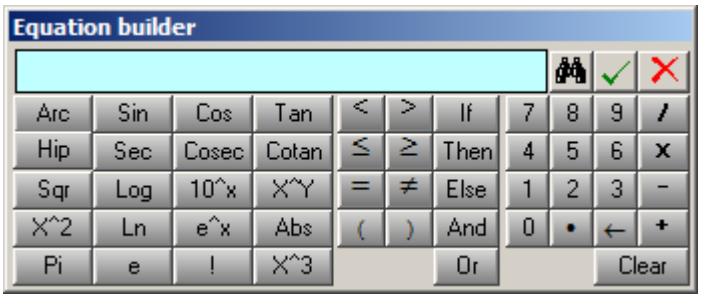
Equation builder

The Equation builder allows to use:

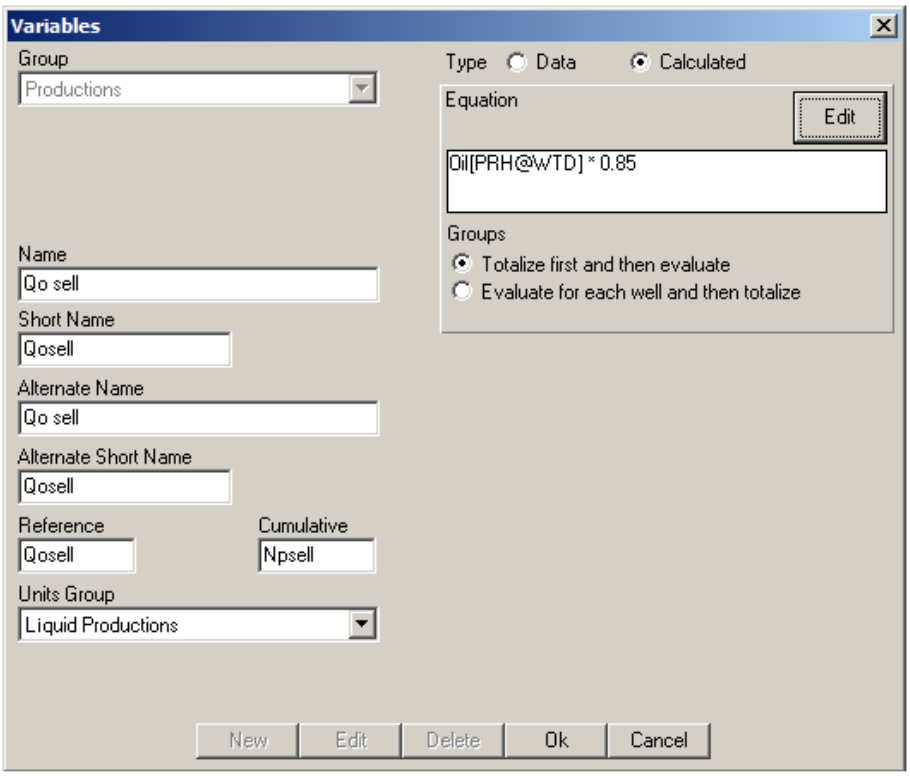
1- Relational operators: greater than, smaller than, equal to, etc.
2- Logic operators: If… Then, and, or, etc.
3- Trigonometric functions: sinus, cosine, tangent, etc.
4- Basic Mathematical functions: sum, subtraction, multiplication, power, etc.

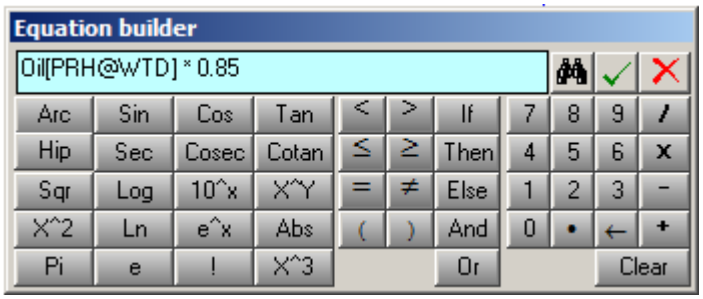


This editor is used in many Sahara windows to insert conditions, filters or operations. An example is the **Variables** window, that allows to create Calculated Variables.

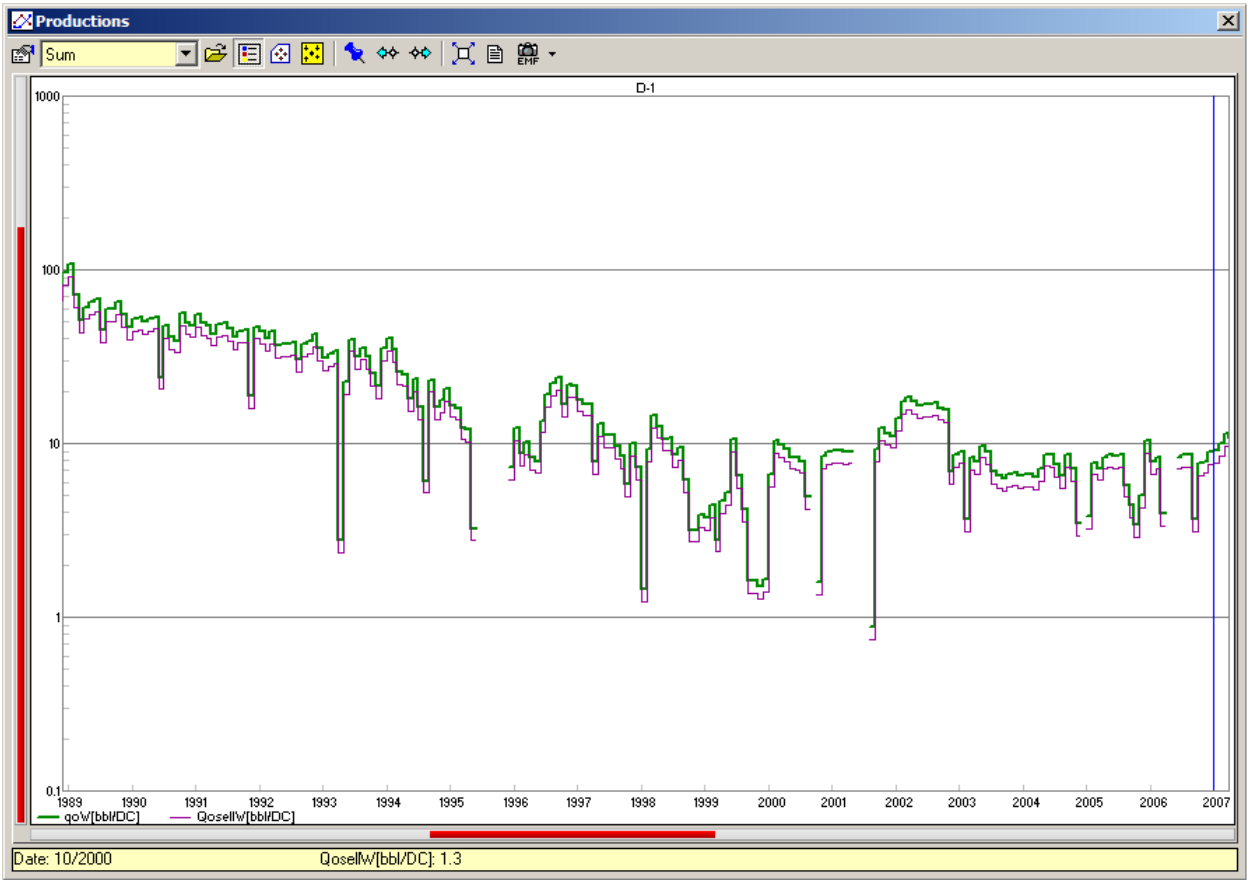
Calculated variables example

If we consider that 15% of well net production is water, gas and/or contaminants that in the future will be extracted so the oil is in sell conditions, we can create a variable for that with the name "**Qo sell**". To create a variable, we can go to **Edit > Variables**, select the group **Productions**, click on **New** and complete the requested data. Then, we define the variable as **Calculated** and clicking on **Edit** we can use the **Equation builder**.





Once the variable is created, it can be selected in any plot of the Productions window. The next example shows: in green the oil well and in violet the new variable “Qo sell”.

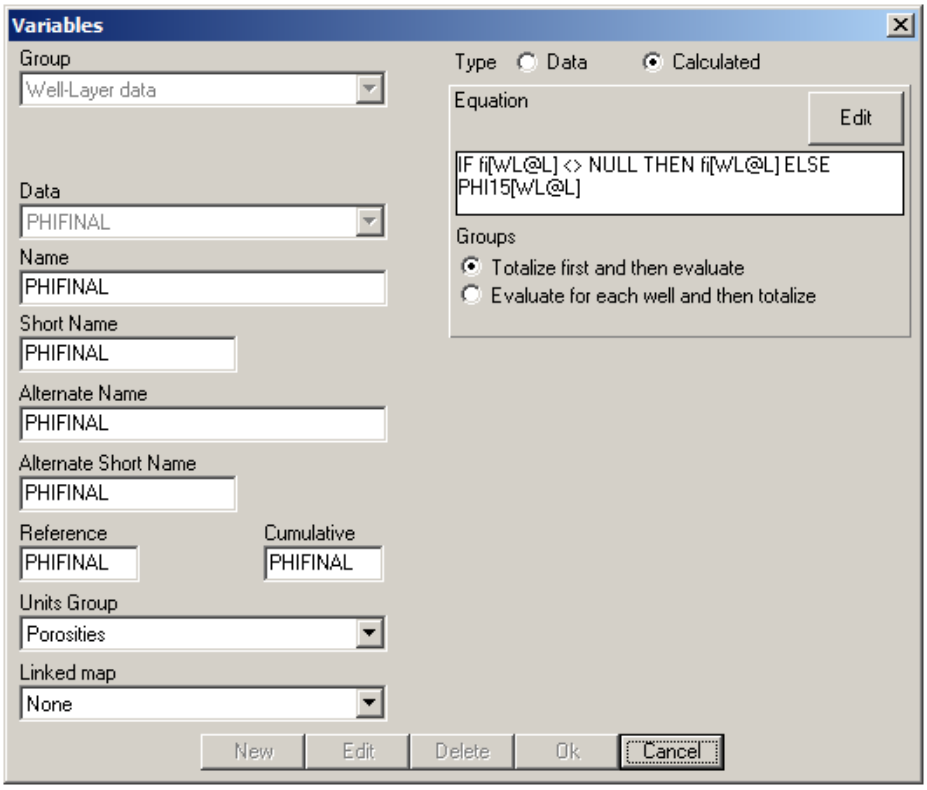


Calculated variable using logic equations example

Now, we are going to consider that there are two values of porosity: one obtained from laboratory samples “fi” and another taken from well logs “PHI15”. We can create a third porosity variable “PHIFINAL” that takes “fi” values, except in those wells or layers where there is no value that it takes “PHI15” value.This can be done as follows:

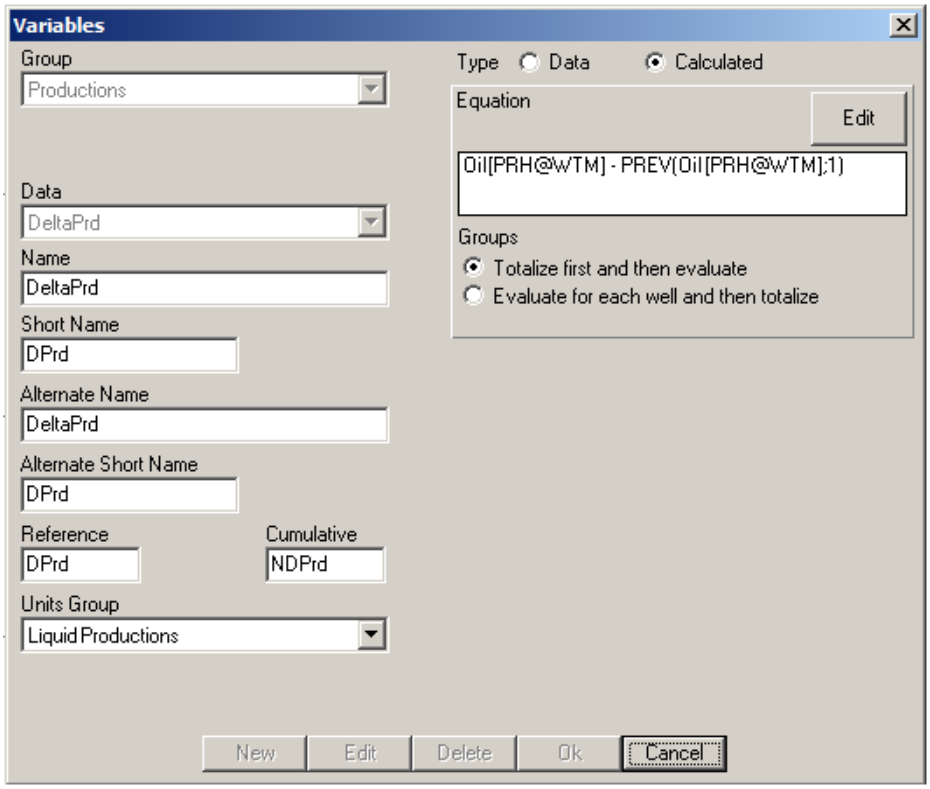
On the calculator, lets write (selecting the variables with the binoculars): **IF** fi[WL@L] <> NULL **THEN** fi[WL@L] **ELSE** PHI15[WL@L]

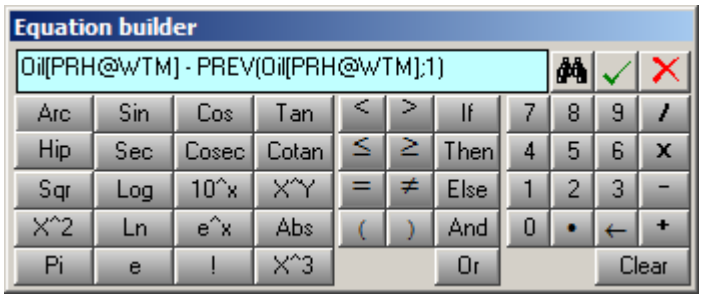
This equation is read as: **IF** *layer porosity is different to a null value* **THEN** *final porosity = layer porosity* **ELSE** *final porosity = log porosity*



Calculated variable comparing different dates example

The next sample will show how to create a variable that compares a variable value from the current month to the same variable in the previous month. We are going to create a variable “DeltaPrd” that compares oil produced rate in two different dates.





The available functions that allows to operate between dates are:

- PREV(<var>;<n>): Variable (<var>) offset, (<n>) months ago
- NEXT(<var>;<n>): Variable (<var>) offset, (<n>) months forward
- LPROM(<var>;<n>): Variable (<var>) average, (<n>) months ago
- RPROM(<var>;<n>): Variable (<var>) average, (<n>) months forward
- CPROM(<var>;<n>): Variable (<var>) average, n/2 months ago and n/2 months forward

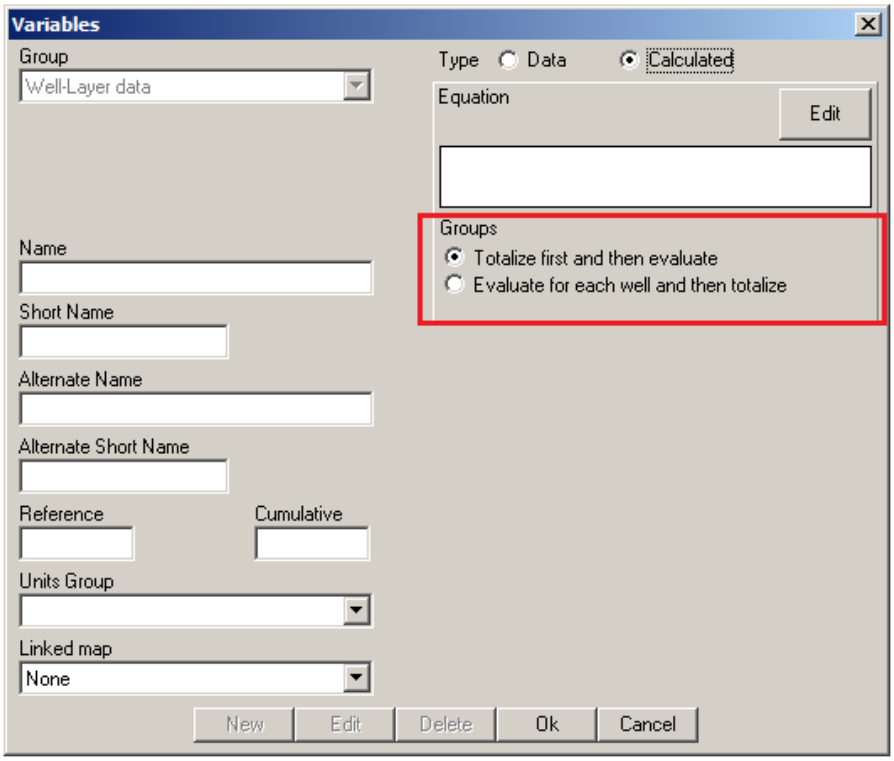
For our example:

1. Using the binoculars, choose the variable **Productions>History>Oil>Well>Total>Calendar Day.** It will show up as: **Oil[PRH@WTM]**
2. Then, write: minus **"-"** and **"PREV("**. So the equation is going to be: **Oil[PRH@WTM] - PREV(**
3. Choose again the variable with the binoculars and next write **";"** and the **number of months** to delay the variable**.** If we choose one month, the equation is going to look like this: **Oil[PRH@WTM] - PREV(Oil[PRH@WTM];1)**
4. So, this variable is going to take the production of the current month and will sustract the production of the previous month.

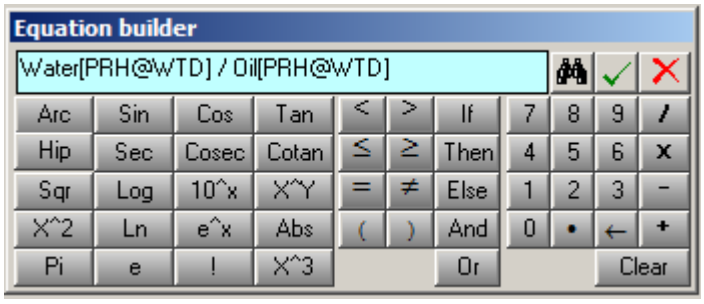
Group options for calculated variables

When creating a calculated variable, the user may chose one of the two next options:

1. Totalize first and then evaluate
2. Evaluate for each well and then totalize

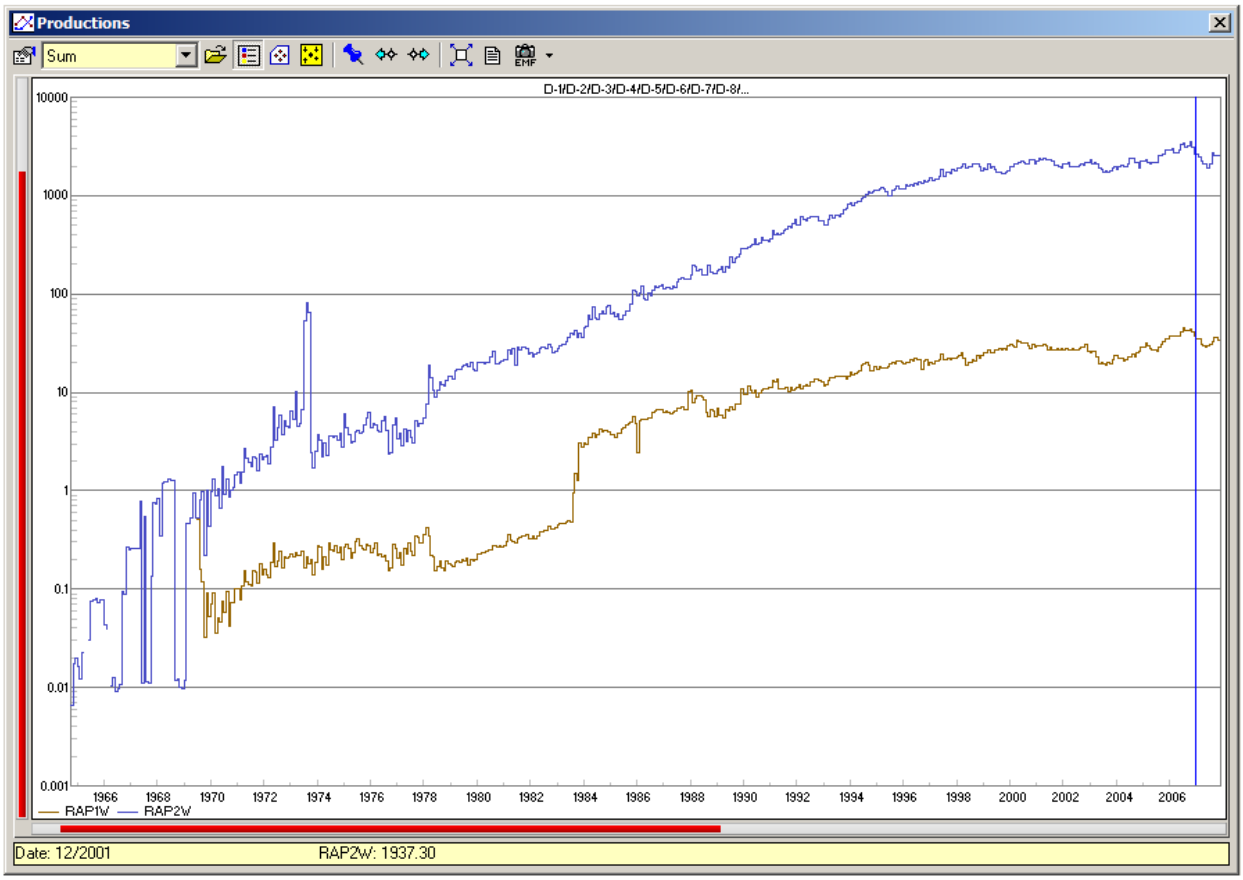


This two options gives the user, the opportunity of choosing the order in which the calculation is going to be done. E.g.: if we create a variable that relate water and oil produced, this variable could be calculated with any of the two options.



Taken the first option, the variable will sum all water well productions and will divided it into the sum of all oil well productions. Otherwise, using the second option, the variable will do the rate for each well and then will sum the values for all wells.

The graph below shows the result of both options: the brown line being the first one and the blue line the second one:



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