The EOS Advanced Spaceborne Thermal Emission Relfectance Radiometer (ASTER): High Resolution Imager for Earth Science

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Remote sensing data for earth science applications will be greatly improved in 1998 with the launch of NASA's Earth Observation System AM-1 (EOS-A) satellite platform, that will carry five earth observation instruments. One of these instruments is the Advanced Spaceborne Thermal Emission and Reflectance Radiometer (ASTER), This imaging system will provide high spatial resolution data in the visible and near-infrared (VNIR), short-wave infrared (SWIR), and thermal infrared (TIR) wavelength regions and along-track stereo imaging capability for producing digital elevation models. The instrument will have three bands in the VNIR spectral range (0.5- 1.0 μm) with 15 m spatial resolution, six bands in the SWIR spectral range (1.0-2.5 pm) with 30 m resolution, and five bands in the TIR spectral range (8-12 μm), with 90 m resolution. The swath width of an image will be 60 km. Cross-track pointing out to 136 km will allow viewing of any spot on Earth at least once every sixteen days. ASTER is a joint project between Japan and the United States; the Japanese are building the instrument, and the US is providing the launch vehicle and telemetry. Science team activities and data distribution are shared responsibilities.

ASTER is the only high spatial resolution surface imager on EOS-A. As a result there are a variety of distinct science objectives for the instrument, The main contributions to the EOS global change studies will be in providing surface temperatures, surface emitted and reflected radiances at a spatial scale that will allow detailed surface studies to be conducted at the sub-pixel level of the other global monitoring instruments .

The multispectral thermal infrared data will allow better separation of the brightness temperature into surface kinetic temperature and surface spectral emissivity, than has been previously possible. These surface temperature data have applications in studies of surface radiation balance as required by climate, weather and biogeochemical models.

Oceanographic, limnologic, and sea ice studies will benefit from ASTER's high spatial and spectral resolutions, allowing analyses of phytoplankton distribution, turbidity and sediment load patterns, and separation of snow/ice/water. ASTER's high temperature sensitivity will allow detailed studies of lake, river, and ocean thermal phenomena.