Abstract B44A–02:
A Strategy for Global Phenological Observatories

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We propose and implement a cluster-based approach for identifying global phenological observatories in which phenologically and climatologically self-similar pixel clusters are monitored. We developed clusters based on a wavelet-filtered subset of the 1982–1999 global Pathfinder Advanced Very High Resolution Radiometer (AVHRR) Land (PAL) Normalized Difference Vegetation Index (NDVI) dataset, a global 10-minute resolution climatology, and the clustering approach developed by the Oak Ridge National Laboratories (ORNL). In the ORNL approach: (1) n cluster centers are defined based on the multi-dimensional NDVI/climate space; (2) pixel distances from the centroids are calculated; (3) pixels are assigned to the minimum distance cluster. While any number of clusters may be specified, we found that a global 500-cluster approach provided a satisfactory global distribution. In traditional rectangular approaches a group of pixels could contain desert, grassland, and tropical forest. Here, longitudinally extensive but latitudinally limited regions such as the Sahel exist as distinct groups. Thus, our approach avoids problems affecting single-pixel approaches (misregistration, cloud contamination) and rectangular approaches (mixed phenological signals). Using the 1982–2003 GIMMS AVHRR dataset, we extracted phenological metrics such as the onset and offset of greenness for each cluster. We then ranked each cluster based on land cover homogeneity, evidence of human impacts, and political diversity. For each biome, we then identified the highest ranked clusters within four climate zones (hot/wet, hot/dry, cold/wet, cold/dry). This strategy provides: (1) selection of regions for which a strong annual is detectable, (2) a method of identifying regions least likely to be impacted by non-climatic factors, and (3) a strategy for ground validation.

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