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Potential for use of GPM and global water cycle remotely sensed data sets for flood and drought prediction

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A major motivation for the Global Precipitation Measurement (GPM) mission is to provide improved globally consistent forcings for land surface models, which in turn can be used to predict hydrological extremes - in particular, floods and droughts. While the potential now exists to produce nowcasts and forecasts of floods and droughts globally (at least in moderate to large river basins), there is presently no coordinated, integrated approach to this problem. The reasons for the absence of global hydrologic nowcast and forecast products have roots in institutional constraints within the major weather prediction centers and agencies, in observational limitations, and in modeling constructs and experience. All three issues are discussed briefly. From an institutional perspective, hydrologic prediction has historically been handled in a manner that is fundamentally different from weather prediction. In particular, the responsible institutions are spatially fragmented in such a way that a large scale, global view is essentially impossible. From an observational standpoint, there are critical limitations to accessing gage-based precipitation, and other land surface hydrologic forcings, in a timely manner. In this respect, remotely sensed precipitation products offer great potential, although there are critical spatial resolution and accuracy issues, as well as a strategic issue of how best to utilize remote sensing products together with global coupled model analysis fields, that need to be addressed. Finally, operational hydrologic models rely heavily on calibration, which is time consuming, and highly local in nature. The extent to which automated calibration procedures can be useful in a global context (and alternative approaches that might minimize the need for calibration), and the role of data assimilation, are reviewed.