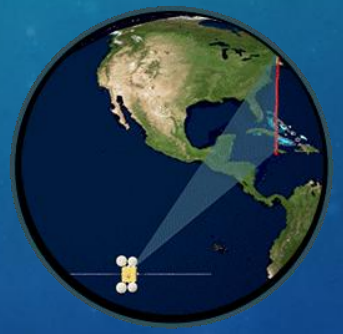
Use of Remote Sensing data by Ministry of Jal Shakti for improving water management



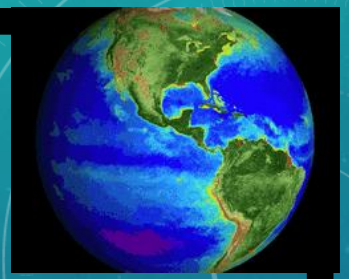
March 29, 2022

Rakesh Kashyap
Senior Joint Commissioner I
National Hydrology Project
Ministry of Jal Shakti

ASPECTS OF WATER MANAGEMENT

- Measure, monitor before manage
- Measuring
  - Components of water cycle
    - Water vapour in atmosphere
    - Rainfall
    - Runoff
    - Soil Moisture
    - Storage in reservoirs and tanks
    - Water as snow in high altitudes
    - Evapotranspiration

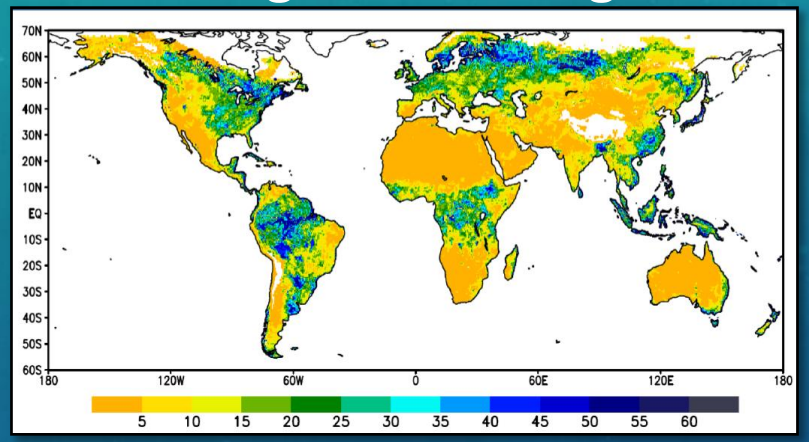
ASPECTS OF WATER MANAGEMENT

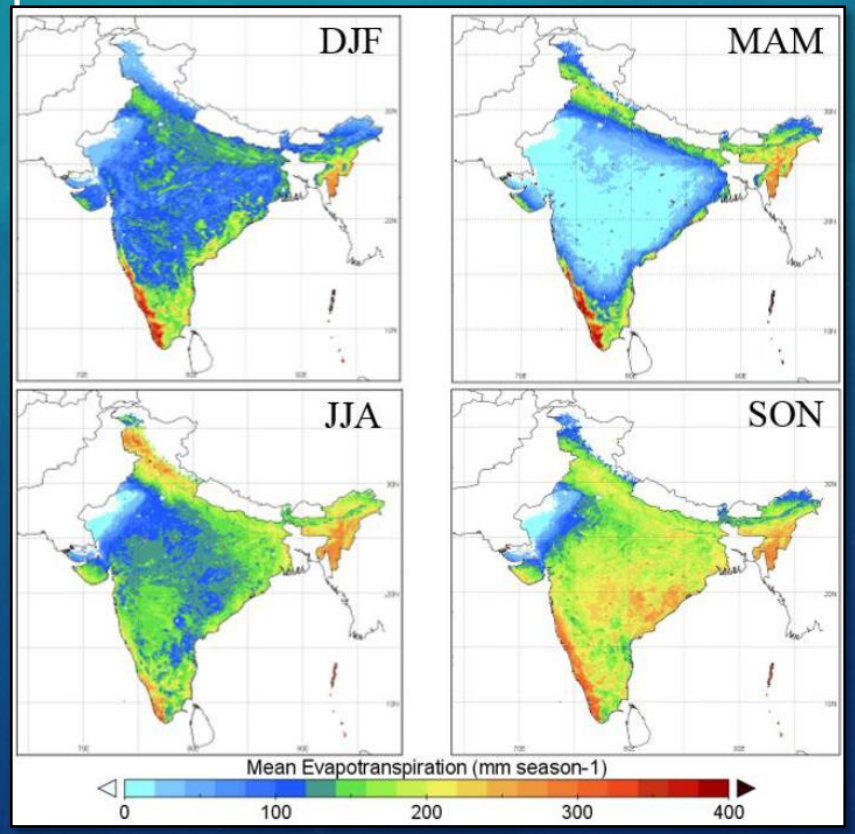


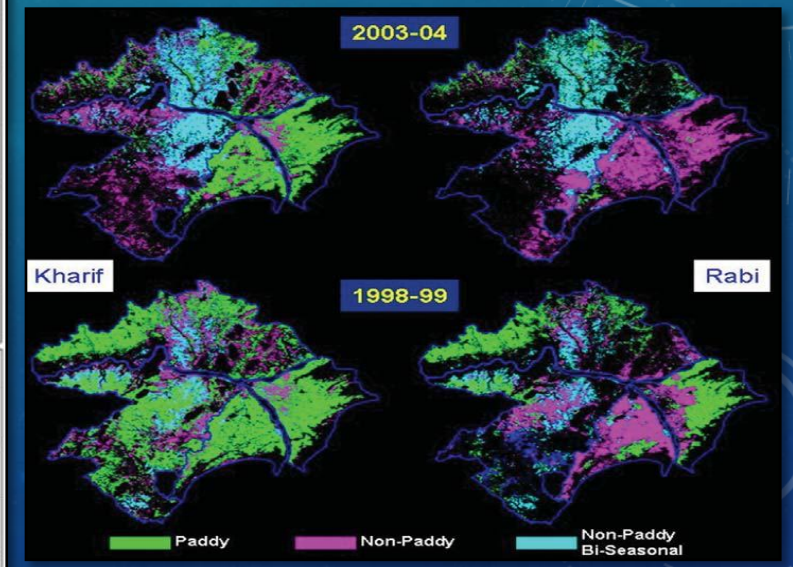
- Monitoring
  - Water accounting: How much
  - Water budgeting: Meeting sectoral demands
  - Water auditing: Performance evaluation

APPLICATION OF REMOTE SENSING IN WATER MANAGEMENT

- Estimation of soil moisture
- Estimation of evapotranspiration
- Irrigation management

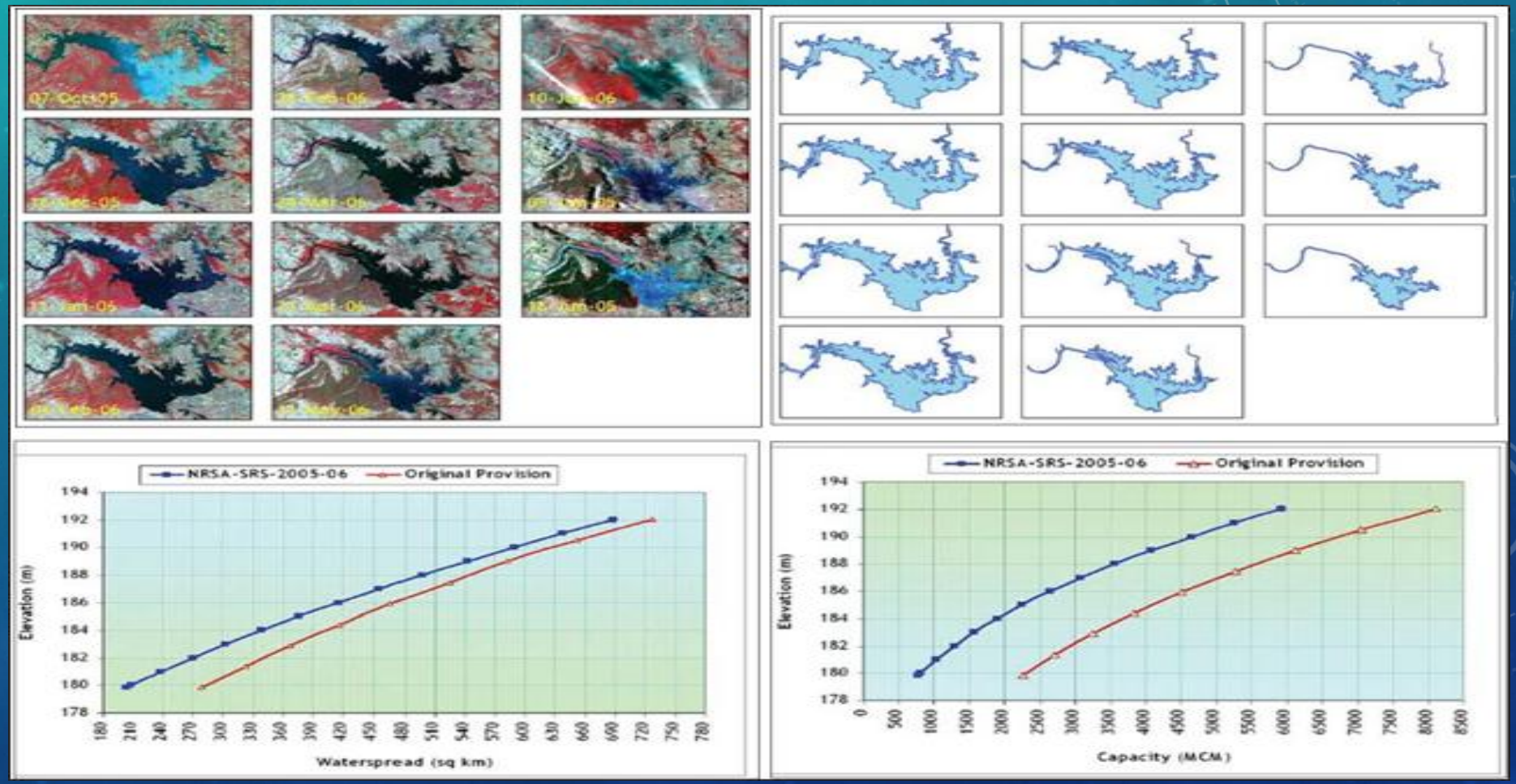


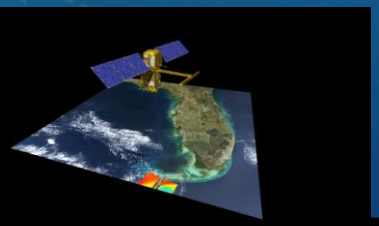




APPLICATION OF REMOTE SENSING IN WATER MANAGEMENT

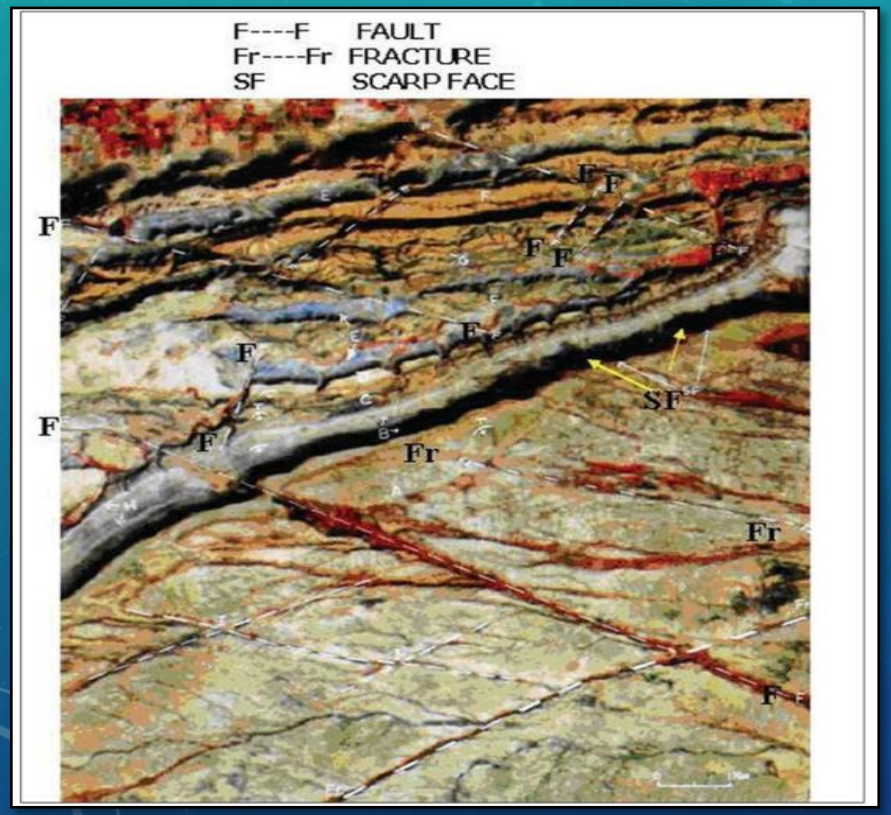
- Estimation of reservoir sedimentation

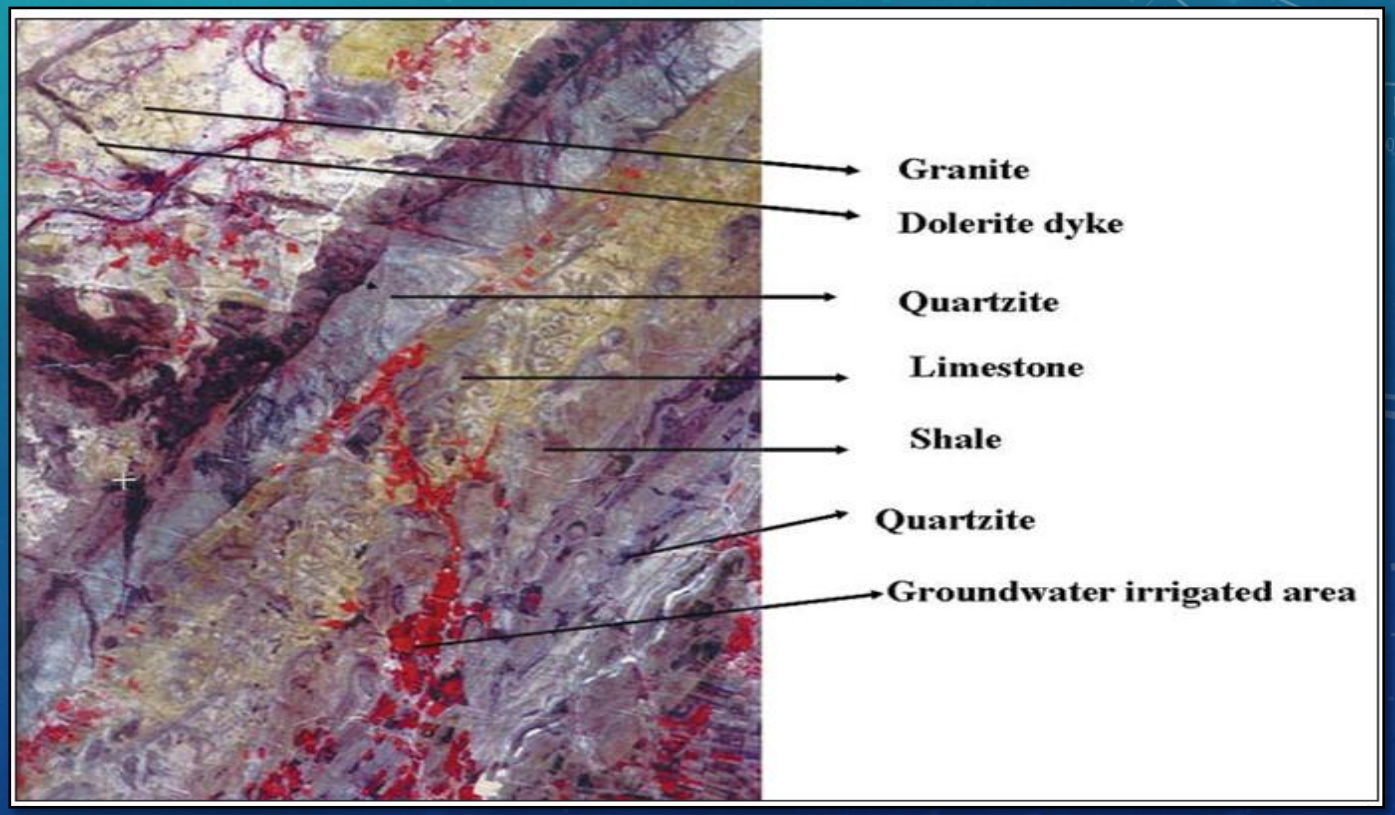




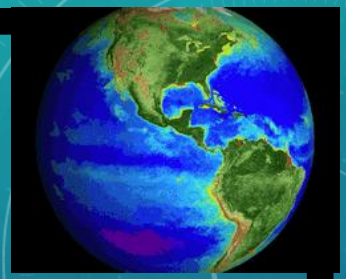
APPLICATION OF REMOTE SENSING IN WATER MANAGEMENT

- Groundwater targeting

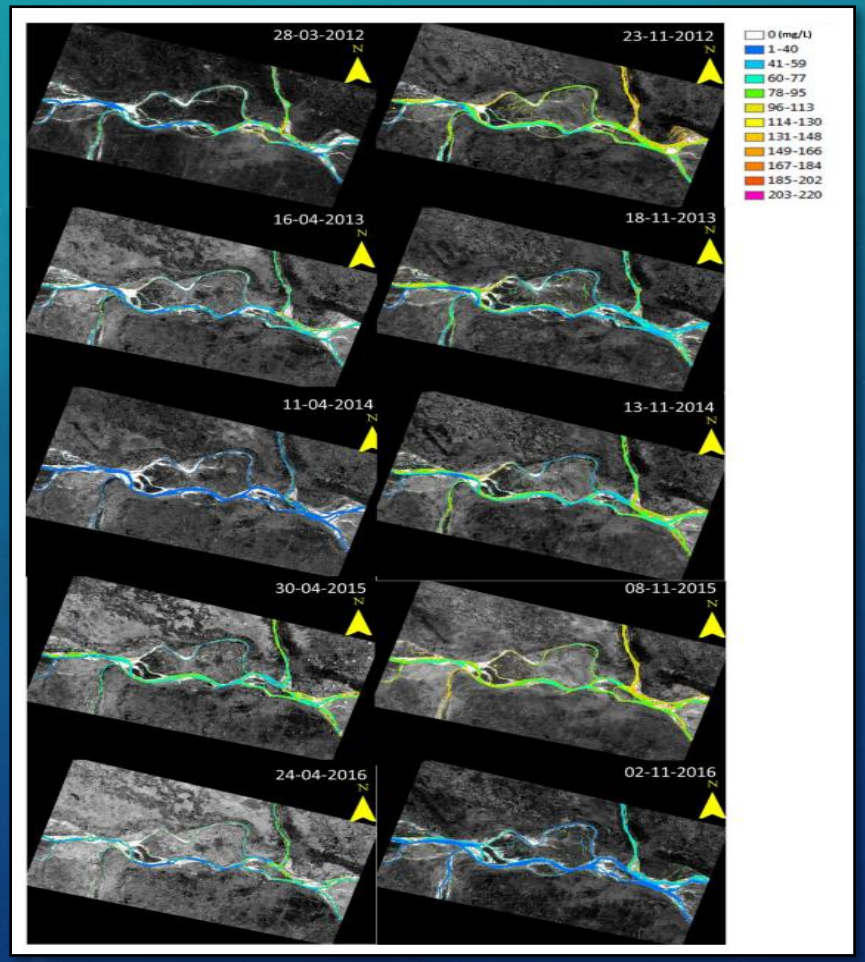




APPLICATION OF REMOTE SENSING IN WATER MANAGEMENT

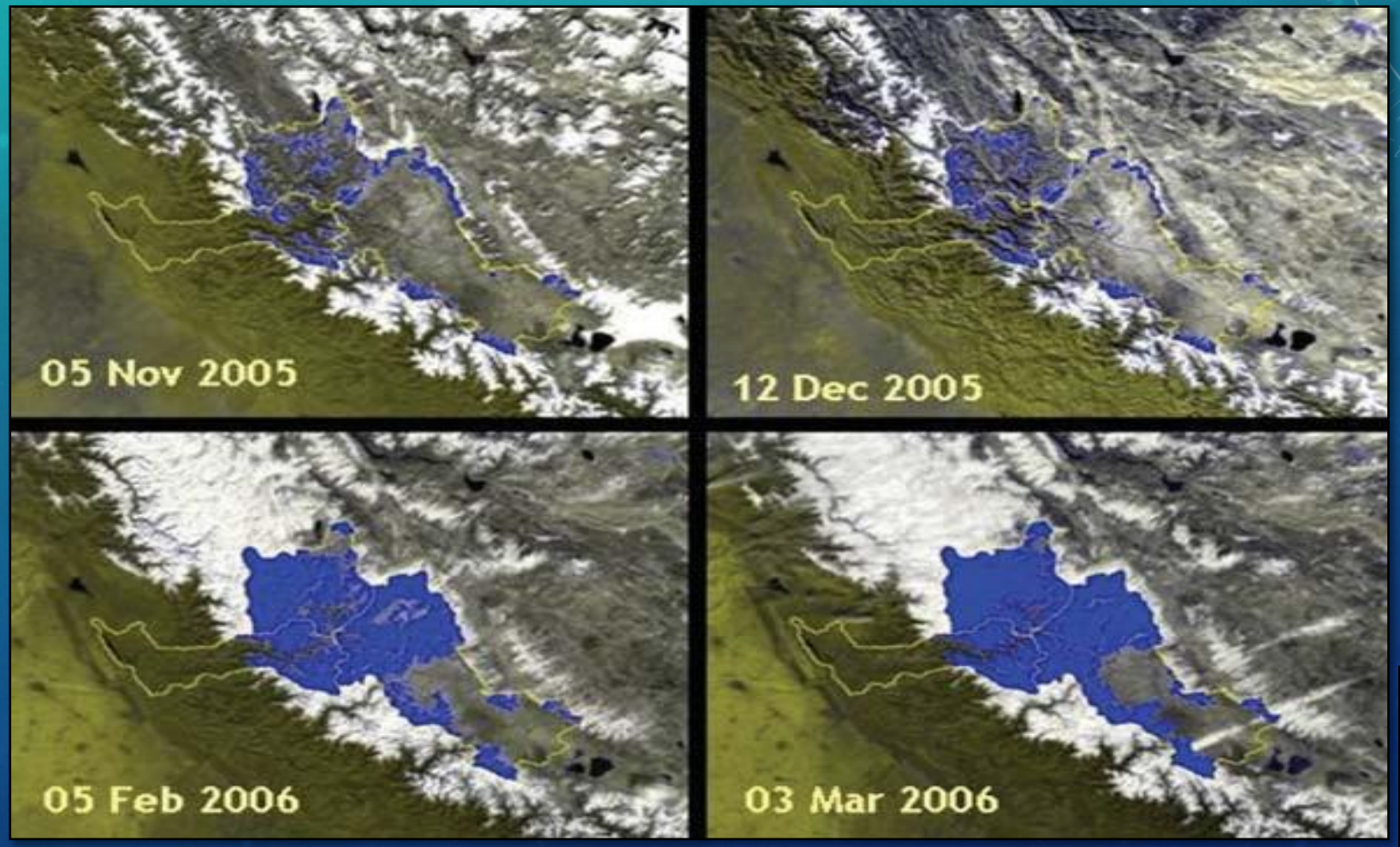


- Water Quality assessment



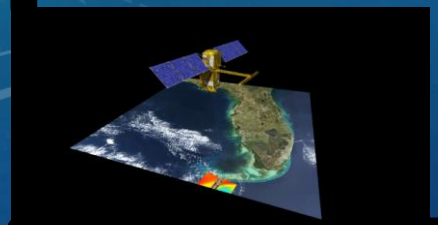
APPLICATION OF REMOTE SENSING IN WATER MANAGEMENT

- Snowmelt runoff assessment



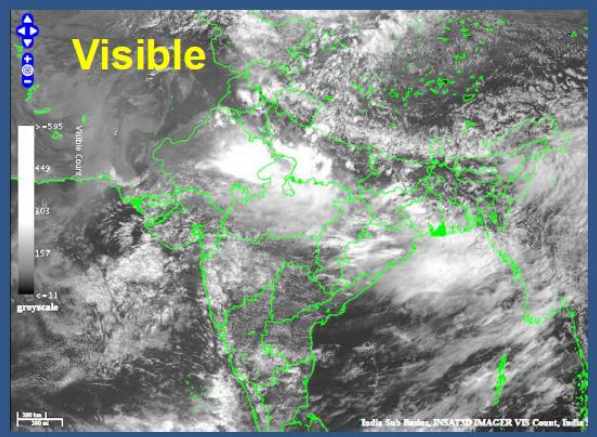
APPLICATION OF REMOTE SENSING IN WATER MANAGEMENT

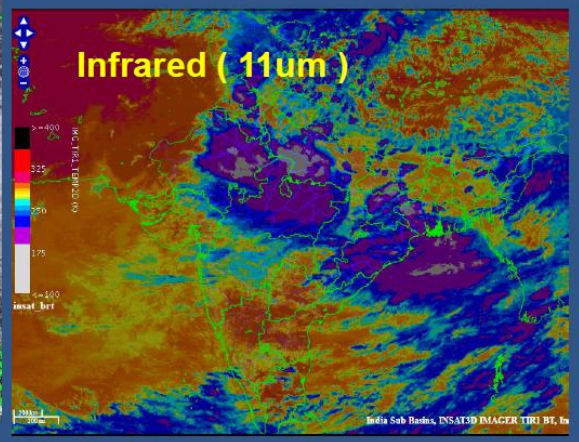
- Soil erosion
- Spring inventorization and spring rejuvenation
- Mapping wetland and salt affected lands

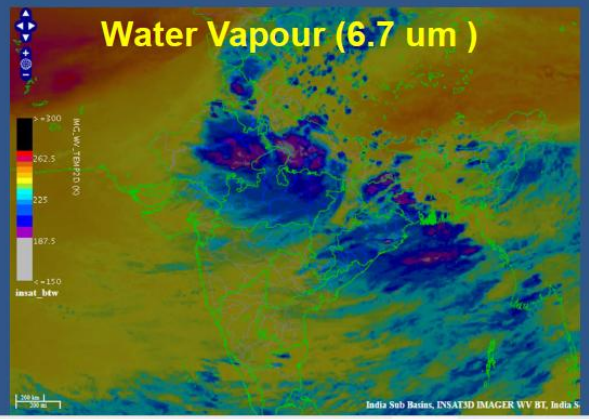


RS IN EXTREME EVENT MANAGEMENT

- Satellite based rainfall estimation

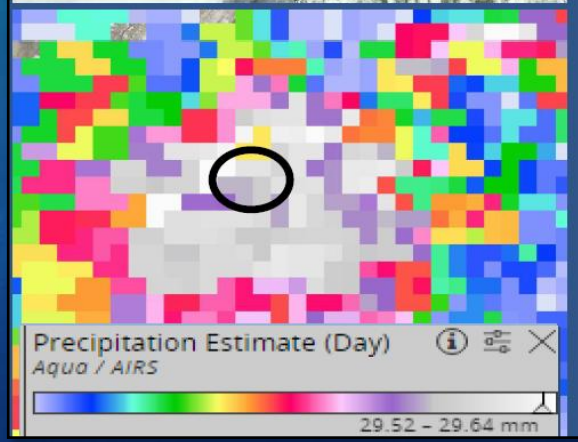


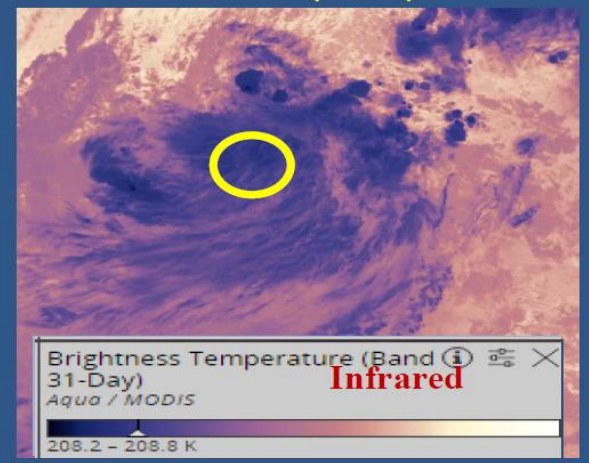


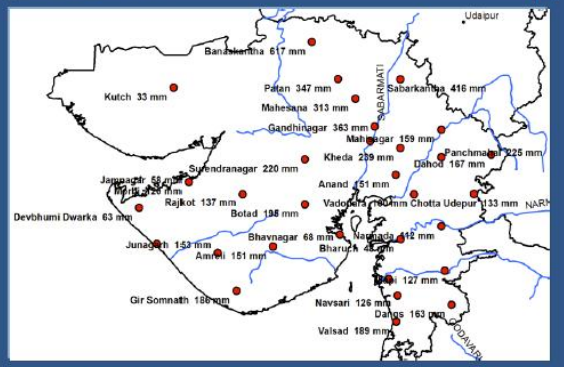


Heavier rainfall is associated with cold cloud top and generally seen as thick cloud in visible imagery

INSAT-3D
15 July
0200 Hrs

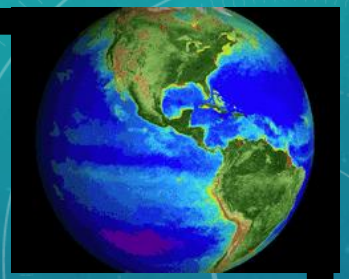




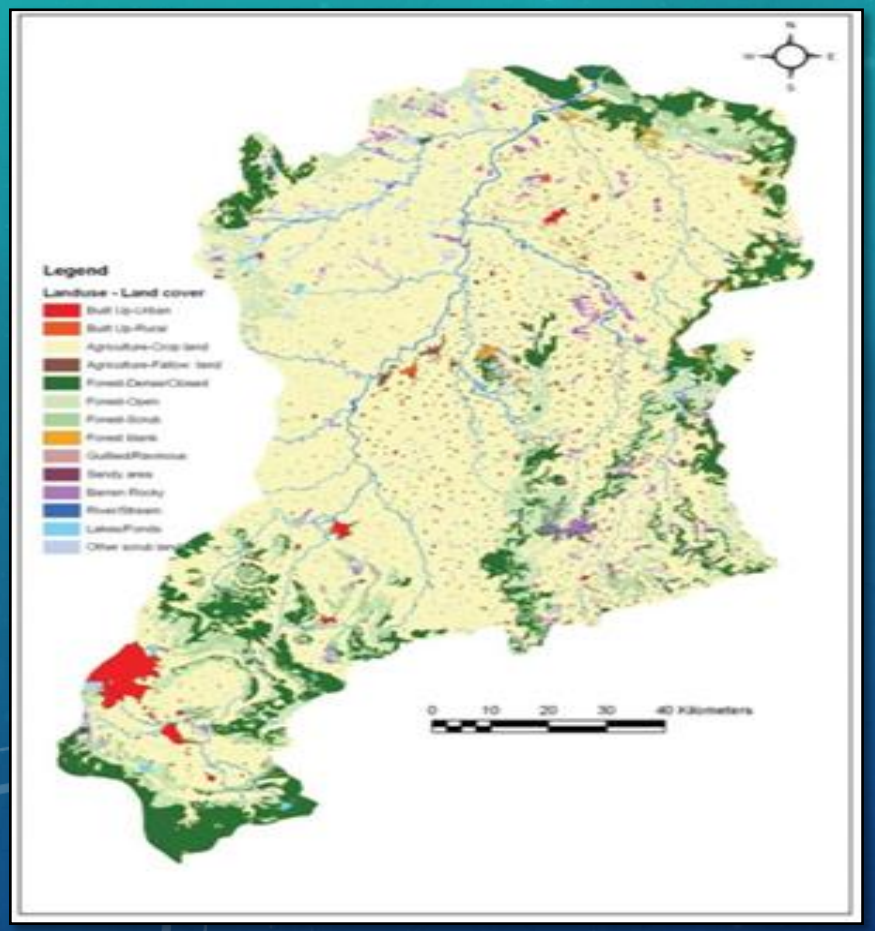


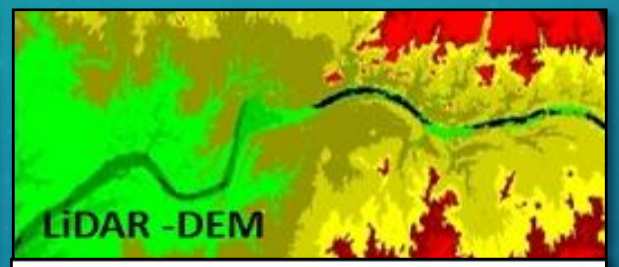
Observed Cumulative Rainfall (mm) in Gujarat during 21-26 July 2017

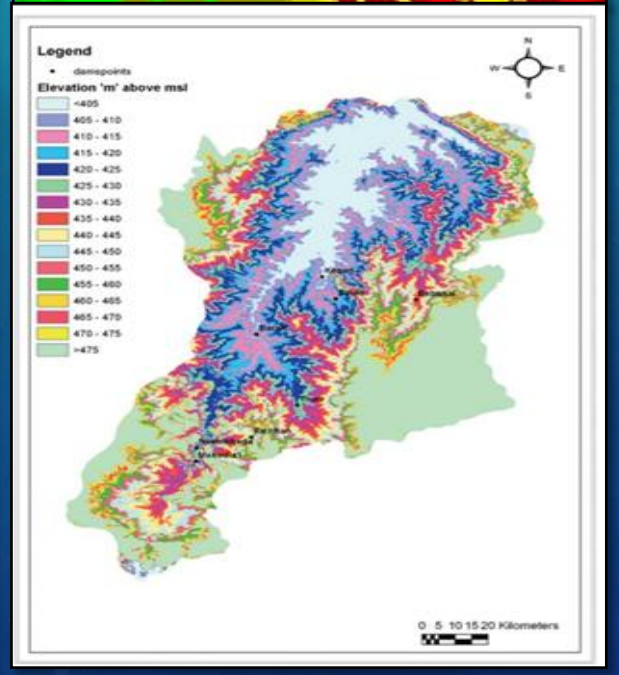
RS IN EXTREME EVENT MANAGEMENT

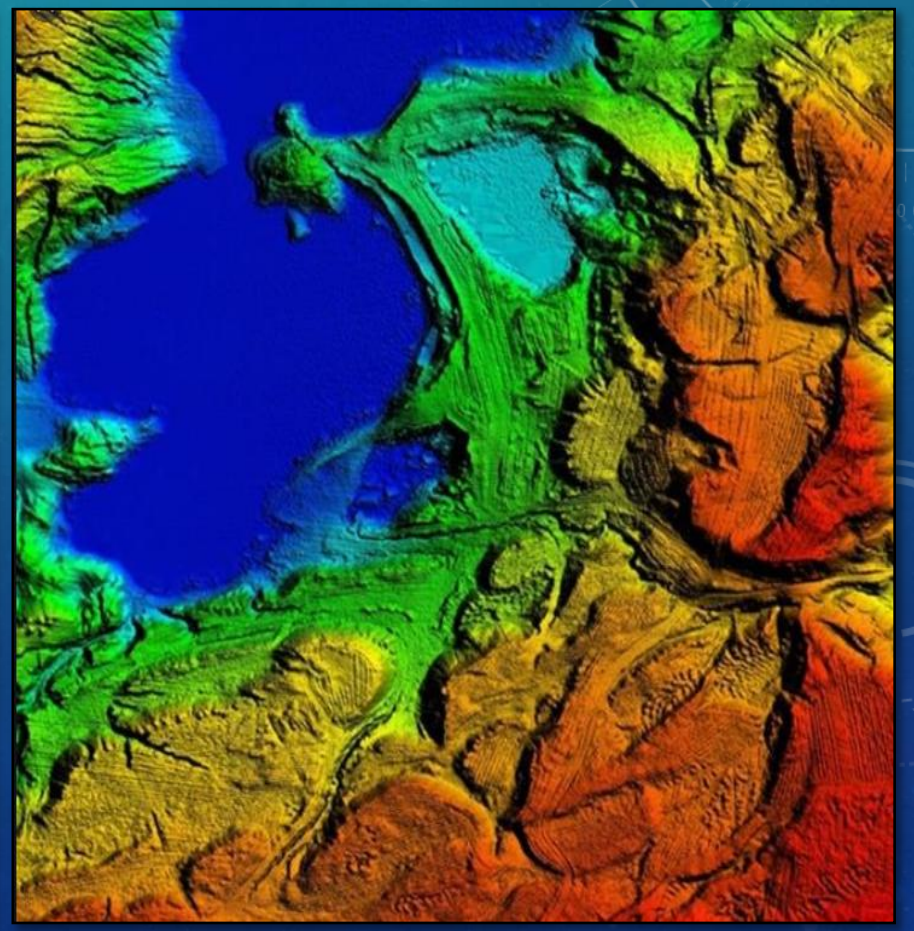


- Land use and land cover for estimation of runoff
- DEM for inundation modelling



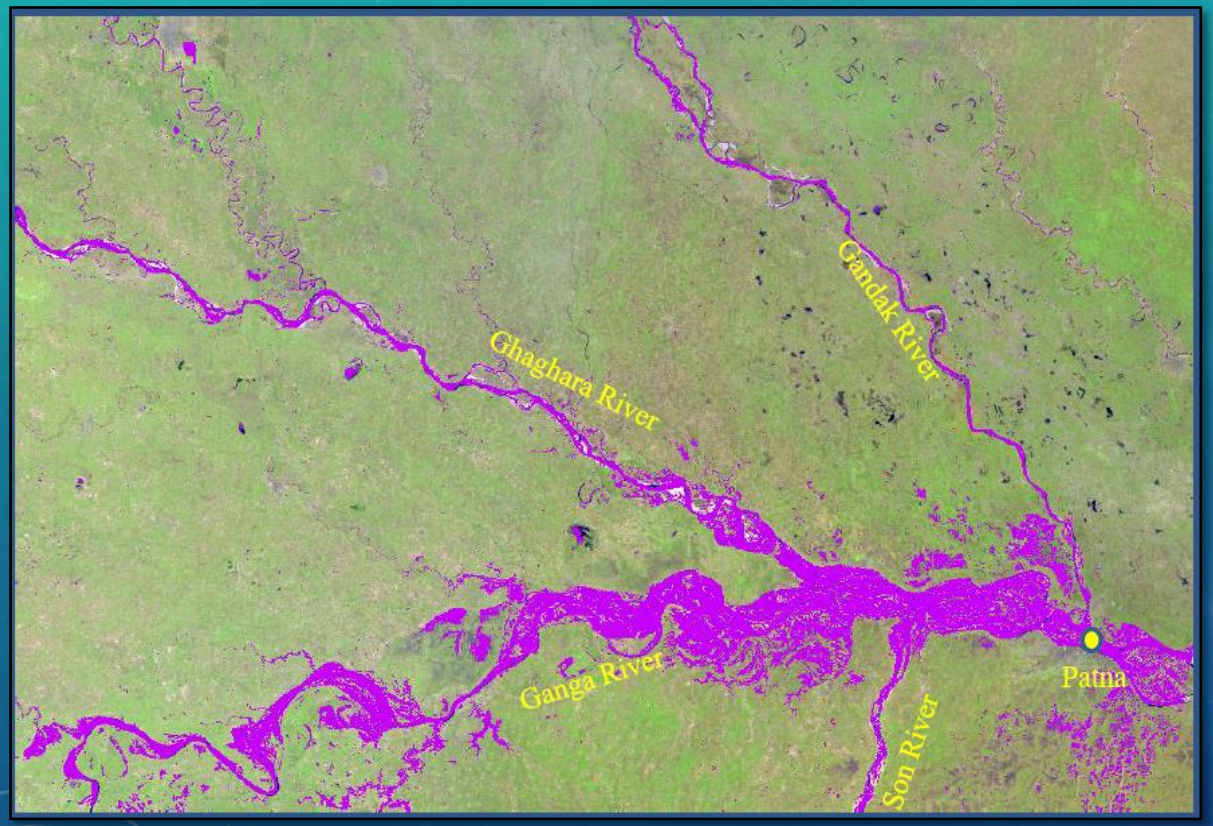


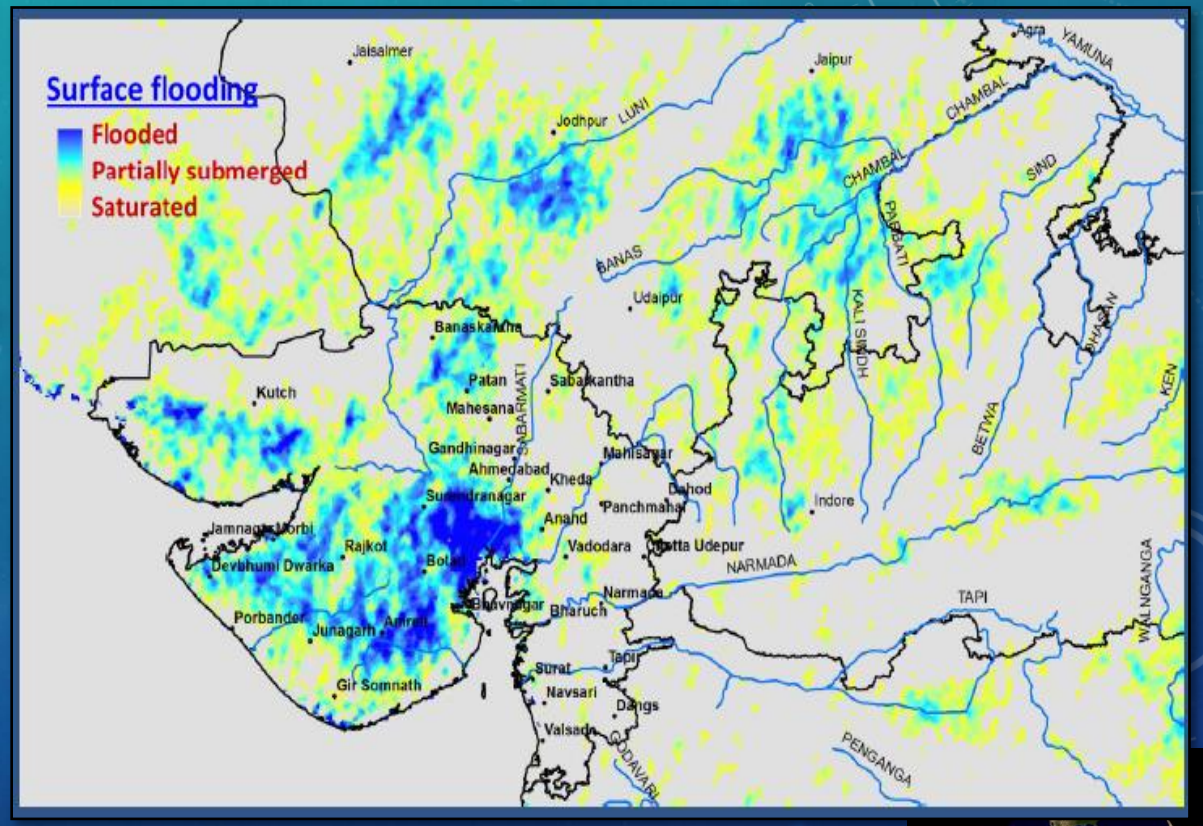




RS IN EXTREME EVENT MANAGEMENT

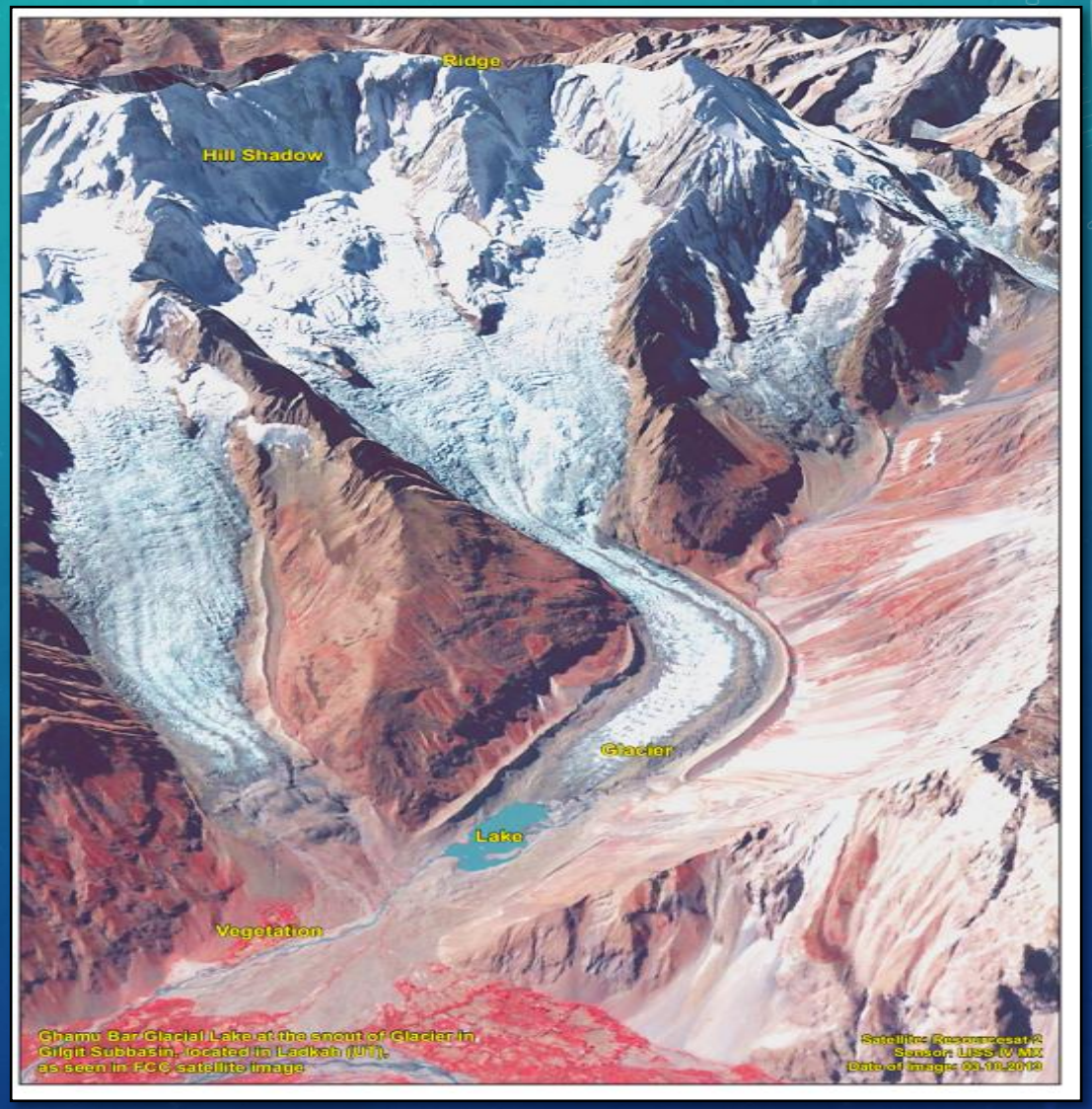
- Mapping of flood inundation extent

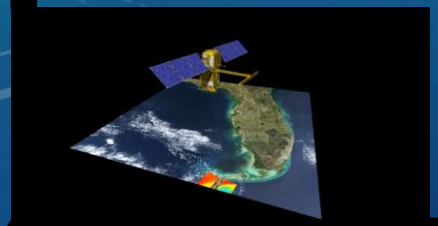




RS IN EXTREME EVENT MANAGEMENT

- Glacial lake inventorization monitoring and GLOF risk assessment

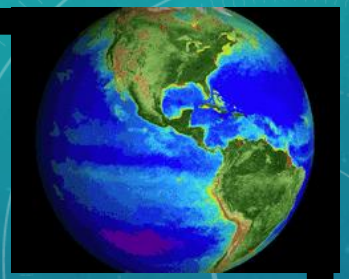




RS IN EXTREME EVENT MANAGEMENT

- High resolution images and GIS ready geo spatial data for evacuation planning
- Flood loss estimation
- Flood risk assessment
- Storm water management

PROGRAMS OF THE MINISTRY USING REMOTE SENSING DATA



- National Water Mission
- Jal Jeevan Mission
- Atal Bhujal Yojna
- Jal Shakti Abhiyan
- National Hydrology Project

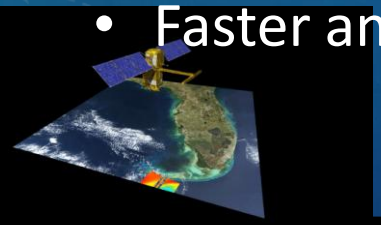
All Organisations under Ministry of Jal Shakti widely use Remote Sensing data for carrying out various types of analysis pertaining to water resources management

STUDIES UNDER NHP USING REMOTE SENSING DATA

1. Assessment of inundation corresponding to different return periods of flood, and its forecast,
2. Estimation of reservoir sedimentation,
3. Development of irrigation management systems including irrigation benchmarking,
4. Hydrological assessment of ungauged catchments for improved assessment of water resources,
5. Study of river morphology for mitigation of erosion patterns,
6. Decision Support System for equitable distribution of Water,
7. Preparation of feasibility study for irrigation development,
8. Conducting River Cross-Section Survey & carrying out Dam Break Analysis.
9. SW Assessment & Water balance studies
10. Sediment Survey using Sentinel Satellite Remote Sensing Technologies
11. Basin planning including Integrated Operation of Reservoirs
12. Development of GIS based inventory with monitoring & rejuvenation of springs
13. Development of Decision Support System for River Basins & IWRM
14. Flood risk & Vulnerability mapping using digital survey data
15. Development of Satellite based Regional Evaporative Flux Monitoring System
16. Glacial Lake Outburst Flood (GLOF) Risk Assessment
17. Operational hydrological drought services using remote sensing data
18. Modelling of Urban flooding
19. Real time inflow forecasting
20. Geoid Model
21. Cross Section Survey for selected rivers
22. Development of GIS Soil Infiltration map
23. Identifying suitable and effective measures and locations for artificial recharge, and many more.

FURTHER EXPECTATIONS FROM REMOTE SENSING TECHNOLOGY

- High frequency Satellite based altimetry for river water level
  - Reasonable degree of accuracy of measurement Including the smaller rivers also
- Bathy LiDAR
  - High accuracy bathymetric details for reservoirs below MDDL and perennial riverbed
- Dependable water quality monitoring
- High resolution DEM through satellite
- Smaller size of raster data
  - Less resource requirement for IT applications
  - Lower internet bandwidth requirement
  - Faster analysis on cloud



Thank You