IIRS PS-1 Presentation (July 2018)

Project Title:

DEVELOPMENT OF A WEB APP WITH MAP BASED GUI FOR REAL TIME INLAND WATER LEVEL MONITORING USING SATELLITE ALTIMETRY

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OBJECTIVES

1. Automating the process of-
    a. Checking for availability of new satellite data on the web
    b. Downloading all new files available
    c. Processing the netCDF files to get the elevation of required locations
2. Improvement in accuracy of elevation assessment by-
    a. Determining longitudinal and latitudinal tolerance to be given so as to get points which lie only within the water body of choice
    b. Determining offset between the satellite's actual ground track (from netCDF file) and offline ground track (from .kmz file)
3. Development of a web app-
    a. Map based GUI for geo-visualisation
    b. Plotting of elevation data

ALTIMETRY

- Altimetry is a technique for measuring elevation. Satellite altimetry measures the time taken by a radar pulse to travel from the satellite antenna to the surface and back to the satellite receiver. Combined with precise satellite location data, altimetry measurements yield water-surface heights.

- A lot of other information can be extracted from altimetry apart from altitude. The magnitude and shape of the echoes (or waveforms) also contain information about the characteristics of the surface which caused the reflection.

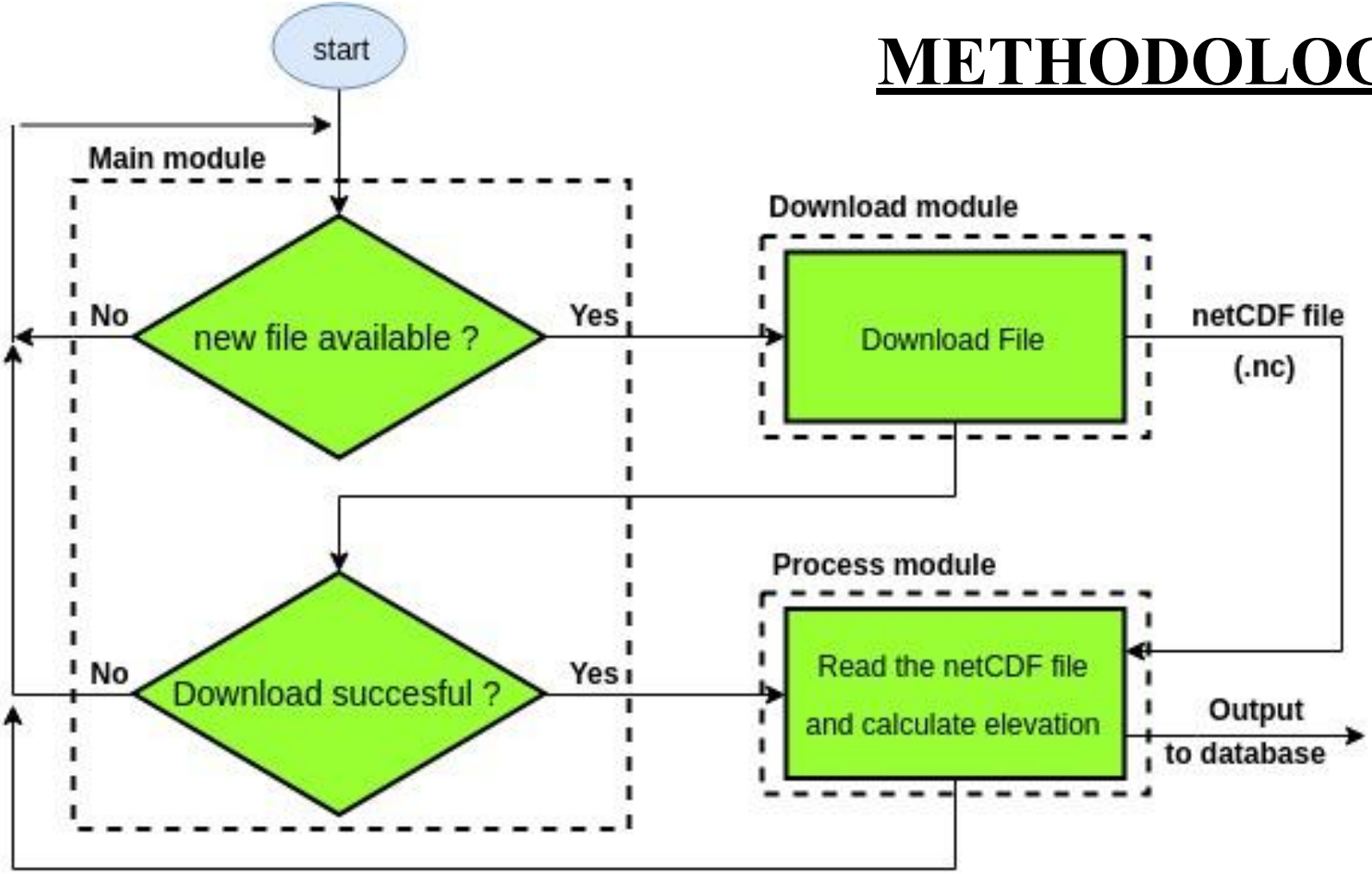
JASON 2/3

Parameters	Jason 2	Jason 3
Operator	NASA, CNES	NASA, CNES
Launch Date	June 20, 2008	January 17, 2016
Purpose	Ensuring continuity of high quality measurements that Jason 1 provided for ocean science and providing operational products for assimilation and forecasting applications.	Ensuring continuity of high quality measurements that Jason 2 provided for ocean science and providing operational products for assimilation and forecasting applications.
Orbit	Geocentric	Geocentric
Orbital period	112.57 minutes	112.42 minutes
Repeativity	~10 days	~10 days
Footprint / Resolution	~10 km (~500m at 20Hz PRF)	~10 km (~500m at 20Hz PRF)

Objective 1

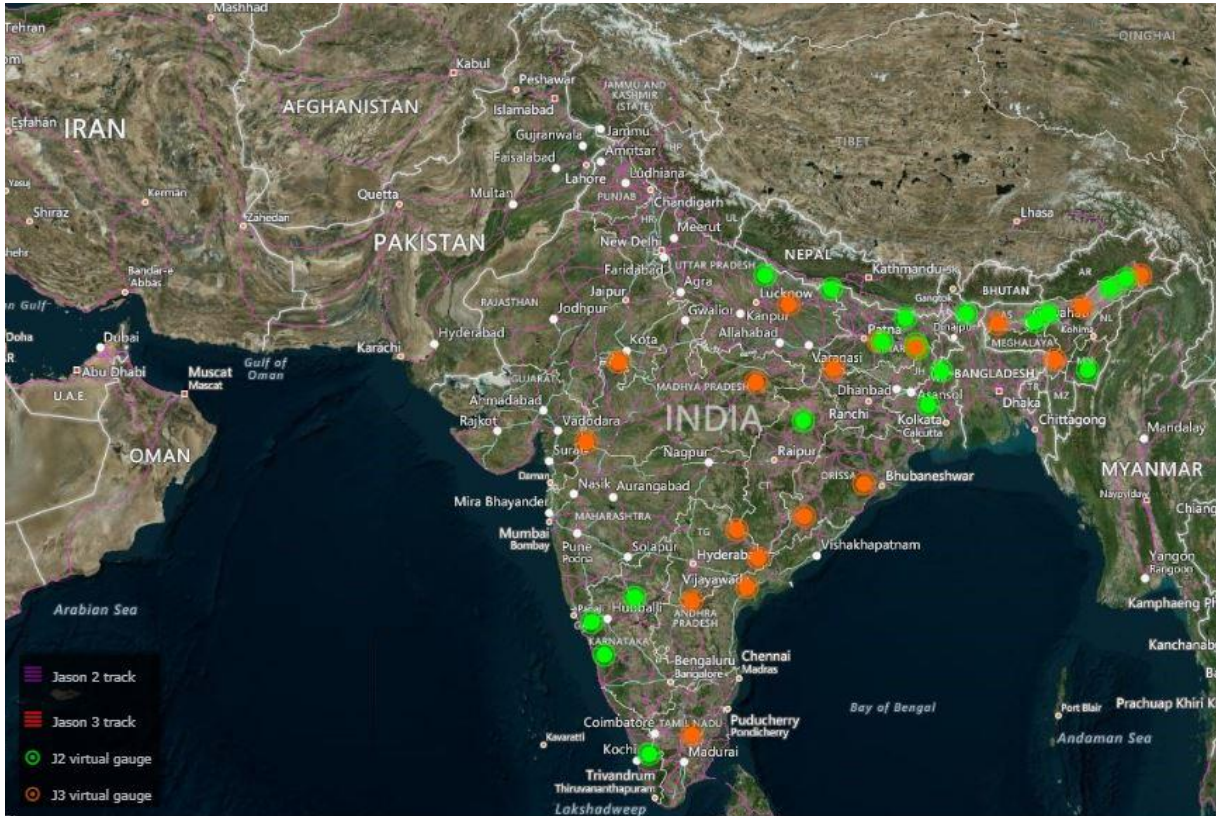
Automation

METHODOLOGY



OUTCOME

The automation script automatically downloads and saves the altitudes for the locations shown in the map.



Objective 2

Improvement in accuracy

METHODOLOGY

Determining offset

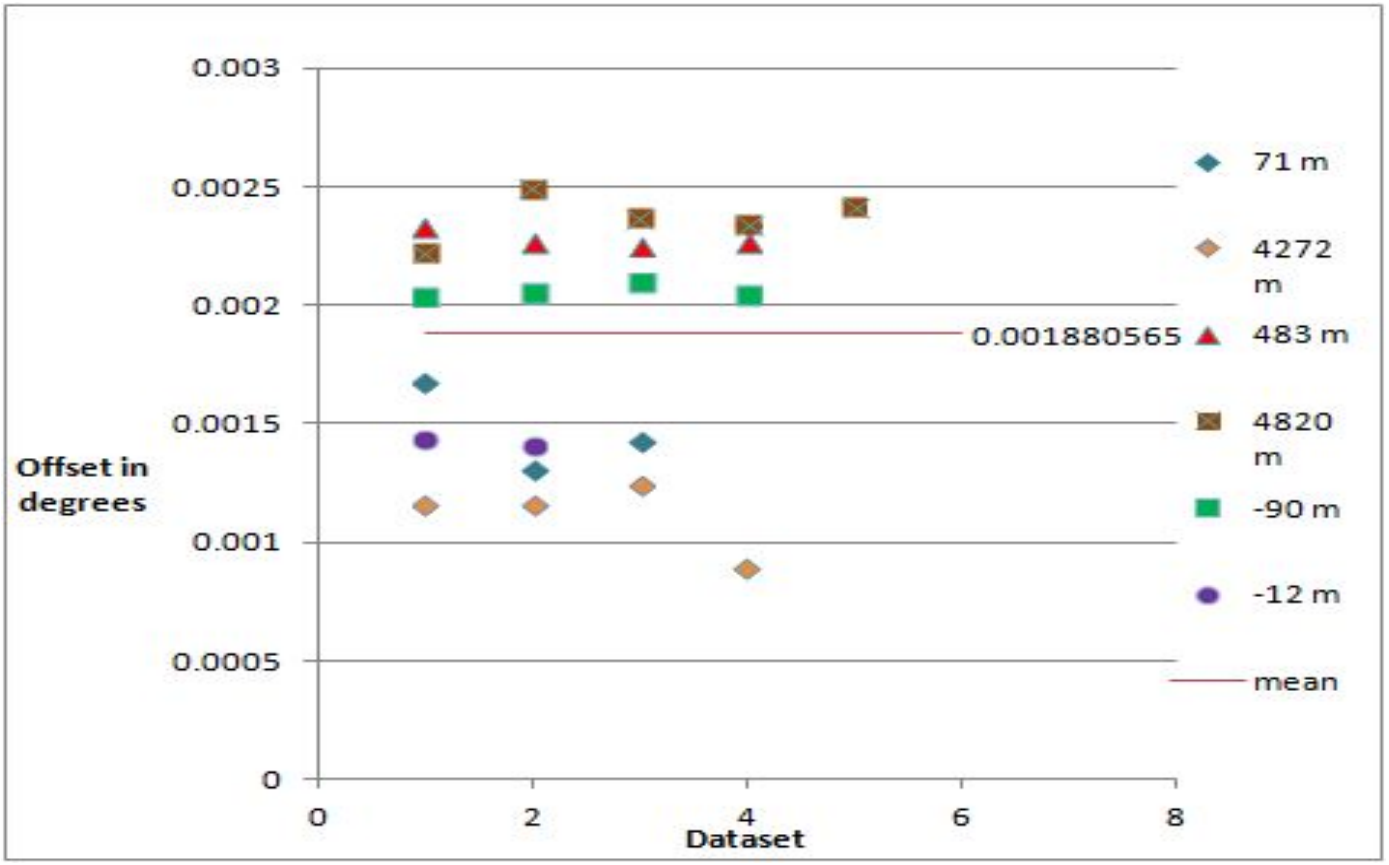


Fig : Plot showing the various longitudinal offsets

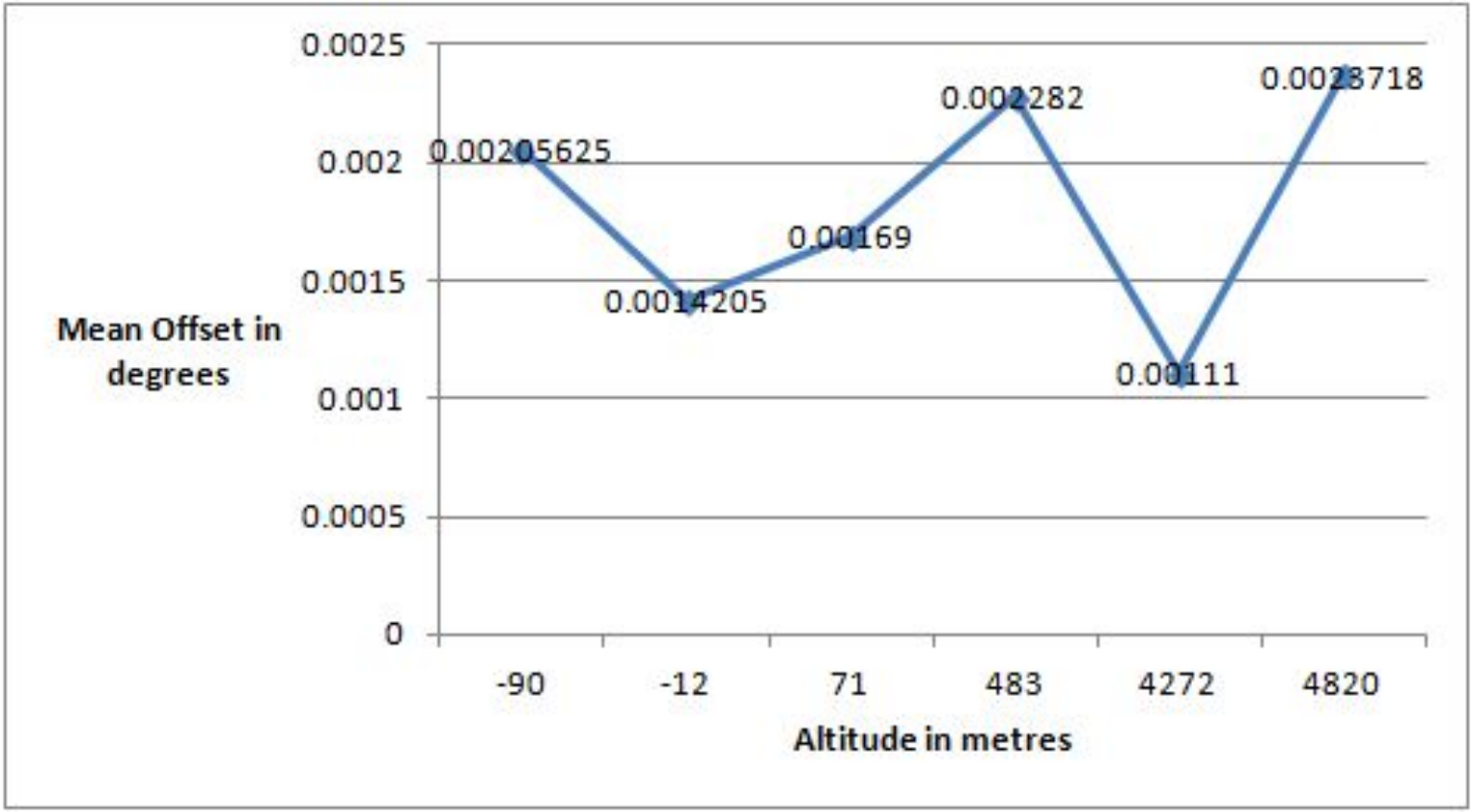


Fig : Plot between mean longitudinal offset and altitude

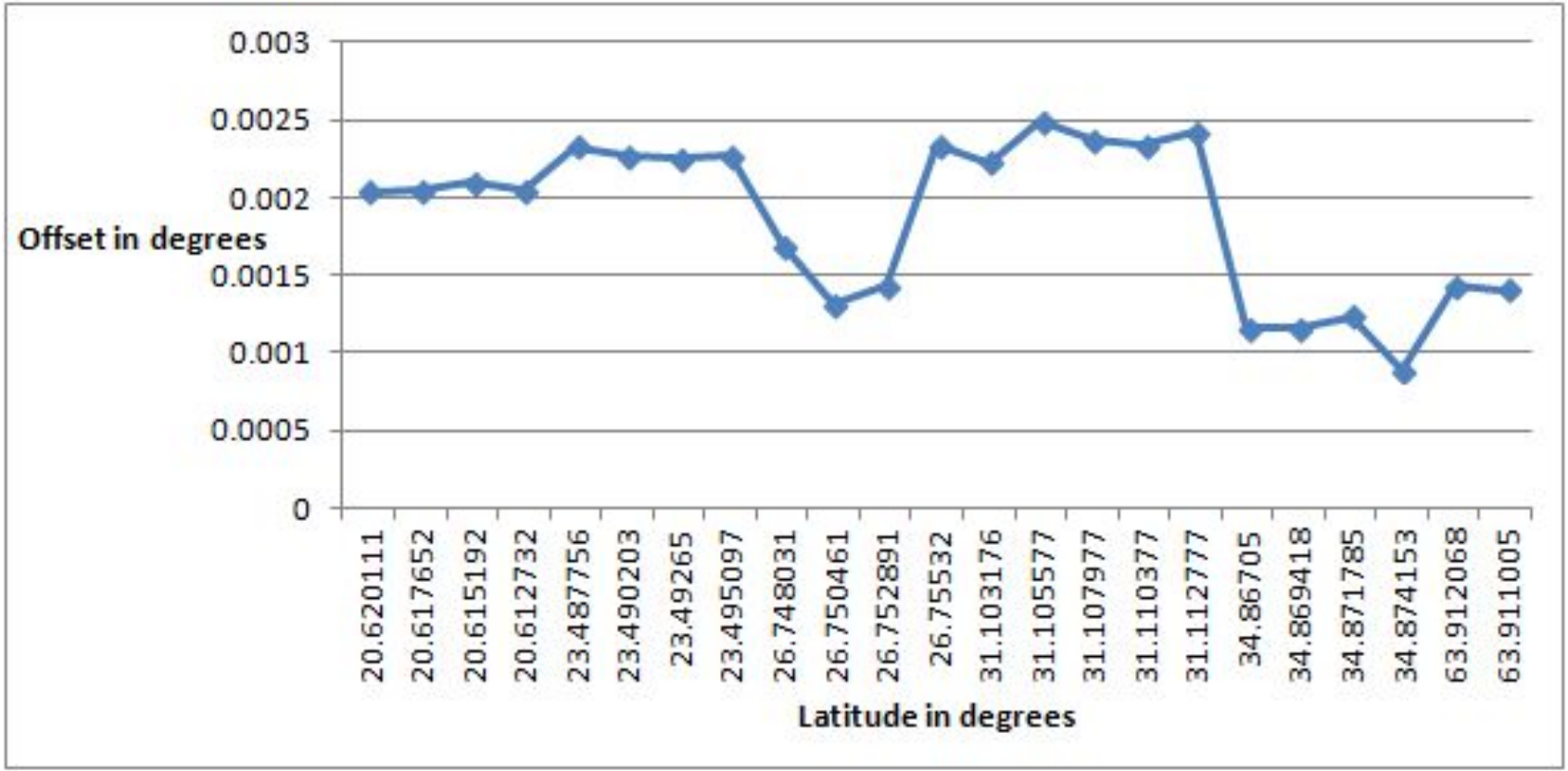


Fig : Plot between longitudinal offset and latitude

Fig : Variation of satellite track with time

OUTCOME

- The variation of longitudinal offsets with latitude and altitude is determined to be arbitrary.

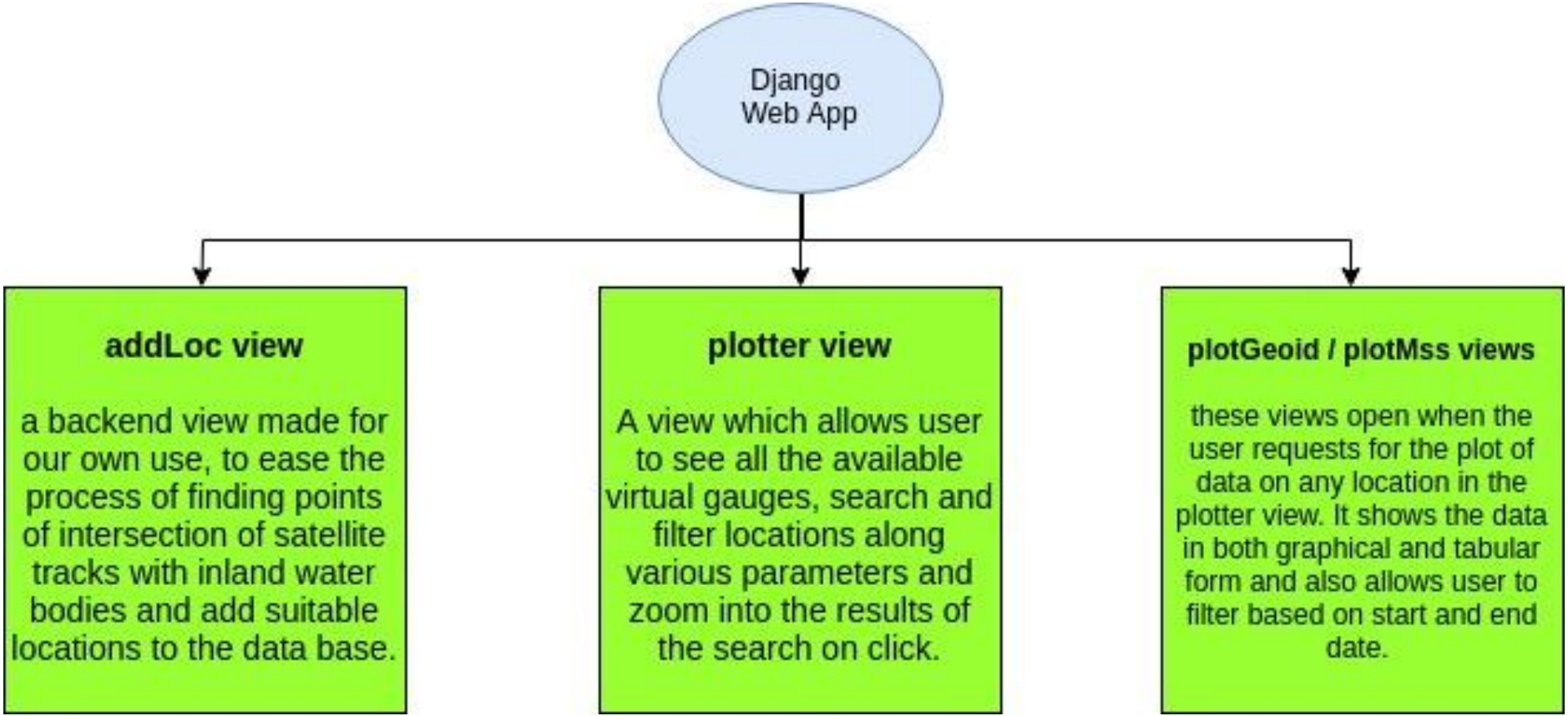
- The drift of satellite with time is also determined to be arbitrary

Objective 3

Development of web app

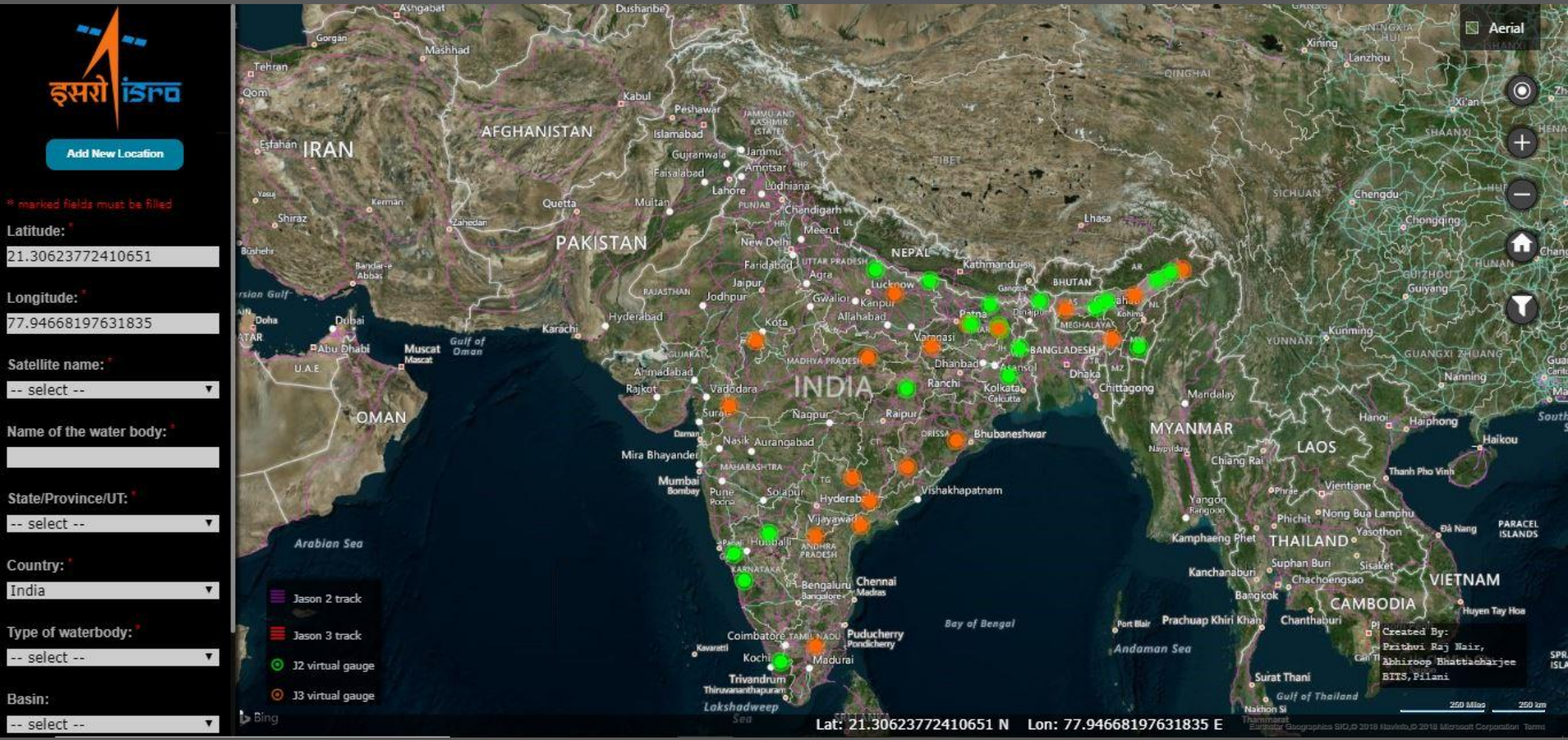
METHODOLOGY

Web app views



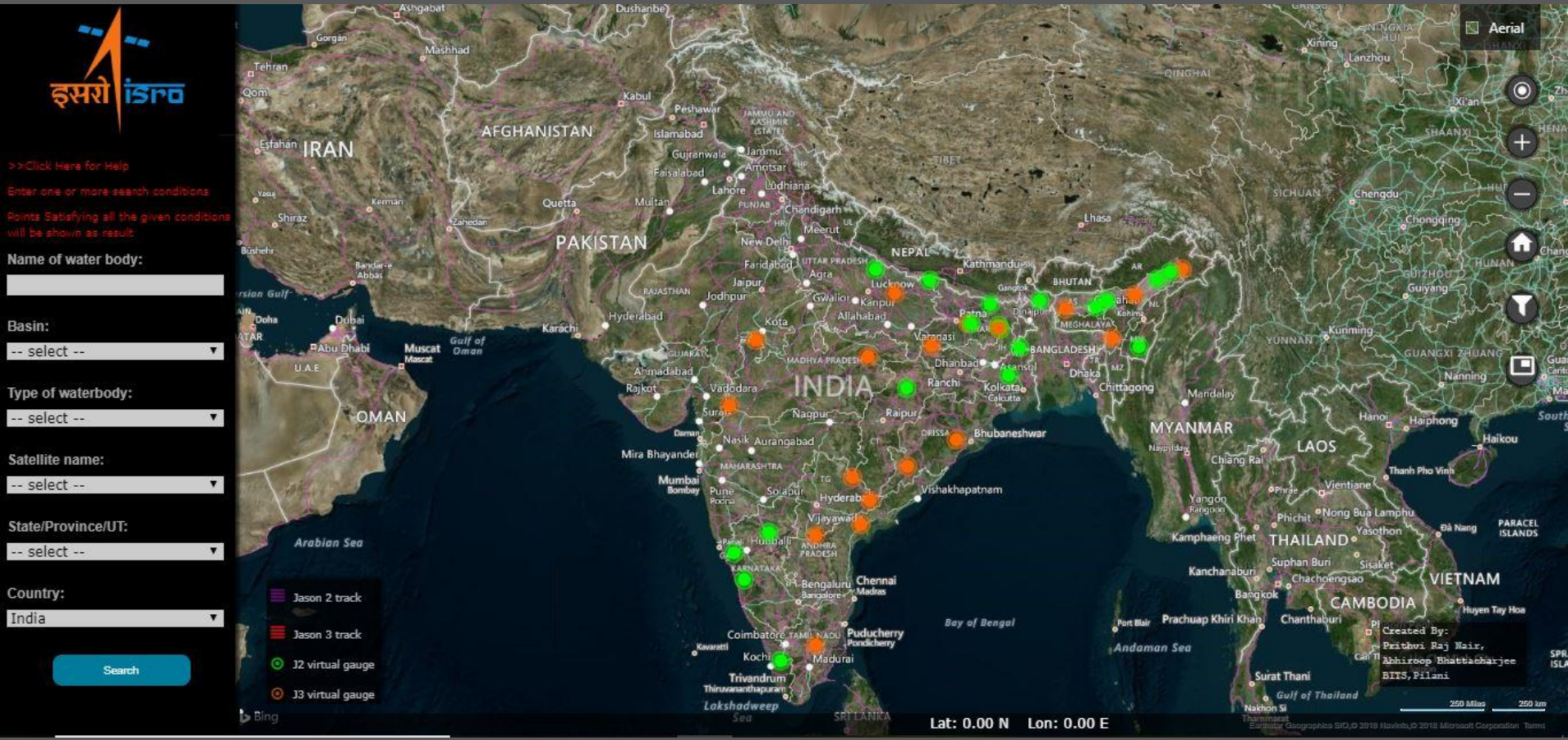
OUTCOME

addLoc view



OUTCOME

plotter view



OUTCOME

plotMss / plotGeoid view

Name of water body: Rana Pratap Sagar
Type of water body: Lake/Reservoir
Basin: None
Satellite: Jason 3
Latitude: 24.783387949390217
Longitude: 75.54361385370345
State/Province/UT: Rajasthan
Country: India

Plot the curve of water level VS time

From: 01-Jan-2010 To: 09-Jul-2018

PLOT RELOAD

Date	Elevation in metres
2018-06-21	23.2
2018-06-30	23
2018-07-09	23.5

CHALLENGES

Challenges	Status	Solution
Running BRAT software using python script to process the netCDF files	**solved**	Read netCDF files directly using python netCDF4 module
Determining offset between satellite's actual track and kmz file	**solved**	Offset determined to be arbitrary with altitude,latitude and time
Determining tolerance to be given so as to get points only within the waterbody of choice	**solved**	After trial and error, the tolerance is suitably estimated to be 0.0045^{o} for Indian region
Incorporating other satellites into the data collection part (Currently only JASON 2 /3)	Not solved	

CONCLUSIONS

- Most of the work that has been automated was earlier being done either manually which is very inconvenient.
- All the functions have been implemented using open source software.
- Better interface for the end user - The graphical user interface with map allows better geo-visualisation of the altimetry data.
- The web app would allow effective monitoring of water levels at various locations.
- Real time plots (at most a few hours delay) are available at just one click and therefore it is a lot easier to monitor elevation on a frequent basis.

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THANK YOU