

Keywords: CO₂ capture; CTSC; Tio₂; CO₂ capture; K₂CO₃; G₂

Introduction

Manufacturing activities are responsible for a significant amount of greenhouse gas (GHG) emissions. The carbon dioxide (CO₂) emissions from manufacturing activities are a major contributor to global warming. The European Union (EU), North America (USA, Canada, Brazil), and Asia (China, Japan) are the major CO₂ emitting regions. The Global CCS Institute reports that 75 CO₂ capture facilities are currently operating worldwide, with a total capacity of 59 million tonnes per annum. While the world is striving to reduce GHG emissions by 19% by 2050,

140
1984-250-345
Na
5% 8% CO₂

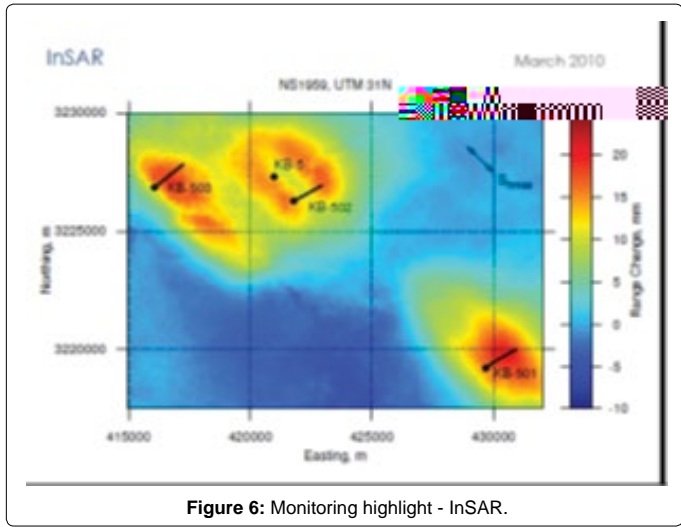


Figure 6: Monitoring highlight - InSAR.

Pre-injection risk register	Risk highlighted during operation	Operational Monitoring Responses
<ul style="list-style-type: none"> -Injection well problems -CO₂ breakthrough to hydrocarbon production well -Vertical leakage -Wellbore leakage -Legacy well integrity 	<ul style="list-style-type: none"> -migration to the north -Vertical leakage -Well integrity at KB-5 	<ul style="list-style-type: none"> -3D seismic; InSAR, shut-in of well KB 502, integrated modeling. -Reduction of injection, pressure, seismic reprocessing, microseismic data, integrated modeling. Plug-and-abandon KB-5, well-bore studies.

Table 2: Key risk responses.

... (reproduction) ...

BRGM ... 2012, ...

... (reproduction) ...

Conclusions

Acc... (reproduction) ...

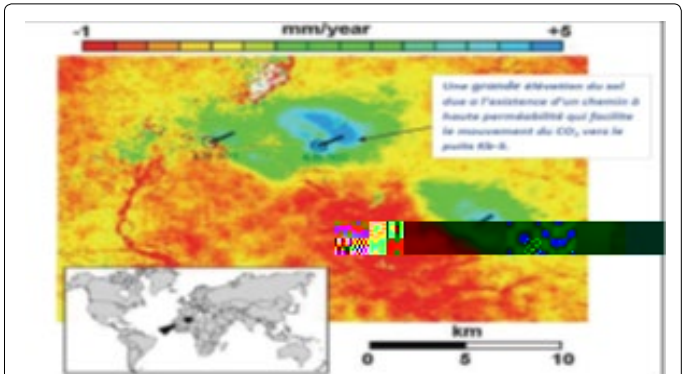


Figure 7: Image satellite InSAR illustrating the deformation of the surface to Krechba (Iding and Ringrose).

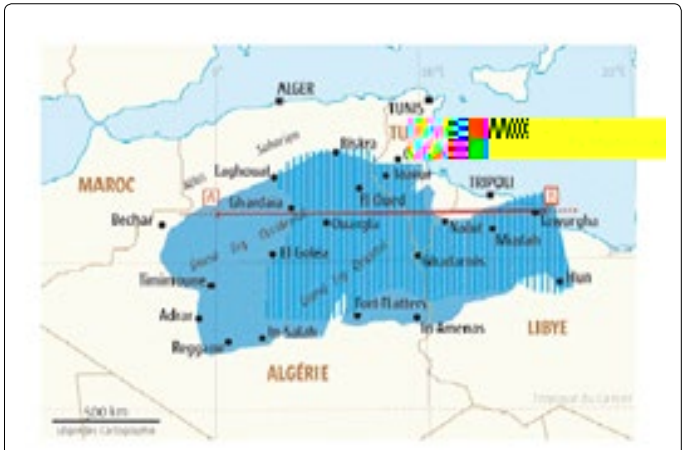


Figure 8: Location of the table Albian groundwater.

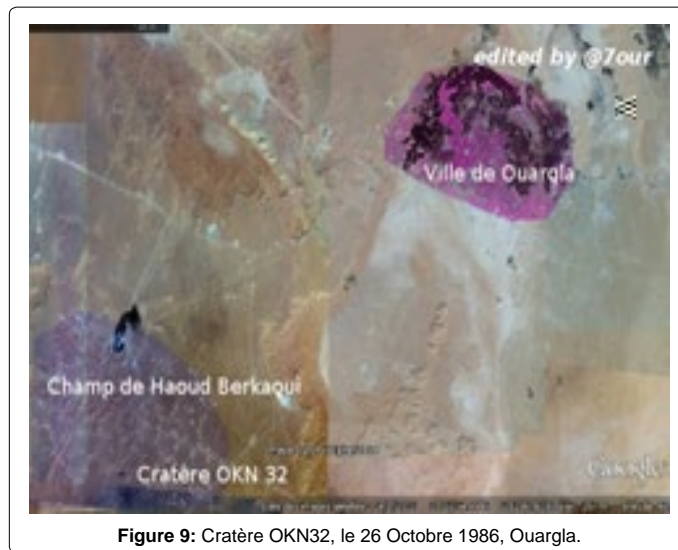


Figure 9: Cratère OKN32, le 26 Octobre 1986, Ouargla.

References

1. ADEME (2013) Captage et stockage géologique du CO₂ (CSC). Les avis de l'Ademe 1-5.
2. Dodds K (2009) In Salah CO₂ JIP: Status and overview. Presented at the 5th IEA GHG R&D Programme Monitoring Meeting, Tokyo, Japan.
3. L'INERIS (2011) modélise les risques du stockage de CO₂ en aquifère salin :Beaucoup d'inconnues relatives aux impuretés encore à déterminer. 1-2.
4. INERIS (2010) État de l'art sur l'évaluation des impacts, sanitaires et environnementaux du stockage Géologique de CO₂. Rapport d'étude INERIS-DRS-10-100825-02286D, EUREKA.
5. INERIS (2010) État de l'art et analyse des risques pour un stockage de CO₂ en aquifère salin. Rapport n°1: les risques en phase d'injection.
6. INERIS (2013) Retours d'expériences des incidents et accidents sur des sites d'exploitation ou de stockage en milieu souterrain- application au stockage géologique du CO₂. DRS-12-126009-13866-unique- 1397139450, Rapport d'études.
7. Belkhatir A (2010) Systémie, complexité, lois du chaos et MCR-Nouveaux concepts et construits pour une science du danger en devenir. IFREI Paris. 1-27.
8. Belkhatir A (2012) Secure gas transportation and distribution in urban area-safety system of gas network and urban planning. World gas conference IFREI Paris 2-6.
9. Belkhatir A, Hamida H (2014) Une ingénierie système relativisée dédiée à la sécurisation du processus de piégeage du CO₂ industriel, ouvrage collectif, Gestion des risques naturels, technologiques, Ed. Cépadués, France.
- 10.
11. Rutqvist J, Vasco DW, Myer L (2009) Coupled reservoir-geomechanical analysis of CO₂ injection at In Salah,Algeria. *Energy Procedia*1: 1847-1854.
12. Ringrose P, Atbi M, Mason D, Espinassous M, Myhrer O, et al. (2009) Plume development around well KB-502 at the In Salah CO₂ storage site. *First Break* 27: 85-89.
13. BRGM, Bureau de la Recherche Géologique et Minière (2015).
14. Wright IW, Mathieson AS, Riddiford F, Bishop (2010) In Salah CO₂ Storage JIP: Site Selection Management, Field Development Plan and Monitoring Overview. *Energy Procedia* 614-1000.
15. Davies E, MacDonald B, McColpin G (2009) CO₂ Sequestration InSAR Monitoring Phase I: Archival Analysis of Well KB-502 In Salah/Krechba Field, Algeria. Pinnacle-MDA Report for JIP.
16. Mason D, Taylor M, Espinassous M, Zinner C, Keddam M, et al. (2010) In Salah Gas Joint Venture: Operating Experience for the CO₂ Carbon Capture and Storage Project in the Krechba Field, Algeria. *Int. Conference on Greenhouse Gas Technologies GHGT-10, Amsterdam*.
17. Iding M, Ringrose P (2009) Evaluating the impact of fractures on the long-term performance of the In Salah CO₂ storage site. *Energy Procedia* 1: 2021-2028.
18. Mathieson A, Midgley J, Dodds K, Wright I, Ringrose P, et al. (2010). CO₂ Algeria. The Leading Edge.
19. Smith J, Durucan S, Korre A, Ji-Quan Shi, Caglar Sinayuc (2010) Assessment of fracture connectivity and potential for CO₂ migration through the reservoir and lower caprock at the In Salah storage site. *Energy Procedia* 4: 5299-5305.