

## 3D complex pollutant transfer in karstified chalk aquifer systems in Eastern Normandy, France

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## 3D complex pollutant transfer in karstified chalk aquifer systems in Eastern Normandy, France. #592

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**Accepted**

**Didier Pennequin** submitted this abstract and it was finally accepted for track

Topic 7 - Karst Hydrogeology

as Oral.

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Most of the chalk aquifer systems in Normandy often tend to display dual or triple porosity textures leading to complex flowfields, not easily detected through regular groundwater level measuring campaigns, which most of the time, use available unevenly distributed wells opened at different depths. This often can biased groundwater flow interpretation and lead to partially erroneous or incomplete flowfields and groundwater level maps.

These unfortunately often are used to address problems such as finding pollution sources, predicting pollutant migration, assessing plume evolution or pollutant concentration trends and setting up corrective measures to protect water resources and drinking water well fields, leading, in several cases, to partially erroneous results or only partially efficient solutions, with all sorts of technical drawbacks and negative economic impacts. This is a real problem in clean or drinking water stressed areas such chalk valleys of eastern Normandy, heavily affected by old and more recent industrial pollution.

This paper intends to discuss complex pollution transfer in two chalk aquifer valleys of eastern Normandy, where pollutants do not seem only to follow flowlines shown on available groundwater level maps. Indeed, divergent pollutant transfers also take place along fractured axes and karst conduits, which can often be associated to geological discontinuities, as previously highlighted through model calibration processes in the Avre river catchment.

In the Commerce valley case, a rare emerging pollutant - N-nitrosomopholine - was found migrating in two opposite directions a short way down from a dual source point identified in the upper Valley. This pollutant was both found south and downstream in the fractured and porous chalk aquifer, as well as way up north in a karst channel system used for drinking water purposes, in what previously was believed to be a completely different watershed.

In the Iton valley case, the pollutants are volatile organohalogenated compounds (VOH) which tend to be widespread in Normandy and often stem from historical industrial pollutions. Several potential VOH sources were identified in industrial areas in the valley south-southeast from contaminated drinking water wells; yet the groundwater flow maps suggest a southwestern origin for the pollution source(s)...

This situation often encountered in the chalk aquifer systems of eastern Normandy makes it difficult to establish "cause to effect" links between pollution sources and contaminated drinking water wells, and therefore to implement efficient corrective measures to protect drinking water well fields, and more generally water resources. To tackle this problem it is necessary to go beyond classical hydrogeological approaches. In order to achieve this and to clarify flowline interpretation, a multi-parameter approach notably based on geological and hydrogeological criteria has been developed and is discussed in this paper through the two above mentioned case studies.

**D**

**Didier Pennequin** submitted this abstract 29 Apr 2019

As contribution type: Oral

For tracks:

Topic 5 - Tools, methods and models to study groundwater

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Topic 7 - Karst Hydrogeology

Topic 8 - Groundwater quality and pollution processes

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**D**

**Didier Pennequin** left a comment 29 Apr 2019

Also could be presented Under topic 7 ou topic 5, I cannot change

**J**

This abstract was accepted 20 May 2019  
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