Thoughts after reading your calibration papers:

Excuse the shaky notes many of these were graded on a bumpy plane ride

Many of you see how little can be done with limited data and begin to appreciate what can and cannot be achieved.

It's better to do what we can with the data and the techniques than by using analytical methods (WHY?) or not do anything. Just be careful not to develop a false confidence in the results.

Some will say that using mathematical methods for calibration "doesn't work".

However the same issues prevail when you calibrate by trial and error but the modeler is generally not aware of them (e.g. parameter correlation, large uncertainty)

Note the value of sensitivity analysis for data needs assessment

How can sensitivity analysis help us decide what data to collect?

Is sensitivity dependent on:

a) the type of item you measure?
b) the location of the measurement?
c) the value of the measurement?

Continued thoughts after reading your calibration papers:

What's your favorite graph for judging the quality of the calibration?

Is it the 45° line of the Observed vs Simulated values?

If so, rethink!

Start relying on

Weighted Residuals vs. Simulated values

Spatial/Temporal Maps of Residuals

Because these reveal quality far more effectively

ALWAYS use actual measurements – we make some exceptions to get a class project done quickly for the sake of learning the process in such a short time.

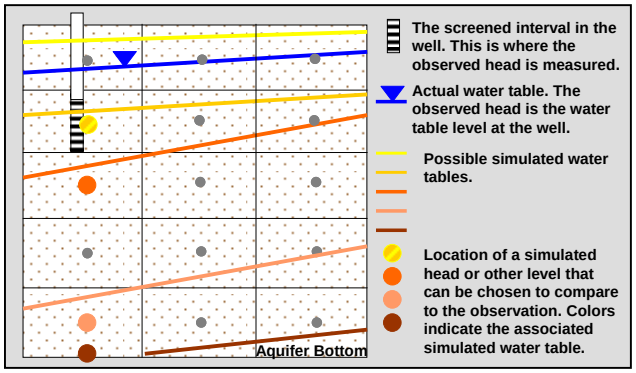
For a field project DO NOT fabricate data, including DO NOT use Darcy's Law to calculate a groundwater underflow for an observation because this is circular thinking. What can be done?

How can we deal with DRY CELLS? given the havoc they cause in the Sensitivities and Sum-of-Squared Residuals?

SimAdjust - http://igwmc.mines.edu/freeware/sim_adjust/

Sometimes simulated values are missing or assigned default values. SIM_ADJUST reads simulated equivalents from process model output, identifies observations or predictions that were omitted or assigned a default value, and provides alternate simulated values or defaults. A sequence of alternatives can be defined.

In UCODE the command to run the process model can be a batch file
The batch file can run MODFLOW then SimAdjust
UCODE can be told to read the output of SimAdjust



"HAND HOLDING" REDUCTION

Now you have seen me "model" modeling via class exercise and at your screen

IT IS TIME TO RELY ON YOURSELF MORE

THINK! About:
- **the hydrologic system (Darcy's Law controls it all)**
- **the feedbacks**
- **how the system could adjust to fit observations**
- **how the computer "sees" your input**
- **the integration of all of these things**

POSE QUESTIONS TO YOURSELF! Answer them by:
- **reading manuals**
- **designing model experiments**
- **surfing the web**
- **asking specific questions of colleagues (including me)**