Samanburður á mælingum á sjávarborði og líkanreikningum með Delft3D-FM og greining áhrifaþátta strandflóða

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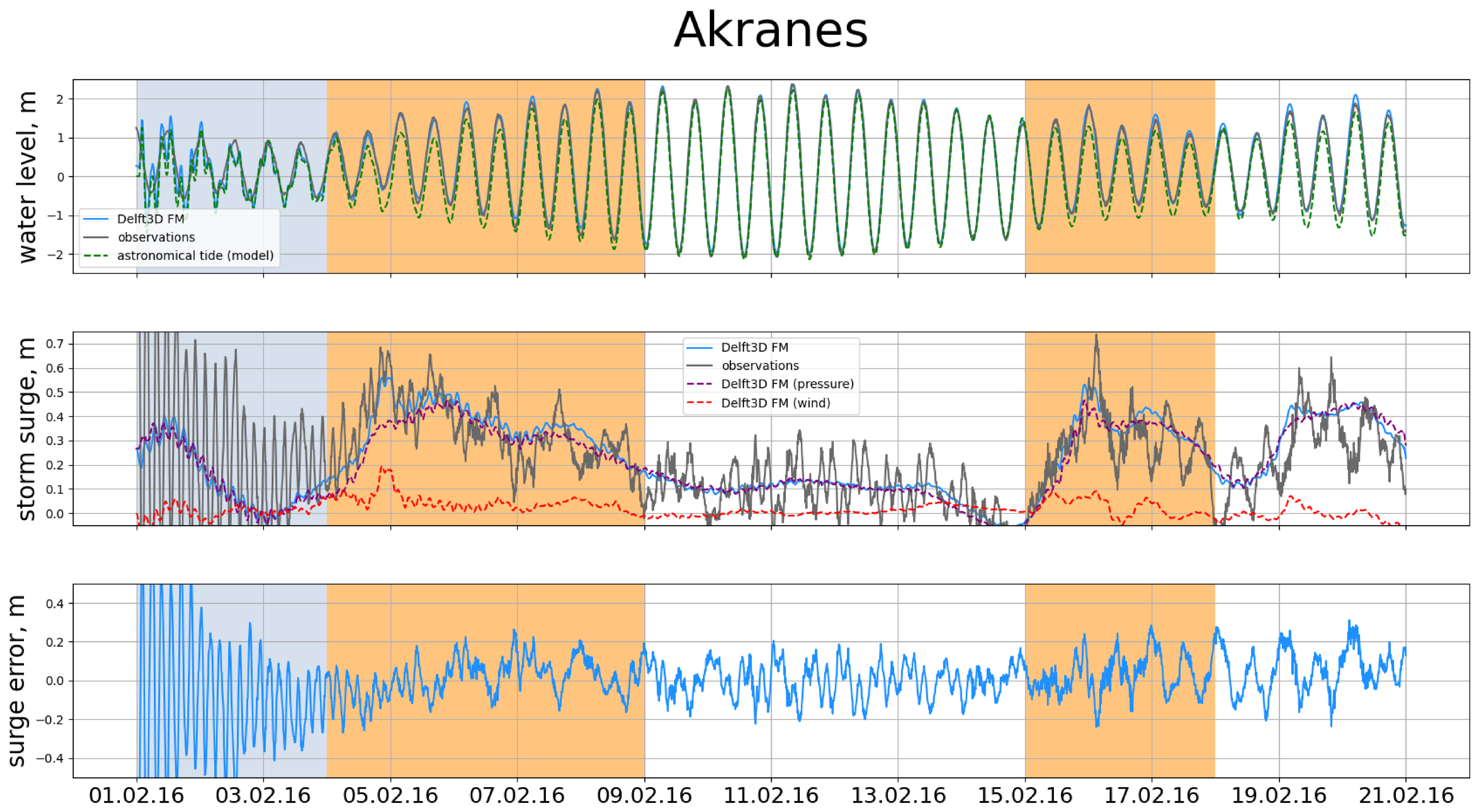
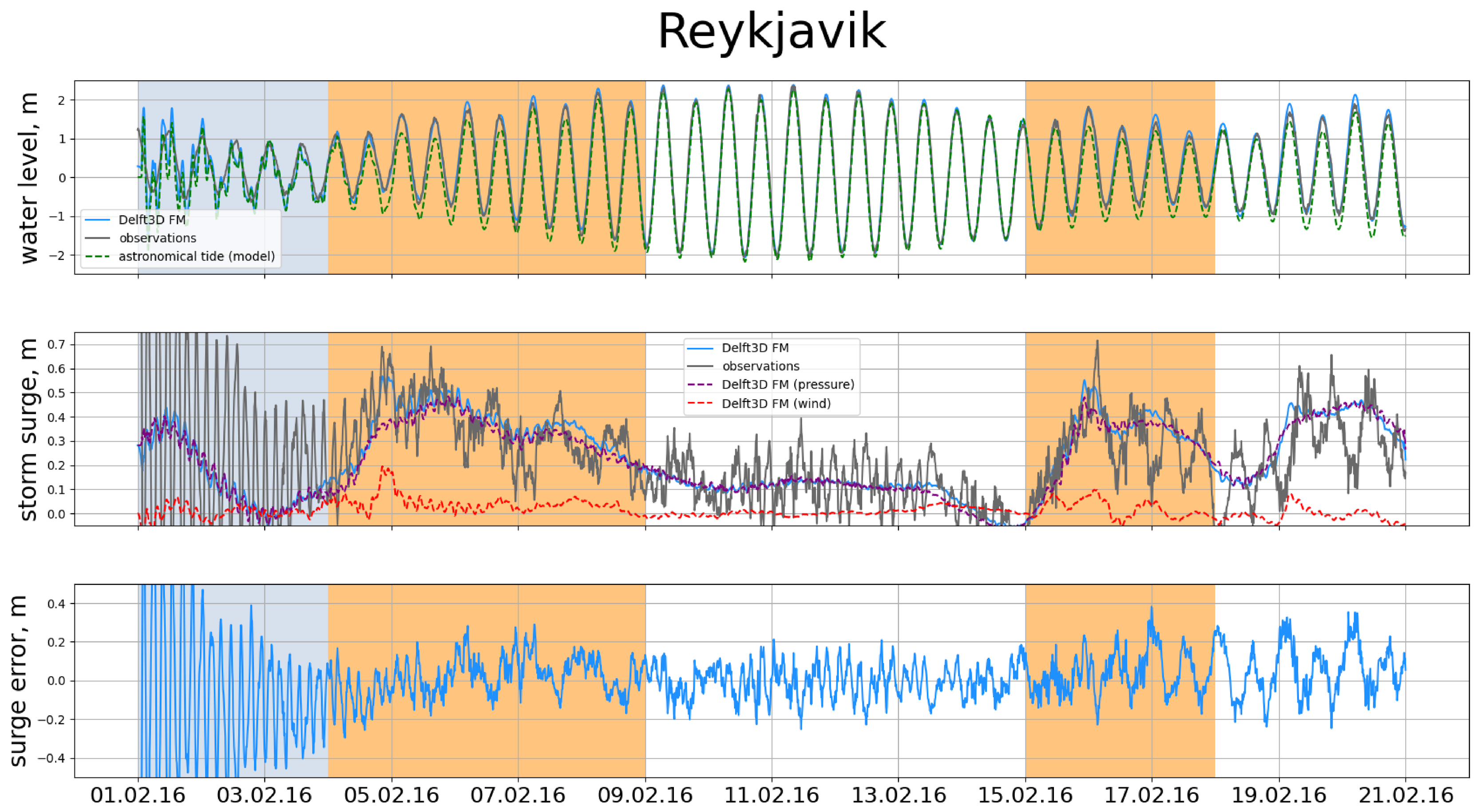
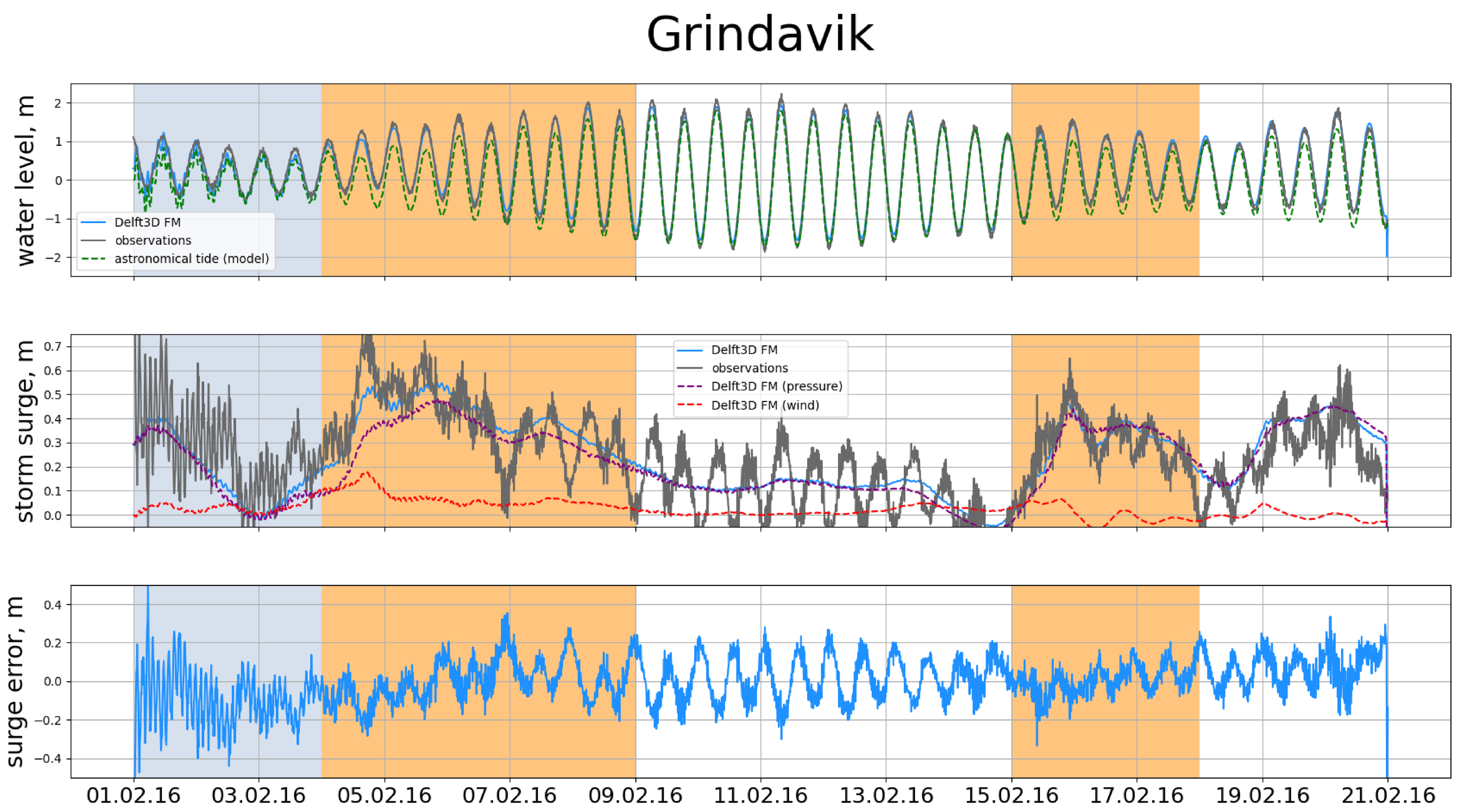
Introduction: Coastal floods cause damage and disruption to the activities in harbours and coastal communities. Iceland has undergone about 84 floods in the second half of the XX Century (G. E. Jóhanssdóttir, 2017), with a recurrency of about 6 significant floods every decade (P. Imsland and Þ.Einarsson, 1991). Thus, both monitoring and forecasting these events is relevant to the coastal communities. The aim of this project is to improve knowledge of coastal floods. We set up 4 domains for Iceland and the South West domain is our pilot domain, shown in Figure 1.







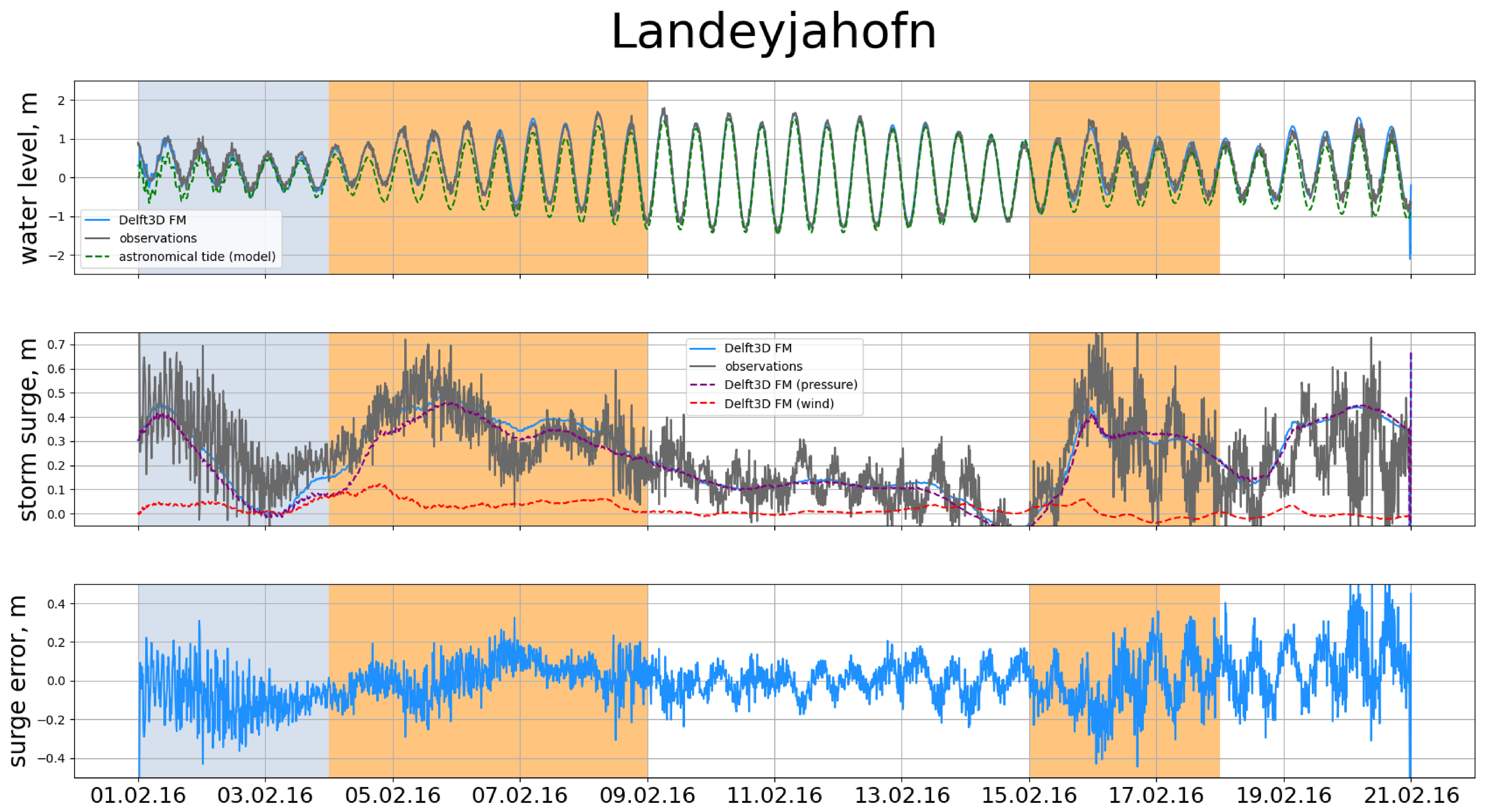


Figure 2-7. Storm surge observations and numerical model estimates for February 2016. The upper panel shows the water level from observations (gray), the tidal model (dashed green) and the Delft3D FM solution (blue). The middle panel shows the storm surge from the observations and the model full forced with surface winds and pressure as well as the contribution from each component (U and P). The lower panel shows the residual between the observations and the model. The period of time in gray corresponds to the spin up process that carries out a large error for all stations.

Method: We selected two consecutive historical storms in February 2016, recorded at tide gauges in Akranes, Reykjavík, Grindavík, Landeyjahöfn, Þorlákshöfn and Báskasker (Vestmannaeyjar). We used the coastal model Delft3D-FM to simulate the flooding events. The numerical model is forced with hourly surface wind and pressure (IRCA reanalysis) throughout the domain and tidal constituents (FES2017) at the boundaries. The results are compared with the measurements from Vegagerðin's database. Four sets of simulations were carried out to separate the contribution of each component: tide-only (dashed green), tide and wind-only (dashed red), tide and pressure-only (dashed purple), and the full forced simulation (light blue).

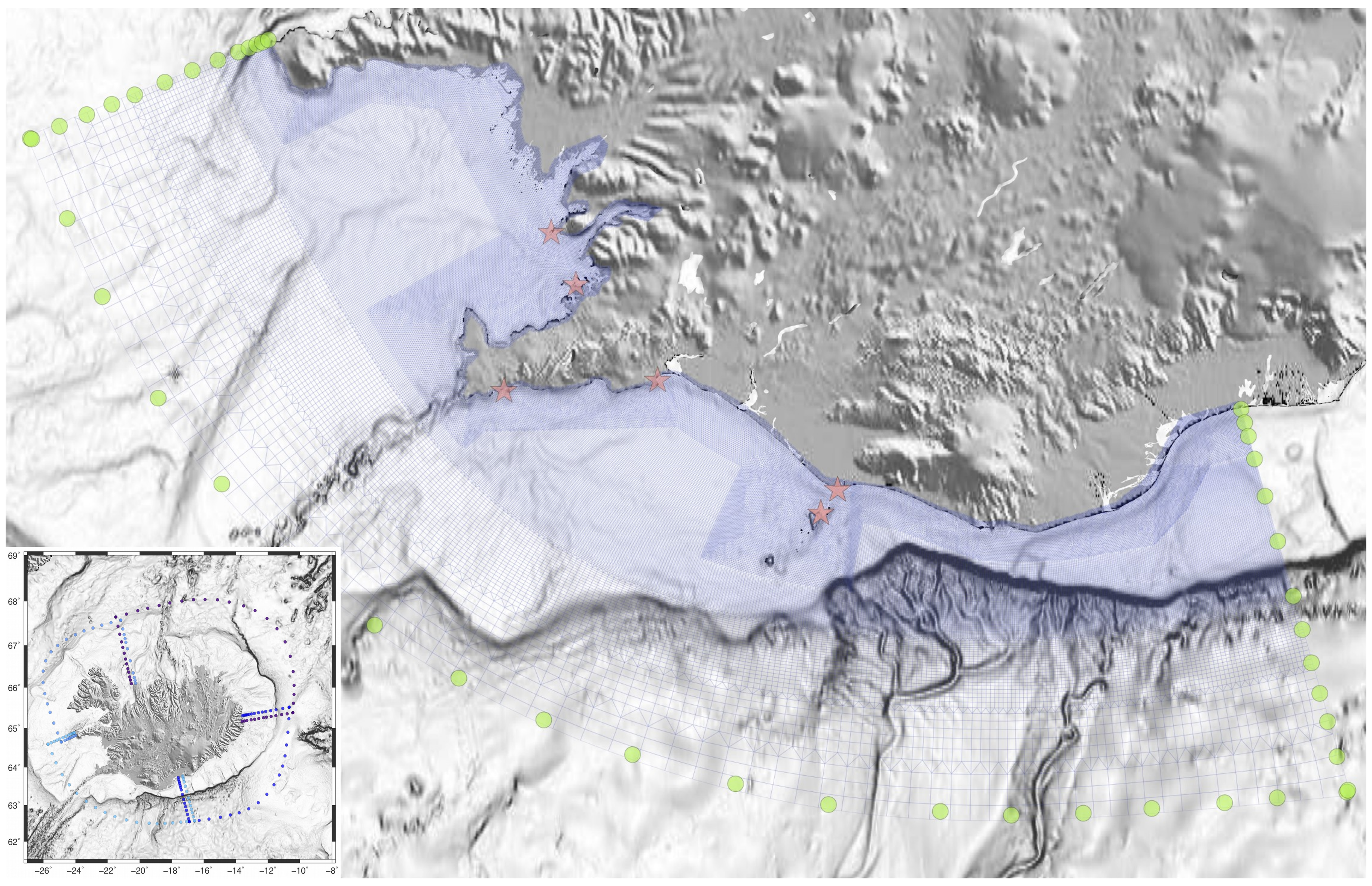
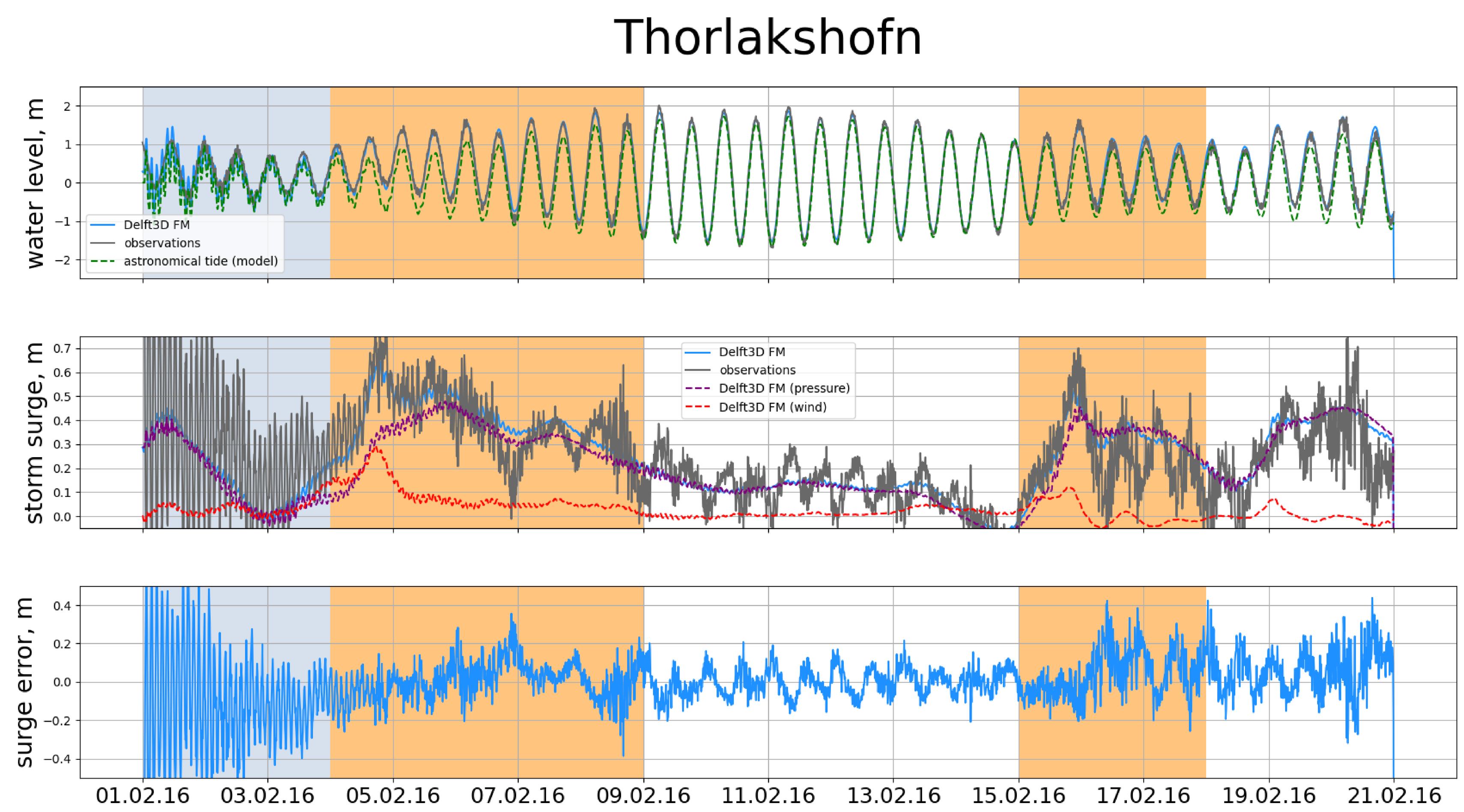
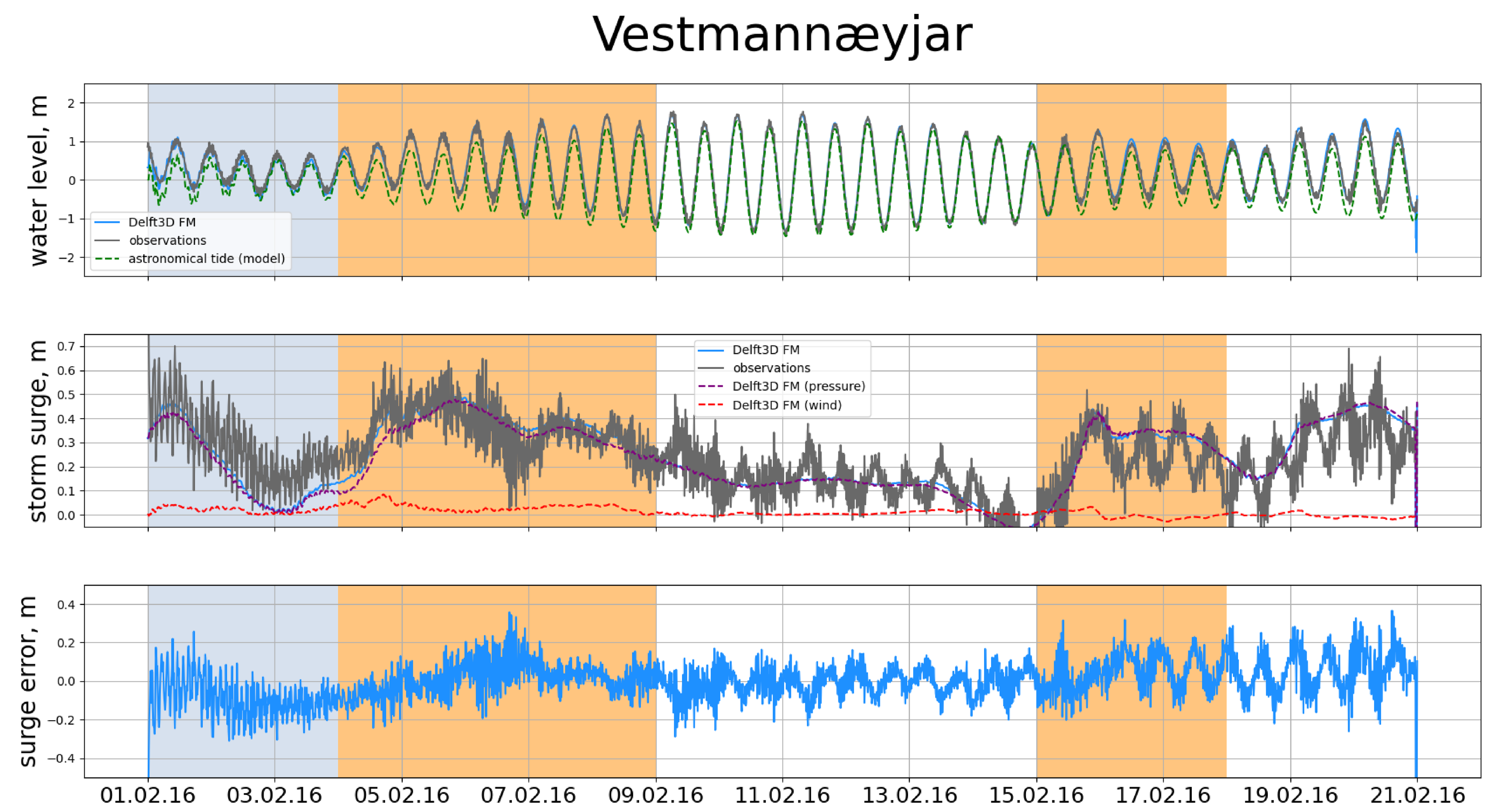


Figure 1. Map of the South West domain of Iceland including the unstructured mesh showing higher resolution at the coast. The stars represent the stations where the comparison for the storm in February 2016 was performed.





Preliminary results: we have successfully performed storm surge simulations for the South West of Iceland. The results are compared with the observations at 6 stations showing a relatively good agreement. The numerical model cannot reproduce the high frequency variability observed in the measurements since the input files are hourly and it automatically filters out the high frequencies. From the analysis, we performed 4 sets of simulations, which allowed us to separate the main components, pressure and wind. From this analysis we conclude that is pressure the main forcing driving the surge, similar to inverse barometer. The spin up time response is very similar for all stations and it is about 4 days. The overall storm surge estimates are satisfactory and we will perform similar analysis for 5 more storms.

G. E. Jóhanssdóttir (2017). Methods for Coastal Flooding Risk Assessments: An Application in Iceland
P. Imsland and Þ.Einarsson (1991). Sjavarflоð a Eyrarbakka og Stokkseyri

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