The SEA CALIPSO project was devised to image the lithosphere and magma system at Soufriere Hills Volcano (SHV) using tomography and reflection seismology. The field phase was carried out Oct-Dec 2007, with support from NSF (Geophysics, Continental Dynamics, I&F, P&G), NERC, BGS, IRIS, Discovery TV, FCO). We deployed 28 3-component refteks and 209 1-component texans from PASSCAL on island, supplementing 10 MVO stations, with 10 OBS deployed offshore. The NERC ship RRS James Cook towed an airgun array plus streamer on encircling and radial tracks for 77 h on 16-21 Dec, providing 4414 shots sampled by receiving sites. First-arrival tomographic inversions over the ~47 x 54 kilometer target area used subsets of 58 to 66 stations with approximately even spacing. Data from as many as 180,000 raypaths were used in damped smoothed inversions to produce 2D and 3D images of the p-wave seismic velocity. High-velocity bodies representing crystallized intrusions underlie the two extinct volcanic centers to at least 8 km, but extend more shallowly under SHV, where a low-velocity zone occurs between ~5.5 km and the ~8 km limit of resolution. This is interpreted as a chamber of partly crystallized magma that feeds the current eruption; details have been developed by co-authors Annen, Paulatto et al. and we leave the thunder to their presentation. The Moho is at ~30 km. Offshore reflection profiles lines reveal wedges of volcaniclastic debris and important tectonic details which illuminate the intimate connection between tectonics, volcanism and sedimentation in volcanic arcs.