sahel now than there were in 1921.**
- **There is a need to train a cadre of experts in sub-Saharan Africa and South Asia as model developers and data collectors.**



Weather prediction is important.

- Improves agricultural decision-making to increase yields; decreases risk of crop failure
- Saves lives from adverse weather events, such as floods
- Long-term climate change planning
- For “us” – Better understanding of weather systems in Africa that become hurricanes affecting U.S.