

Agreement Signing Ceremony for a New Project in Saudi Arabia

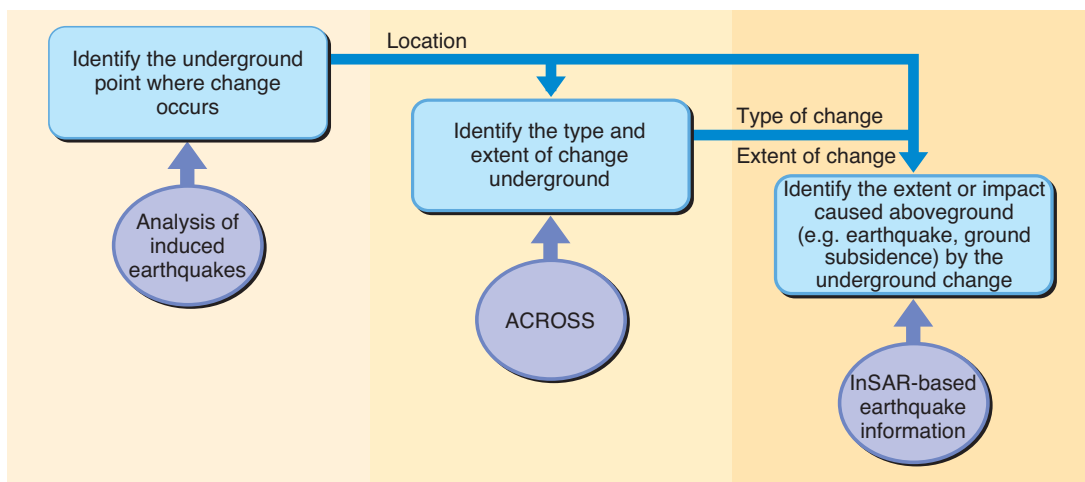
On February 21, 2010, JCCP and King Abdulaziz City for Science and Technology (KACST), a state-run research institution in Saudi Arabia, held an agreement signing ceremony for the project on “Application of Ground Deformation Monitoring Technologies towards Preserving the Natural Resources Infrastructure’s Potential.” The ceremony took place at KACST.

The project aims to survey and develop comprehensive ground deformation monitoring technologies that would prevent ground subsidence and induced earthquakes in oil fields from impacting oil facilities (refining equipments, pipelines, etc.), and to ultimately transfer those technologies to KACST. On the Japanese side, NTT Data CCS Corporation and Nippon Mining Research and

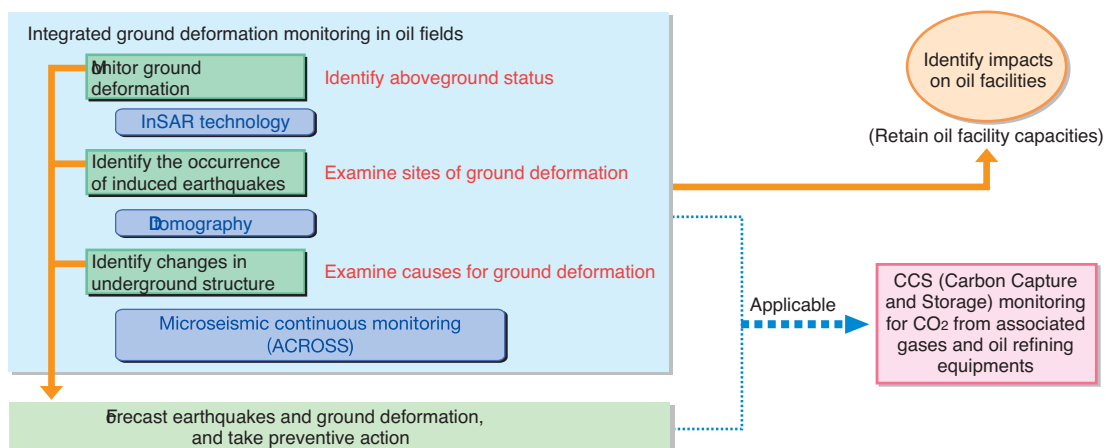
Technology Co., Ltd. are participating in the project.

In oil fields, pressure and stress inside the reservoir can be changed by oilfield operation. This leads to ground subsidence. In order to preserve the production potential in the oil fields, it is necessary to identify the status and causes of ground deformation and also forecast and prevent further deformation. To this end, it is important to introduce monitoring technologies enabling the observation within reservoirs to determine the causes as well as status of ground deformations.

Pressure changes inside the reservoir may cause stress imbalance, which could trigger earthquakes (induced earthquakes). Although the scale of an induced earthquake is normally minimal, it is reported that the magnitude



Interrelationship between ground deformation monitoring technologies



Integrated ground deformation monitoring in oil fields

sometimes exceeds 3. Because the source depth of such induced earthquakes is shallow, its aboveground motion is relatively large, which may impact on oil production facilities directly. In fact an earthquake that occurred in northern Haradh in September 2007 was relatively small on a Japanese scale, with a magnitude of 4.2 and a depth of 33 kilometers (the maximum acceleration was estimated at about 12.5 Gal). Nevertheless, all oil well equipments were shut down in the Hawaiyah oil refinery. In the Haradh oilfield, some 300 induced earthquakes occurred in two months, including minimal ones.

For comprehensive ground deformation monitoring technologies, the project will investigate and develop the InSAR (Interferometric Synthetic Aperture Radar) remote sensing technology, the Double-Difference Tomography (DD tomography) and the ACROSS system (Accurately Controlled Routine-Operated Signal System) technology. The InSAR technology monitors ground surface change in oilfields using satellite data. The DD tomography analyzes induced earthquakes and identifies the accurate locations where ground change is likely to occur. The ACROSS system monitors microseismic waves on a continuous basis to identify the type and extent of stress change in ground change locations. The project will apply these technologies to creating a risk management system.

The signing ceremony was held with the attendance of

H.E. Dr. Mohammed ibn Ibrahim Al-Suwaiyel, President, and H.H. Dr. Turki bin Saud bin Mohammad Al Saud, Vice President, on the KACST side; and H.E. Mr. Shigeru Endo, Ambassador of Japan to Saudi Arabia, Mr. Tatsuo Baba, Executive Officer at NTT Data CCS Corporation, and Mr. Morihiro Yoshida, Managing Director of JCCP, on the Japanese side. The press were also present to report on the commemorative event.

With Dr. Al-Suwaiyel presiding over the ceremony, representatives from the participating companies each gave a speech. KACST members, in particular, expressed their pleasure in the fact that the mutual relationship of cooperation between JCCP and KACST has continued for so many years, and said that the new project is an extremely important undertaking that they expect will be fruitful.

Following the speeches, Dr. Al Saud and Mr. Yoshida affixed their signatures to the agreement, and members from the two countries gave a technical overview of the project. Active questions and answers, including some highly professional ones, were exchanged, and demonstrated KACST's extremely strong interest in the project.

We feel that the signing ceremony was instrumental in promoting mutual awareness of the significance of implementing the project in Saudi Arabia with Japanese technical cooperation.

<by Haruhiko Oshima, Technical Cooperation Dept.>



Signing of the agreement

*(Front row) H.H. Dr. Turki bin Mohammad Al Saud, KACST Vice President (left)
Mr. Morihiro Yoshida, Managing Director of JCCP (right)*
*(Back row) H.E. Dr. Mohammed ibn Ibrahim Al-Suwaiyel, KACST President (left)
H.E. Mr. Shigeru Endo, Ambassador to Saudi Arabia (center),
Mr. Tatsuo Baba, Executive Officer at NTT Data CCS (right)*