

MOMENTUM AS A USEFUL TSUNAMI DESCRIPTOR

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ABSTRACT

In looking at the videos of the Indonesian tsunami coming ashore at various locations it, occurred to me that the momentum of the entire first wave would be worthwhile to focus on. This momentum is ultimately dissipated by the external horizontal forces on the entire body of water from objects, bottom friction and from the slope of the land. The advantage of momentum is that only external forces on a large, defined body of water enter the calculations. Turbulence and laminar flow involve only internal forces and are not relevant.

This could be particularly useful in the generating area. In the case of a landslide or of pyroclastic flows there are external forces on the body of water and the horizontal component of those forces results in horizontal momentum which can be converted to wave height. The horizontal momentum contribution to the directionality of the wave would be narrower than that due only to the vertical displacement.

In an earlier paper in the Science of Tsunami Hazards I calculated momentum formulas for long waves. Focusing on the momentum description of the tsunami introduces many new kinds of physical problems that may be worth thinking about.