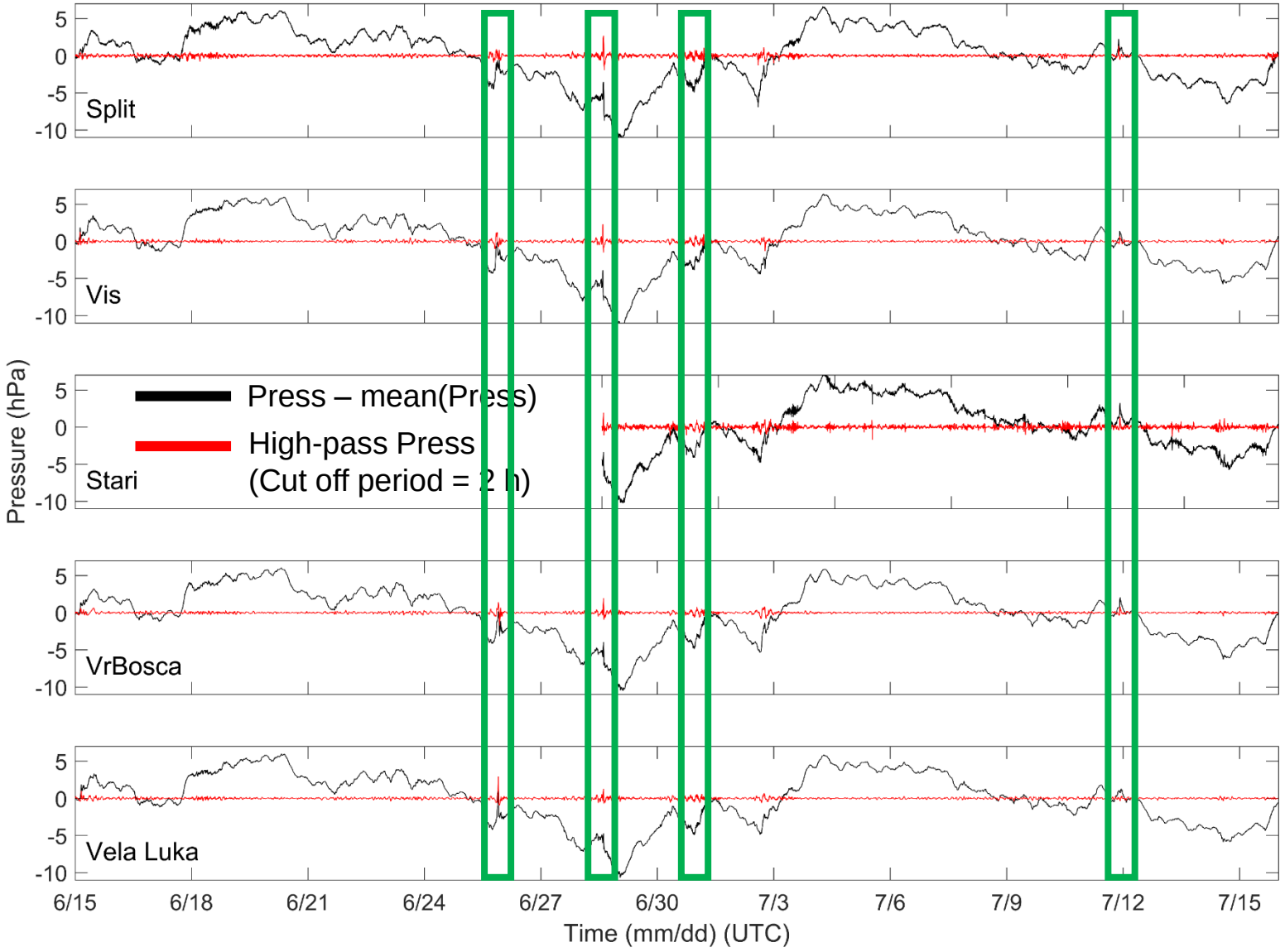
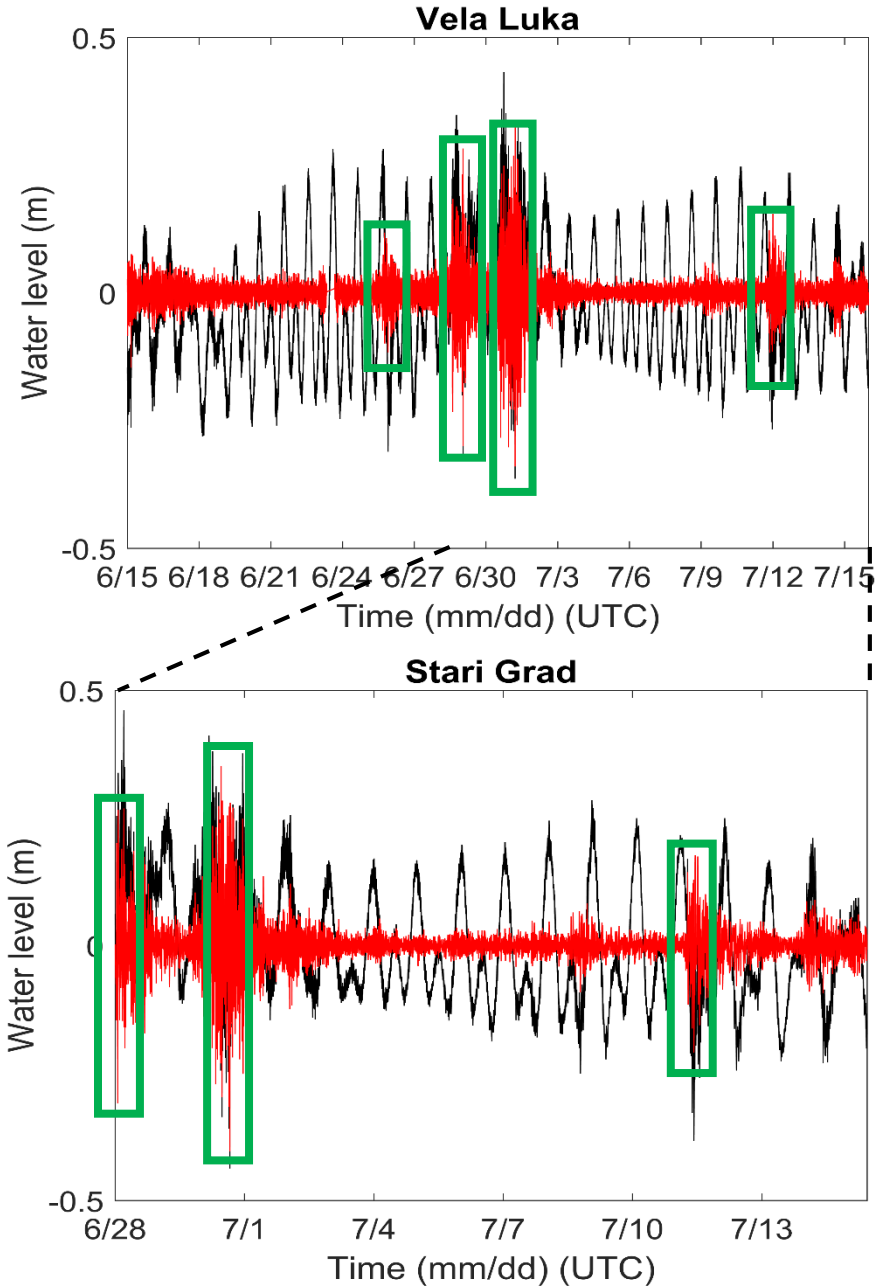
Heuristic Approach for Estimating (or Forecasting) Meteotsunami-Height in the Adriatic Sea

Atmospheric Pressure



Meteotsunami Events



Water level – mean (water level)

High-pass Water Level
(Cut off period = 2 h)

Threshold:

Wave Height > 0.2 m

Meteotsunamis:

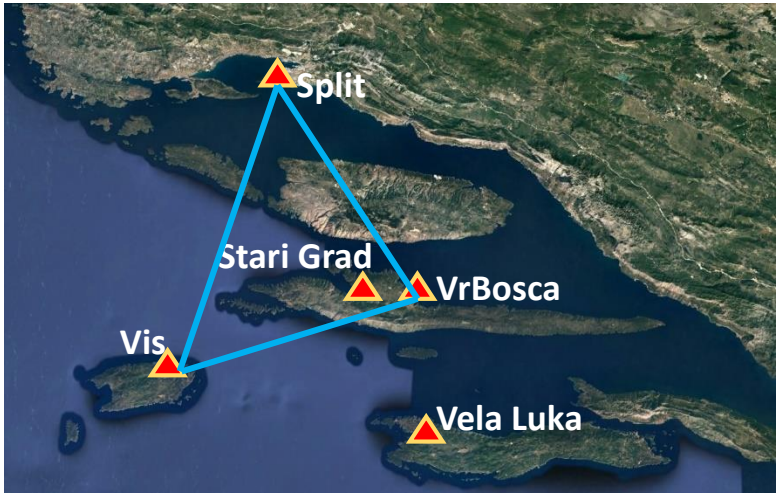
- 25-Jun-2017 09:56:57 (Vela Luka) η = 0.22 m
- 28-Jun-2017 16:43:59 (Vela Luka) η = 0.58 m
  28-Jun-2017 15:02:00 (Stari Grad) η = 0.57 m
- 30-Jun-2017 21:07:59 (Vela Luka) η = 0.66 m
  01-Jul-2017 04:54:54 (Stari Grad) η = 0.67 m
- 11-Jul-2017 15:51:00 (Vela Luka) η = 0.23 m
  11-Jul-2017 05:01:58 (Stari Grad) η = 0.34 m

Heuristic Approach (HA)

From the study in Linares et al. (2016)

$$\eta = \eta_0 \left| \frac{1}{1-\left(\frac{U}{\bar{c}}\right)^2} \right| f(\theta) S$$

$$where\ \eta_0 = \frac{1}{\rho g}\ (\Delta P_{max})$$



Adriatic characteristic propagation speed:

$$A = \left| \frac{1}{1-\left(\frac{U}{\bar{c}}\right)^2} \right|$$

Characteristic propagation speed ($\bar{c}$) is assumed:

$\bar{c} \approx 35\ m/s$ For *Vela Luka*

$\bar{c} \approx 22\ m/s$ For *Stari Grad*

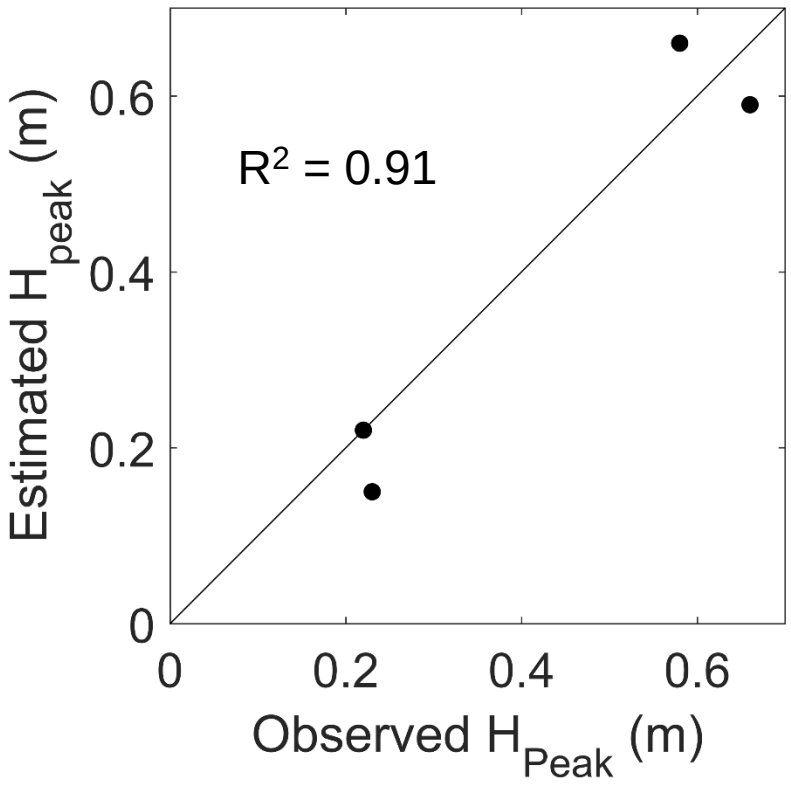
Following the decision matrices of Šepić and Vilibić (2011)

Note: f(θ) was not included in this study due to the lack of data.

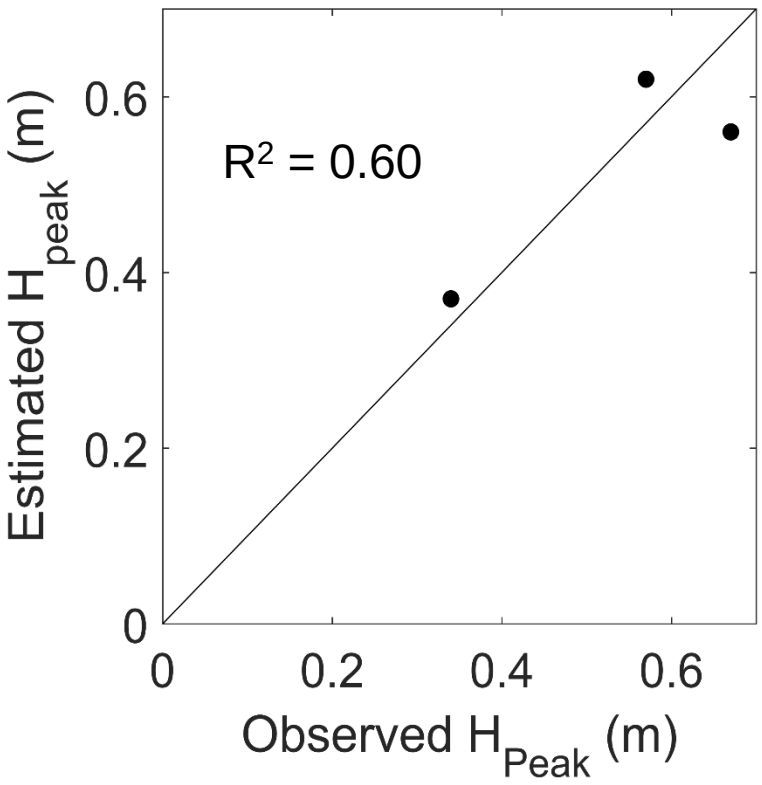
The decision matrices of *Šepić and Vilibić (2011)* provide qualitative information of the role of θ. Quantification of the effect of θ can be made through numerical modeling.

Meteotsunami Height Estimation

Vela Luka



Stari Grad



The S that minimizes the error was estimated as **S_{vela} = 6.6** and **S_{stari} = 10.4**

I minimized MSE between η_{obs} and $\eta_0 * A$

Remarks

- The heuristic estimation with data from the *Split – Vis-VrBosca* triangle seems **promising.**
- The **uncertainty** in Heuristic Approach (HA) comes from the estimate of propagation speed (U). Specifically, we assume that the pressure perturbation is a uniform long-lasting wave. This uncertainty could be reduced with observations with higher-frequency sampling and more spatial stations.
- With more observations, we can establish better estimate **S** and incorporate **f(θ)** to improve the performance of meteotsunami forecast using HA.

We are very glad to collaborate with you.
For any questions, please email me (alvaro.linares@wisc.edu) or Chin (chin.wu@wisc.edu).