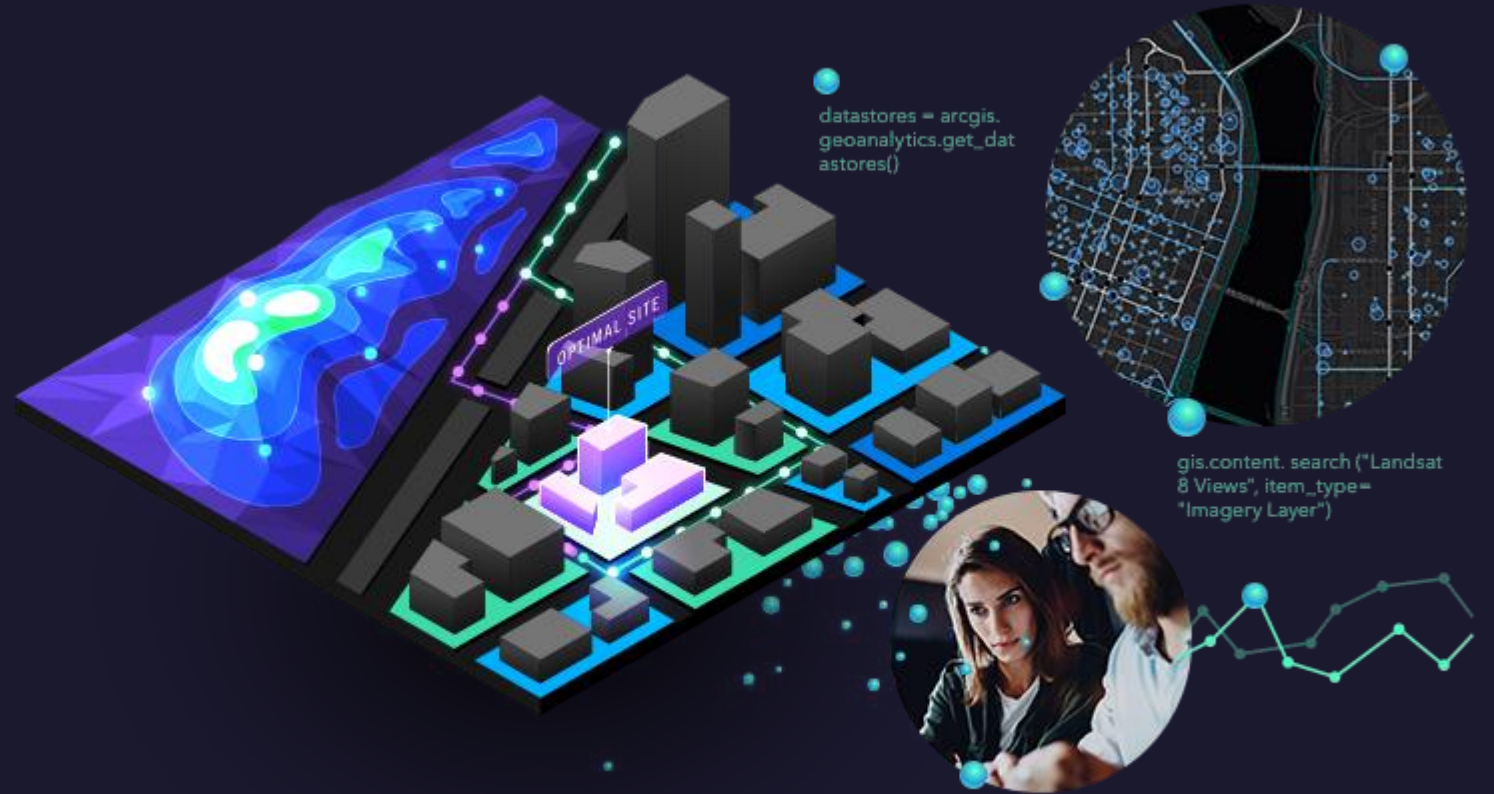


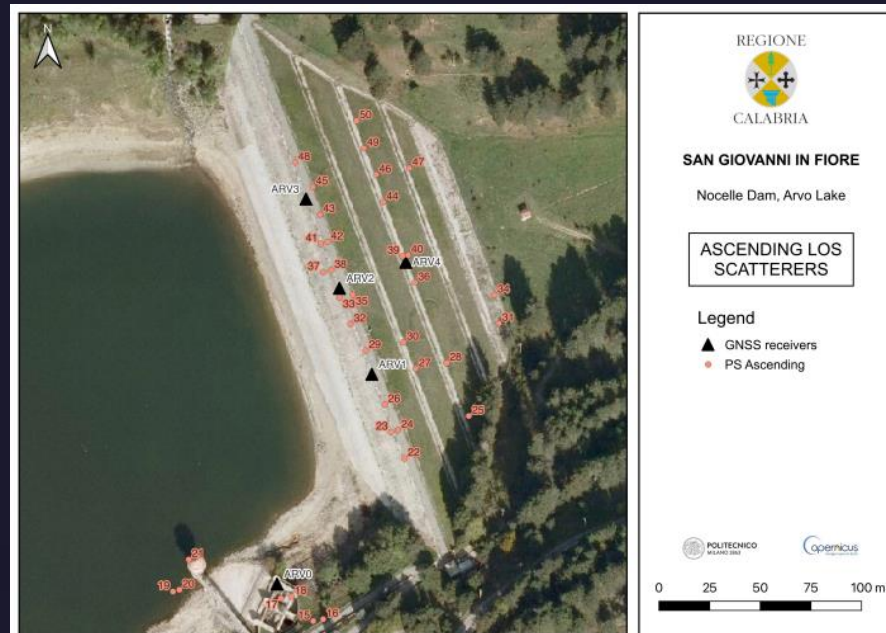
Geospatial Data Analysis on SAR Data and Ground Data

- Milad, Ramezani Ziarani
10930504



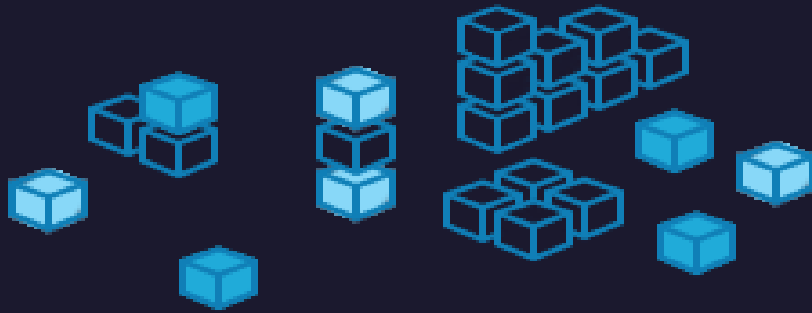
Abstract

- Integration of data with geospatial techniques
- Study area
- Data
 - SAR Displacement Data
 - Water Temperature Data
 - Water Level Data



Data Analysis

- **Pre-processing**



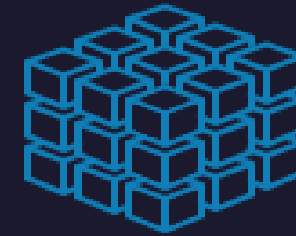
- Choosing PS
- Smooth SAR Displacement Data
- Synchronization Environmental data

- **Processing**



- Multiple Linear Regression
- Correlation length
- Time lag
- Bhattacharyya distance

- **Results**



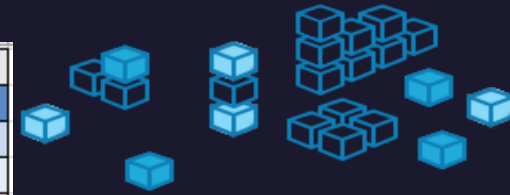
- Find best regression model

Pre-processing

- Choosing PS



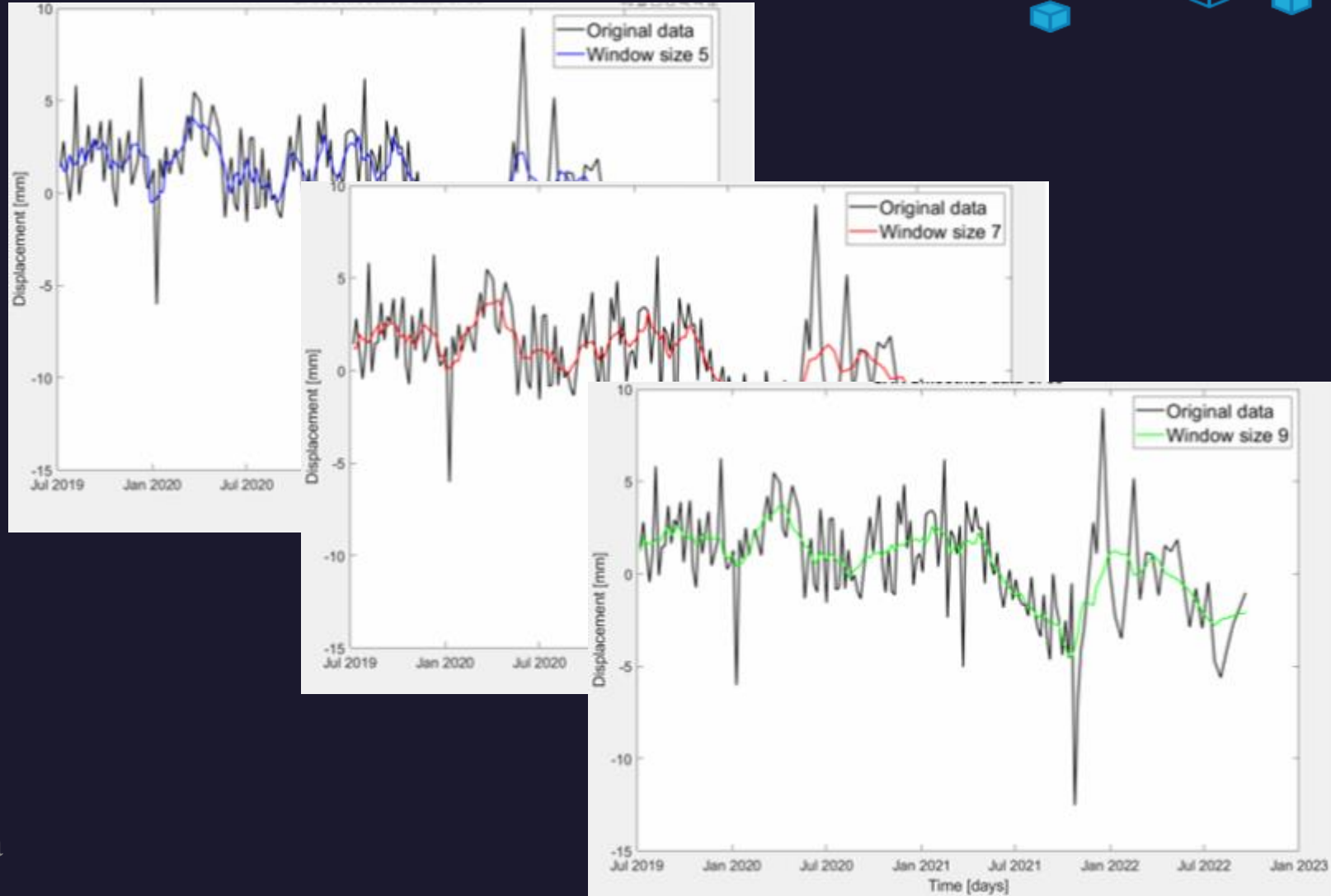
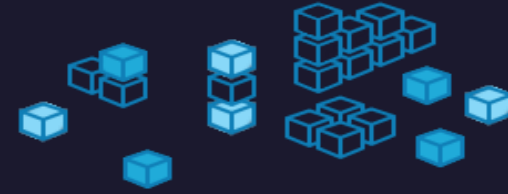
point	lon	lat	variance	standard deviation
22	16.5458622	39.24455261	3.158	1.782
23	16.54578781	39.24467087	5.439	2.339
24	16.54582787	39.2446785	6.099	2.477
25	16.54623413	39.24473572	7.778	2.797
26	16.54575539	39.24479294	9.467	3.086
27	16.54593468	39.24494934	5.713	2.397
28	16.54611206	39.24497223	7.148	2.681
29	16.54565048	39.24503326	4.554	2.140
30	16.54586792	39.2450676	5.696	2.394
31	16.54641533	39.24514389	5.009	2.245
32	16.54556656	39.24515152	6.505	2.558
33	16.54550743	39.24526978	21.853	4.688
34	16.54639244	39.24526978	7.579	2.761
35	16.54558182	39.24528122	5.510	2.354
36	16.54593849	39.24533081	10.272	3.214
37	16.54541397	39.24538422	6.208	2.499
38	16.54546165	39.24539185	5.377	2.326
39	16.54587173	39.24544907	5.182	2.283
40	16.54590225	39.24545288	7.557	2.757
41	16.54540443	39.2455101	8.056	2.847
42	16.54544449	39.24551773	5.342	2.318
43	16.54540253	39.2456398	8.968	3.003
44	16.54576492	39.24568939	9.608	3.109
45	16.54536438	39.24576187	9.746	3.131
46	16.54572678	39.24581146	7.061	2.665
47	16.54591751	39.24583817	7.844	2.809
48	16.5452652	39.2458725	6.145	2.486
49	16.54566002	39.24592972	6.684	2.593
50	16.54561996	39.24605179	6.937	2.642



- Smooth SAR Displacement Data
- Synchronization Environmental data

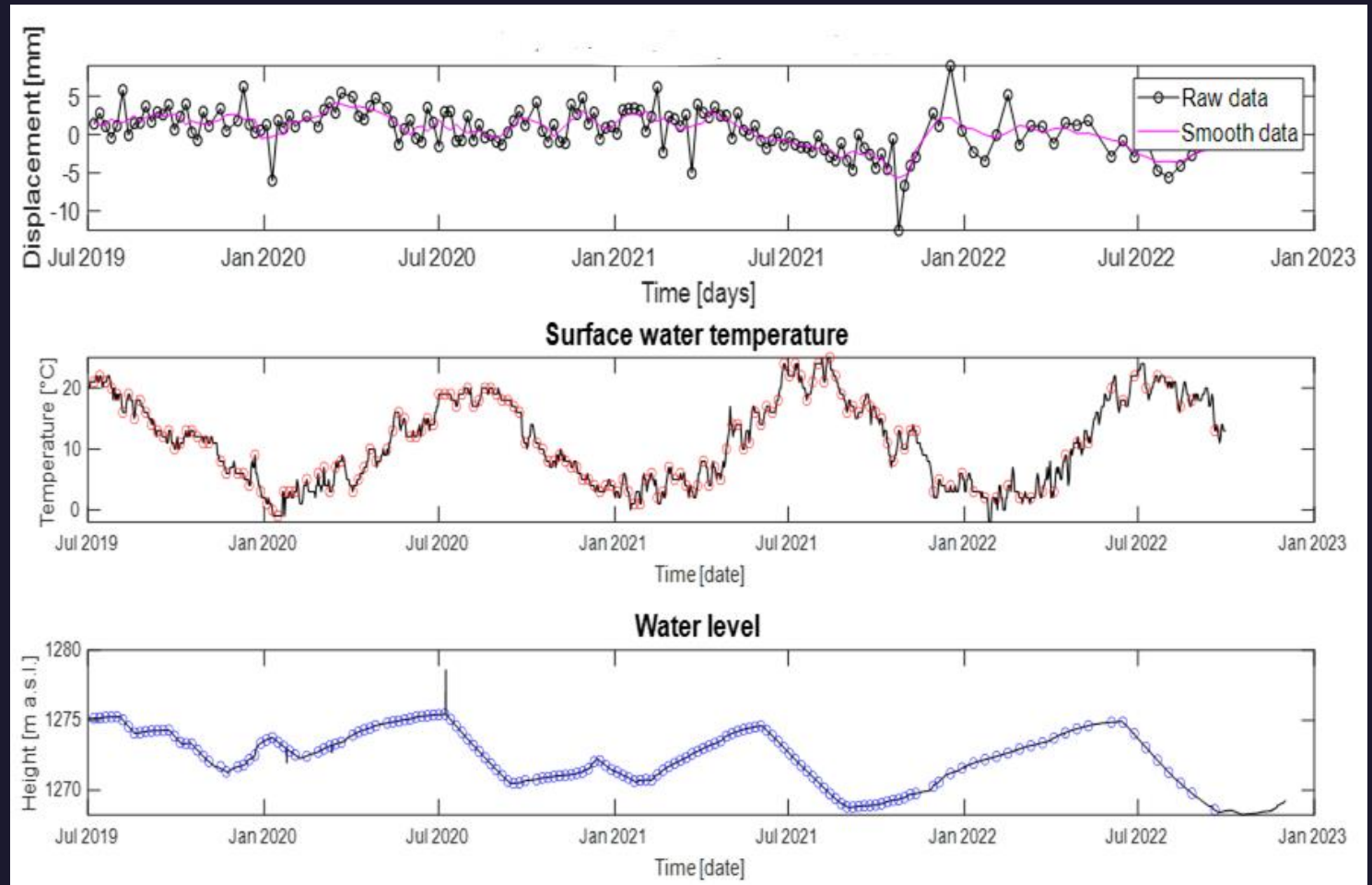
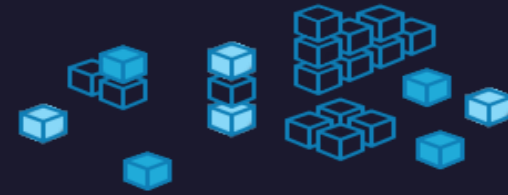
Pre-processing

- Choosing PS
- **Smooth SAR Displacement Data**
 - Moving average
 - Window size 5 , 7 , 9
 - Remove noise
- Synchronization Environmental data



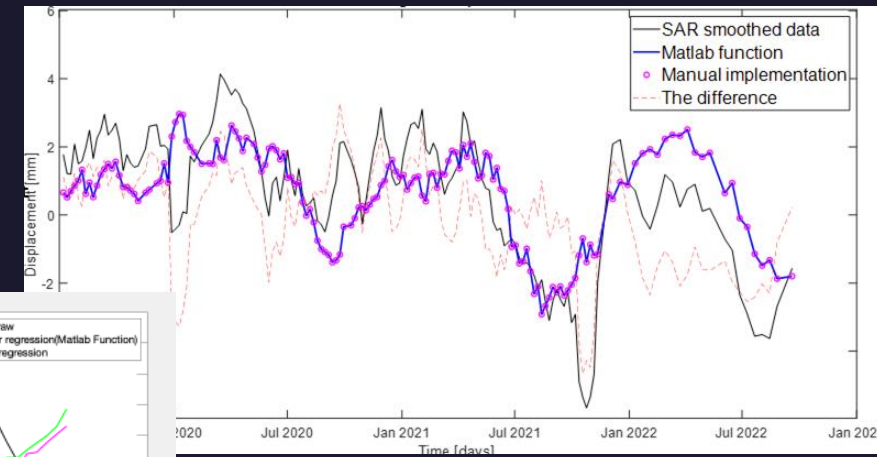
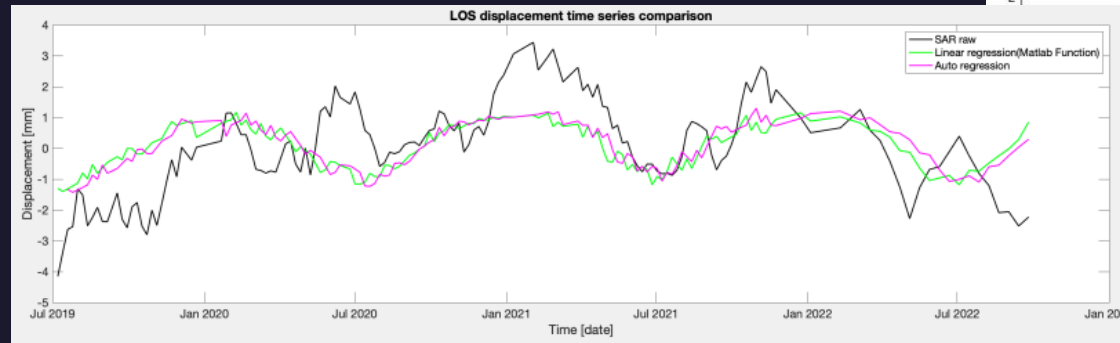
Pre-processing

- Choosing PS
- Smooth SAR Displacement Data
- **Synchronization Environmental data**



Processing

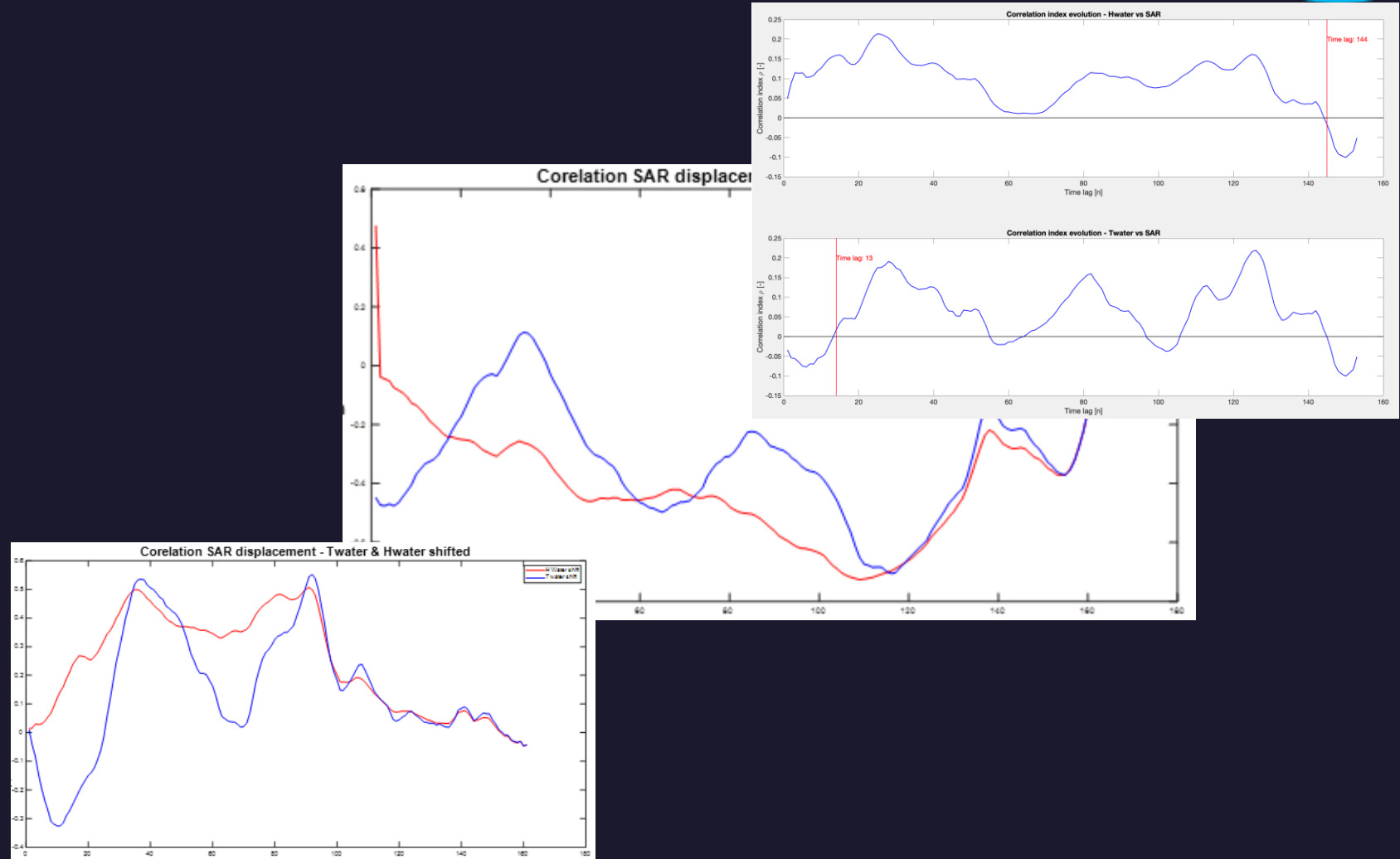
- **Multiple Linear Regression**
 - MATLAB function
 - Manual
 - ✓ Subtracting mean
 - ✓ Stochastically independent from the constant term
 - ✓ T-test
 - Remove constant
 - ✓ new model without constant
 - ✓ new model with a new constant(Bhattacharyya distance)
 - ✓ Residual



- Time lag
- Bhattacharyya distance

Processing

- Multiple Linear Regression
- Time lag



- Bhattacharyya distance

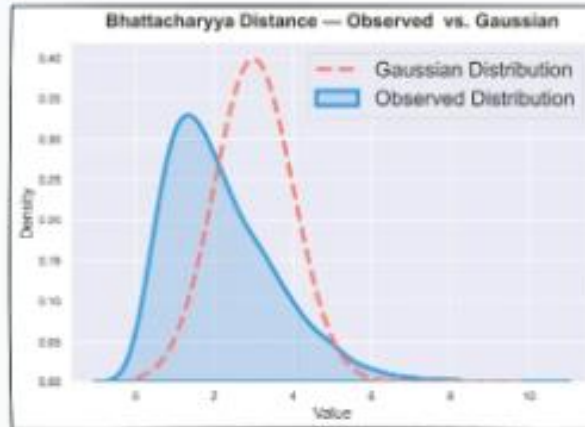
Processing

- Multiple Linear Regression
- Time lag
- **Bhattacharyya distance**



Bhattacharyya Distance: Explained Visually

 blog.DailyDoseofDS.com

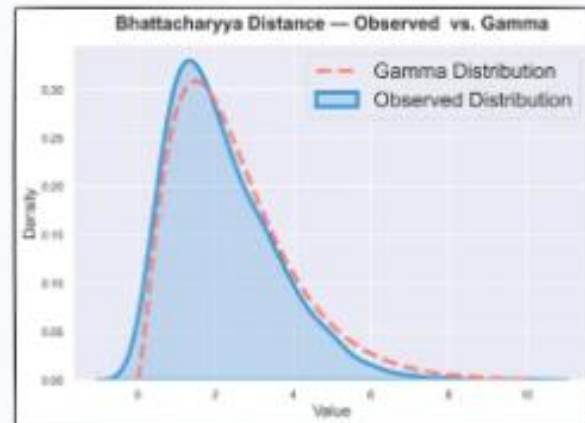


Bhattacharyya Distance **0.19**
(high)

Conclusion



Distributions are less similar



Bhattacharyya Distance **0.03**
(low)

Conclusion



Distributions are more similar

Processing

- Multiple Linear Regression
- Time lag
- **Bhattacharyya distance**

✓ Correlation without Bd

Radar Data and Temperature water: 0.5433

Radar Data and Hight of the water: 11.5122

Radar Data and Manual Regression: 2.2029

Radar Data and Auto Regression: 2.2029

Consider c coefficient be 1*c

$$\text{LOS_displacement}(\text{epoch}) = a + b \times \text{data_Hwater}(\text{epoch}) + c \times \text{data_Twater}(\text{epoch})$$

a: Constant term (intercept).

b: Coefficient for water level.

c: Coefficient for water surface temperature.

✓ Correlation with Bd

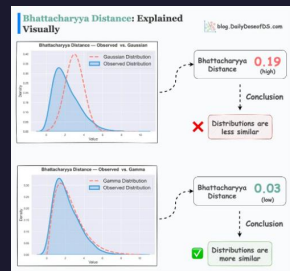
Radar Data and Temperature water: 0.5433

Radar Data and Hight of the water: 11.5122

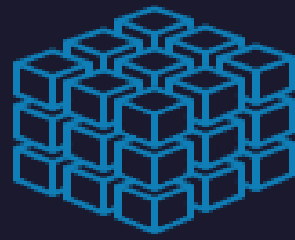
Radar Data and Manual Regression: 2.2029

Radar Data and Auto Regression: 0.0003

Consider c coefficient be 18.4*c



Results



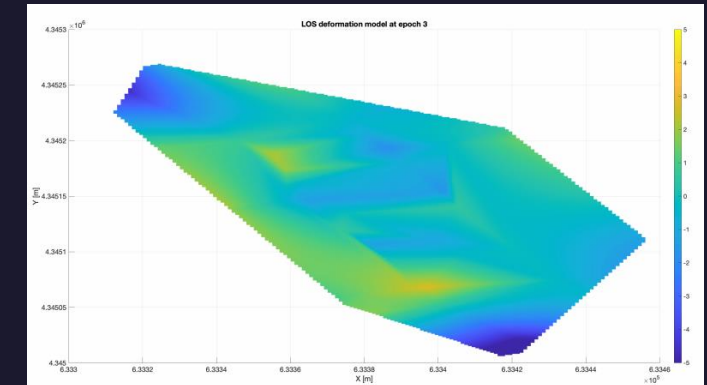
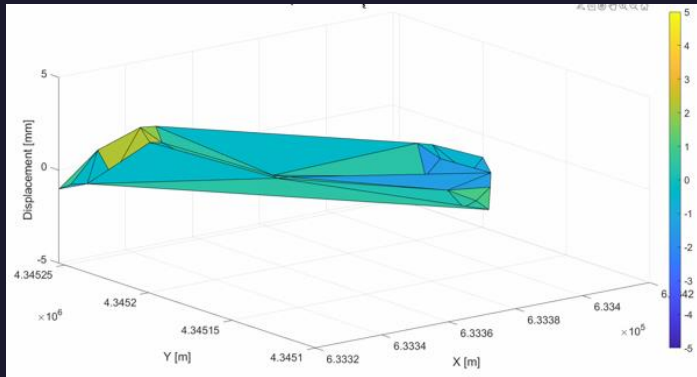
- Find best regression model

$$\text{LOS_displacement}(\text{epoch}) = a + b \times \text{data_Hwater}(\text{epoch}) + \underline{18.4} * c \times \text{data_Twater}(\text{epoch})$$

a: Constant term (intercept).

b: Coefficient for water level.

c: Coefficient for water surface temperature.



Thank You

- Milad Ramezani Ziarani
- Milad.ramezani@mail.polimi.it
- <https://miladramezani.weebly.com/>

