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Development of road fog information for road weather services based on the meteorological satellite(GK2A)

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The threshold values of the GK2A fog algorithm were optimized by performing a multi-class ROC(Receiver Operating Characteristic) analysis on two types of threshold values sensitive to fog intensity as day and night. The developed GK2A road fog algorithm can detect the 3 steps of road fog by visibility distance criteria(1km, 500m, and 200m). The GK2A road fog information was replaced with visibility objective analysis data in unknown and cloud areas of satellite data. In the last process, the road fog information based on meteorological satellite was merged with visibility distance data of visibility gauges data and CCTV image analysis data, which are observed on the highways to improve the accuracy of road fog detection. The developed road fog algorithm based on a meteorological satellite provides real-time road fog information which has a spatial and temporal resolution of 1km x 1km and 5 minutes each other, and the road fog information is divided into the 3 steps(attention, caution, and danger) by visibility distance. The road fog algorithm was successful in detecting 5 times(71.4%) against the 7 traffic accidents induced by fog recorded by Korean news media from 2020 to 2022. It looks forward to being more accurate as an adding new visibility gauge in a highway and when the next high-resolution meteorological satellite(GK5) will launch.

The road fog information service was first started in the middle inner highway on July 27, 2023, and all T-map users can use this service through the car navigation system for free. This service will expand to the west coastal highway in 2023 and the last goal of this research is to supply real-time observing road fog information on all Korean highways.