Advanced instruments of current and planned satellite missions will increasingly provide large volumes of data related to the atmospheric, oceanic, and land surface state. During this decade, planned satellite missions have resulted in a five order of magnitude increase in the volume of data available for use by operational and research communities. These data have exhibited accuracies and spatial, spectral and temporal resolution never before achieved. New instruments such as the Atmospheric Infrared Sounder (AIRS) and the Infrared Atmospheric Sounding Interferometer (IASI), data from the recent The Constellation Observing System for Meteorology, Ionosphere and Climate (COSMIC) Global Positioning System (GPS) based radio-occultation system and high spatial and temporal resolution observations from geostationary orbit have allowed the Earth system state to be described with the precision to significantly improve environmental and climate monitoring and prediction. The significant improvements in monitoring and predicting the Earth system resulting from the assimilation of these data will be summarised. Specific examples will be shown of significant improvements in analysis and predictability from use of advanced sounder data, continuous winds available from geostationary observations and use of occultation data from the COSMIC constellation. Finally areas where improvements may be expected, both in terms of better use of observations and data application methodologies will be discussed and their importance to earth system monitoring and prediction will be noted.