Geophysical Research Abstracts
Vol. 13, EGU2011-6279, 2011
EGU General Assembly 2011

3D-Paris basin Modelling: How past geological history explains its present day hydrodynamics

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A 3D basin model of the Paris basin is presented in order to simulate through geological times (248 M) fluid, heat and solute fluxes. This study emphasizes: i) the contribution of basin models to the hydrodynamic understanding of the multilayered system; ii) the additional use of Atmospheric General Circulation model (AGCM) and pollen records to provide palaeo-climatic boundaries for a coupled flow and mass transfer modelling, constrained by geochemical tracers and iii) the impact of the human activities (pumping) on the present day hydrodynamics of the Paris basin multi-layered aquifer system. Paris basin has been studied for a number of years by different scientific communities (geologists, palynologists, rock and water geochemists, rock mechanists, hydrogeologists, climatologists, modellers and industrial companies (Gas Storage, Petroleum and Water resources exploitation), thus a large amount of data has been collected. By integrating all these actors in a same research program and by using numerical codes we were able to draw a more comprehensive view of the Paris basin evolution. Our results show the advances and limits of the developed methodology.