



Multi-modal Remote Surveillance of Localized Processes Using Cube Satellite Platforms: Fuel Cycle and Reactor Facilities and Event Recognition

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Abstract:

The effort is focused on science and technology of predictive and on-demand characterization of localized developments on the Earth surface, subsurface and within the atmosphere. The use of remote surveillance methods, such as orbital surveys, offers uninhibited access opportunities for assessing any location in 3D from subsurface up to the upper atmosphere layer. This local feature observation can be organized to provide continuous data feeds or can be setup for discrete interval on-demand reporting targeting periods of interest.

The project is a synthesis of high TRL observational platforms, cube satellites and small satellites, with lower TRL sensors and predictive methods including fusion and machine learning to yield a robust multi-modal surveillance and prediction capability. To be feasible for practical applications, this approach needs to establish methods for signature generation capabilities for localized events and features of interest. Furthermore, these signatures may need to be developed on demand and in an automated manner from within the surveillance platform. The data feed and transmission and sensor resolution as well as various noise perturbations should be accounted for to assure robust interpretation capabilities for events, phenomena and features of interest. These signatures are expected to be a multi-modal/multi-dimensional data aggregates capturing and integrating heterogeneous data feeds. Such a process signature development is an integral part of the effort. The results are expected to be widely applicable for all survey programs where signatures are needed to characterize developing local phenomena remotely. In particular, the CubeSat platform solves the challenge of access to a location of interest. The effort is an integrated program consisting of computational and experimental elements including development, design, and analysis of configuration options for cube-satellite-based survey systems to demonstrated advantages of such a platform in remote sensing activities. The poster will discuss the current status focusing on the fuel cycle facilities and reactor facilities and their signatures for event recognition, interpretation processes and identification. Signature-based sensor considerations are also included.