



## **Uncertainty and risk evaluation in a truly pluri-disciplinary framework, or when you are asked to provide exact solutions with virtually none information and you fail miserably**

X. Sanchez-Vila

Technical University of Catalonia, Dept Geotechnical Engineering and Geosciences, Barcelona, Spain  
(xavier.sanchez-vila@upc.edu, +34 93 401 7241)

Hydrogeology has had an interesting evolution. In the early 20th century professionals faced the challenges of flow in porous media and well hydraulics; the emphasis was on quantity. Then in the second part of the century quality issues took over, and hydrogeologists faced geochemistry and transport of conservative solutes. Late in the 1980's the work turned to modeling and to stochastic hydrogeology. Since then new problems are incorporated every decade, now including (and by no means this is a complete list) surface/subsurface interactions, coastal aquifer dynamics, geothermal, vadose zone infiltration, multispecies reactive transport, CO<sub>2</sub> sequestration, climate change, non-conventional resources related to integrated water management (e.g. reclaimed water), presence of emergent contaminants, risk evaluation, . . . , and who knows what the future will bring.

In short, most interesting problems involve hydro-bio-geo-chemical processes, most of them coupled and all of them extremely non-linear. But our "clients" want to read the results in ecological or toxicological terms. Furthermore there is the issue of heterogeneity which is present at all scales and that cannot be resolved, and on top of that uncertainty in the future possible scenarios. Yet, we are still providing solutions using very sophisticated codes that give one and only one answer, and we solve the problem by performing some sensitivity analysis. In this talk I discuss issues on pluri-disciplinary problems and beg the audience to spread the word on proper stochastic modeling to address present and future hydrogeological problems.