

Shakespeare Cliff	Bed roughness	Velocity		Elevation	
		BSS	RMSE	BSS	RMSE
	0.1	0.9488	0.0517	0.9932	0.0068
	0.08	0.9721	0.0279	0.9993	0.0007
	0.001	0.9438	0.05462	0.647	0.353
	0.008	0.9631	0.0369	0.999	0.001
	0.0001	0.9622	0.0378	0.9988	0.0012
	0.0004	0.9601	0.0399	0.999	0.001

Wharekaho	Bed roughness	Velocity		Elevation	
		BSS	RMSE	BSS	RMSE
	0.1	0.7803	0.2197	0.7692	0.2308
	0.08	0.889	0.111	0.6785	0.3215
	0.001	0.8206	0.1794	0.9643	0.0357
	0.008	0.8139	0.1861	0.7367	0.2633
	0.0001	0.8657	0.1343	0.7772	0.2228
	0.0004	0.8665	0.1335	0.7542	0.2458

Entrance	Bed roughness	Velocity		Elevation	
		BSS	RMSE	BSS	RMSE
	0.1	0.3543	0.6457	0.2143	0.7857
	0.08	0.9243	0.0757	0.9654	0.0346
	0.001	0.7209	0.2791	0.9405	0.0595
	0.008	0.8775	0.1225	0.9561	0.0439
	0.0001	0.8012	0.1988	0.9429	0.0571
	0.0004	0.8572	0.1428	0.6388	0.3612

Rivers	Bed roughness	Velocity		Elevation	
		BSS	RMSE	BSS	RMSE
	0.1	0.8372	0.1628	0.9094	0.0906
	0.08	0.9075	0.0925	0.9456	0.0544
	0.001	0.9356	0.0644	0.9619	0.0381
	0.008	0.8979	0.1021	0.9541	0.0459
	0.0001	0.8871	0.1129	0.9547	0.0453
	0.0004	0.6029	0.3971	0.4934	0.5066

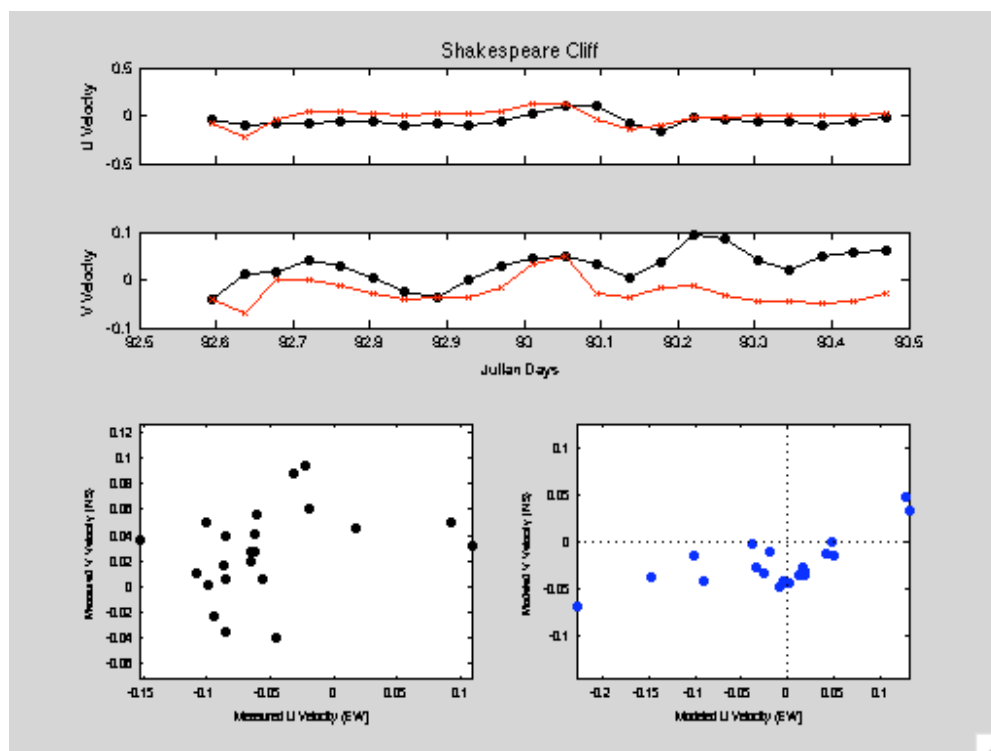
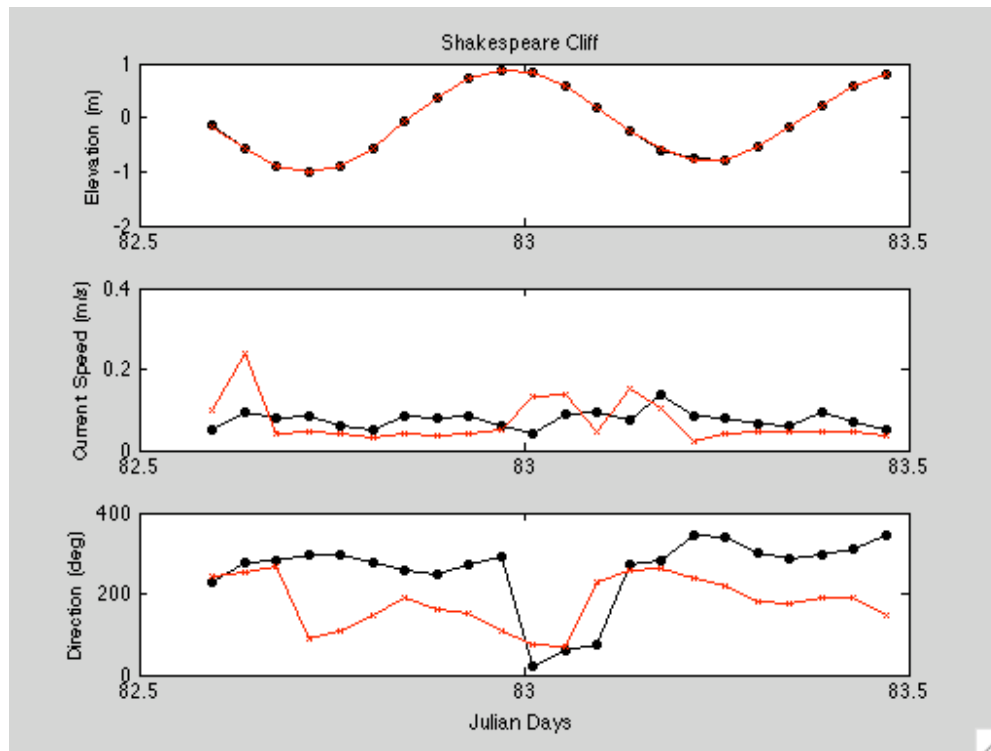
Model calibration graphs:

Note: bed roughness was changed for each calibration run.

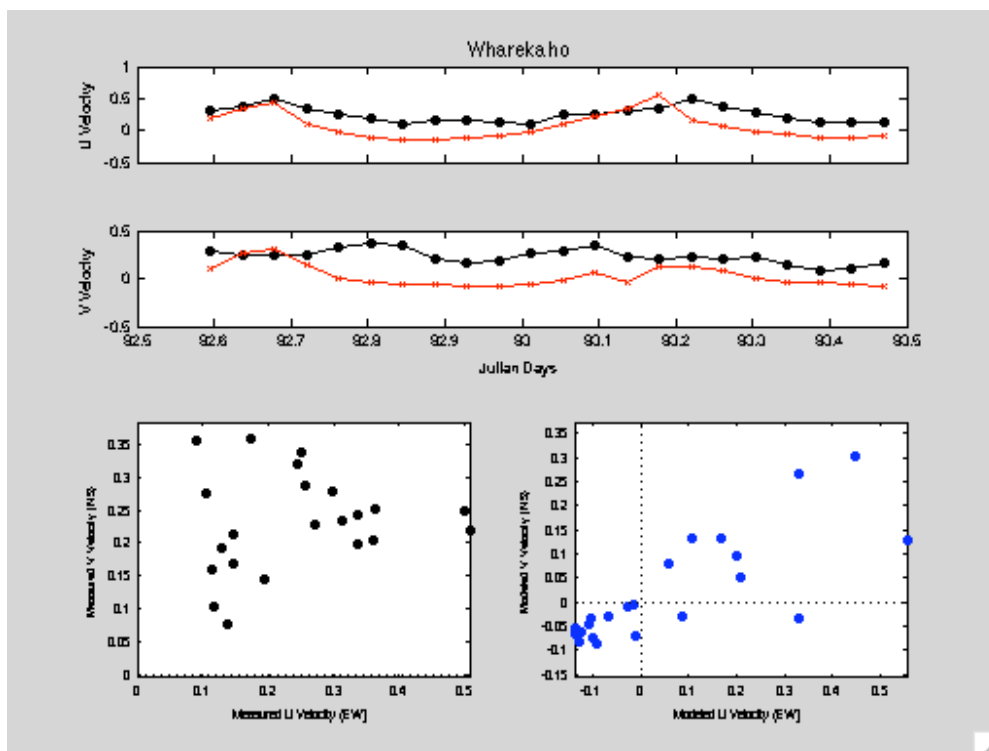
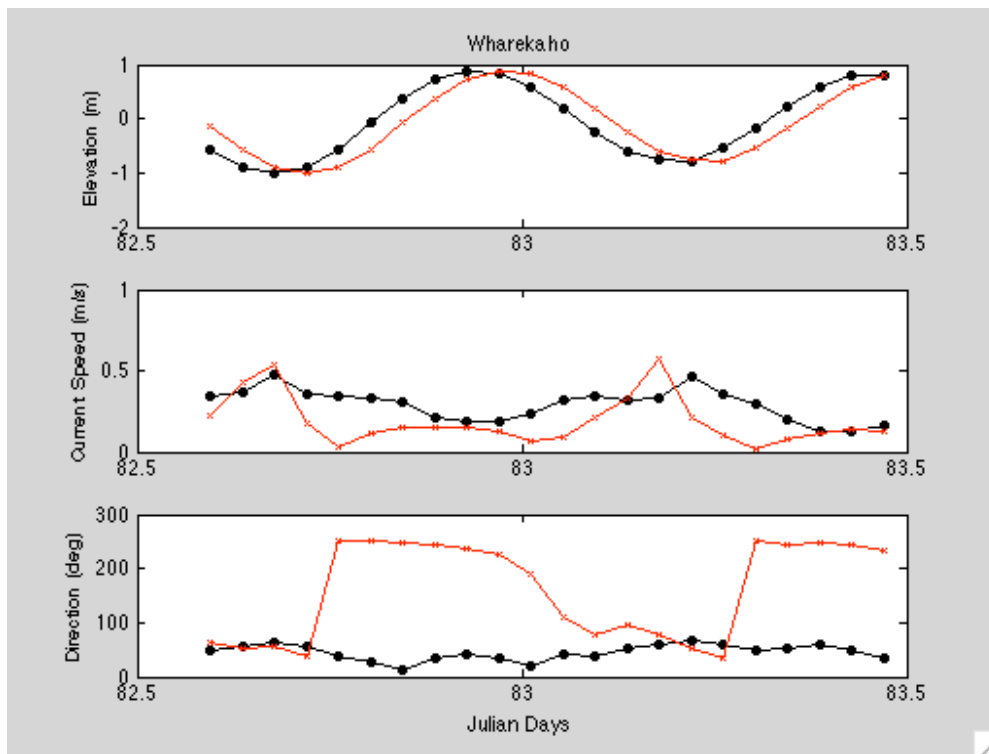
Calibration Run 1

Bed Roughness 0.0001

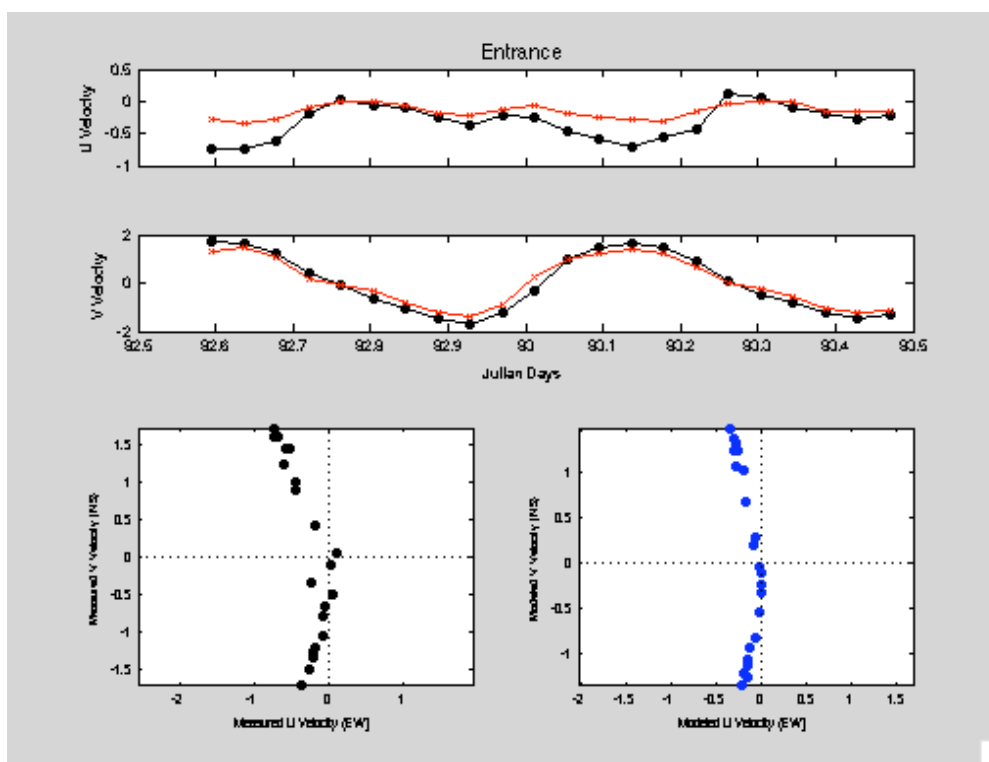
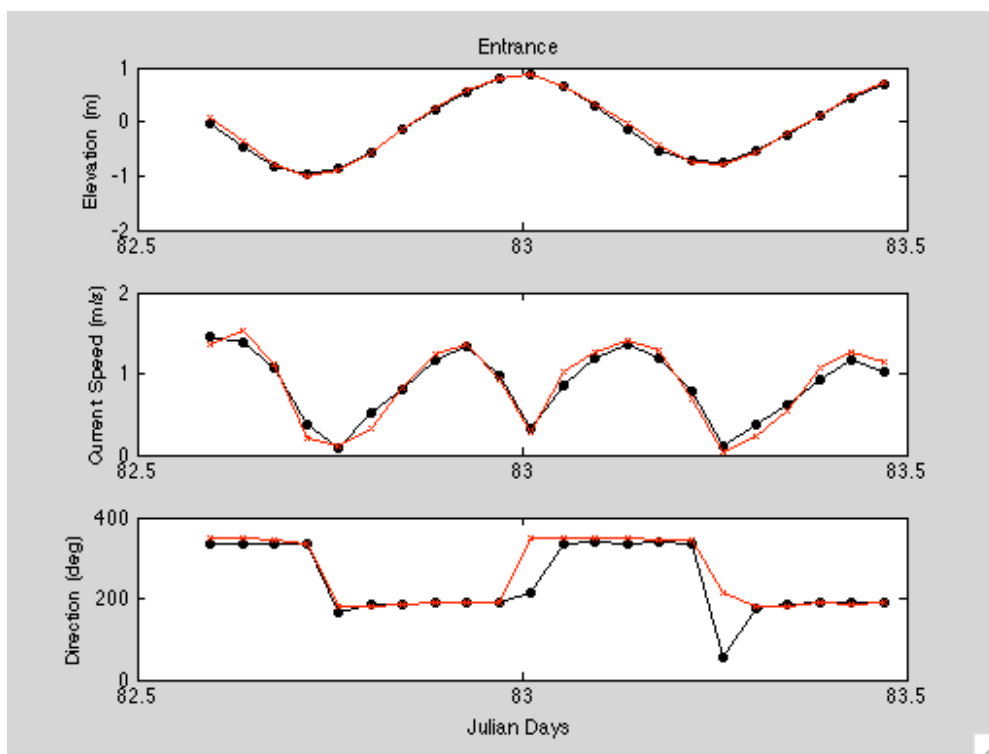
Shakespeare Cliff



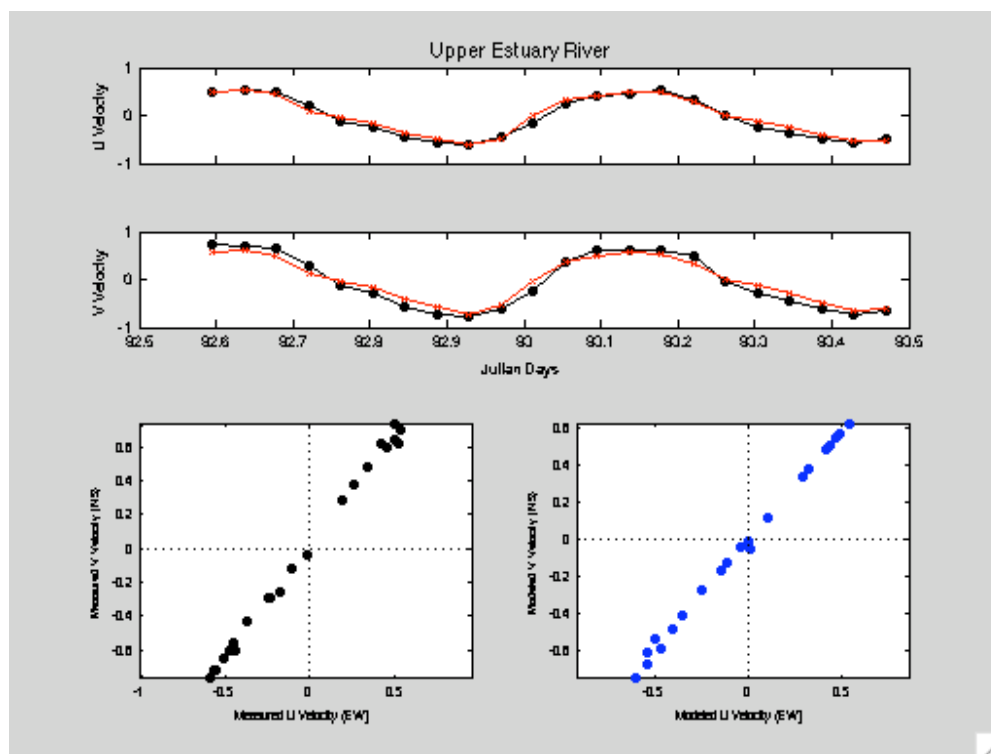
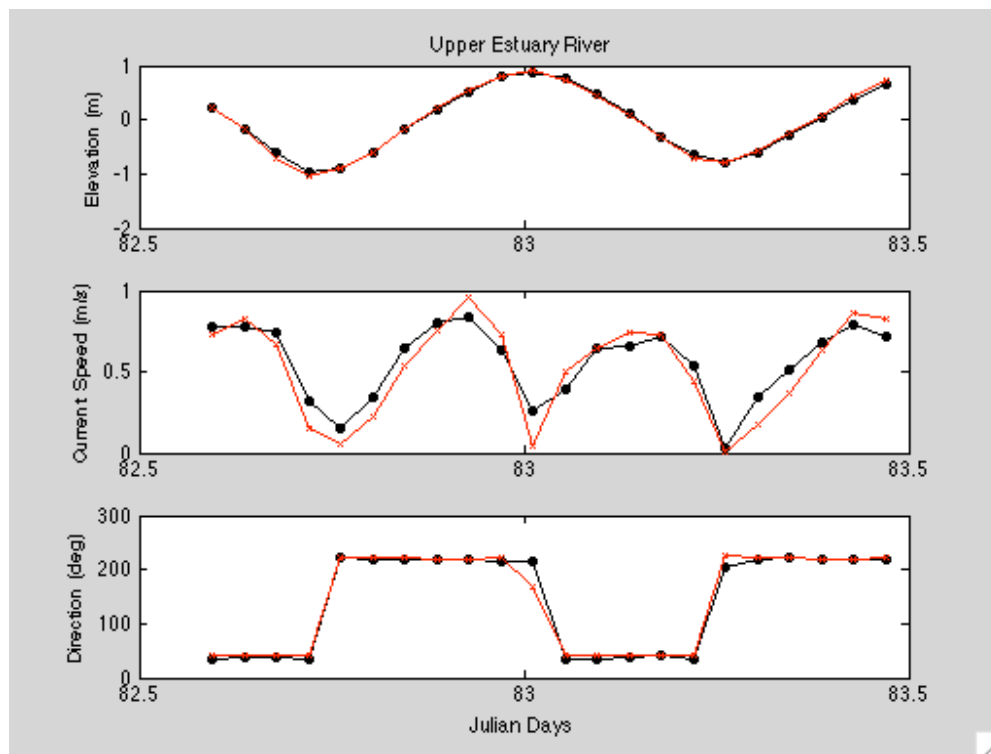
## Wharekaho



## Entrance



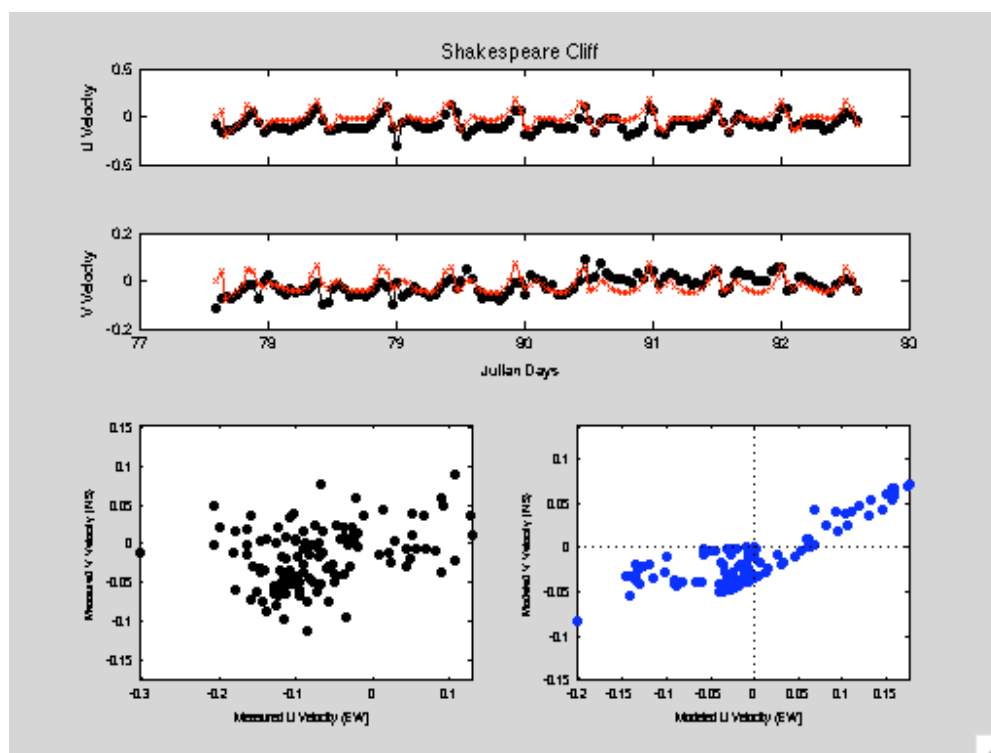
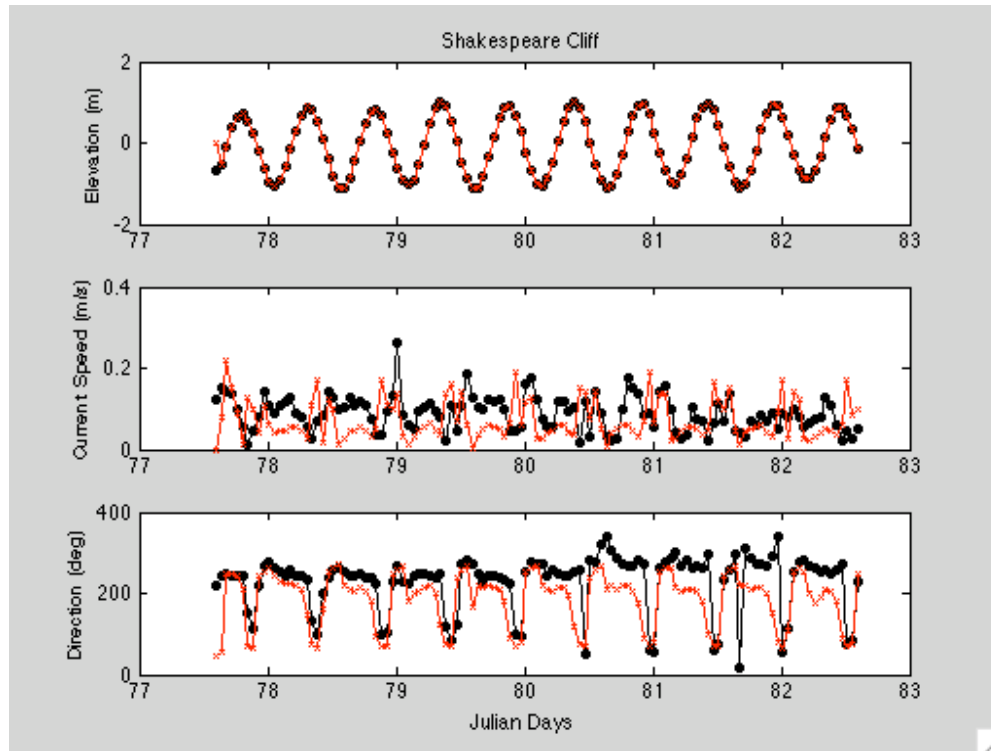
## Rivers



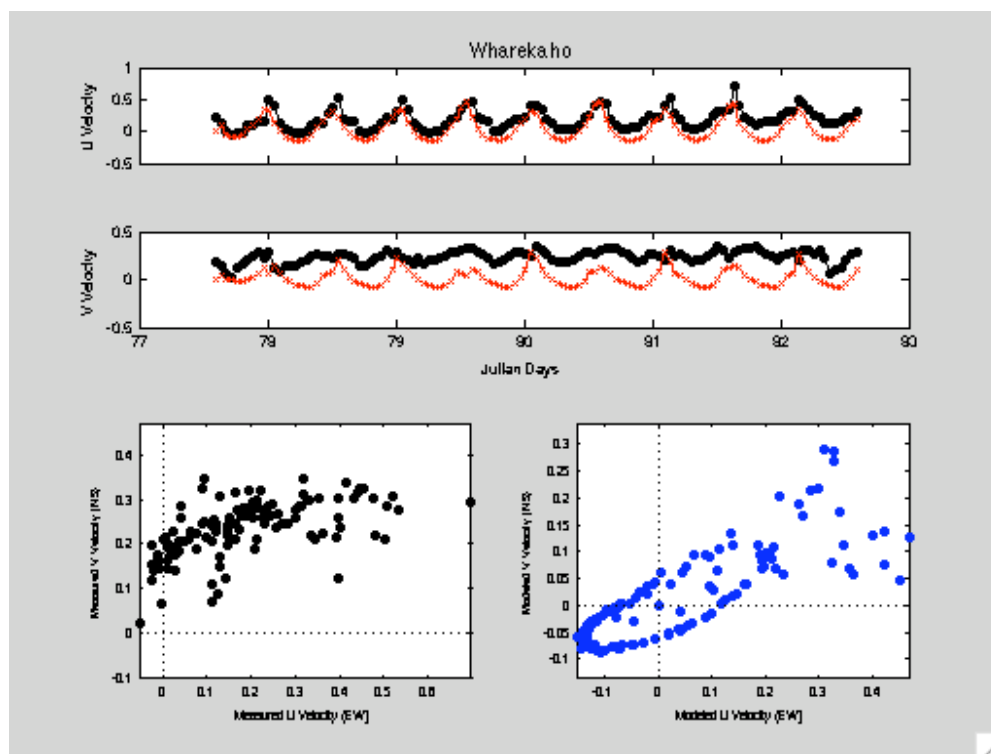
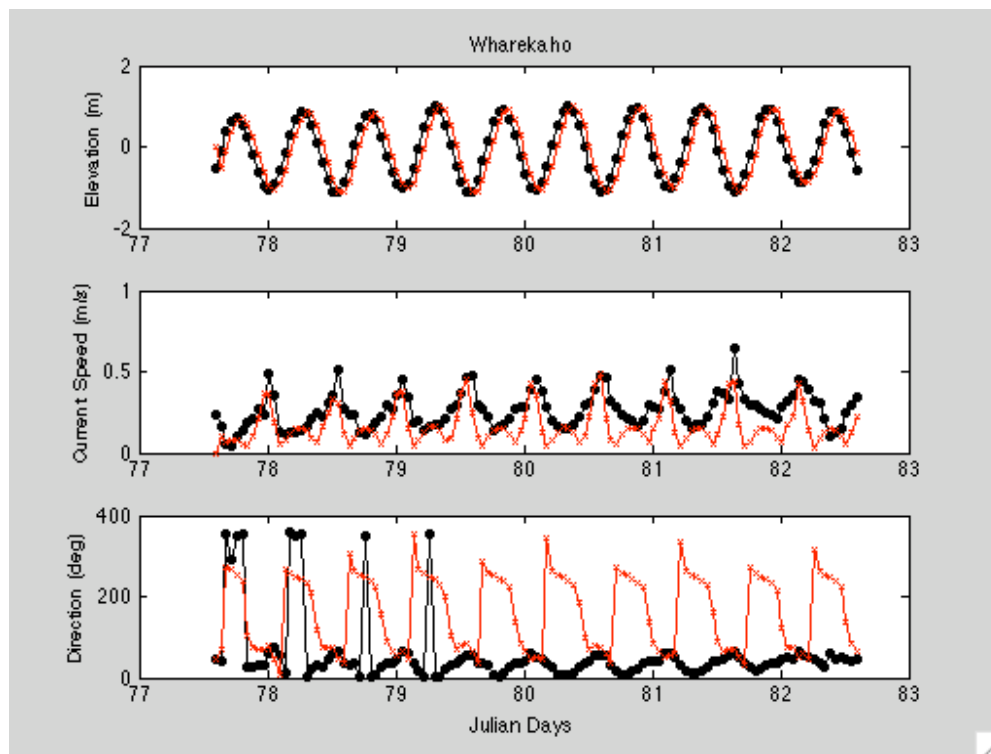
Calibration Run 2.

Bed Roughness 0.01

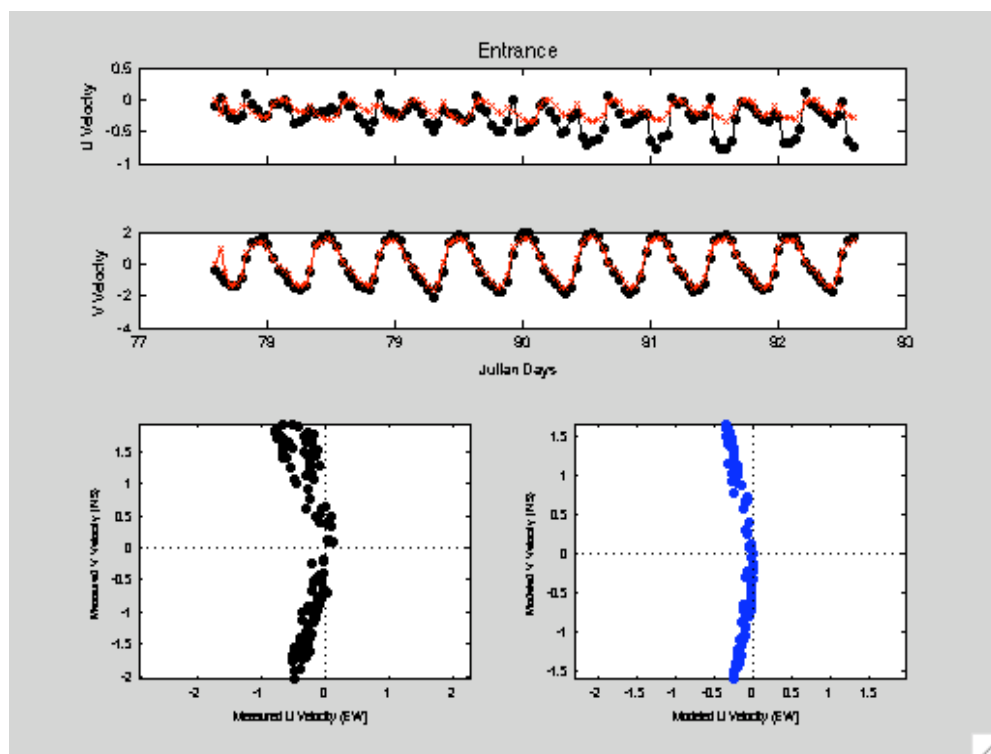
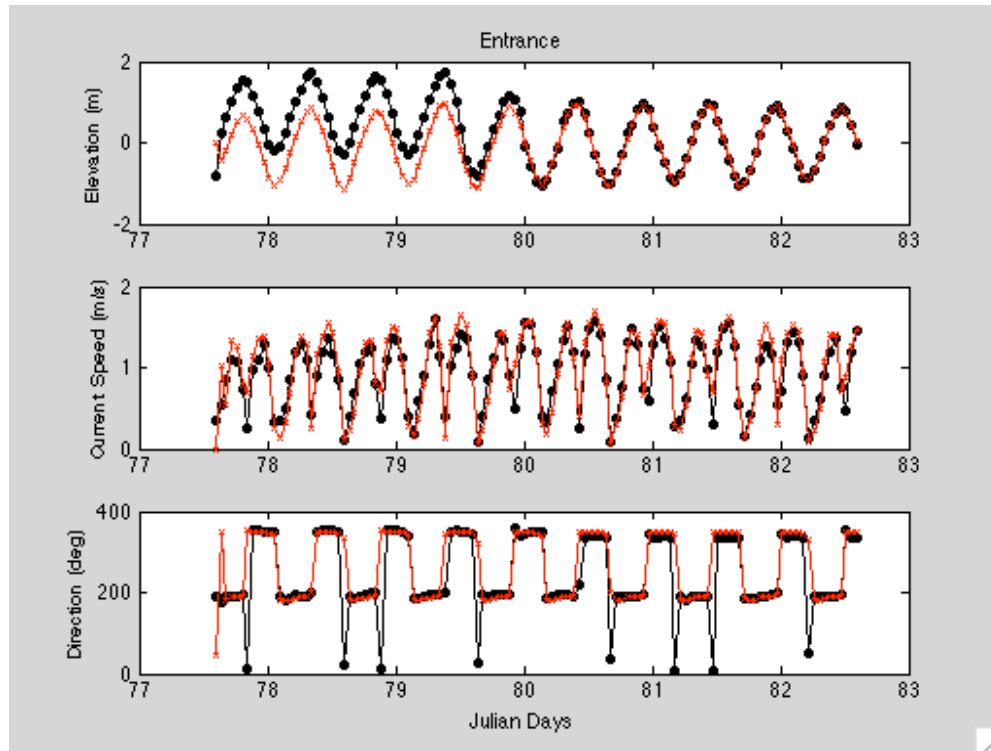
Shakespeare Cliff



## Wharekaho

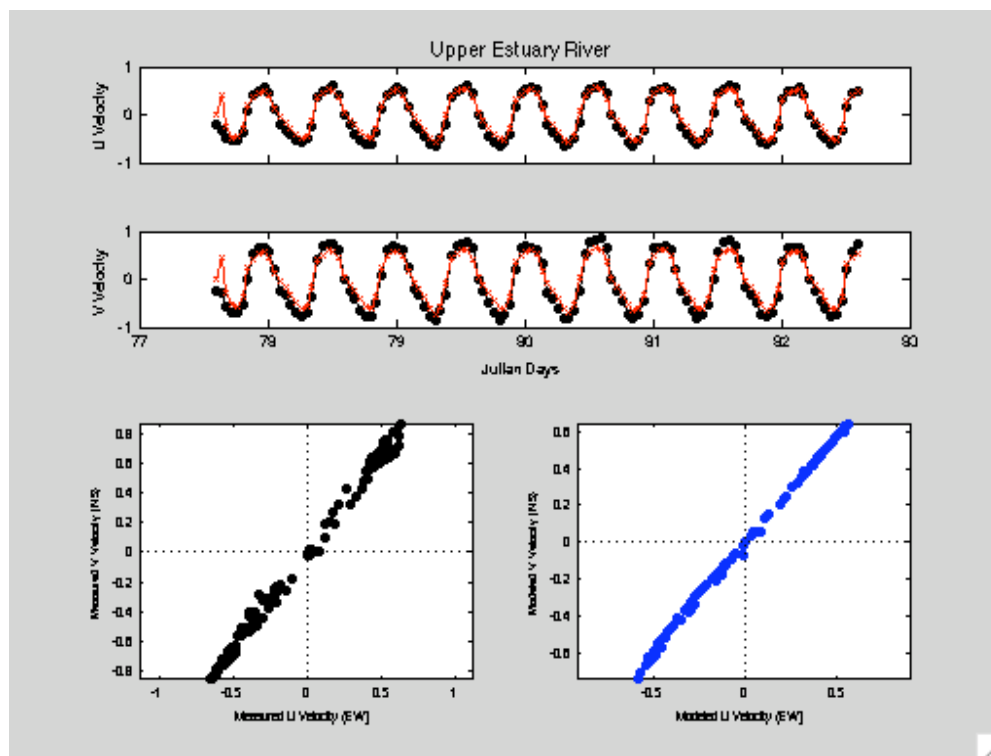
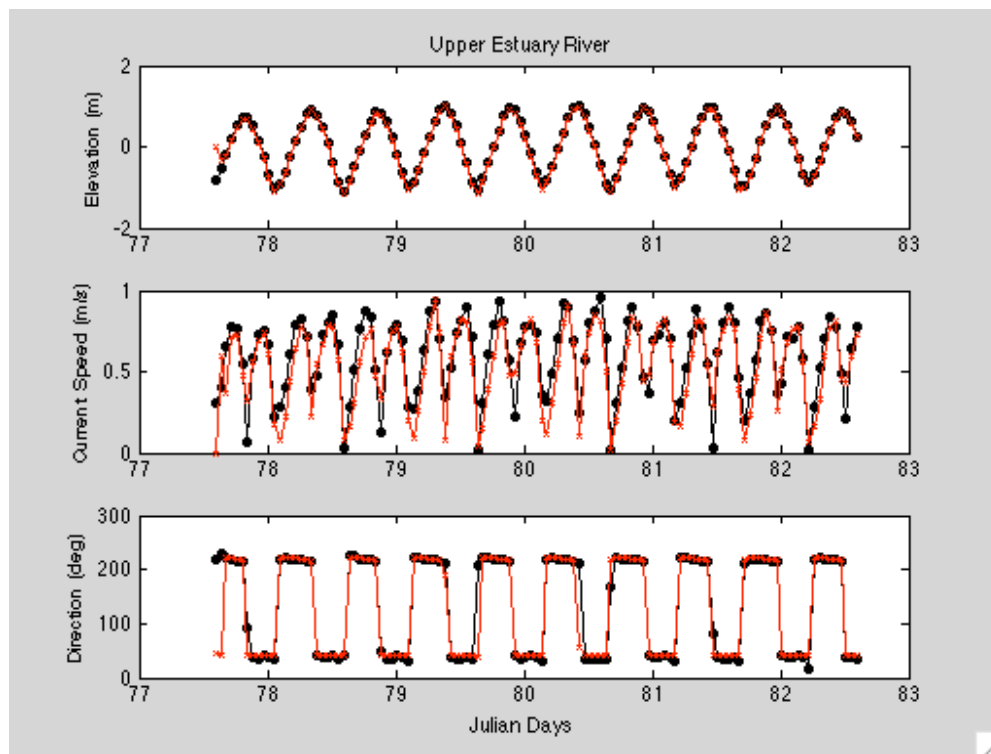


## Entrance





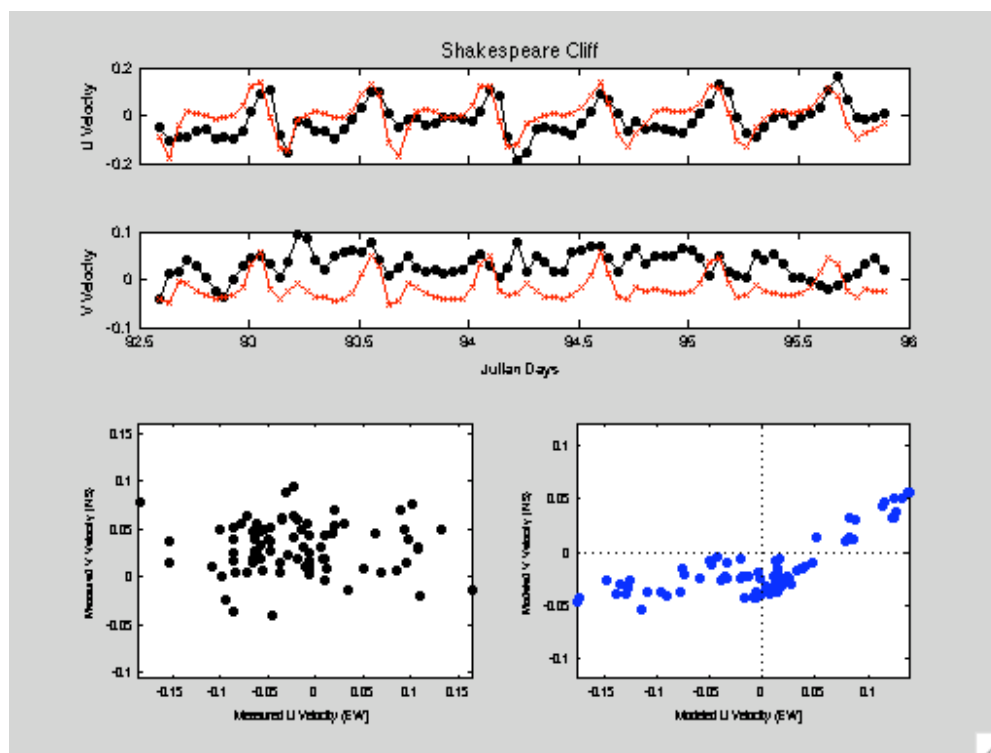
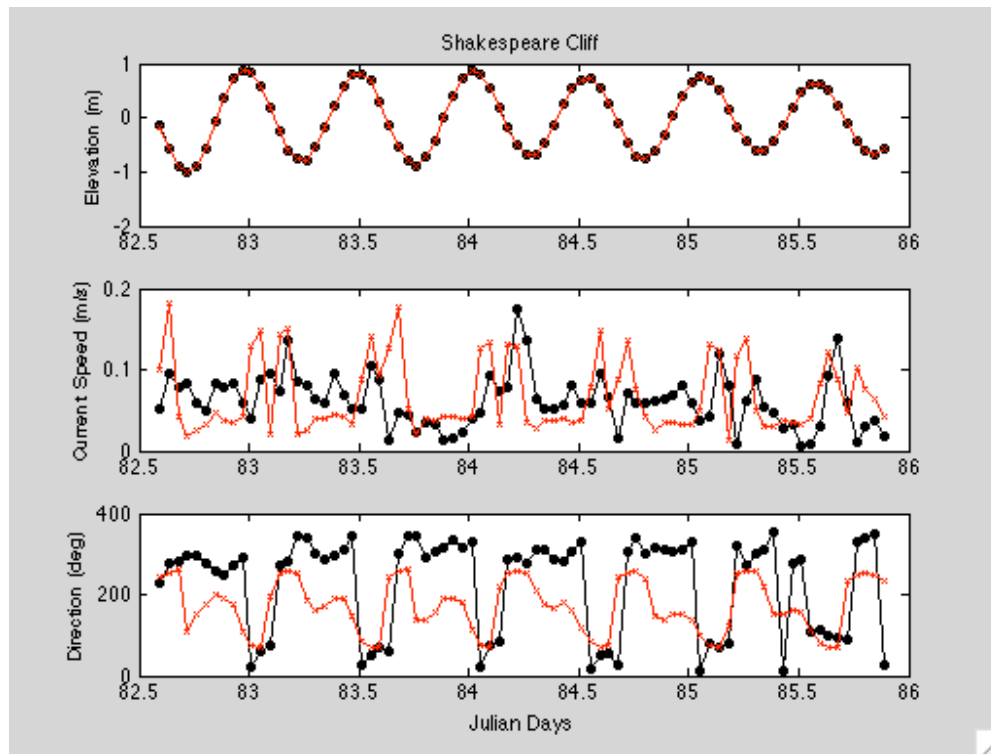
## Rivers



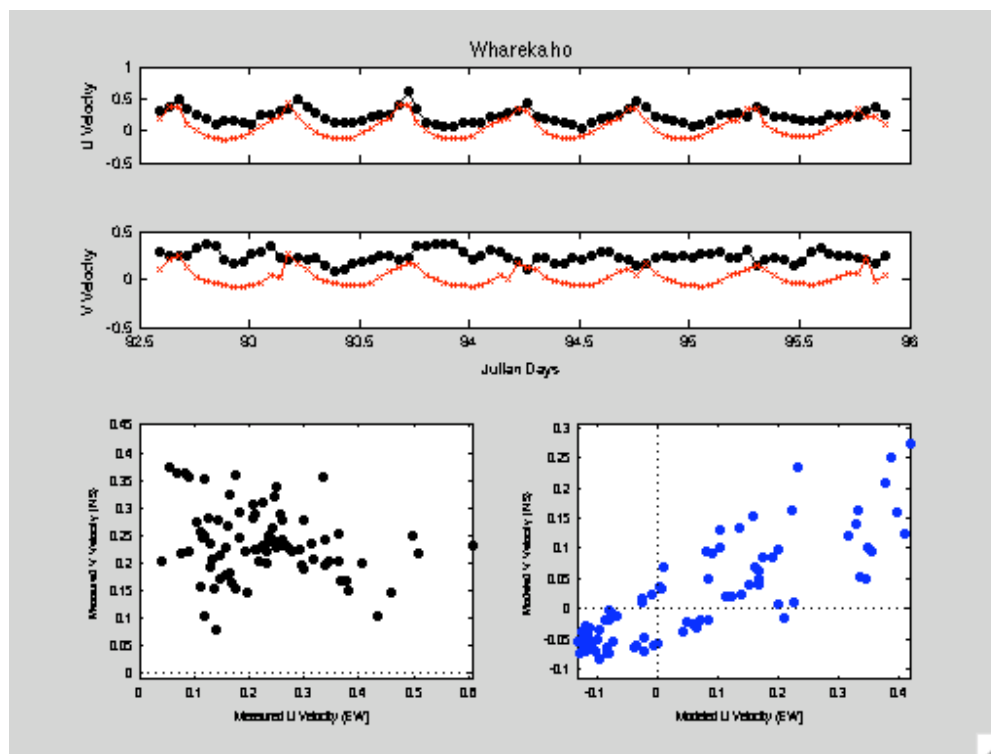
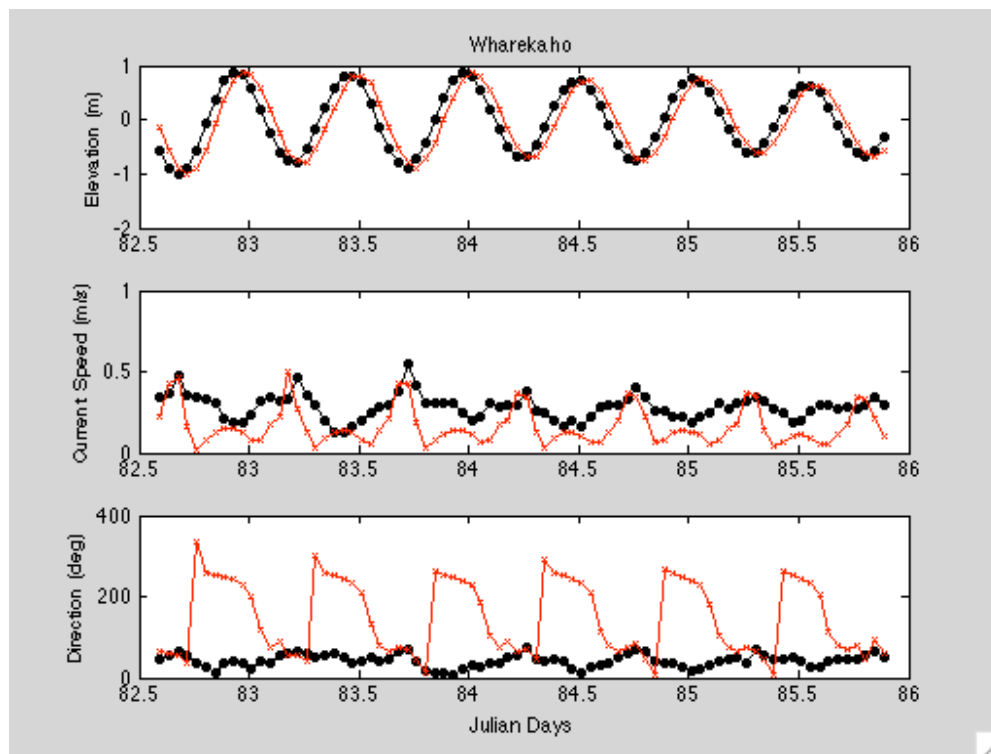
Calibration Run 3.

Bed Roughness 0.0004

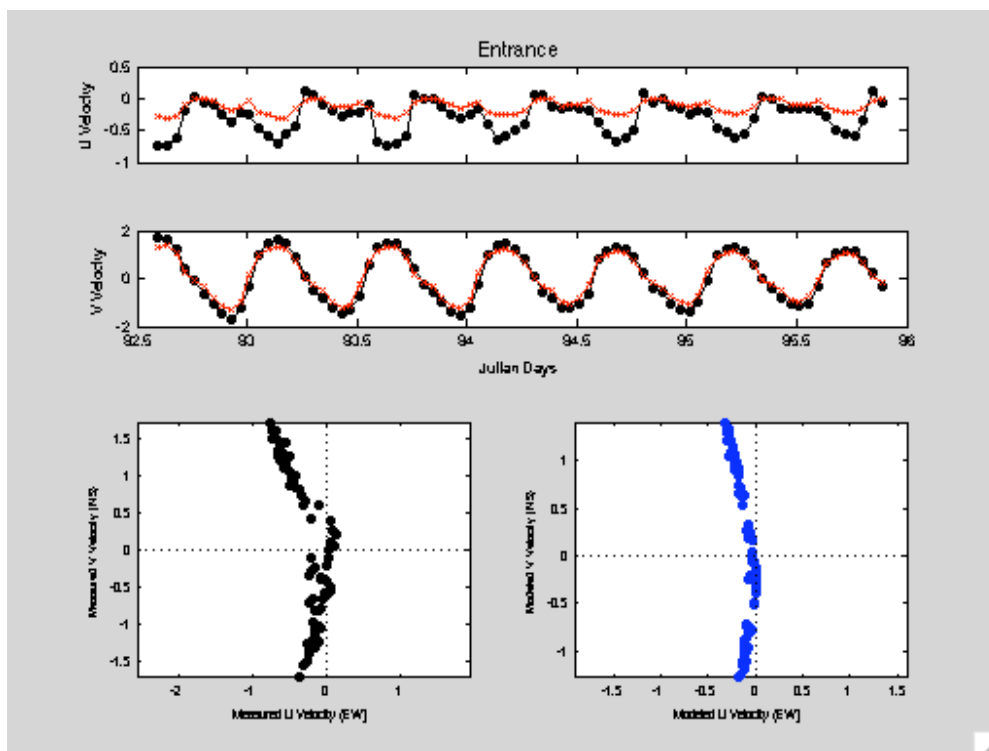
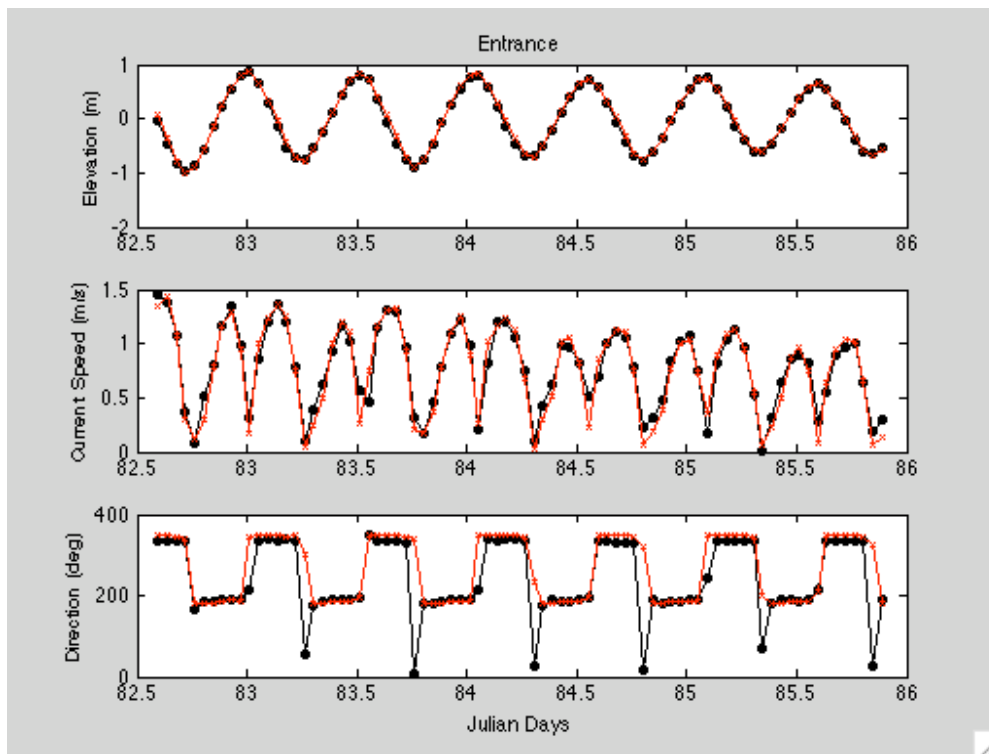
Shakespeare Cliff



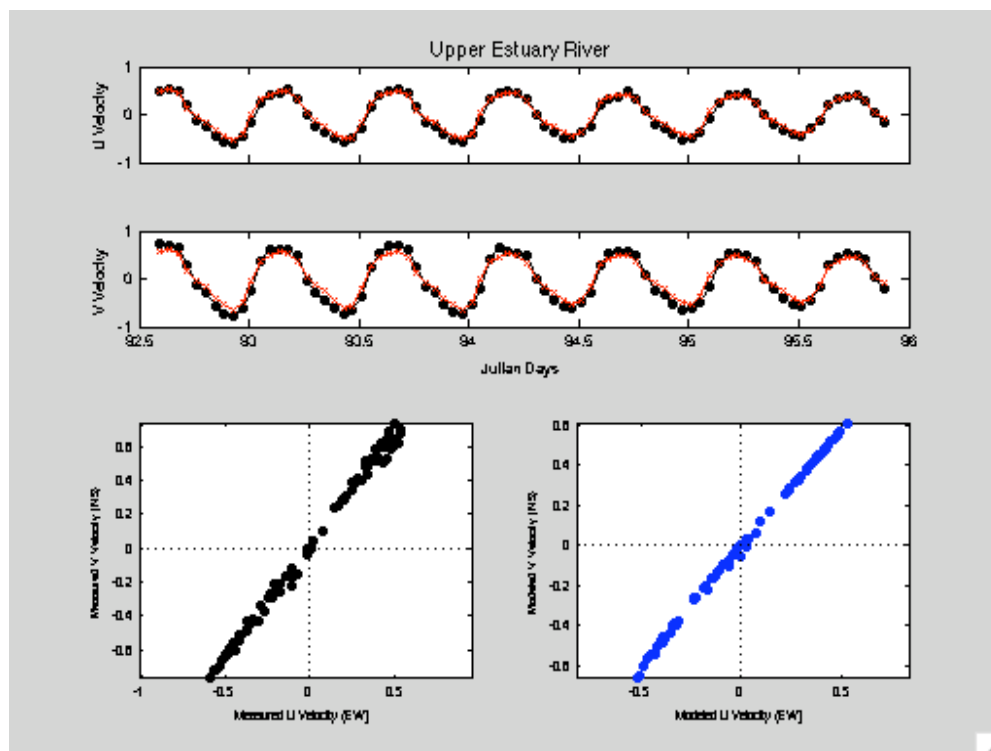
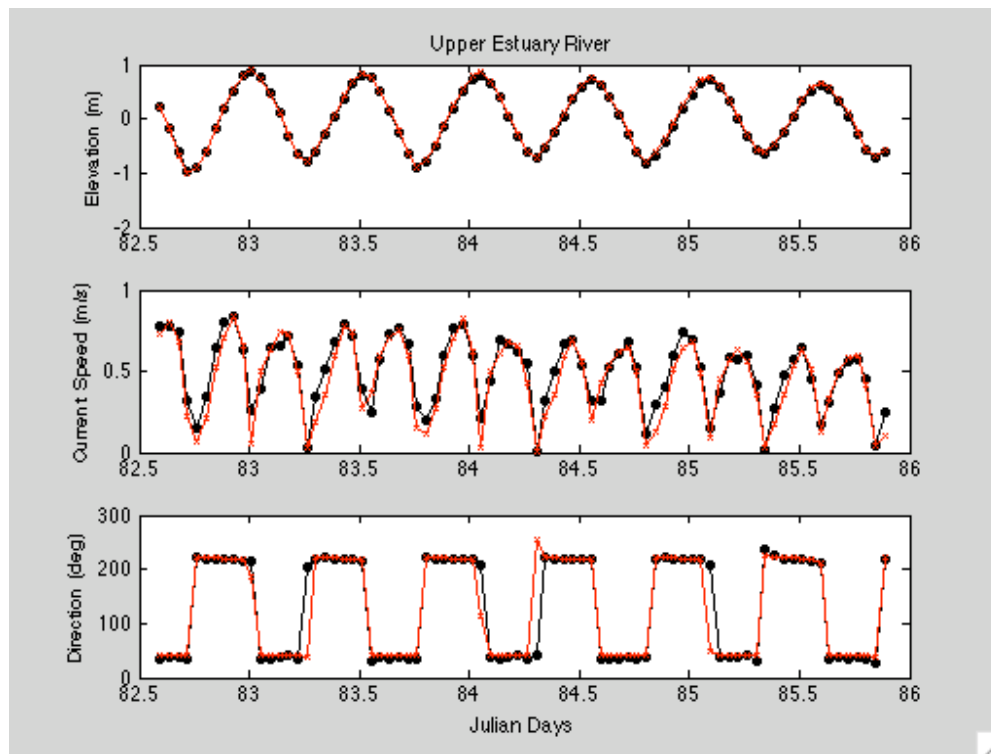
## Wharekaho



## Entrance



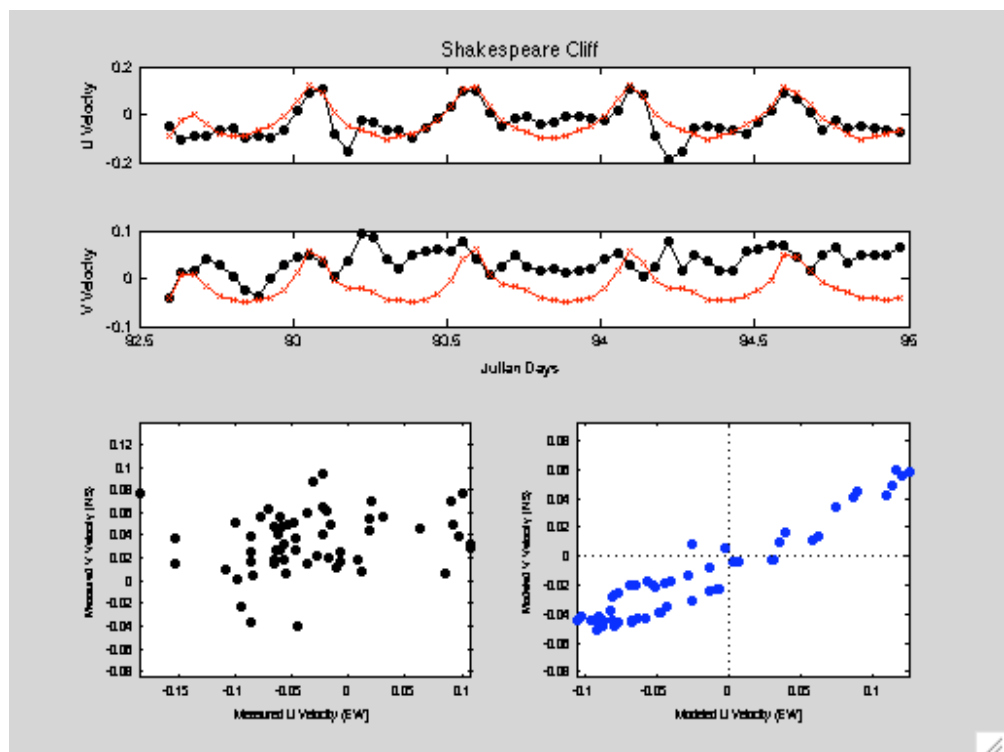
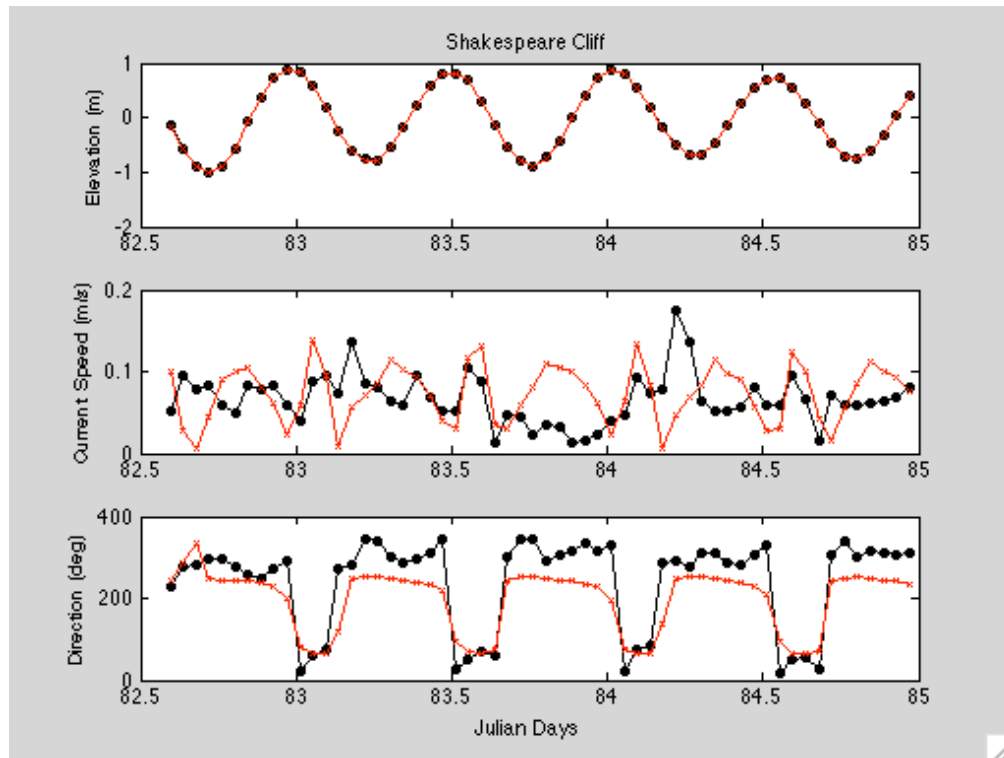
## Rivers



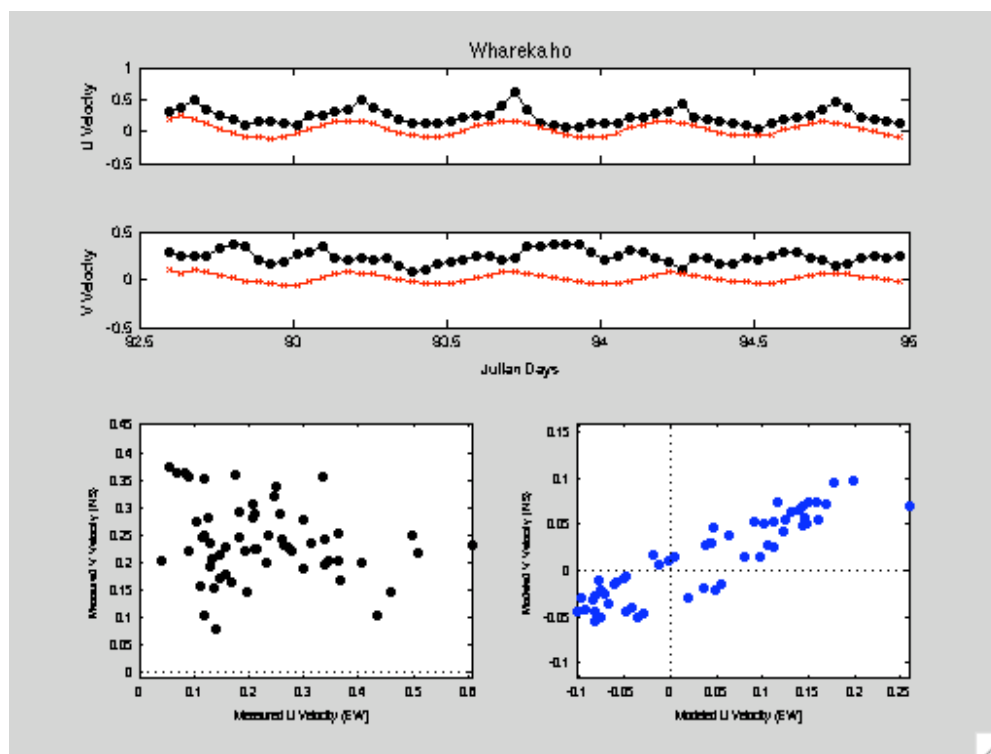
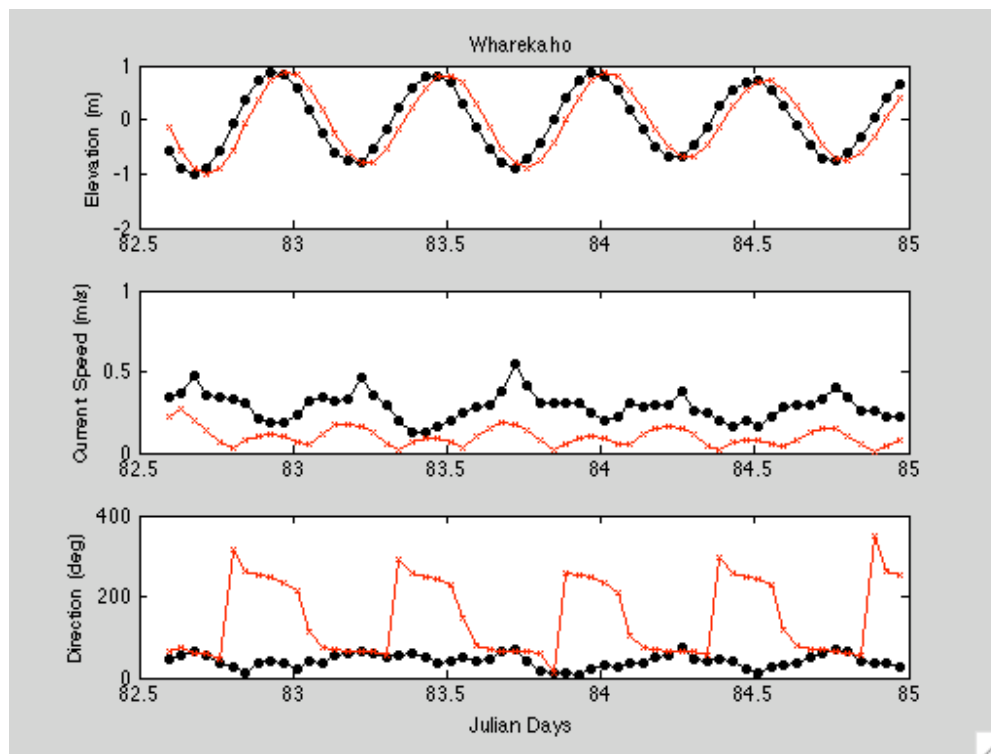
## Calibration Run 4

Bed Roughness 0.008

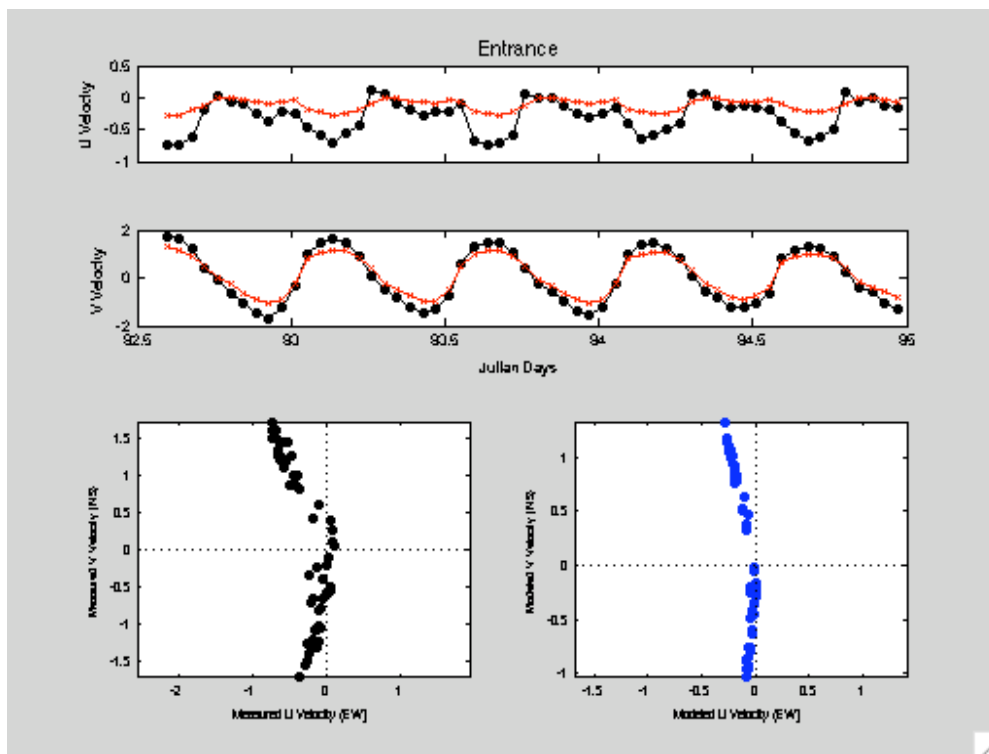
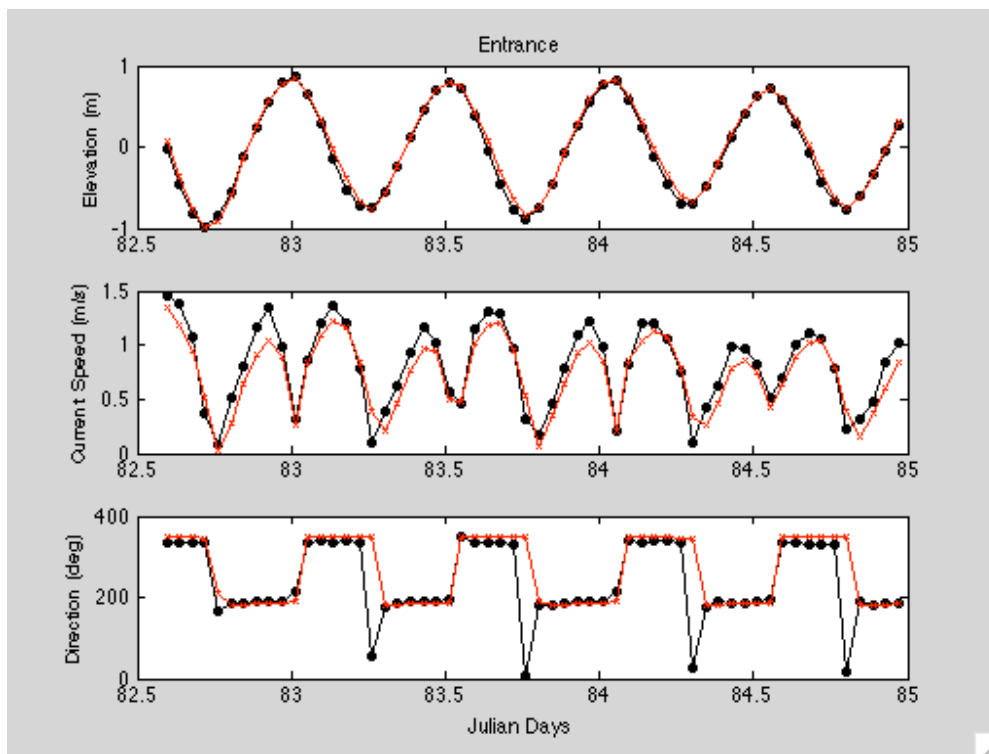
Shakespeare Cliff



## Wharekaho

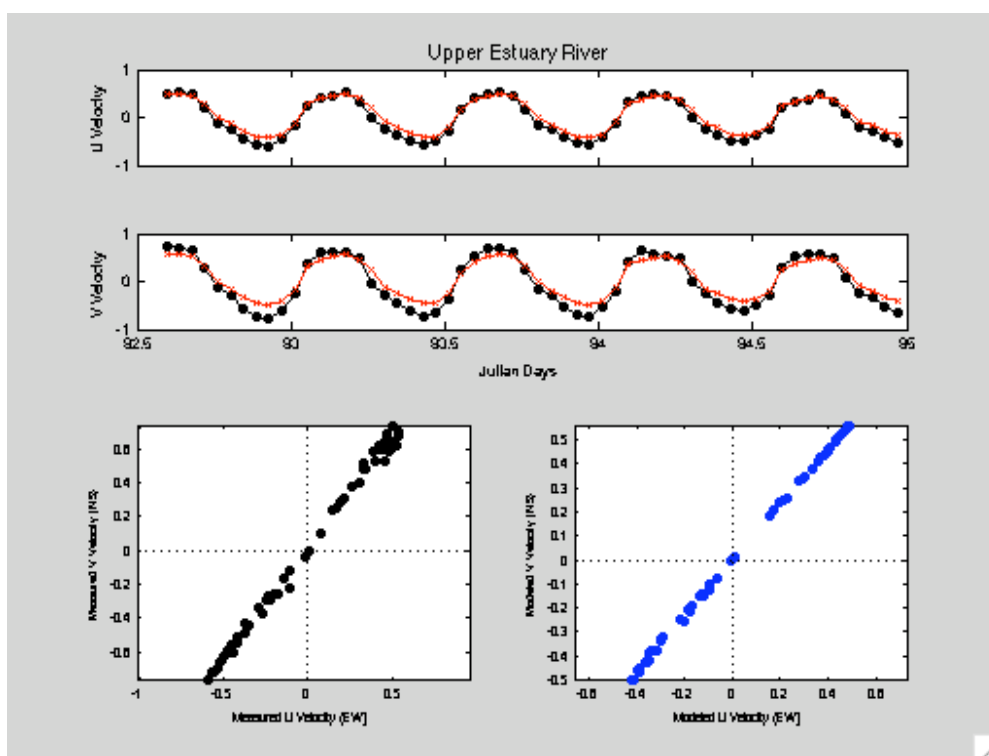
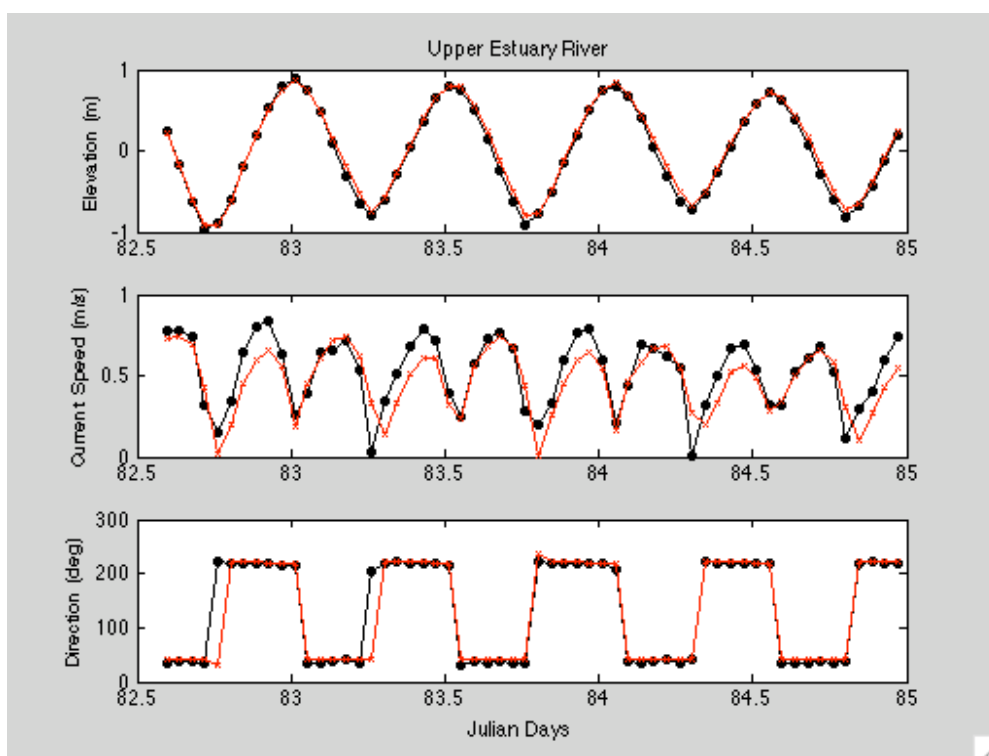


## Entrance





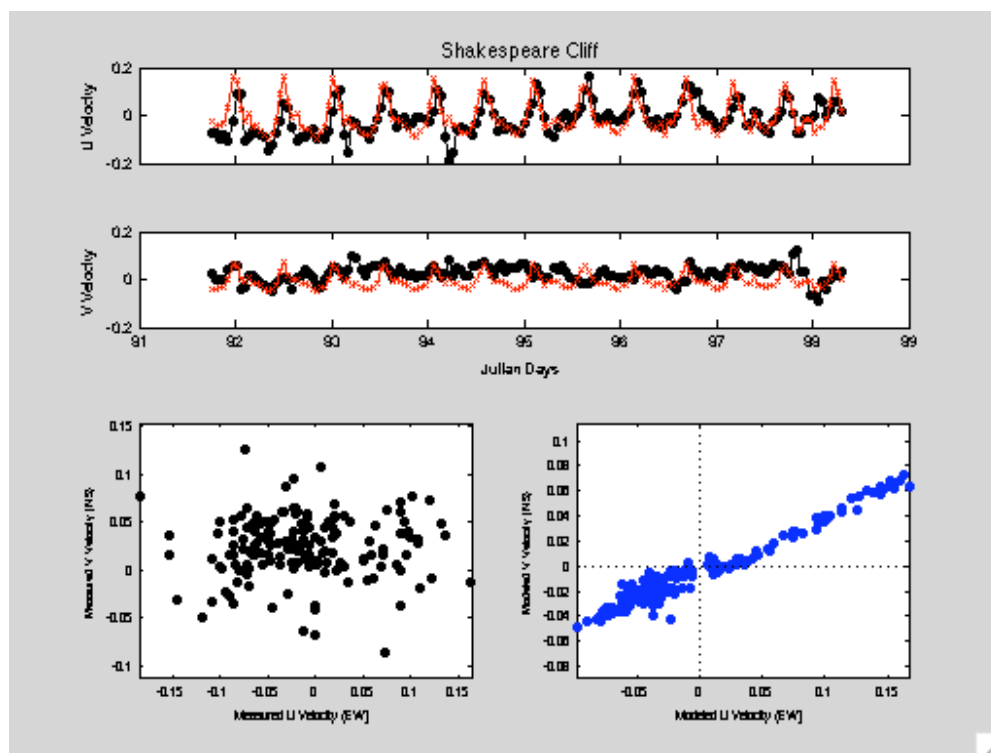
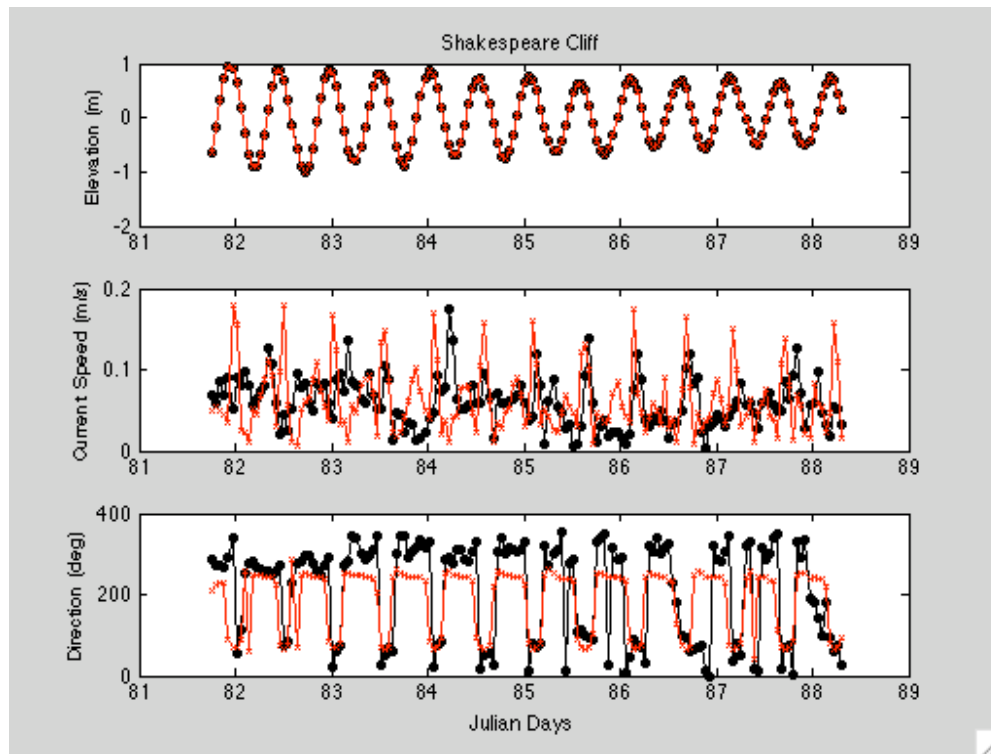
## Rivers



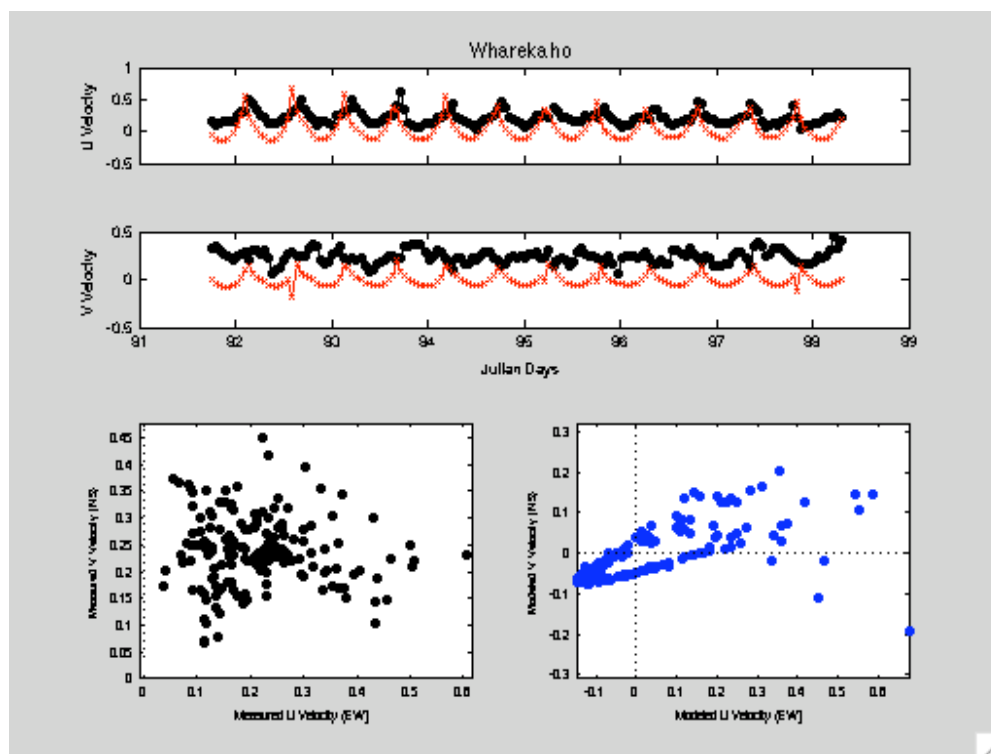
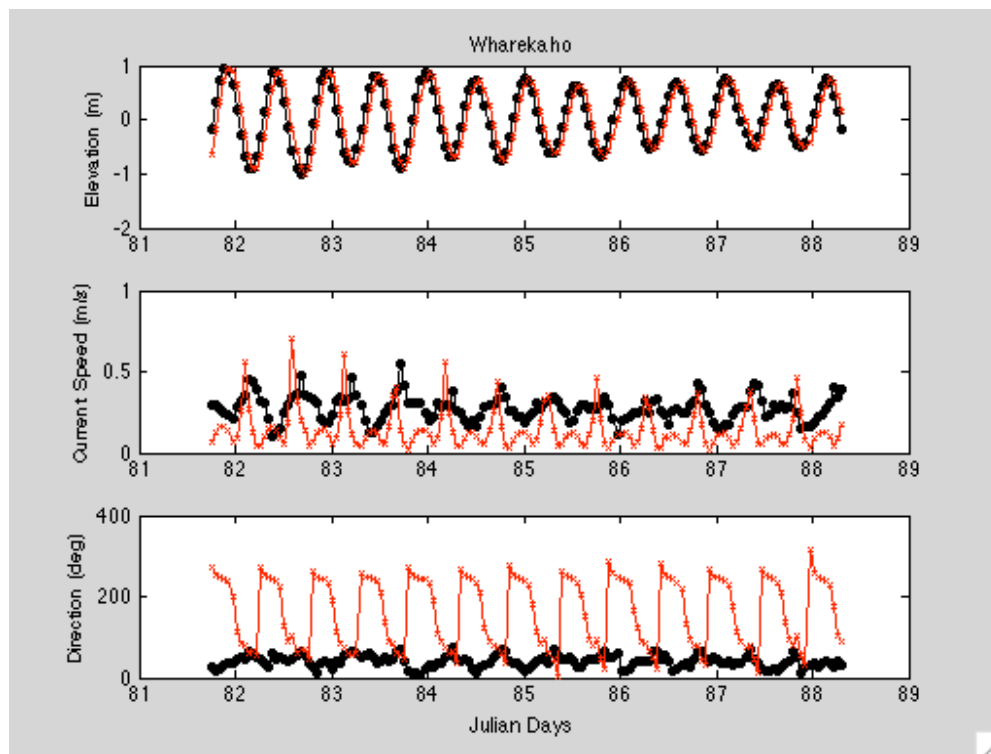
## Calibration Run 5

### Bed Roughness Map

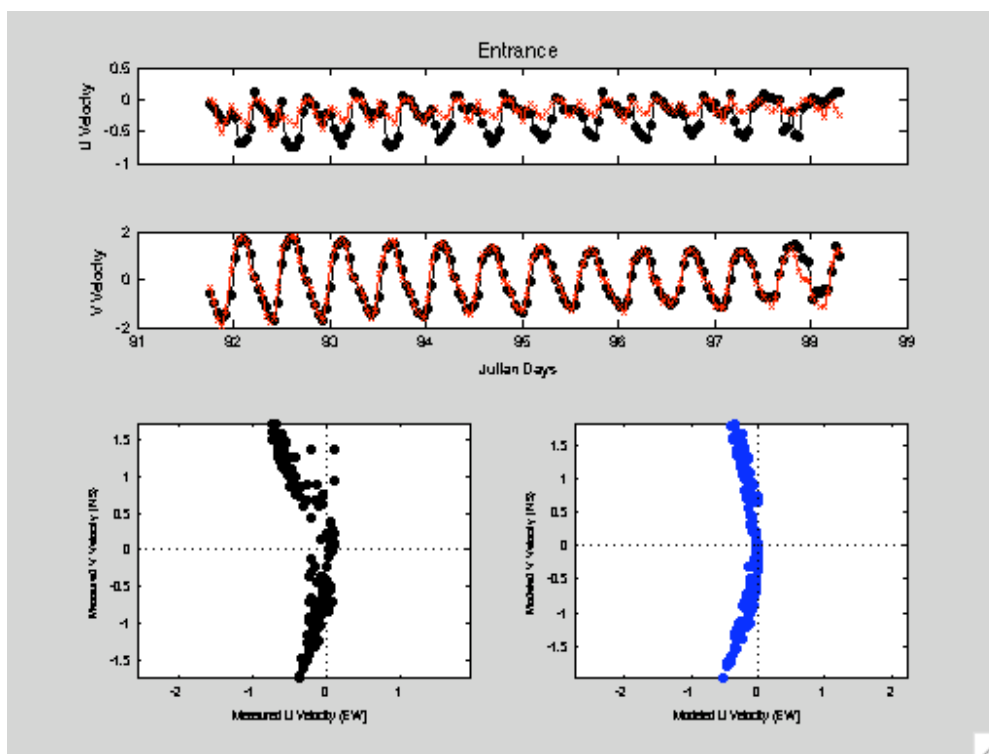
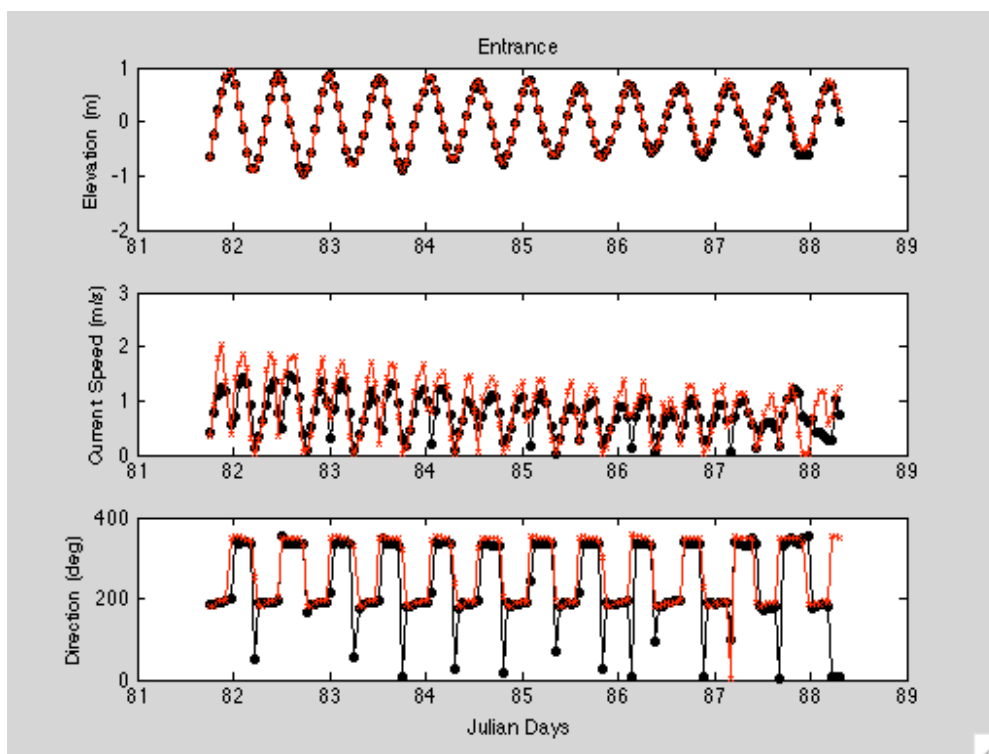
### Shakespeare Cliff



## Wharekaho



## Entrance



## Rivers

