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Toward Generic, Multi-Modal Object Tracking and Image Fusion using Unsupervised Deep Learning

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Sets of similar remote sensors have provided important insights into different Earth subsystems, and subsystem interactions haven become better understood. With this increase in knowledge as well as an increase in different remote sensors, comes additional opportunities to gain new insights by studying these sensors' datasets in aggregate. This can be a challenging task, however, because not only is there a vast number of features that can be looked at, but each instrument requires specific knowledge, and each dataset from each instrument requires additional knowledge before they can be leveraged. To add to this complexity, a user would need to know translation and combination techniques to get a properly fused dataset. While there are established techniques for combining certain datasets, there is no generic, automated method that can potentially address the complete problem. This poster shows the progress of the second stage of our research, which, overall, aims to provide a framework that allows for the tracking of objects across different image-like data-modalities, given data in a similar spatio-temporal range, automatically co-register these images when appropriate, and fuse data. Using Deep Belief Networks combined with other unsupervised machine learning techniques, we are able to track objects across multi-modal datasets in the same spatio-temporal ranges, with a high level of certainty.