



Developing a Real-Time Ecosystem Monitoring Platform using IBM Stream Analytics

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Through our current partnership with IBM Alberta Center for Advanced Studies and the use of Stream Analytics, we have developed an environmental monitoring platform capable of real-time processing and analysis of eddy covariance, meteorological, and optical remote sensing time series data. The Stream Analytics platform also allows integration of carbon and water fluxes with meteorological and optical data. These integrated products are starting to deliver new tools for understanding drivers of ecosystem productivity as well as validating current terrestrial carbon models derived from satellite platforms. The real-time ingestion and manipulation of the different data streams allows for real-time monitoring of ecosystems and is proving useful in the identification and quantification of the effect of short-term disturbances on ecosystem-scale carbon budgets. A dataset composing of four years of flux, weather, and optical wireless sensor network collected over a tropical dry forest in Costa Rica was used as a test dataset. The test dataset included drought and flooding events to test the ability of the platform to identify disturbance events. Processing results were compared to traditional post-collection processing procedures and software (Eddy Pro and EdiRe) to assess accuracy and processing speed. The ability to provide real-time global responses based on the integration of present climate and vegetation status can help resolve issues of carbon quantification and verification that currently hinders the development of effective carbon markets. We see this project as representing a transformative way of quantifying biosequestration and how to conduct global ecosystem monitoring.