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Role of thermal infrared remote sensing in agricultural water management

RAKHESH.D[1] AND NISHA ARAVIND*[2]
[1]Soil Conservation Office, Tiruvalla (Kerala), India
[2]Department of Agriculture Extension, KVK, Pathanamthitta dist. (Kerala), India

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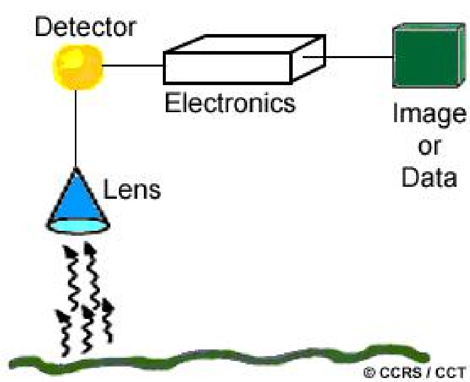
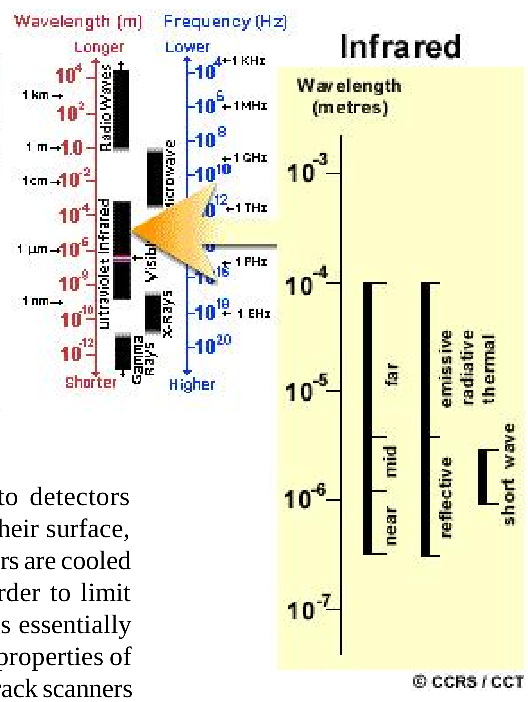
SUMMARY
Many multispectral (MSS) systems sense radiation in the thermal infrared as well as the visible and reflected infrared portions of the spectrum. . However, remote sensing of energy emitted from the Earth's surface in the thermal infrared (3 mm to 15 mm) is different than the sensing of reflected energy. Thermal sensors use photo detectors sensitive to the direct contact of photons on their surface, to detect emitted thermal radiation. The detectors are cooled to temperatures close to absolute zero in order to limit their own thermal emissions. Thermal sensors essentially measure the surface temperature and thermal properties of targets. Some of the important space borne systems, with thermal imaging capability with specific relevance to agricultural water management, are NOAA Advanced Very High Resolution Radiometer (AVHRR), Landsat TM Bands, Terra-Aqua/Modis sensor. In this paper importance of Thermal Remote Sensing in Agricultural Water Management, Assessment of Irrigation Water Requirement, Irrigation scheduling,To detect and quantify plant water stress, For determining Canopy-air temperature difference (CATD) and stress degree days (SDD), Canopy temperature validity (CTV), Temperature stress day (TSD):, Crop water stress index (CWSI):, Water Deficit Index (WDI) is reviewed. In this paper a modest attempt has been made to review the effectiveness of thermal imaging technology in the field of agriculture specifically in optimum management of scarce water resources.

Key words : Remote sensing, Water management.

Many multispectral (MSS) systems sense radiation in the thermal infrared as well as the visible and reflected infrared portions of the spectrum. However, remote sensing of energy emitted from the Earth's surface in the thermal infrared (3 mm to 15 mm) is different than the sensing of reflected energy. Thermal sensors use photo detectors sensitive to the direct contact of photons on their surface, to detect emitted thermal radiation. The detectors are cooled to tempe-ratures close to absolute zero in order to limit their own thermal emissions. Thermal sensors essentially measure the surface temperature and thermal properties of targets. Thermal imagers are typically across-track scanners (like those described in the previous section) that detect emitted radiation in only the thermal portion of the spectrum. Thermal sensors employ one or more internal temperature references for comparison with the detected radiation, so they can be related to absolute radiant temperature. (Anon, 2003)





Because of the relatively long wavelength of thermal radiation (compared to visible radiation), atmospheric scattering is minimal. However, absorption by atmospheric gases normally restricts thermal sensing to two specific regions 3 to 5 ìm and 8 to 14 ìm. Because energy decreases as the wavelength increases, thermal sensors generally have large IFOVs to ensure that enough energy reaches the detector in order to make a reliable measurement. Therefore the spatial resolution of thermal sensors is usually fairly coarse, relative to the spatial resolution possible in the visible and reflected in-

*Author for correspondence