Contribution ID: **350** Type: **Oral Presentation**

Estimation of aquifer permeability using aquifer testing with fiber-optic Distributed Strain Sensing

Monday, 30 May 2022 14:55 (15 minutes)

Permeability & compressibility structures in aquifers are critical for predicting fluid flow behavior as well as utilizing and managing subsurface fluid resources. In conventional pressure-based well testing methods, formation investigation by the packer testing is difficult to operate and only the properties of thick sections can be acquired. In this study, based on the results of a field aquifer test, we show that fiber-optic Distributed Strain Sensing (DSS) can provide high-resolution aquifer formation characterization at fine scales. The strain changes indicate the spatial distribution of fluid pressure migration. Via the poroelastic modeling, we demonstrate that the strain changes, like the pressure changes, contain the information of formation permeability & compressibility. We further apply an inversion algorithm to estimate the fine-scale vertical permeability & compressibility profiles from field DSS records. Our study gives a new reservoir characterization method using DSS in aquifer testing.

Acknowledgment:
This presentation is based on results obtained from a project (JPNP18006) commissioned by the New Energy and Industrial Technology Development Organization(NEDO) and the Ministry of Economy,Trade and Industry(METI) of Japan.

Acceptance of the Terms & Conditions

Click here to agree

MDPI Energies Student Poster Award

No, do not submit my presenation for the student posters award.

Country

Japan

References

[1] Zhang, Yi., Lei, X., Hashimoto, T., & Xue, Z. (2021). Toward retrieving distributed aquifer hydraulic parameters from distributed strain sensing. Journal of Geophysical Research: Solid Earth, 126(1), e2020JB020056.
[2] Zhang, Yi., Xue, Z., Park, H., Shi, J. Q., Kiyama, T., Lei, X., ... & Liang, Y. (2019). Tracking CO2 plumes in clay-rich rock by distributed fiber optic strain sensing (DFOSS): A laboratory demonstration. Water Resources Research, 55(1), 856-867.
[3] Zhang, Yi, & Xue, Z. (2019). Deformation-based monitoring of water migration in rocks using distributed fiber optic strain sensing: A laboratory study. Water Resources Research 55(11) , 8368-8383.
[4] Zhang, Yi., Lei, X., Hashimoto, T., & Xue, Z. (2020). In situ hydromechanical responses during well drilling recorded by fiber-optic distributed strain sensing. Solid Earth, 11(6), 2487-2497.

Time Block Preference

Time Block A (09:00-12:00 CET)

Participation

Online

Primary author: ZHANG, Yi (Geological Carbon dioxide Storage Technology Research Association, Kyoto, Japan; Research Institute of Innovative Technology for the Earth (RITE), Kyoto, Japan)

Presenter: ZHANG, Yi (Geological Carbon dioxide Storage Technology Research Association, Kyoto, Japan; Research Institute of Innovative Technology for the Earth (RITE), Kyoto, Japan)

Session Classification: MS18

Track Classification: (MS18) Innovative Methods for Characterization, Monitoring, and In-Situ Remediation of Contaminated Soils and Aquifers