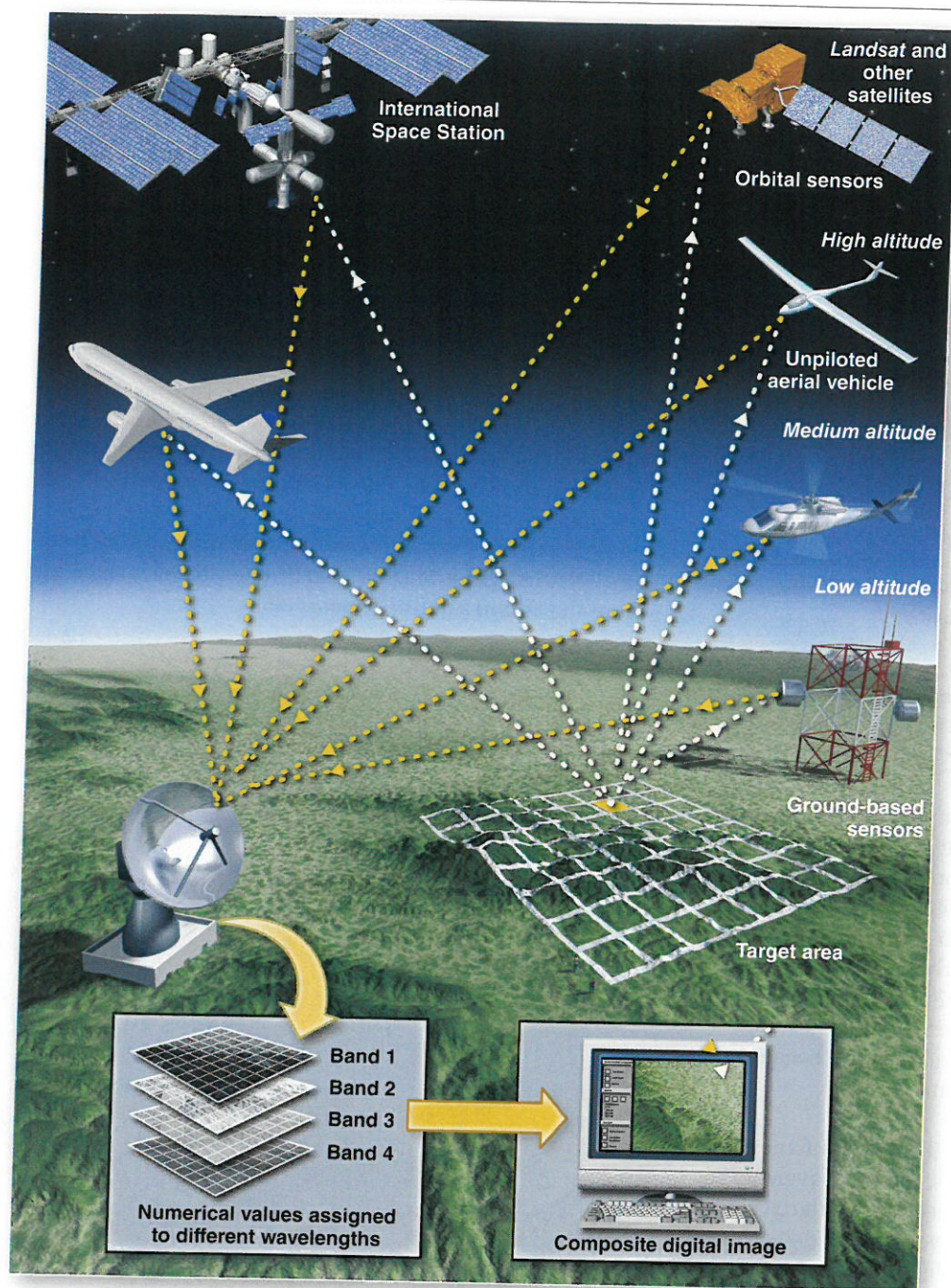




A sample of orbital platforms:

CloudSat: Studies cloud extent, distribution, radiative properties, and structure.

ENVISAT: ESA environment-monitoring satellite; 10 sensors, including next generation radar.

GOES: Weather-monitoring and forecasting; GOES-12, -13, -14, and -15.

GRACE: Accurately maps Earth's gravitational field.

JASON-1, -2: Measure sea-level heights.

Landsat: Landsat-1 in 1972 to Landsat-7 in 1999 and Landsat-8 in 2013; have provided millions of images for Earth systems science and study of global change.

NOAA: First in 1978 through NOAA-15, -16, -17, -18, and -19 now in operation; global data gathering, short- and long-term weather forecasts.

RADARSAT-1, -2: Synthetic Aperture Radar in near-polar orbit, operated by Canadian Space Agency.

SciSat-1: Analyzes trace gases, thin clouds, atmospheric aerosols with Arctic focus.

SeaStar: Carries the SeaWiFS (Sea-Viewing Wide Field-of-View Sensor) to observe Earth's oceans and microscopic marine plants.

Terra and Aqua: Environmental change, error-free surface images, cloud properties, through five instrument packages.

TOMS-EP: Total Ozone Mapping Spectrometer, monitoring stratospheric ozone; similar instruments on NIMBUS-7 and Meteor-3.

TOPEX-POSEIDON: Measures sea-level heights.

TRMM: Tropical Rainfall Measuring Mission, includes lightning detection and global energy budget measurements.

For more information, see:
<http://www.nasa.gov/centers/goddard/missions/index.html>

▲ **Figure 1.23 Remote-sensing technology.** Remote-sensing technology measures and monitors Earth's systems from orbiting spacecraft, aircraft, and ground-based sensors. Various wavelengths (bands) are detected by sensors; computers process these data and produce digital images for analysis. A sampling of remote-sensing platforms is listed along the side of the illustration. Also, see the "Remote-Sensing Status Report" on the *MasteringGeography* website.

many communications and weather satellites use these high Earth orbits.

Some satellites orbit at lower altitudes. The pull of Earth's gravity means that the closer to Earth they are, the faster their orbiting speed is. For example, GPS satellites, at altitudes of about 20,200 km (12,552 mi), have *medium Earth orbits* that move more quickly than high Earth orbits. *Low Earth orbits*, at altitudes less than 1000 km (621 mi), are the most useful for scientific monitoring. Several of the National Aeronautics and Space

Administration (NASA) environmental satellites in low Earth orbit are at altitudes of about 700 km (435 mi), completing one orbit every 99 minutes.

The angle of a satellite's orbit in relation to Earth's equator is its *inclination*, another factor affecting remotely sensed data. Some satellites orbit near the equator to monitor Earth's tropical regions; this low-inclination orbit acquires data only from low latitudes. An example is the *Tropical Rainfall Measuring Mission (TRMM)* satellite, which provides data for mapping rainfall patterns in the