

Motivation

Advances in:

- Remote sensing technologies
- Land surface modeling and reanalysis
- Data merging techniques

Availability of large range of observed and modelled datasets!

However:

- High (unknown) uncertainties
- Low temporal or spatial resolution
- Low sampling frequency
- Short period of record

How to select the most appropriate dataset?

Project goals, dominant hydrological and climatological processes in the region of interest, required accuracy, required frequency, available computational and personal resources, and much more!

Spatial resolution

Temporal resolution

Spatial coverage

Period of record

Accuracy

Modelled

Observed

Cost

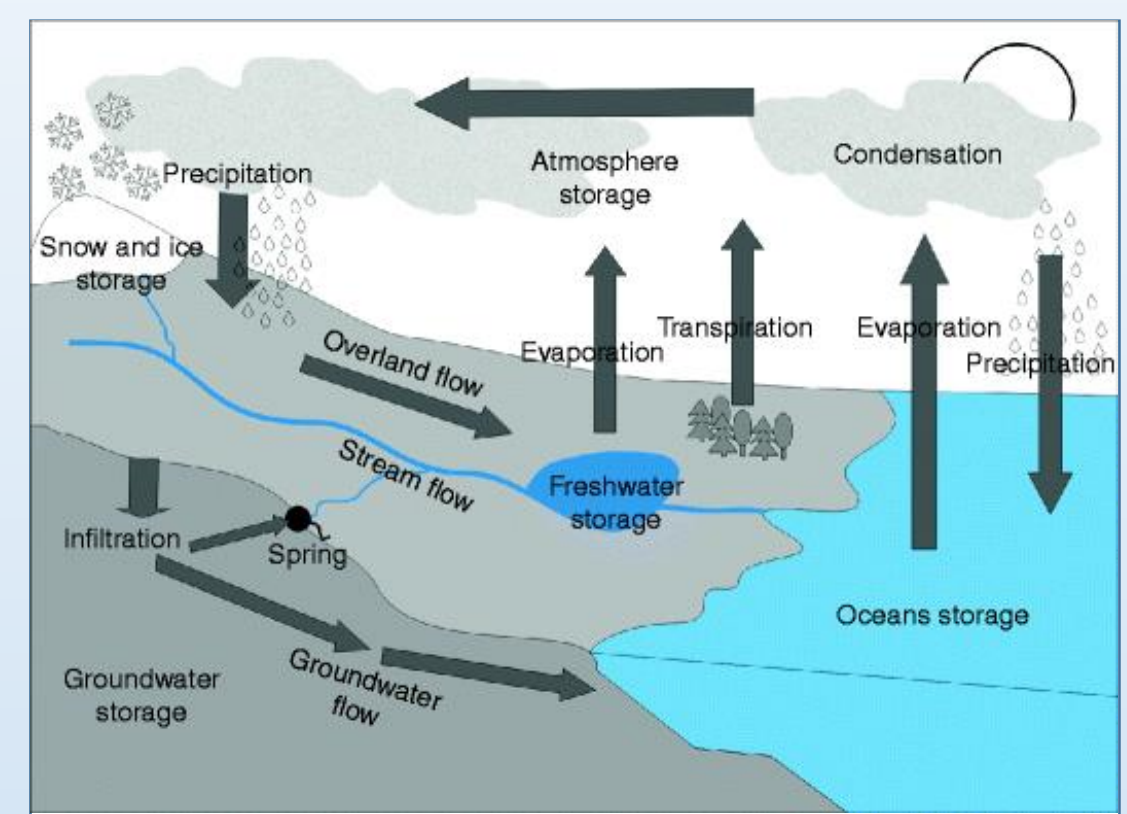
Sampling frequency

Continuity

Resources (computational, staff)



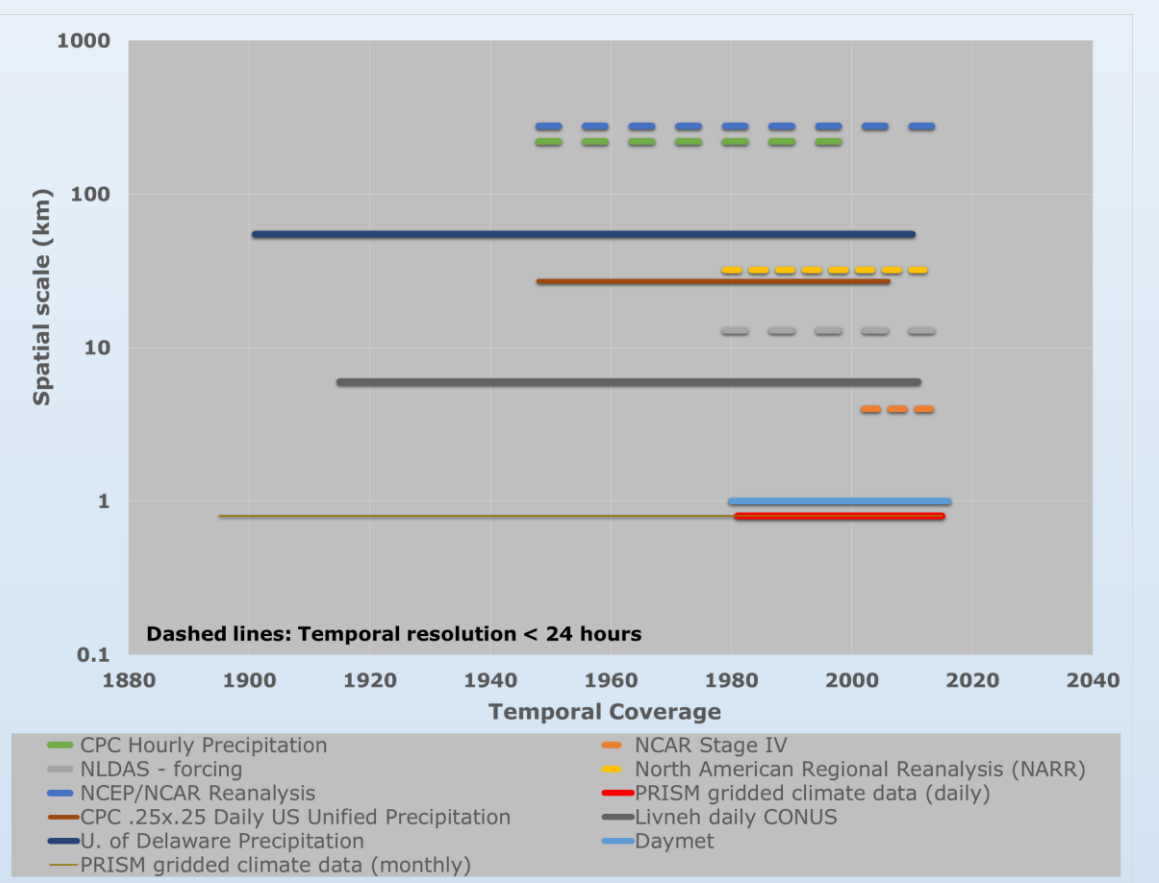
Datasets: terrestrial water balance



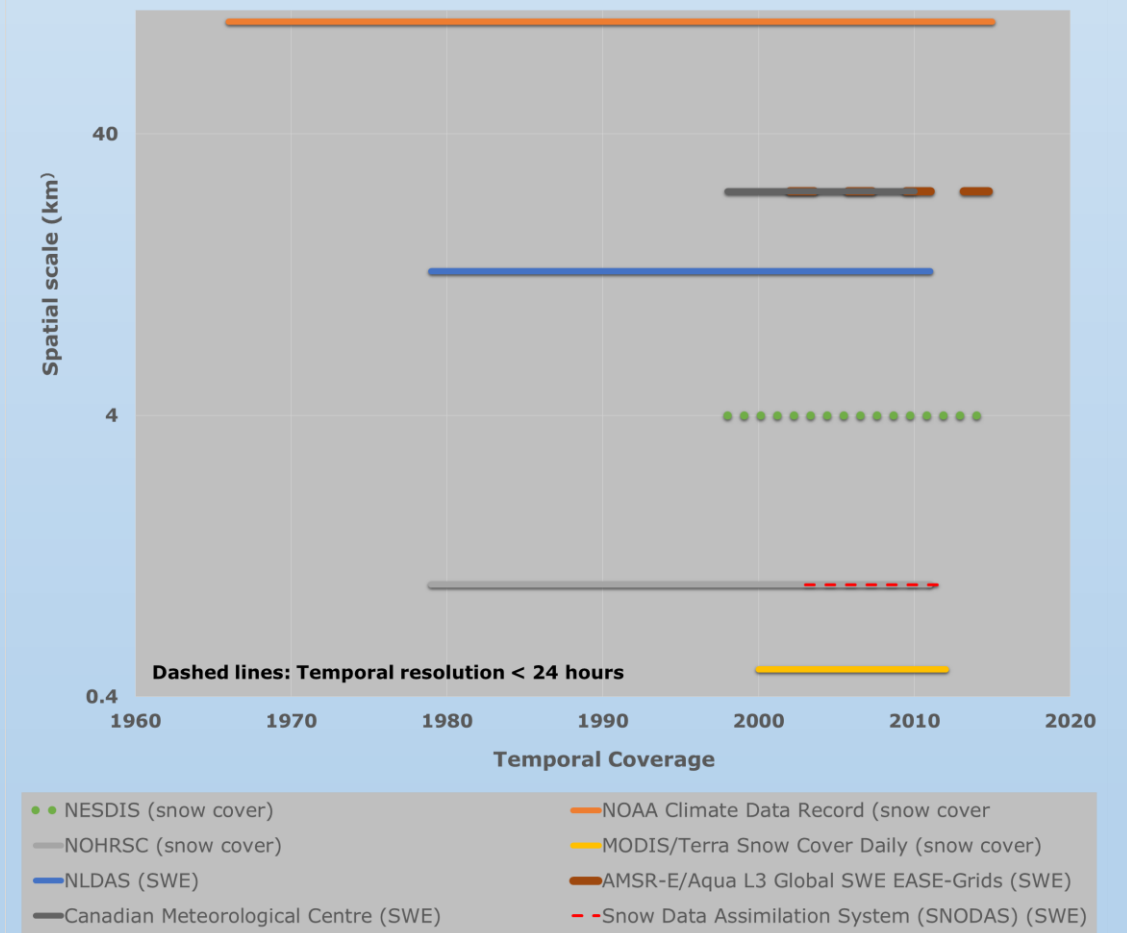
$$\Delta = P - E - Q \quad E = f(T)$$

Gauge - Satellite - Radar - Models

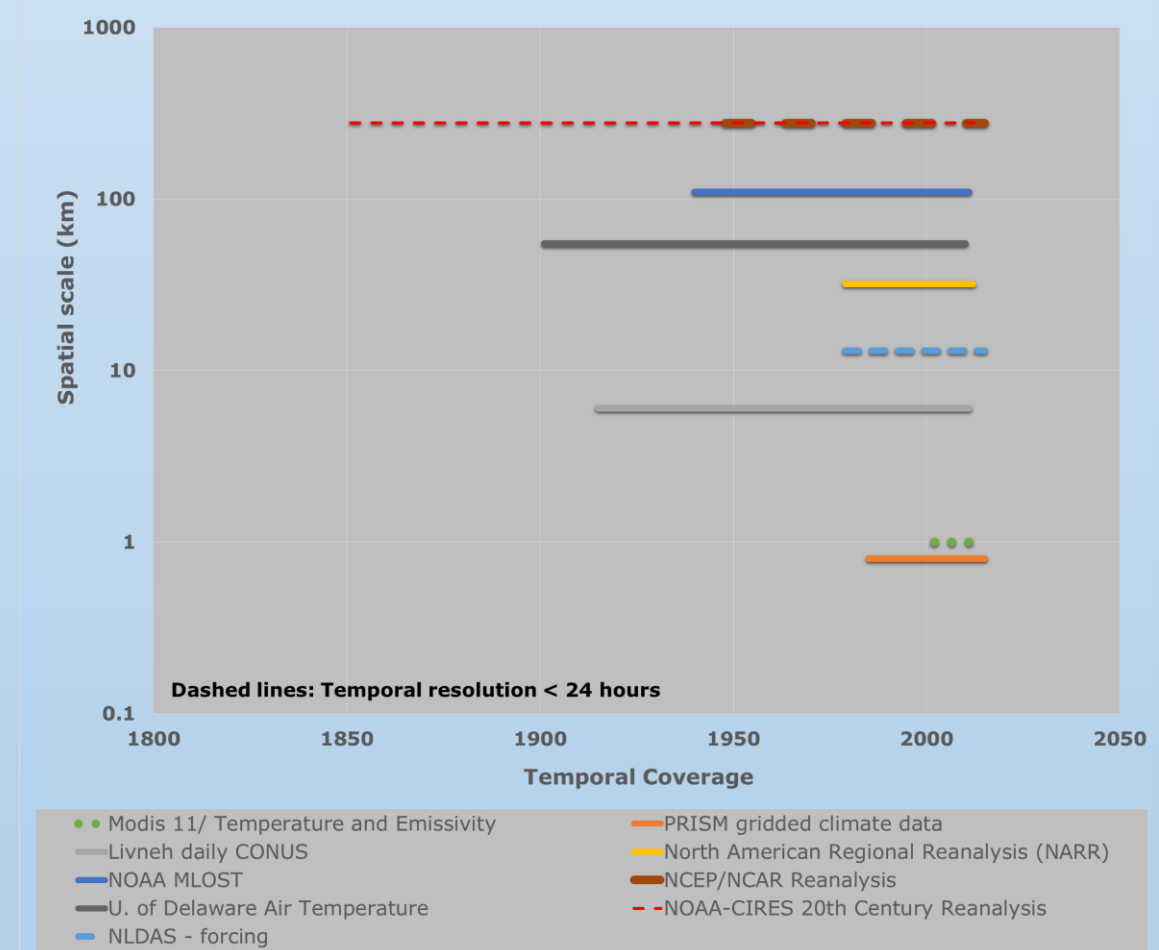
Precipitation



Snow cover and snow water equivalent



Temperature



Evapotranspiration

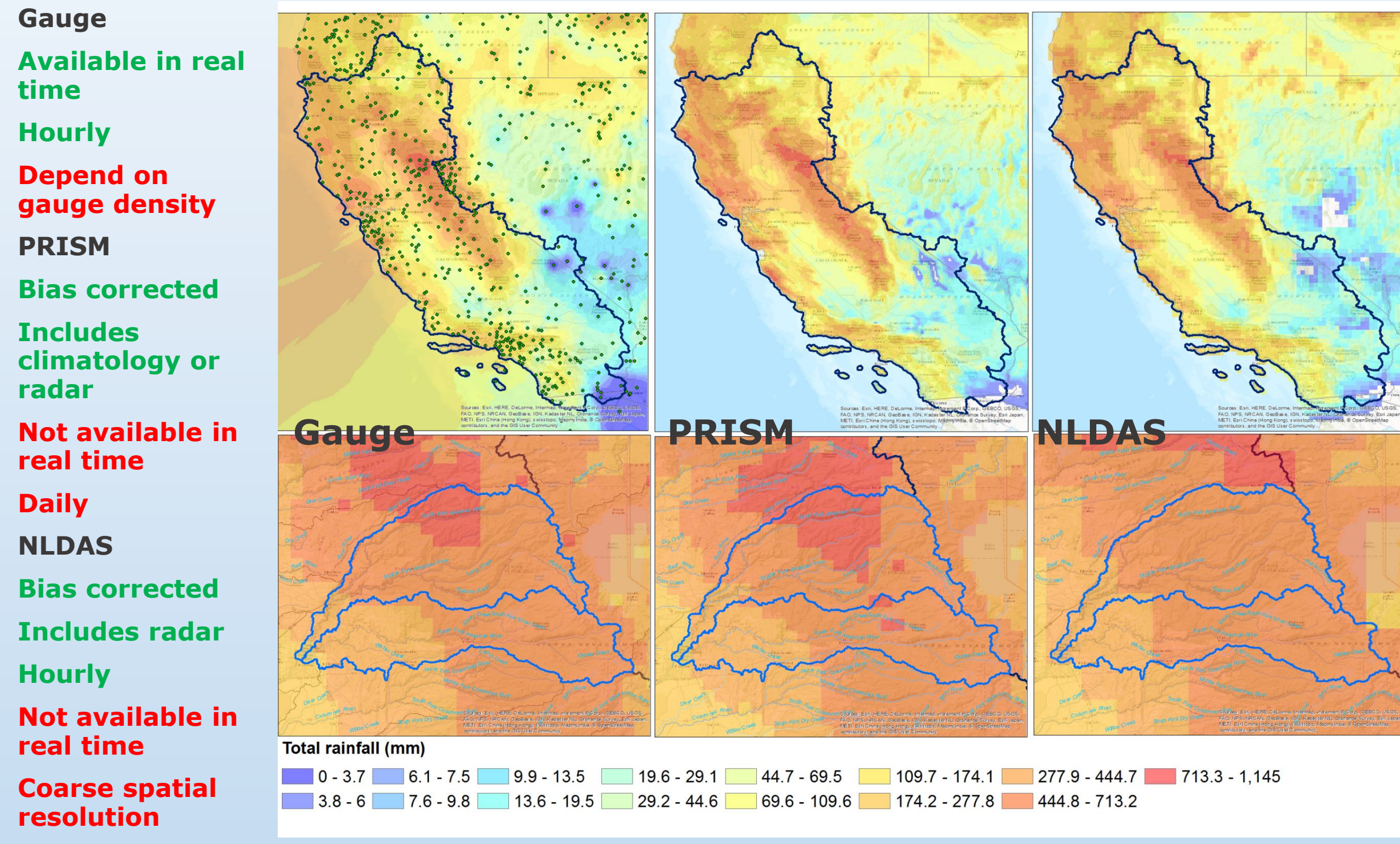
Datasets	Areal Coverage	Grid Size	Time Step	Time Coverage	Relevant Datasets
Modis 16/ evapotranspiration (ET)	Global veg. land areas	1 km	8 Day	2001-2010	Evapotranspiration and potential evapotranspiration
NARR	Northern Hemisphere	32km	3-hr	1979-present	Potential evaporation, evaporation, transpiration
NLDAS 2	CONUS	12km	1-hr	1979-now	Potential evaporation, evaporation, transpiration

Soil moisture

- **Gauge data:** very sparse
- **AMSR-E/Aqua:** daily measurements of surface soil moisture: 2002- 2011
- **NLDAS:** liquid soil moisture content (non-frozen), root soil moisture content soil moisture content (0-10-40-100-200 cm below surface for Noah-2.8), and moisture availability (0-10-40-100-200 cm below surface for Noah-2.8)

Examples

1986 flood



Flood forecast system

Main requirements

- High temporal resolution (hourly)
- High spatial resolution (< 1 km)
- Real time availability (< 1 hour)
- High accuracy (space, time, intensity)

Others:

- Long period of record (calibration)
- Smaller basins -> limited spatial coverage

Recommendations:

Rainfall: Gauge data combined with radar

Model: Even-based model

Initial condition: based on soil moisture from land surface models

Long term evaluation of hydrological losses (trends)

Main requirements

- Temporal High accuracy (no bias)
- Long period of record (>30 years)
- Large spatial coverage

Others:

- High spatial resolution

Recommendations:

Rainfall: Monthly PRISM data or NCEP/NCAR Reanalysis (depend on basin size and period)

Evapotranspiration: estimated based on temperature or from NLDAS