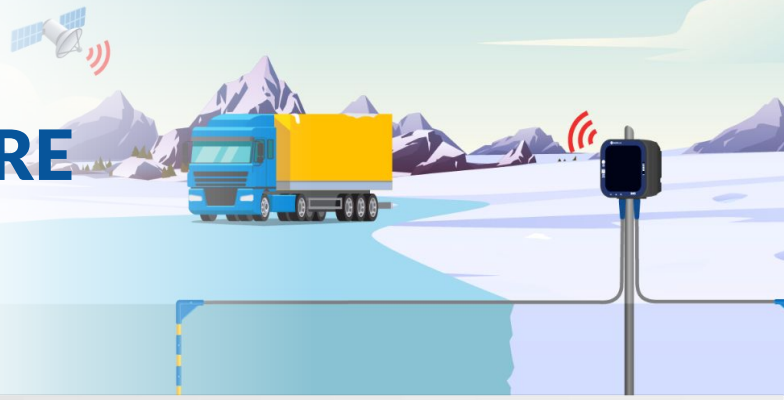


GROUND TEMPERATURE FORECASTING PILOT

CASE STUDY







VARIOUS CUSTOMERS

North Slope, AK, USA

"We can forecast the date of reaching target ground temperatures to within 6-7 hours which aids with planning. We've been able to get out on tundra 1 to 1.5 months sooner by using temperature sensors for monitoring." - Federico Lier, Owner - Ninox Consulting and Civil Engineering



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beadedstream collaborated with Santos Limited (Santos) to enhance ice road construction operations for the Pikka Development Project during the winter of 2023-24. Leveraging innovative technology, the project aimed to optimize resource planning and mitigate risks associated with variable seasonal weather patterns on the North Slope.

Application

Santos conducted a trial of beadedstream's new Temperature Forecasting Tool (TFT) to optimize ice road construction operations for the Pikka Project 2023-24 Development. Tundra sensors were strategically deployed at the west end of this season's ice road network, near the Colville River boat launch. On November 1, 2023, the temperature forecasting tool was integrated with the live data feed from one site, Thermistor T1.

The TFT aims to provide predictive insights into specific ice road route segments, addressing the need for innovation in resource planning by North Slope ice road operators. Given the increasing variability of seasonal weather patterns during freeze-up, the TFT represents a pioneering effort by beadedstream to develop predictive analytics products for industry and research.

Leveraging a Machine Learning algorithm, the TFT forecasts when the temperature 30 cm below ground will reach -5°C . This temperature is significant as it represents the critical threshold for safe ice road construction, aligning with AK DNR guidelines to protect the underlying tundra. These guidelines dictate that the tundra can be opened to off-road travel and ice road construction in coastal areas. The TFT achieves this forecasting by using current and historical data from beadedstream temperature cables and loggers, as well as weather forecasts.



Tundra temperature sensors are installed in the fall before the ice road construction season starts.



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beadedstream Solution

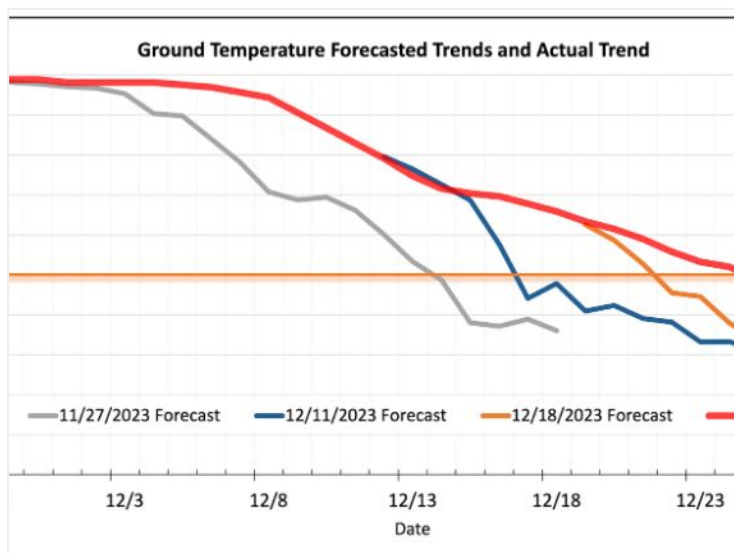
The trial was conducted at one planned ice road site, with data and forecasts also analyzed for several other sites for informational purposes. The TFT provided weekly ground temperature forecasts for the selected site, alongside additional critical information such as the overall average air temperature during the work duration and the date of reaching -5°C compared to historical site data. This comprehensive data analysis enables informed planning for future ice road operations on the North Slope.



beadedstream used D605 remote data loggers, transmitting sensor data from the tundra to the web four times a day. Twelve units were used for that year's ice road monitoring.

beadedstream Solution Benefits

The TFT demonstrated promising accuracy in predicting ground temperature thresholds. A week before temperatures reached -5°C , the tool predicted within 3 days of the actual time, an improvement from 8 days without ML. The precision of predictions increased with proximity to the actual event.



November to December 2023 forecast vs actual ground temperature trends at Site T1.

While detailed analysis continues, initial findings suggest the effectiveness of the forecast model based on minimal data. Notably, Santos obtained its opening permit for tundra travel 21 days before the general opening by the State of Alaska for the same area.

This project highlights the significant potential of the Temperature Forecasting Tool in enhancing operational efficiency and mitigating risks associated with ice road construction, contributing to the success of the Pikka Project 2023-24 Development.