FLOOD MONITORING USING MICROWAVE DATA IN GOOGLE EARTH ENGINE

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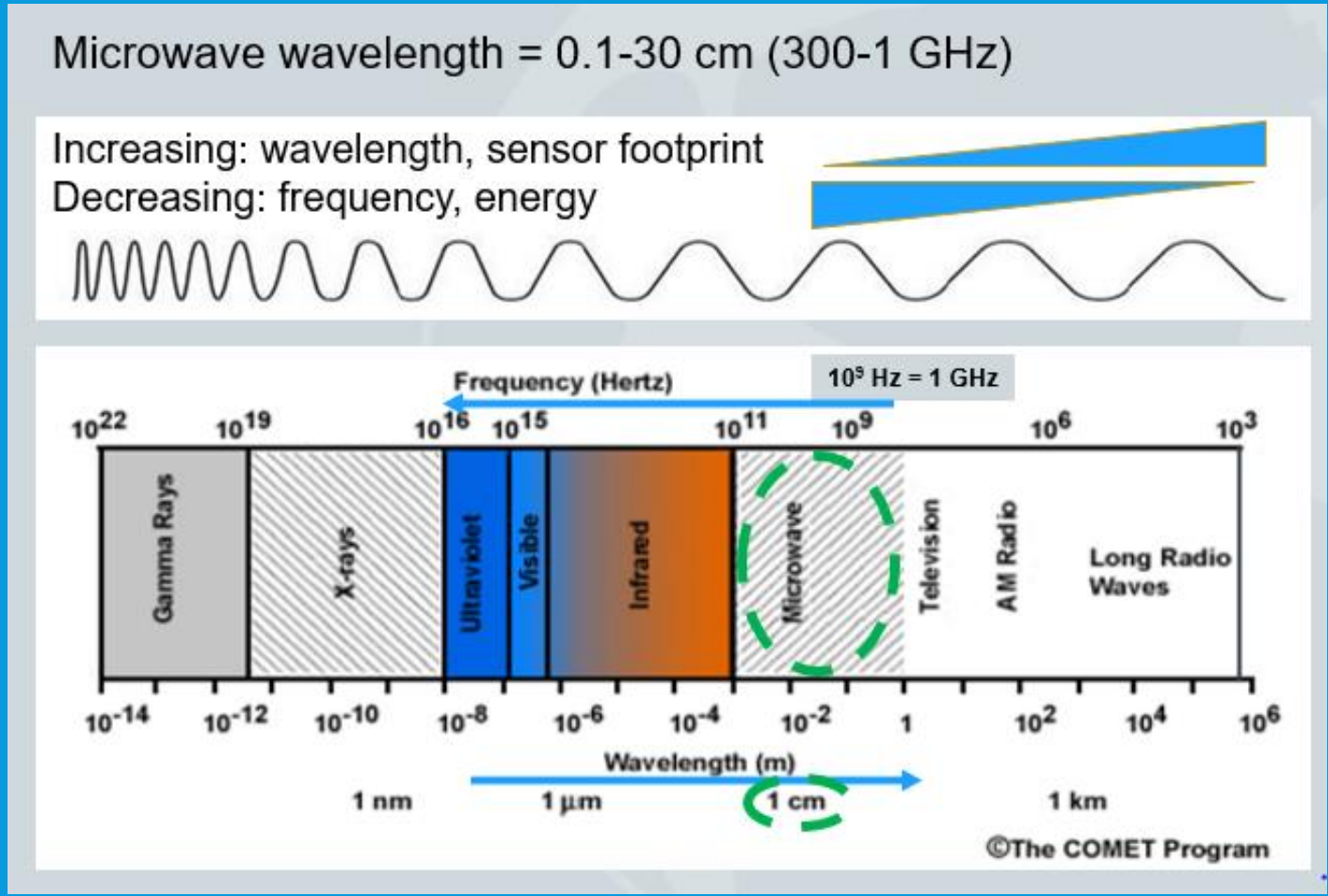
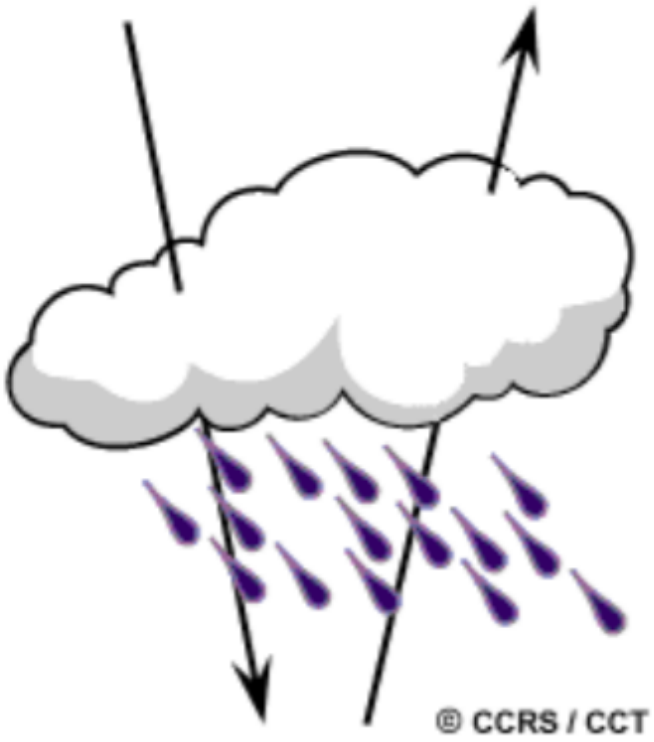
MICROWAVE REMOTE SENSING

- The portion of the spectrum of more recent interest to remote sensing is the microwave region from about **1mm to 1m**.
- This covers the longest wavelengths used for remote sensing.
- The shorter wavelengths have properties similar to the thermal infrared region while the longer wavelengths approach the wavelengths used for radio broadcasts.
- **The remote sensing using microwave spectrum is termed as microwave sensing**



Microwave Remote Sensing

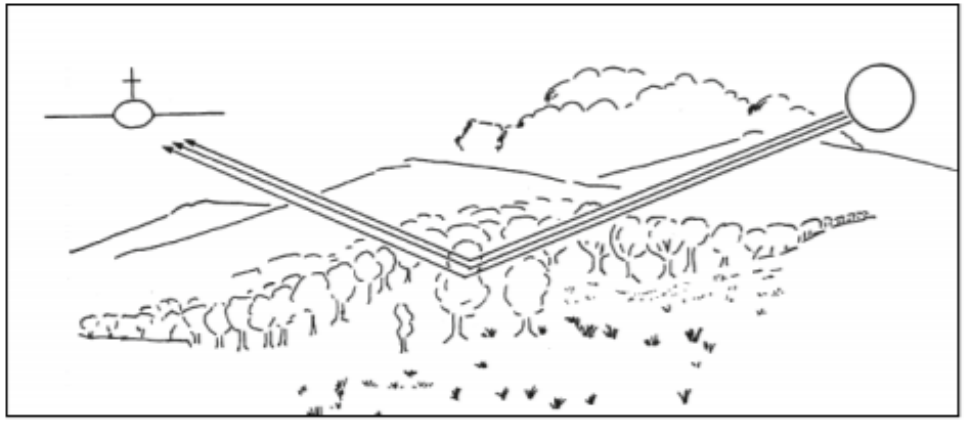
- Microwave remote sensing covers EM spectrum in the range from approximately 1mm to 1m
- Because of their long wavelengths, compared to the visible and infrared, microwaves have special properties that are important for remote sensing.
- Longer wavelength microwave radiation can **penetrate through cloud cover, haze, dust,** and all but the heaviest rainfall as the longer wavelengths are not susceptible to atmospheric scattering which affects shorter optical wavelengths.
- This property allows detection of microwave energy under almost all weather and environmental conditions so that data can be collected at any time



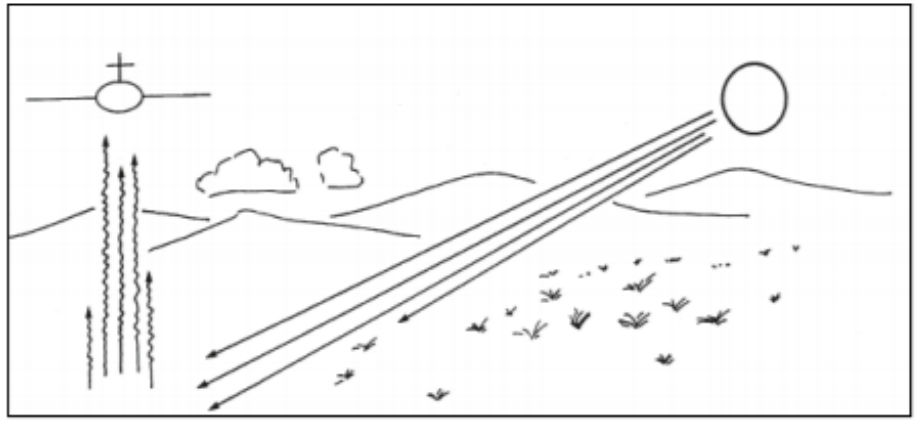
Type of Microwave Remote Sensing

Passive RS

- Natural (EMR from Sun)



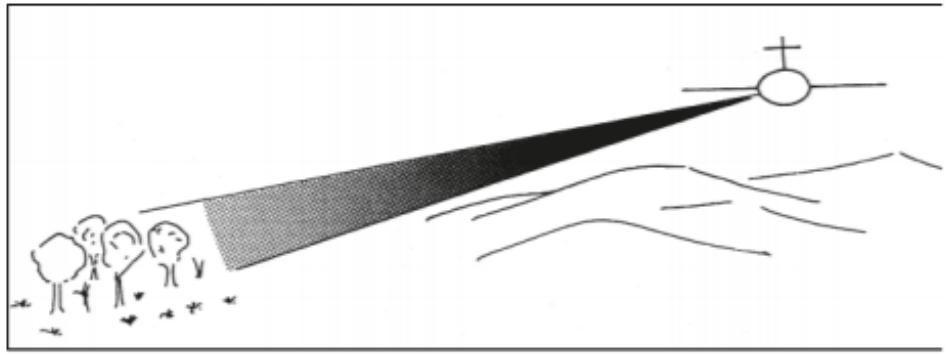
RS using reflected solar radiation



RS using emitted terrestrial radiation

Active RS

- Technological Assisted Radiation



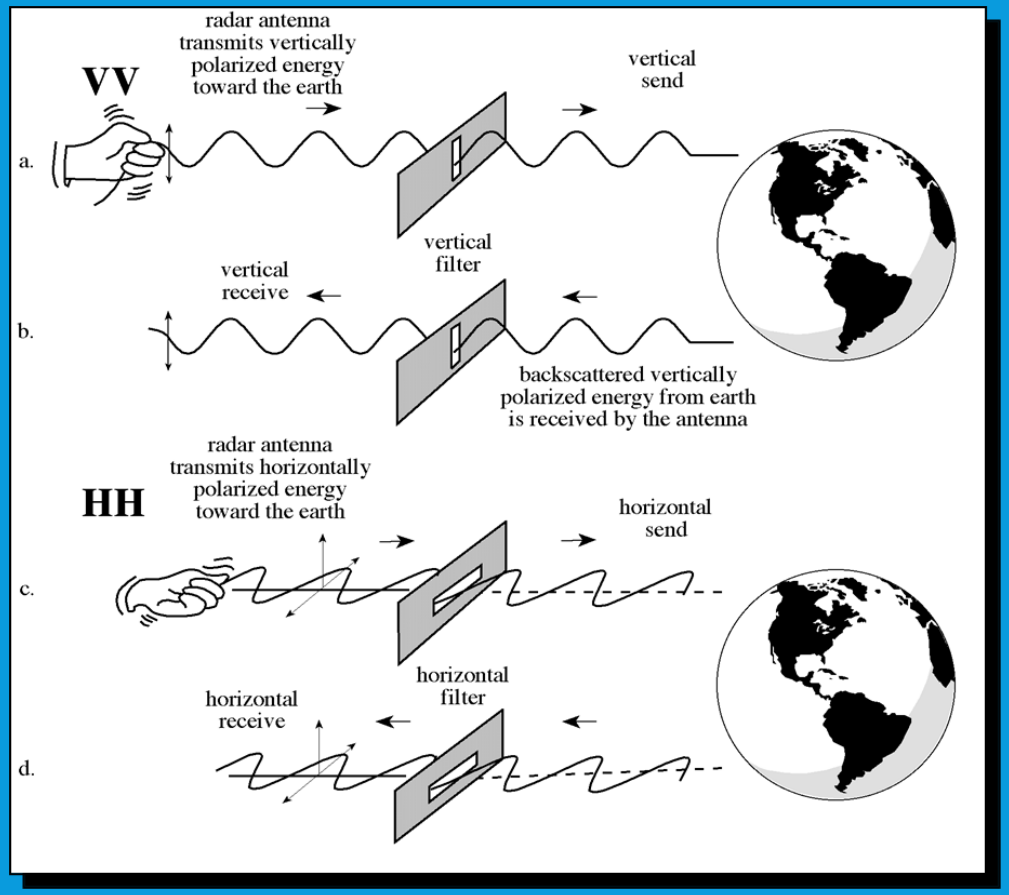
RS using senor's transmitted radiation

BASICS OF PASSIVE AND ACTIVE RS

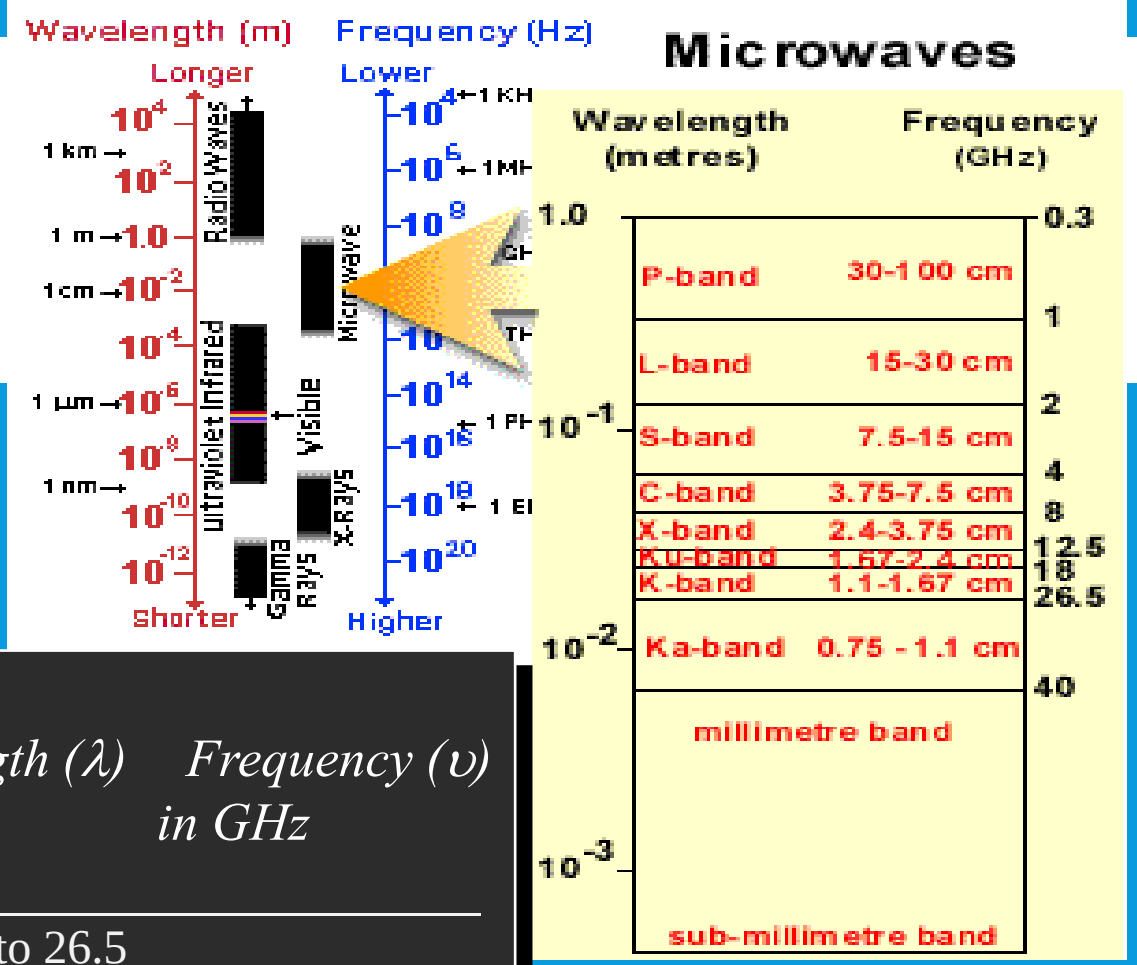
- **Passive**: uses natural energy, either reflected sunlight (solar energy) or emitted thermal or microwave radiation.
- **Active**: sensor creates its own energy
  - Transmitted toward Earth or other targets
  - Interacts with atmosphere and/or surface
  - Reflects back toward sensor (backscatter)

POLARIZATION

- *Unpolarized* energy vibrates in all possible directions perpendicular to the direction of travel.
- The pulse of electromagnetic energy is filtered and sent out by the antenna may be *vertically* or *horizontally polarized*.
- The pulse of energy received by the antenna may be *vertically* or *horizontally polarized*
- VV, HH – like-polarized imagery
- VH, HV- cross-polarized imagery



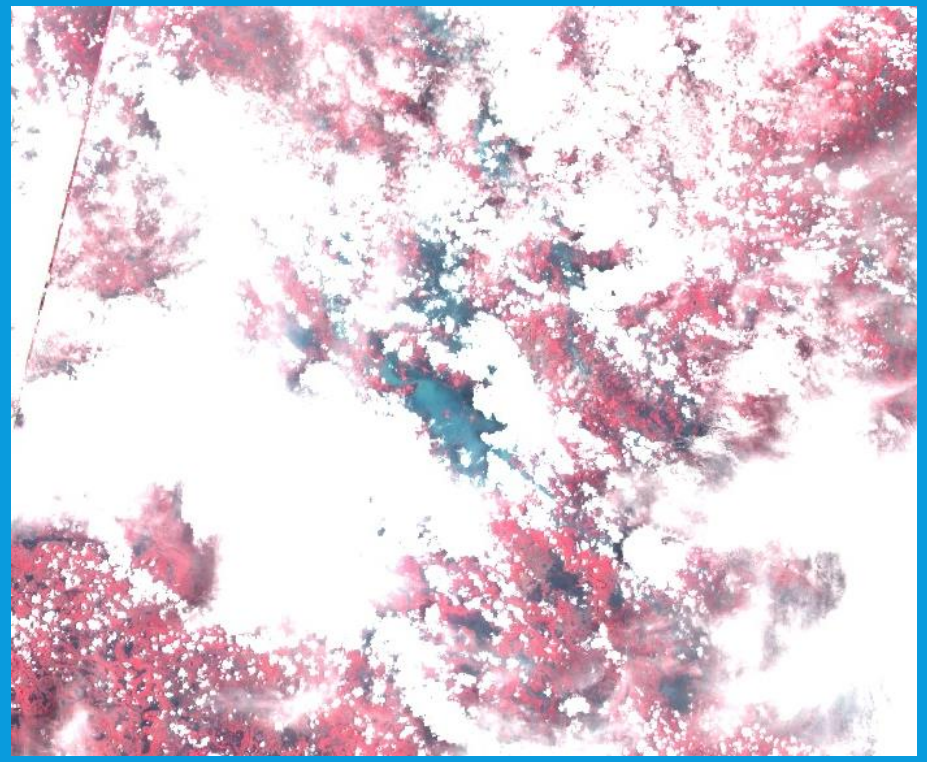
MICROWAVES



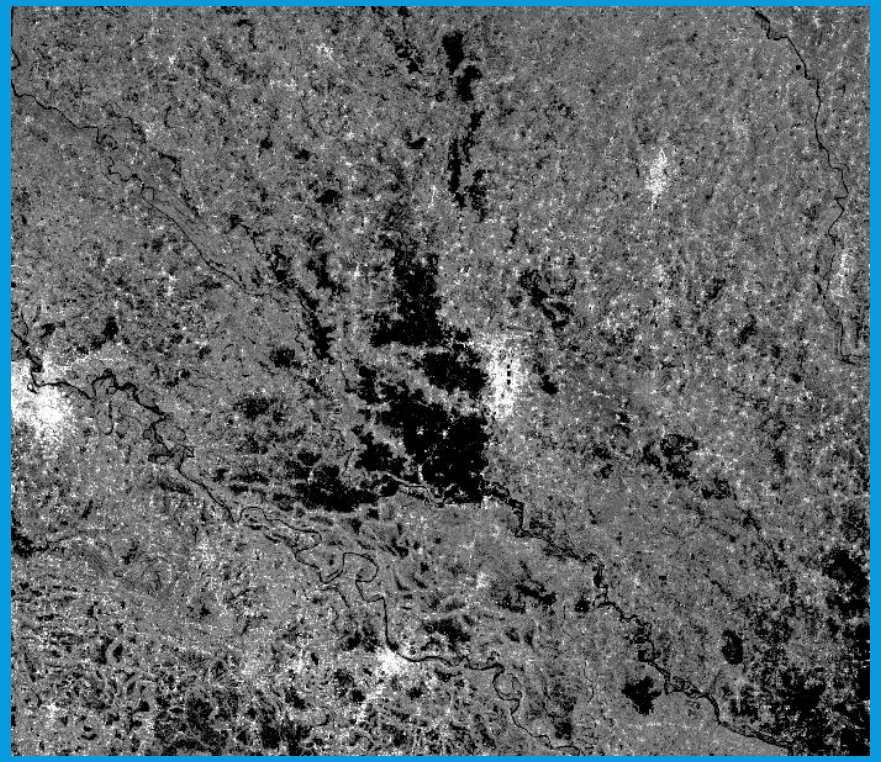
Band Designations (common wavelengths shown in parentheses)	*Wavelength (λ) in cm*	*Frequency (υ) in GHz*
Ka (0.86 cm)	0.75 - 1.18	40.0 to 26.5
K	1.18 - 1.67	26.5 to 18.0
K_u	1.67 - 2.4	18.0 to 12.5
X (3.0 and 3.2 cm)	2.4 - 3.8	12.5 - 8.0
C (7.5, 6.0 cm)	3.8 - 7.5	8.0 - 4.0
S (8.0, 9.6, 12.6 cm)	7.5 - 15.0	4.0 - 2.0
L (23.5, 24.0, 25.0 cm)	15.0 - 30.0	2.0 - 1.0
P (68.0 cm)	30.0 - 100	1.0 - 0.3

OPTICAL V/S MICROWAVE DATA

Optical data of Bihar flood



Microwave data of Bihar Flood



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Google Earth Engine Based Approach for Assessment and Management of Flood in Ganga Sub Basin – Ghaghra Confluence to Gomti Confluence

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Abstract: Floods are an intense and frequent disaster happening in numerous portions of the world. Flood is a excess of water that submerges surroundings that is normally dry. It is the sever problem in Ganga Sub Basin - Ghaghra Confluence to Gomti Confluence of Uttar Pradesh. Near real time mapping of inundated areas is very important for figuring out the flood extent, deployment of emergency reaction teams, and evaluation of damages and casualties. In this thesis work, a real time flood mapping and monitoring online WEB based application using Sentinel-1 time-series data has been developed on Google Earth Engine (GEE) platform. The SAR Data has Capability to see through the cloud and during the flood the major problem with optical data is, it can not see through the cloud. In this thesis work the SAR data has been used to identify the inundated pixels before and during flood to identify the extent and calamities due to flood. Flood is a hazardous natural phenomenon which severely affect lives, goods and services. Monitoring of flood affected area becomes compulsory for emergency

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