ID: **P4.4-470**                                                   Type: **E-poster**

# for training predictive maintenance algorithms with sparse, unlabeled data

Predicting equipment degradation and failure within the International Monitoring System (IMS) would enable more efficient maintenance intervals and ultimately reduce station downtime. The coarse sampling of the time-series data, the scarcity of known, labeled failures, as well as the potential influence of unknown failures in the training data makes an AI/ML solution challenging. We introduce a methodology that leverages several state of the art methods in unsupervised training, data augmentation, and model design to overcome these difficulties. We outline our training procedure and offer a series of diagnostic tests that can equally apply to time-series data sets with similar qualities. We show that this method can produce embeddings from time-series data that can be used to compute a system health score. We also illustrate a CONOPS where an algorithm trained using this method can learn to classify early signs of degradation from a database of observed failures. Finally, we discuss the key challenges of deploying such an algorithm and its potential impact on operations.

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**Session Classification:** P4.4 International Monitoring System Sustainment into the future

**Track Classification:** Theme 4. Sustainment of Networks, Performance Evaluation, and Optimization: T4.4 International Monitoring System Sustainment into the future