

Environmental Monitoring and Pipeline Erosion Detection

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Distributed Temperature Sensing (DTS) has been widely used for infrastructure monitoring. Most common applications are pipeline leak detection prevention and geohazard mitigation as well as power cable thermal rating. The study of the soil-atmosphere thermal interaction reveals that natural phenomenon can be monitored with DTS and buried communication Optical Fiber Cables (OFC). The current article discusses the application of DTS to the monitoring of the effect of soil-atmosphere thermal interaction showing annual and daily variations. DTS data from over 10 years is analyzed, allowing for the observation of the El Niño 2014-2016 event, which is among the strongest of the recent El Niño Southern Oscillation (ENSO) occurrences. It illustrates how DTS technology and communication backbone can provide data to study environmental effects at a global level. In addition, erosion can be monitored using DTS based system. Erosion is a natural hazard that threatens transportation infrastructures, and more specifically to prevent pipeline exposure. The advantage of DTS is not only the erosion detection but also its localization with meter accuracy. A correlation analysis is introduced to quantify erosion by estimating the Depth-of-Cover (DoC). DoC can also be spatially profiled. Erosion events are detected and compared with periodic survey.