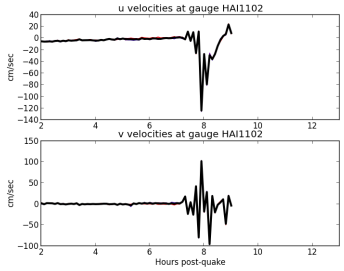
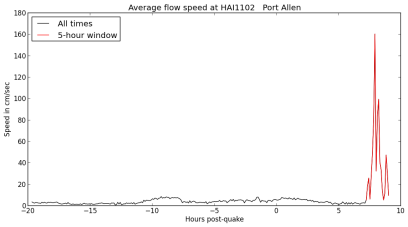
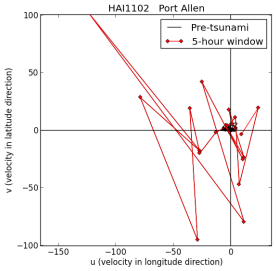
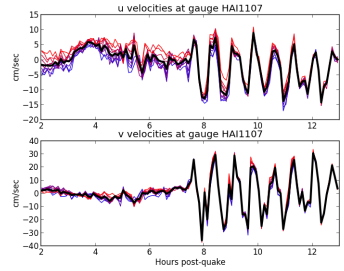
Supplemental Figure for the paper ‘ “Validating Velocities in the GeoClaw Tsunami Model using Observations Near Hawaii from the 2011 Tohoku Tsunami”

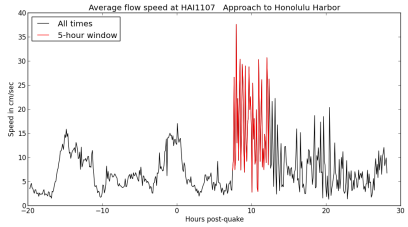
by M. E. M. Arcos, Randall J. LeVeque

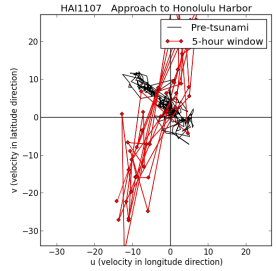


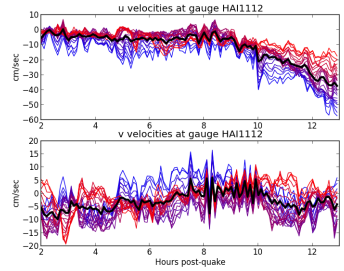


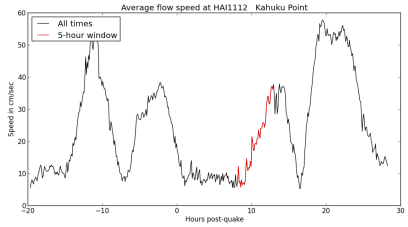


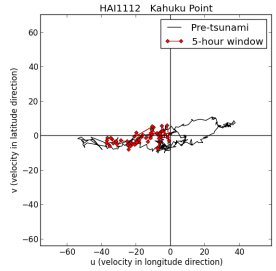


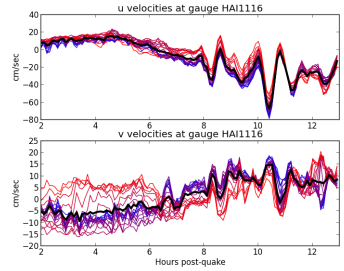


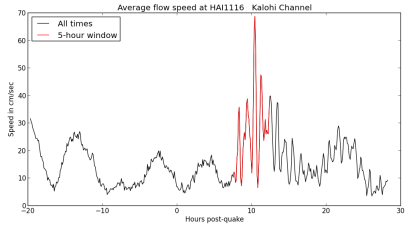


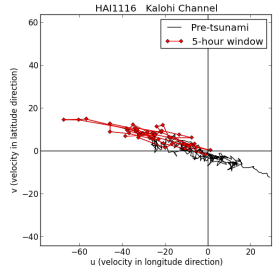


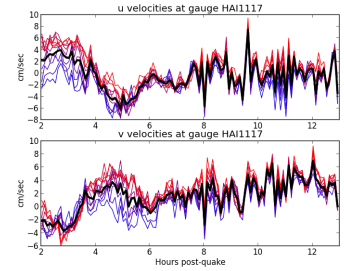


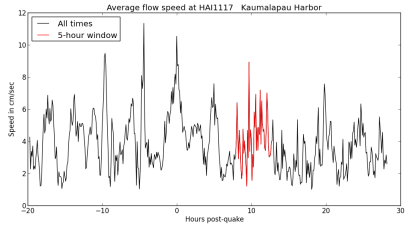


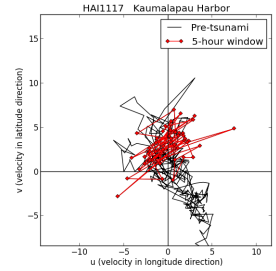


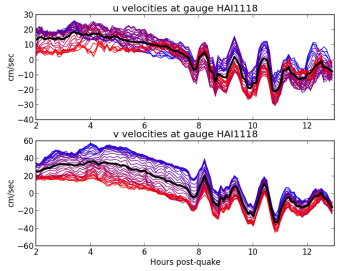


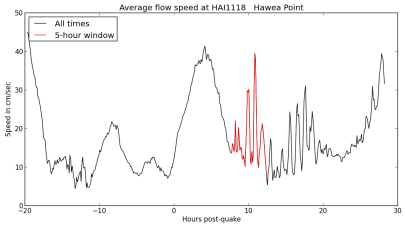


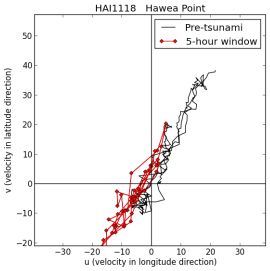


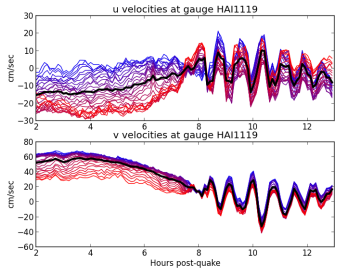


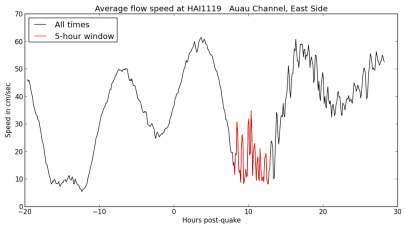


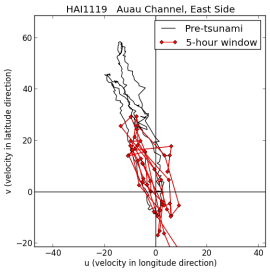

u velocities at gauge HAI1118
v velocities at gauge HAI1118
cm/sec
Hours post-quake

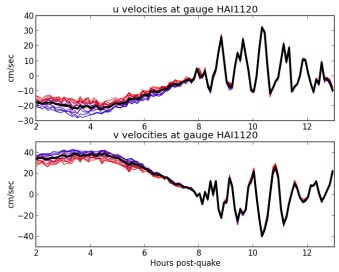

Average flow speed at HAI1118 Hawea Point
All times
5-hour window
Speed in cm/sec
Hours post-quake

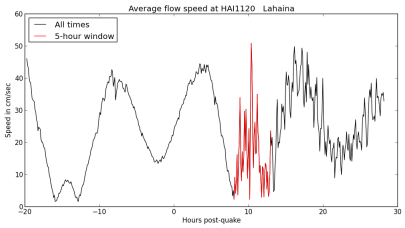

HAI1118 Hawea Point
Pre-tsunami
5-hour window
v (velocity in latitude direction)
u (velocity in longitude direction)

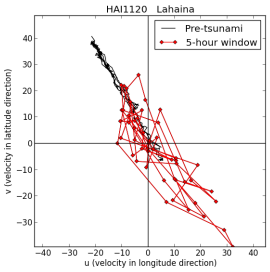

u velocities at gauge HAI1119
v velocities at gauge HAI1119
cm/sec
Hours post-quake

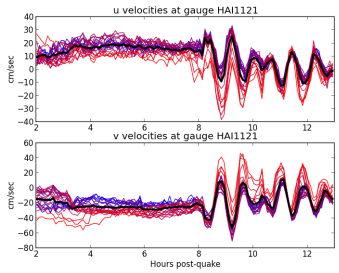

Average flow speed at HAI1119 Auau Channel, East Side
All times
5-hour window
Speed in cm/sec
Hours post-quake

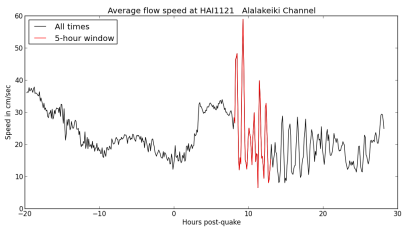

HAI1119 Auau Channel, East Side
Pre-tsunami
5-hour window
v (velocity in latitude direction)
u (velocity in longitude direction)

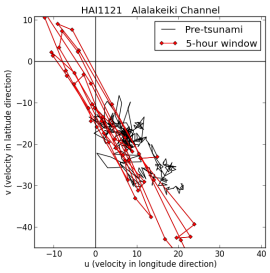

u velocities at gauge HAI1120
v velocities at gauge HAI1120
cm/sec
Hours post-quake

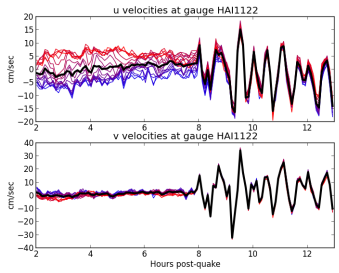

Average flow speed at HAI1120 Lahaina
All times
5-hour window
Speed in cm/sec
Hours post-quake

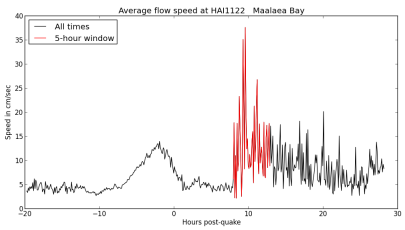

HAI1120 Lahaina
Pre-tsunami
5-hour window
v (velocity in latitude direction)
u (velocity in longitude direction)

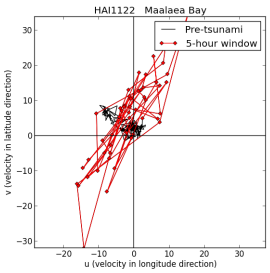

u velocities at gauge HAI1121
v velocities at gauge HAI1121
cm/sec
Hours post-quake

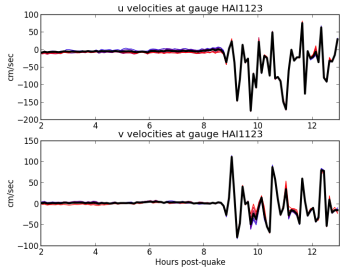

Average flow speed at HAI1121 Alalakeiki Channel
All times
5-hour window
Speed in cm/sec
Hours post-quake

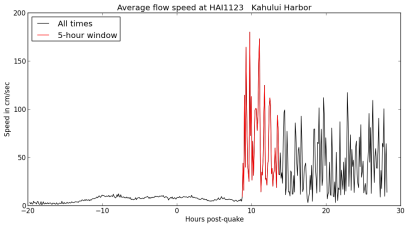

HAI1121 Alalakeiki Channel
Pre-tsunami
5-hour window
v (velocity in latitude direction)
u (velocity in longitude direction)

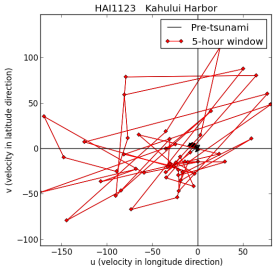

u velocities at gauge HAI1122
v velocities at gauge HAI1122
cm/sec
Hours post-quake

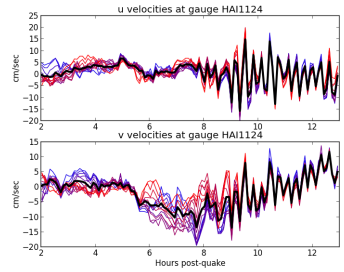

Average flow speed at HAI1122 Maalaea Bay
All times
5-hour window
Speed in cm/sec
Hours post-quake

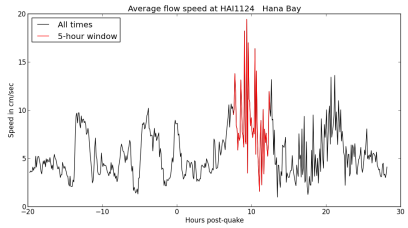

HAI1122 Maalaea Bay
Pre-tsunami
5-hour window
v (velocity in latitude direction)
u (velocity in longitude direction)

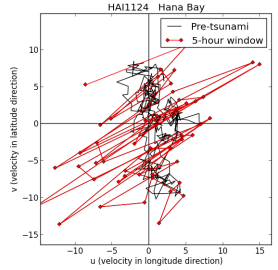

u velocities at gauge HAI1123
v velocities at gauge HAI1123
cm/sec
Hours post-quake

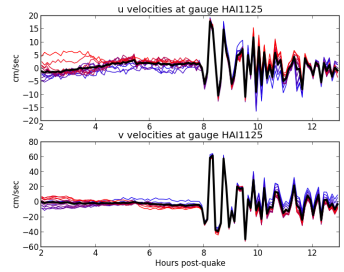

Average flow speed at HAI1123 Kahului Harbor
All times
5-hour window
Speed in cm/sec
Hours post-quake

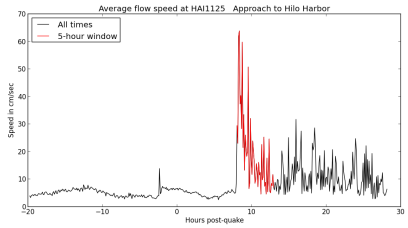

HAI1123 Kahului Harbor
Pre-tsunami
5-hour window
v (velocity in latitude direction)
u (velocity in longitude direction)

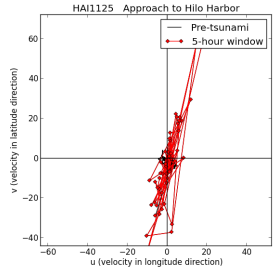

u velocities at gauge HAI1124
v velocities at gauge HAI1124
cm/sec
Hours post-quake

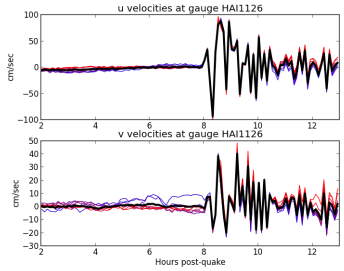

Average flow speed at HAI1124 Hana Bay
All times
5-hour window
Speed in cm/sec
Hours post-quake

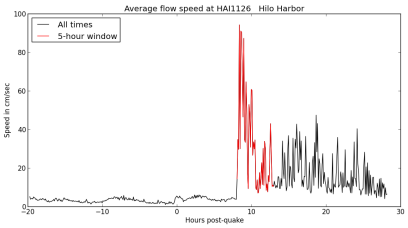

HAI1124 Hana Bay
Pre-tsunami
5-hour window
v (velocity in latitude direction)
u (velocity in longitude direction)

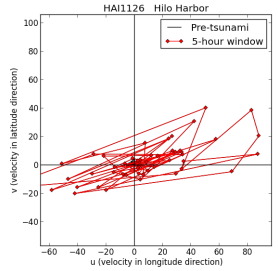

u velocities at gauge HAI1125
v velocities at gauge HAI1125
cm/sec
Hours post-quake

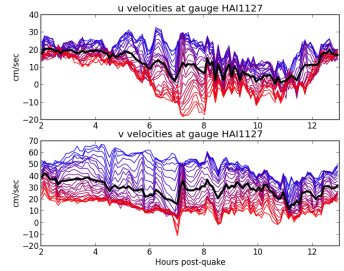

Average flow speed at HAI1125 Approach to Hilo Harbor
All times
5-hour window
Speed in cm/sec
Hours post-quake

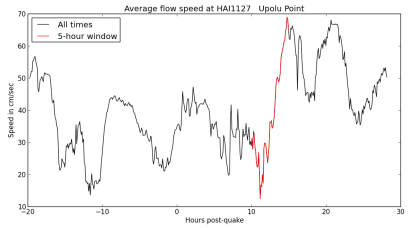

HAI1125 Approach to Hilo Harbor
Pre-tsunami
5-hour window
v (velocity in latitude direction)
u (velocity in longitude direction)

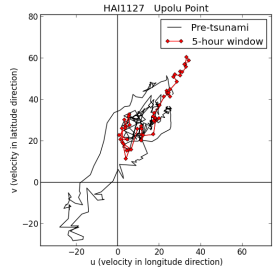

u velocities at gauge HAI1126
v velocities at gauge HAI1126
cm/sec
Hours post-quake


Average flow speed at HAI1126 Hilo Harbor
All times
5-hour window
Speed in cm/sec
Hours post-quake


HAI1126 Hilo Harbor
Pre-tsunami
5-hour window
v (velocity in latitude direction)
u (velocity in longitude direction)


u velocities at gauge HAI1127
v velocities at gauge HAI1127
cm/sec
Hours post-quake


Average flow speed at HAI1127 Upolu Point
All times
5-hour window
Speed in cm/sec
Hours post-quake


HAI1127 Upolu Point
Pre-tsunami
5-hour window
v (velocity in latitude direction)
u (velocity in longitude direction)

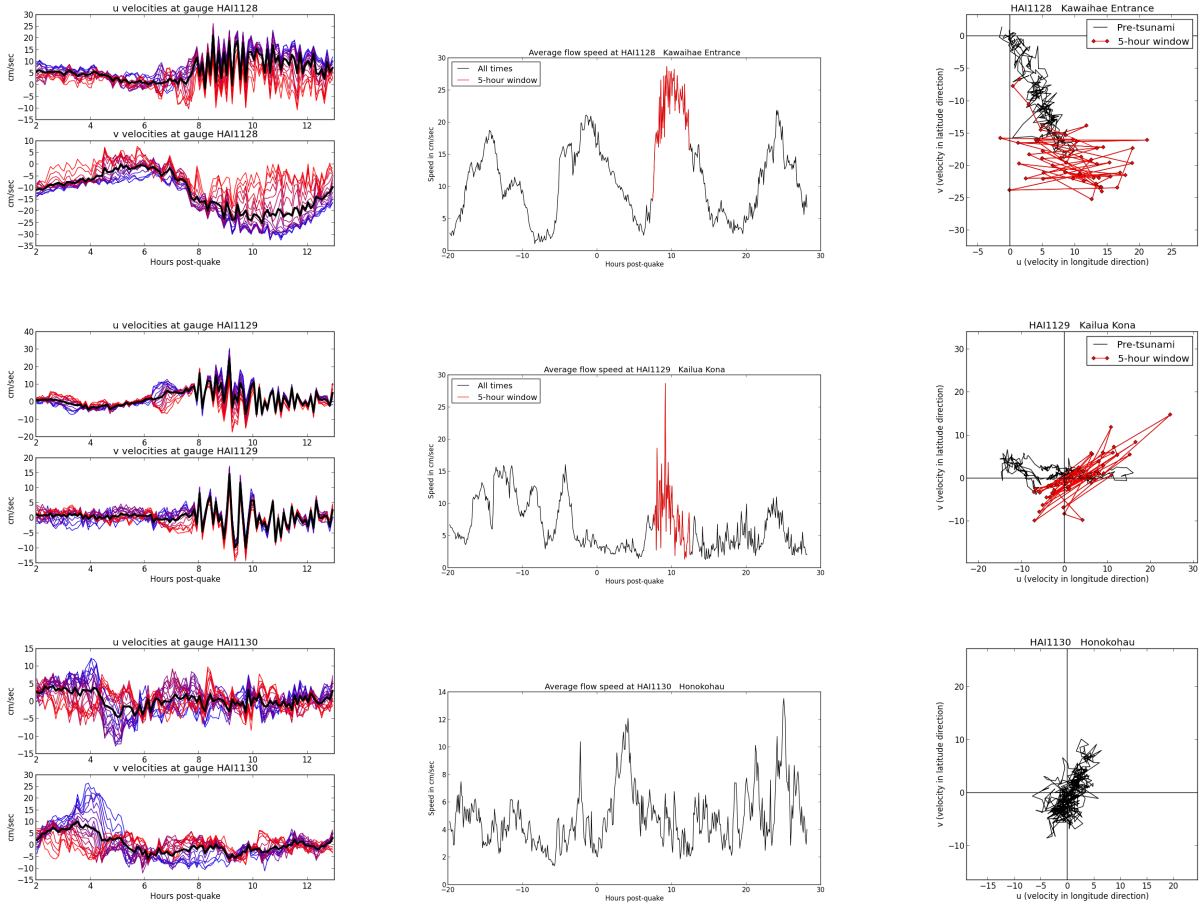


FIG S1. Plots of the observed velocity data from each station, from raw data obtained from http://tidesandcurrents.noaa.gov/cdata/StationList?type=Current%20Data&filter=survey**. Presented in format similar to Figures 5 and 6 in the paper. Left column: Velocities are shown at all depths, split into u and v velocity components. Blue is the shallower gauges, Red is the deeper gauges. The thicker black line is the depth averaged velocity based on these observations. Shown over a 12 hour window around the tsunami arrival time at roughly 8 hours post-quake. Middle column: Observations over five hours just after the tsunami arrived are plotted in red, all other times in black. Observed speed $\sqrt{u^2+v^2}$ over a 48-hour window, illustrating the non-smoothness of the signal before the tsunami arrived. Right column: In the u-v plane, showing that direction of currents.**