Hydrology notes

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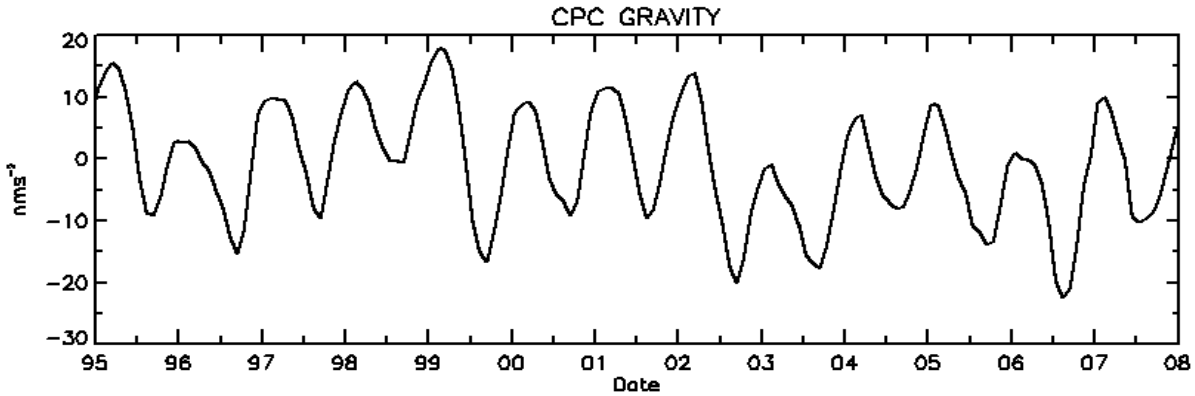
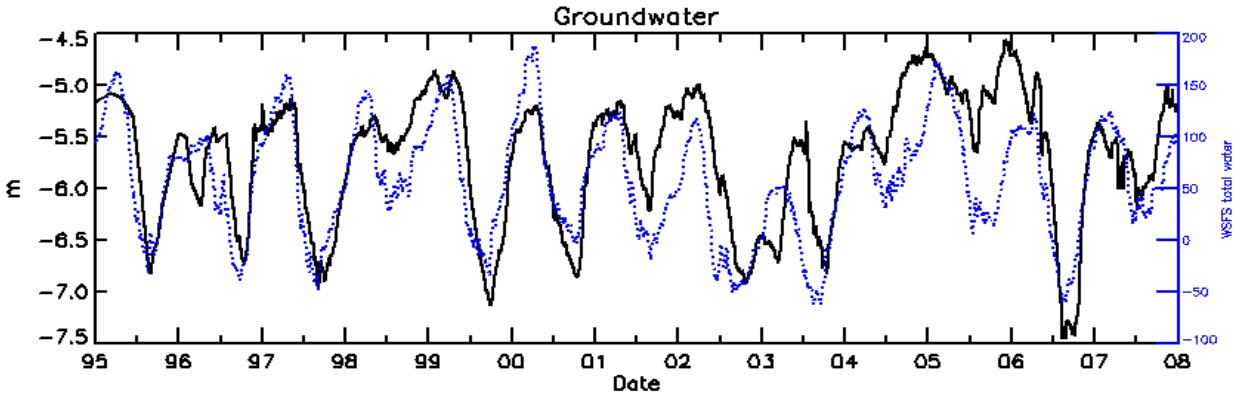
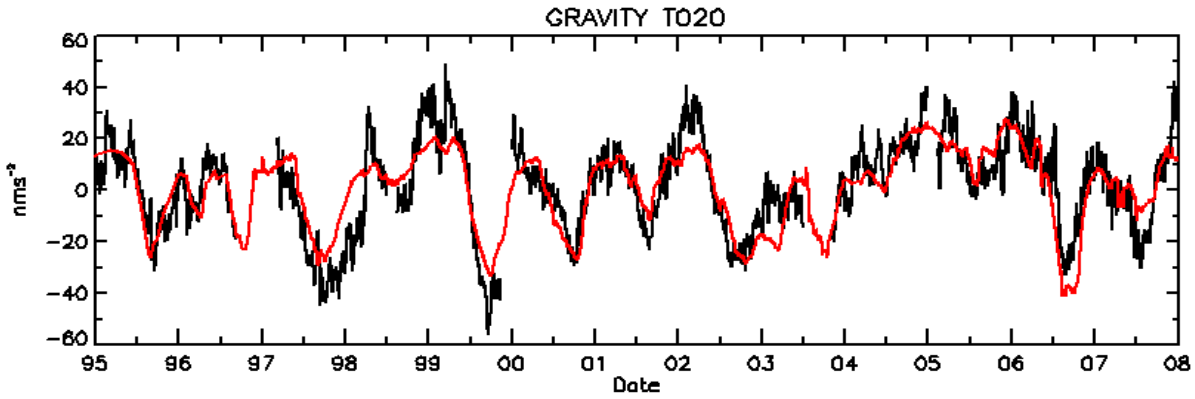


Global gravity from CPC (attraction excluding local zone, and deformation)



Black groundwater

Blue total storage in Finland

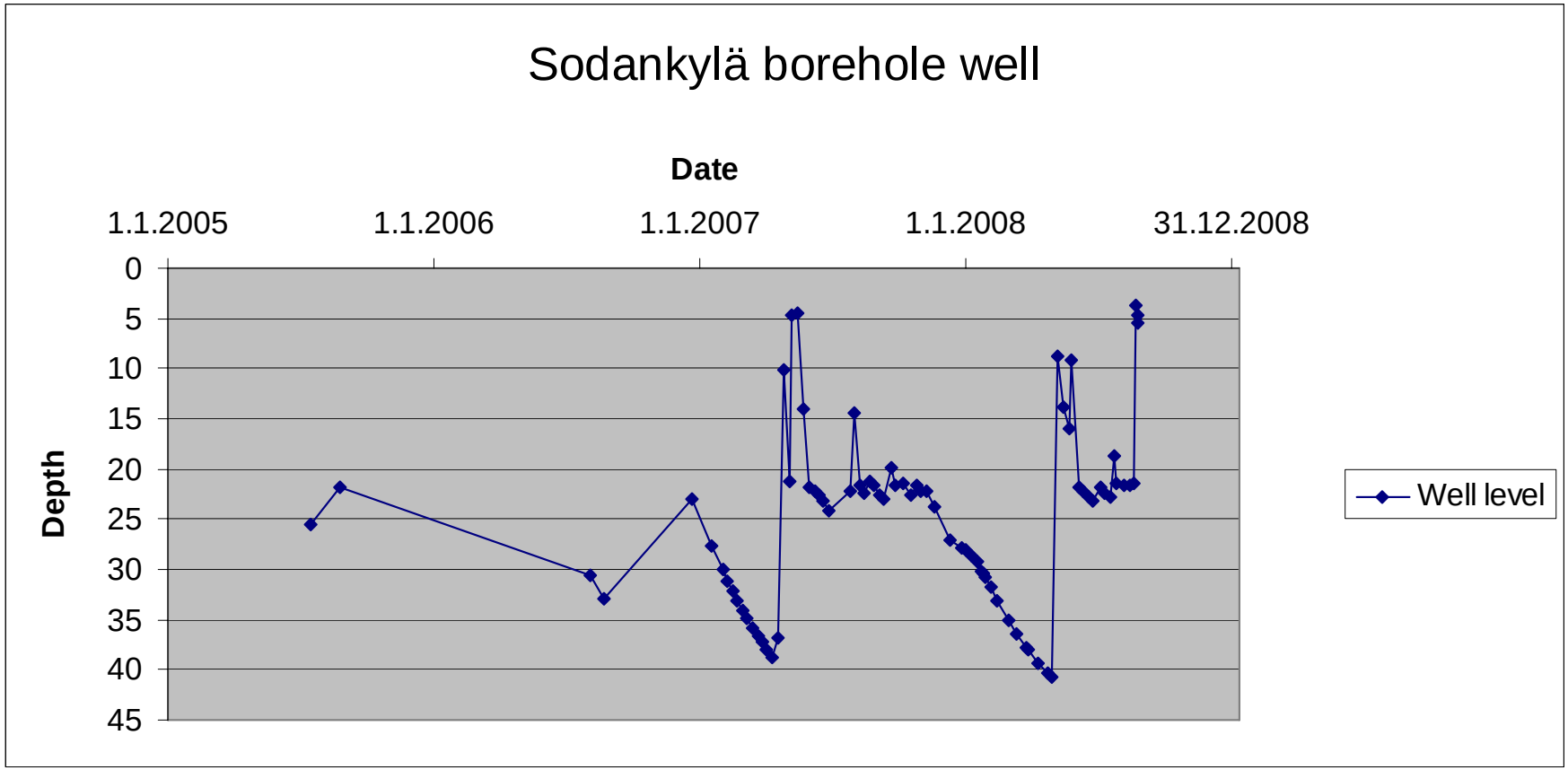


Black SG residual

Red groundwater

Metsähovi, courtesy of Heikki Virtanen

Sodankylä borehole well, courtesy of Tero Raita
A Very Expensive Percolation Gauge



Two alternatives

- (i) Do correlation of hydrological time series and gravity, scale e.g. the groundwater time series to gravity by using the observed gravity
- (ii) Do physical modelling: local hydrological observations, determination of soil and rock properties, determination of rock and soil geometry

I. Correlation approach using e.g. groundwater (Fennoscandia)

- to first order, you do not need local observations
- variation in storage has the same temporal pattern over large areas
- i.e., GW series taken at ”almost any sensible place” will have the same appearance except for scale
- if you fit to gravity for scale anyway, this does not matter
- soil moisture will be approximately in phase and will be fitted simultaneously
- regional/global loading too

II. Physical modelling

- Map topography of soil surface, soil interfaces and rock surface
- Determine soil properties in laboratory
- Install soil moisture gauges around the station at various depths; horizontal resolution depends on lateral homogeneity
- Install groundwater gauges
- If GW table in soil, determine specific yield using laboratory data (pF curve) and pumping tests
- If GW “table” in fractures of crystalline bedrock, determine transport by pumping, fracture space by drilling

II. Physical modelling (continued)

- in practice full modelling only affordable on SG sites and AG home sites
- COST ES0701 WG1 AG subgroup Workshop March 16-17 looks for ”reasonable” solutions for AG sites

Joensuu absolute site December 1999