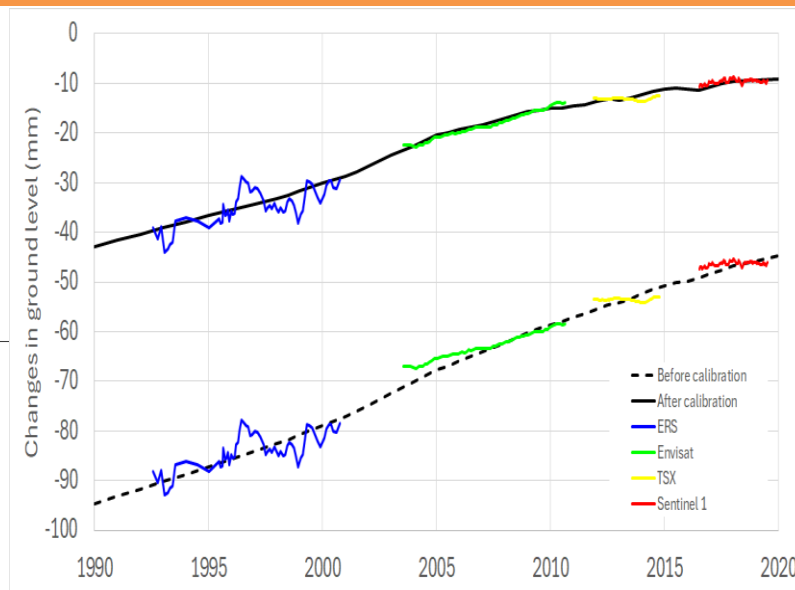
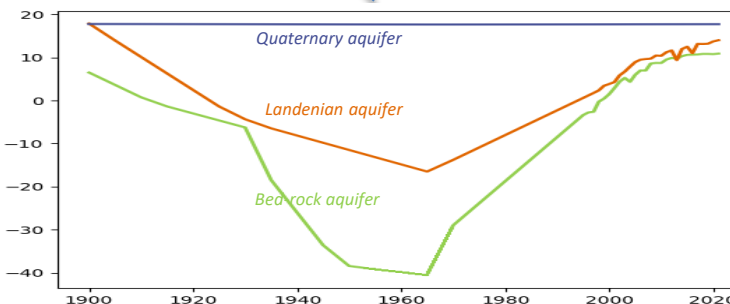
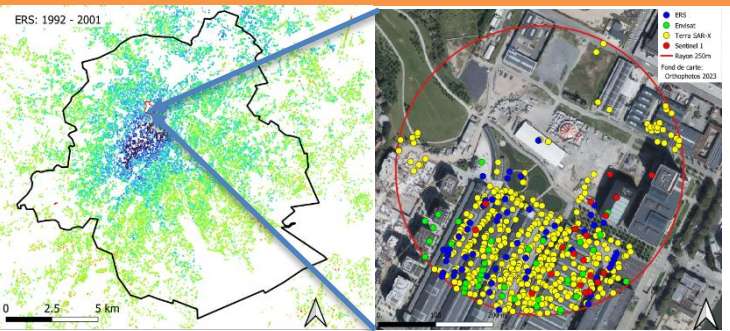


Modeling recent uplift subsidence caused by decreased groundwater extraction and revealed by geodetic InSAR measurements in the Brussels area

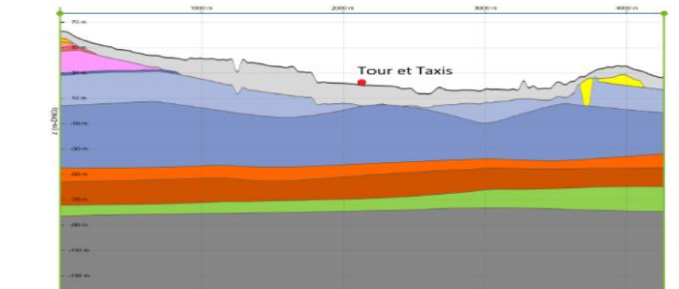
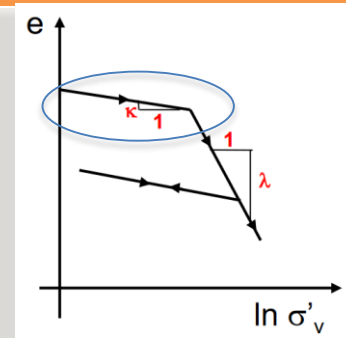
In the framework of the BELSPO project: « monitoring Land Subsidence caused by Groundwater exploitation through gEOdetic measurements » (LaSuGEO)

A. Poncelet, P. Orban, P.-Y. Declercq, M. Agniel, P. Gerard, A. Dassargues



Hydro-Geomechanical model

- A 1D hydro-geomechanical model
 - Computed water pressures (i.e., from the calculated piezometric heads) **in each aquitards and aquifer** are translated, at each time step, into effective stresses using the Terzaghi principle.
 - a non-linear elastoplastic model for swelling/settlements
 - layers are over-consolidated, only the elastic behavior is considered.
- The following elastic law is used: $\varepsilon_v = -\frac{\kappa}{1+e} \ln\left(\frac{\sigma'_1}{\sigma'_0}\right)$ where ε_v is the relative vertical deformation, κ is the elastic compressibility factor, e is the void ratio, and σ'_1 and σ'_0 the initial and final effective stress.



Formation	Unité Géologique (UG)	Type	Part de la coupe	caractéristiques
Landenian aquifer	UG 100	Aquifère	Landenien	Sable de Hannut
Bed-rock aquifer	UG 101	Aquifère	Bedrock	Bedrock
Member of Moen	UG 102	Aquitard	Moen	Kortrijk formation
Member of Maur	UG 103	Aquitard	Maur	clays of Kortrijk

- Two main aquifers:
 - 1) 'Landenian aquifer' = sand of Hannut formation
 - 2) Bed-rock aquifer
- Two main compressible aquitards:
 - 1) Member of Moen = Kortrijk formation
 - 2) Member of Maur = clays of Kortrijk

