

Tsunami Runup and Coastal Interaction

Outstanding Issues for Future Research

- What sort of fluid dynamics / physics issues need to be addressed?

Depends on the purpose

Early warning system -- basic linear wave mechanics may be sufficient

Preparatory flood maps -- more detailed inundation mechanics can/should be used

- The “design tsunami” -- need to think carefully about what kind of tsunami you’re planning for, in preparing advanced data

- Dissipation / runup issues -- how do we parameterize the incredibly complicated flow over terrain, vegetation, cities....

Bottom friction “n” parameter -- poorly understood, hard to parameterize

□ Frictional parameterizations for runup -- the “n”

Could we use observed run-up data to back out real-world frictional parameters, using an inverse modeling technique?

--- Probably not enough data

--- But maybe we could do something with large-scale tank experiments...

--- or really *really* high-resolution but limited-scale numerical simulations of flow over various terrain types...

□ Is a frictional flow law designed for steady river flow even appropriate when we're talking about highly turbulent, mixed-phase, transient flows over complex topography? Are there any alternatives?

□ Sediment transport issues -- do we need to worry about how the tsunami reshapes the landscape as it moves over it, to generate good runup predictions, for either the first wave or later inflows?

- Reducing the runup problem to a “library lookup” -- in the same way that one can isolate the key parameters of the tsunami source problem (magnitude and subfault position) and build a “library” of wave responses, could one isolate key parameters of the inundation problem for a locality (incoming wave amplitude? Maybe direction too?) and build a pre-simulated “library” of inundation scenarios?
- How important *is* nonlinearity? -- the incoming tsunami bore is an incredibly nonlinear process, but how nonlinear are the output parameters of interest (runup heights and distances) compared to the input parameters of interest (deep-water amplitude)
- Superposition of tsunami waves and wind-driven surf -- nonlinear interaction of waves to produce multiple closely-spaced bores -- does this change things?

