Group 1: Semi-arid and arid regions

Data differences between rich-scarce

- Precip
- Temp
- Streamflow
- GW levels
- Soil moisture
- SWE
- SCA
- Topography
- Solar radiation/insolation
- Wind
- Land use/cover
- Soil types
- Geology
- Water extractions/use
- Water quality

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thursday: how to improve existing approaches? how to transfer knowledge from data-rich to data-poor regions?

- Monitoring related to processes
- Compulsory water use reporting
- Strengthen the link with land use management -> more reliable scenarios for “alternative future” studies
- A much better understanding of Surface/GW interactions -> Recharge as a variable, not a parameter

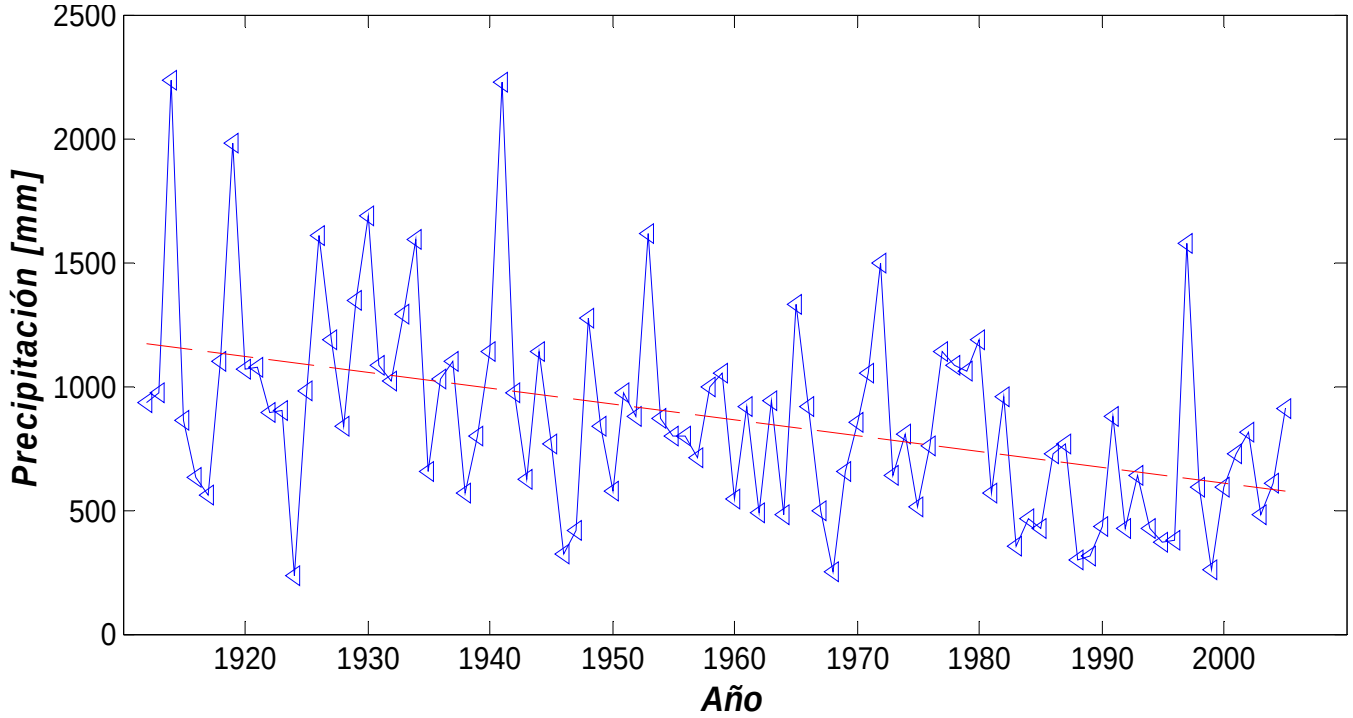
Most importantly, understand, quantify and REPORT the sources of uncertainty in hydrologic predictions

May not improve predictions, but at least will make them more useful

Data uncertainty estimation

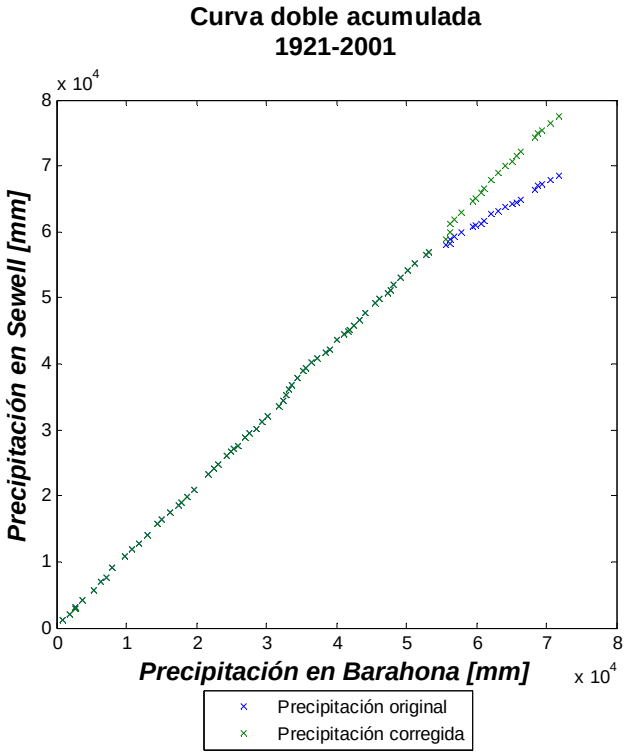
- Improved methods for data in-filling
- Standardize reporting of basi data uncertianty estimates
- QA/QC and data storage + accessibility: locked-up data has an effective value of $0.00
- Integrated monitoring network planning: streamflow, GW, quality, sediment, etc.
- Improve usefulness and availability of remote sensing data

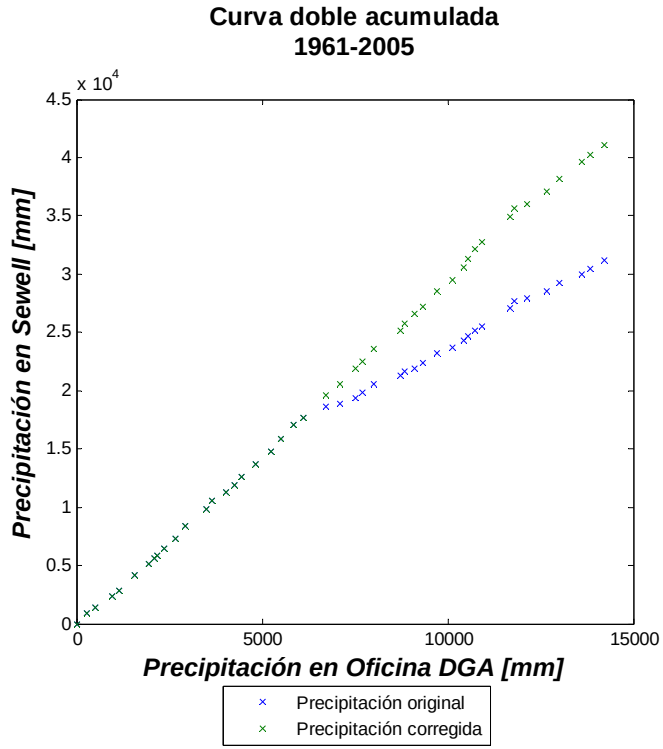
Example: Precipitation data in Sewell, Chile (2500 masl)



Time series used for water resource planning at the largest underground copper mine in the world

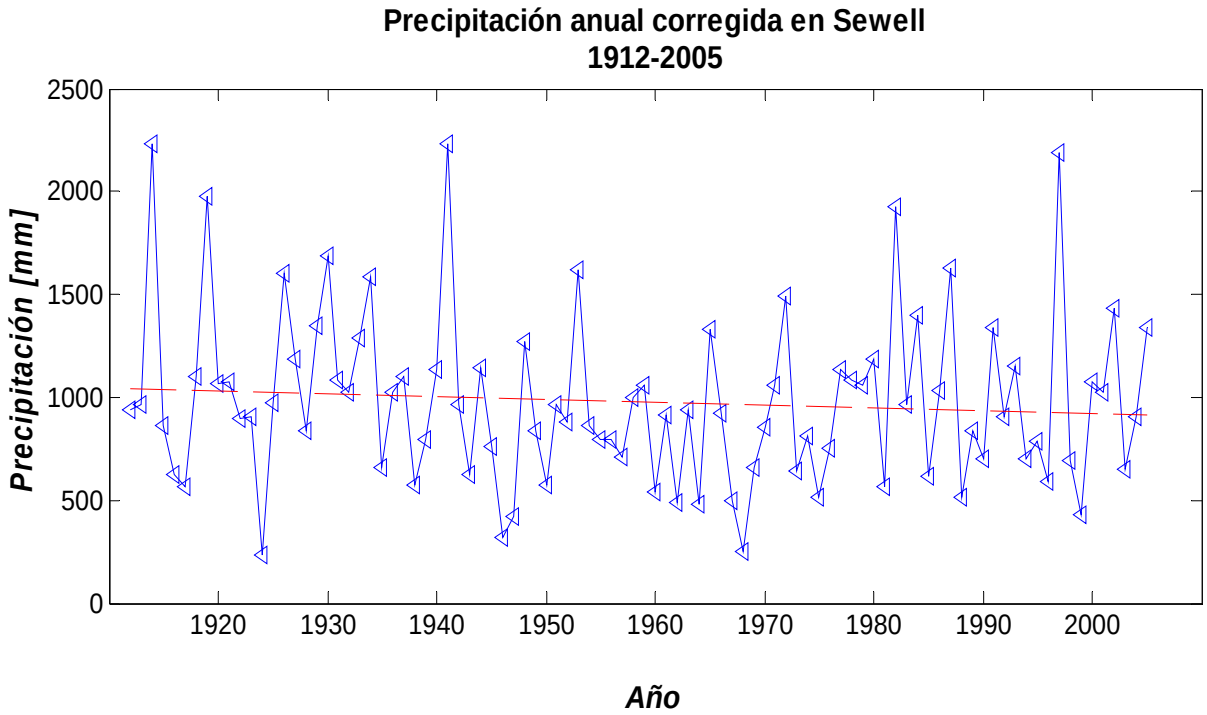
A little prodding showed something was amiss…





Total Precip record did not include SWE since 1982

Corrected data…



Process uncertainty (or model uncertainty)

- Spend enough time characterizing the area
  - build a conceptual model
  - Different SOURCES of information
- Understand limitations of methods/models
- Better representation local climate influence on model parameters
  - In relation to spatial scale
  - Seasonal changes

Empirical methods

- Develop local coefficients
- Understand limitations
- If possible, apply several empirical relations to the same problem -> bayesian model averaging

Statistical methods

- Maintain observational networks
- Appropriate recording and reporting of data quality
- Regionalization of model parameters
- Explore fractal behavior of hydrologic variables for predictions at various scales
- Develop methods that merge information at different scales (anomalies)
- Remote sensing data as a predictor in statistical methods -> record long enough

Conceptual models

- Better process representation. E.g. natural recharge to groundwater (no more R=0.1xP)
- From J. McNamara's talk: physically based parameters as opposed to mathematical parameters

Physically-based models

- improve geometry characterization (surface, subsurface)
- link parameters to basin properties
- investigate seasonality of model parameters
- spend time on appropriate definition of model discretization
- Improve representation of lateral flows, surface and gw interactions