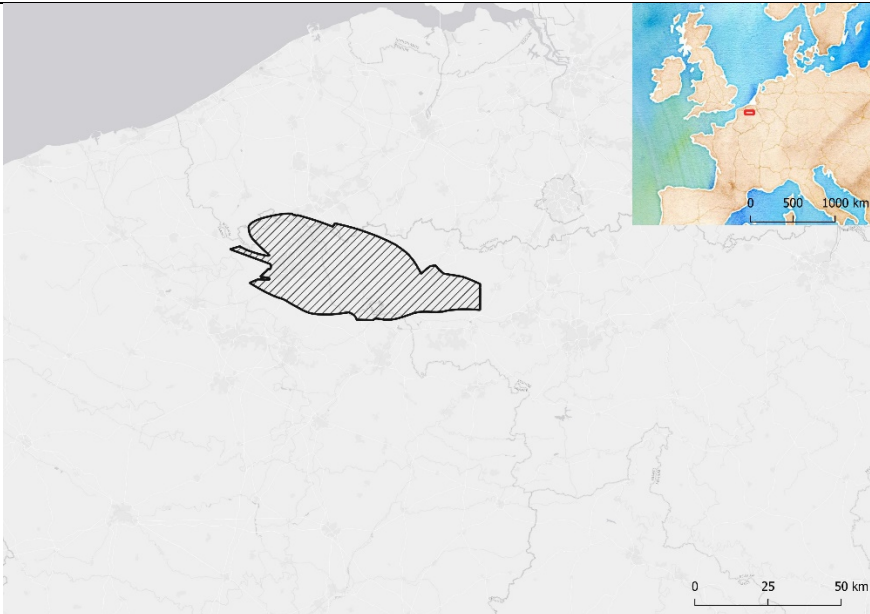
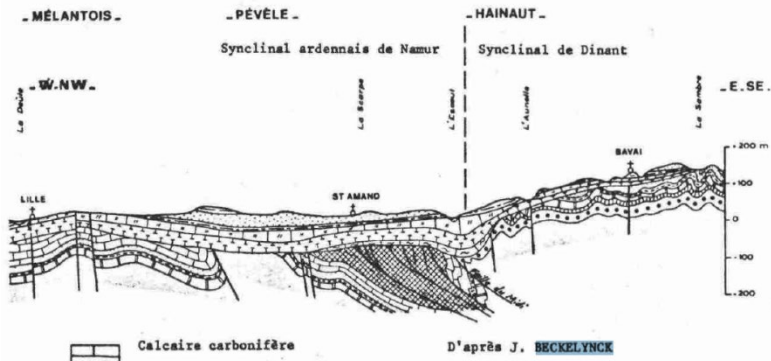


3.13 Description of the Nord-Pas-De-Calais French-Belgian transboundary aquifer case study

Name of pilot area / aquifers / type: Carboniferous/ Early Carboniferous Limestones and dolomite/ porous and karstified		Country: FRANCE/BELGIUM Region: Nord-Pas-De-Calais (Northern part of France) (FR-BE border aquifers)	
Study level	Transboundary : ☒ Regional: ☐ Local: ☐ Single well(s): ☐		
Type of observations <i>(choose one of the options, create separate template if needed for each type if each type need specific information)</i>	☐ Short screened observation wells (not pumped) ☐ Long screened observation wells (not pumped) ☒ Pumped wells, long screens in one aquifer ☐ Pumped wells, long screens over multiple aquifers ☐ Springs ☐ Other (eg. research wells; indicate type and information on pumping):		
Approximate location of pilot:			
Geological cross section / conceptual model of the pilot area:			

Name of Shape- / Geopackage file defining the area: carboniferous_limestones_surface_exten t.shp		Projection to be used: WGS84 (Epsg4326)		
Hydrological parameters:	Mean annual precipitation (mm or range in mm)	Mean annual groundwater recharge (mm or range in mm)	Mean annual groundwater recharge temperature (°C)	Thickness of unsaturated zone (range in m)
	600	200		
Pumped wells only		Typical pump discharge of sampled individual well (m³/day):	Typical pump discharge of complete well field (m³/day): $16.10^6 \text{ m}^3/\text{year} = 43800 \text{ m}^3/\text{day}$	
List of aquifers and aquitards in pilot area		No. of confined or semiconfined aquifers in pilot area: 2		No. of unconfined aquifers in pilot area: 1
Aquifer no. (aqf):5 Aquitard no. (aqt): 4 Aquiclude no. (aqc): -	Aquifer/aquitard type and/or name	Lithology (Resource WP6 terminology)	Depth range (m)	GW age range (yr)
Aqf-1:	Quaternary alluvial deposits + Miocene sands	Sand, gravel, pebbles + sands		
Porosity type	Porous: X	Fissured: ☐	Karst: ☐	Fissured and porous / dual porosity: ☐
Aqt-1:	Upper Eocene clay	Clay		
Aqf-2:	Eocene aquifer	sand		
Porosity type	Porous: X	Fissured: ☐	Karst: ☐	Fissured and porous / dual porosity: ☐
Aqt-2:	Ypresian	Sandy clay		
Aqf-3	Thanetian aquifer	Sand and gravel		
Porosity type	Porous: X	Fissured: ☐	Karst: ☐	Fissured and porous / dual porosity: ☐
Aqt 3	Gault Clay	clay		
Aqf-4	Upper cretaceous	Chalk		
Porosity type	Porous: X	Fissured: X	Karst: ☐	Fissured and porous / dual porosity: X
Aqt-5	Low cretaceous clay			
Porosity type	Porous: ☐	Fissured: ☐	Karst: X	Fissured and porous /



				dual porosity: ☐
Applied tracer age indicators (^3H , $^3\text{H}/^3\text{He}$, ^{85}Kr , ^{39}Ar , ^{14}C , ^{36}Cl , ^{81}Kr , ^4He , CFCs, SF_6 , etc.) Applied recharge temperature indicators (^{18}O , D, noble gases)	Aquifer-1	–		
	Aquifer-2	–		
	Aquifer-3	–		
	Aquifer-4	$^{34}\text{S}/^{32}\text{S}$, $^{18}\text{O}/^{16}\text{O}$ on sulphates, ^3H , ^{13}C , ^{14}C , ^{18}O , D, CFC's (11,12,113), SF_6		
	Aquifer-5	$^{34}\text{S}/^{32}\text{S}$, $^{18}\text{O}/^{16}\text{O}$ on sulphates, ^3H , ^{13}C , ^{14}C , ^{18}O , D, CFC's (11,12,113), SF_6		
Number of sites (wells/springs) with age indicators	Aquifer-1	1-5: ☐ 5-10: ☐ 10-25: ☐ >25: ☐		
	Aquifer-2	1-5: ☐ 5-10: ☐ 10-25: ☐ >25: ☐		
	Aquifer-3	1-5: ☐ 5-10: ☐ 10-25: ☐ >25: ☐		
	Aquifer-4	1-5: X 5-10: ☐ 10-25: ☐ >25: ☐		
	Aquifer-5	1-5: ☐ 5-10: ☐ 10-25: X >25: ☐		
GW age range (GAR) GAR-1: Modern (< 60 yr) GAR-2: Old (> 60 yr and 10 kyr) GAR-3: Paleowaters (> 10 kyr)	Aquifer-1	–		
	Aquifer-2	–		
	Aquifer-3	–		
	Aquifer-4	GAR-1: 1-10%: X 10-25%: ☐ 25-50%: ☐ >50%: ☐ GAR-2: 1-10%: ☐ 10-25%: ☐ 25-50%: ☐ >50%: X GAR-3: 1-10%: ☐ 10-25%: ☐ 25-50%: ☐ >50%: ☐		
	Aquifer-5	GAR-1: 1-10%: X 10-25%: ☐ 25-50%: ☐ >50%: ☐ GAR-2: 1-10%: ☐ 10-25%: ☐ 25-50%: ☐ >50%: X GAR-3: 1-10%: ☐ 10-25%: ☐ 25-50%: ☐ >50%: ☐		
Groundwater age ranges (GAR) estimated by:	Tracer based estimates X Flow and age model simulations ☐ Combination of model and tracer estimates ☐ Expert judgement: ☐			



Objective of age dating studies:					
Basic research or General groundwater management	Assessment of pollutant history		Assessment of the efficiency of remediation and mitigation measures		Indication of vulnerability of aquifers and water supply wells
X					X
Water Usage <i>(not relevant for observation wells)</i>	Water supply		Irrigation	Industry	Other
	X		X	X	
Geoenergy related activities <i>(not relevant for observation wells)</i>	Shallow Geo-T	Deep Geo-T	Hydrocarbons		Nuclear waste disp.
	X				
Mining activities <i>(not relevant for observation wells)</i>	Construction materials		Minerals / metals	Coal	Other
REFERENCES					
OPEN Access reports and papers (PDF versions made available in EGDI repository making them downloadable via maps and keyword / free text searches): https://www.sciencedirect.com/science/article/pii/S1878522013001215			Reports and papers with restricted access:		
Remarks / other relevant information:					