Streamflow & Surface Runoff:

Excerpt from Marla Schwartz
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1. The Basics

- **Surface runoff**: precipitation that falls on saturated or impervious ground and flows downhill over land
- **Streamflow**: the amount of surface water flowing downhill through creeks, streams, and rivers toward the oceans
Motivation

- Water supply
  - Where is Earth’s water?
  - Rivers & lakes that supply surface water for human uses constitute about 0.007% of Earth’s total water.

- Flood prediction and forecasting

Gleick, 1993
Streamflow Measurements

- Streamflow is measured at gauging stations
- Streamflow is unique among water cycle components in that it both spatially and temporally integrates surplus runoff and waters upstream within a catchment basin
- Measurements are made by determining the discharge in each subsection of a channel cross section and summing the subsection discharges to obtain a total streamflow discharge.

Olson and Norris, 2007
My Favorite Streamflow Data Set: USGS HCDN

- United States Geological Survey’s Hydro-Climatic Data Network
- Gauges are identified as having:
  1. Natural streamflows least affected by direct human activities
  2. Accurate measurement records
  3. At least 20 water years of suitable streamflow data

- **Original HCDN**: 1,659 streamflow gauges, data spans 1874-1988. (Slack and Landwehr, 1992)
- **Updated HCDN-2009**: 743 streamflow gauges with at least 20 years of complete and continuous streamflow record through 2009 (Lins, 2009)
My 2nd Favorite Streamflow Data Set: GRDC

- Global Runoff Data Center: [www.bafg.de/GRDC](http://www.bafg.de/GRDC)
- Database of historical daily or monthly river discharge from nearly 9000 gauges worldwide in 157 countries
- GRDC features ~350000 years worth of monthly and daily values
- Average station time-series length of 40 years
GRDC GTN-R

- Global Terrestrial Network for River Discharge
- 380 gauges
- Specialized subset of GRDC stations: gauges along continental coastlines
- Determines the freshwater flux into the world oceans