

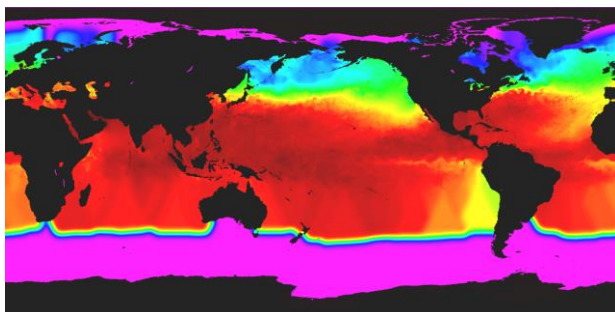
Spatial Resolution



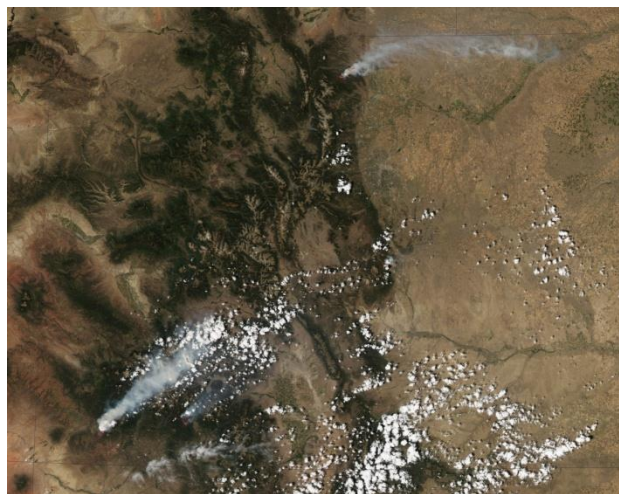
Each remote sensor carried by a satellite is designed to monitor a selection of wavebands at a resolution needed for its particular mission. "Spatial resolution" of a satellite image refers to the distance on the ground represented by each image pixel as the sensor looks straight down at the Earth's surface (nadir). Automated Picture Transmission (APT) instruments on NOAA polar orbiting weather satellites have a resolution of 4km/pixel. The Advanced Very High Resolution Radiometer (AVHRR) on the same satellites is a High Resolution Picture Transmission (HRPT) sensor with a resolution of 1km/pixel. The Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra and Aqua satellites captures radiation in 36 visible and infrared wavebands at resolutions of 250, 500, and 1000 meters/pixel depending on the band. The sensors on Landsat 7 and Landsat 8 have a resolution of 30m/pixel in 7 and 11 wavebands, respectively. These high-resolution data are widely used for a variety of purposes from assessing crop health to land use studies, from the search for new sources of petroleum to calculating snowfall, from distinguishing cultural features to determining soil moisture content.

Each of these remote sensor examples has a nadir perspective. That is, it looks at the Earth's surface from a point directly above the ground it is observing and looking toward the center of the Earth. This perspective can result in a distortion of data that are close to the edge of the image window. The Multi-angle Imaging SpectroRadiometer (MISR) on NASA's Terra satellite launched in 1999 adds the perspective of angled observation. According to NASA's Langley Atmospheric Research Center, MISR is designed to view the sunlit Earth simultaneously at nine widely-spaced angles and provides images in 4 spectral bands at resolutions of 275 and 1100 meters.

To illustrate the impact of image resolution on viewing perspective, compare these two images. The left image below is a composite image of AVHRR data from a NOAA polar orbiting weather satellite that has been processed for display at 4km/pixel to give a broader global perspective -- in this case, world-wide sea surface temperature. For comparison, the right image is from MODIS on Terra. Notice greater image detail than the AVHRR image. The higher resolution from MODIS provides a localized perspective of these wildfires in Colorado.



AVHRR – Multi Channel Sea Surface Temperature, 1994



MODIS – Colorado Wildfires, June 26, 2012