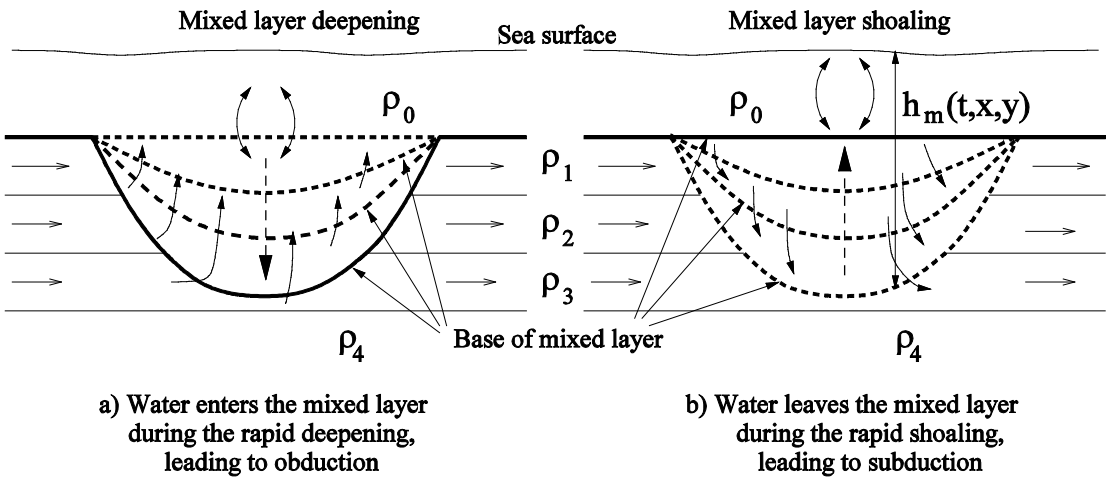

Figure 1. An intuitive example of ventilation induced by tropical cyclones. The horizontal thin lines indicate the stratification; the vertical double arrows in the mixed layer indicate the strong vertical mixing which maintain the vertically nearly homogeneous density within the mixed layer; the heavy curves indicate the time evolution of mixed layer deepening and shoaling associated with a tropical cyclone; the thin horizontal arrows depict the trajectories of water parcels; the heavy arrows depict the process of subduction and obduction.

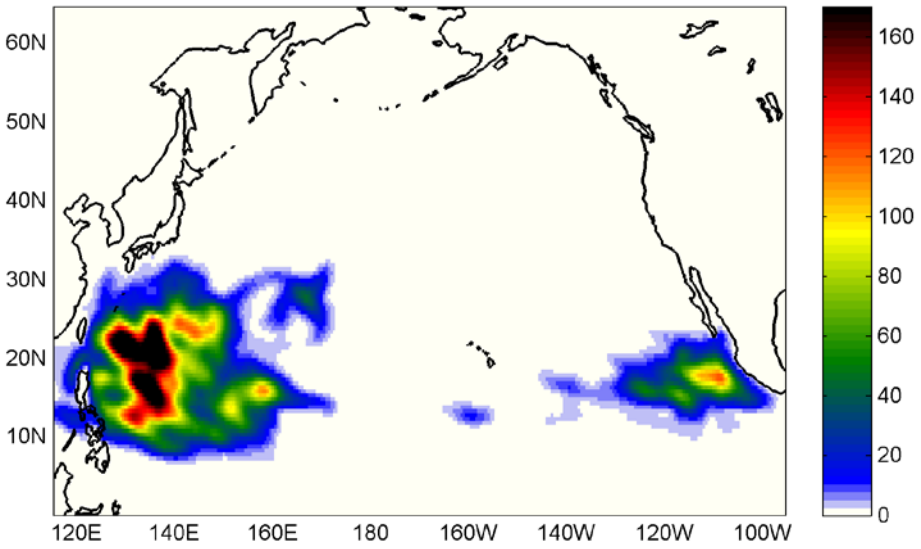

Figure 2. Annual-mean (accumulated) mixed layer deepening (m) induced by tropical cyclones in the North Pacific averaged from 2001 to 2004 (Liu et al., 2008).

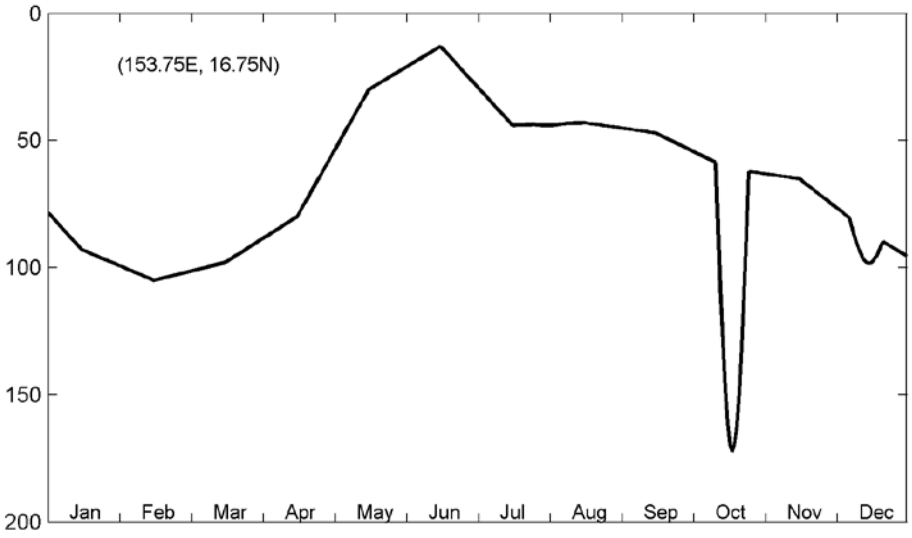

Figure 3. The annual evolution of mixed layer depth at the station (153.75°E, 16.75°N), including two mixed layer depth perturbations induced by tropical cyclones. The background seasonal cycle is taken from SODA outputs in 2001; the first tropical cyclone-induced maximal mixed layer deepening is 115.2*m;* the occurring time of the perturbation is 287th day; and the second mixed layer deepening is 12.4*m*, occurring at 343rd day. The duration of the perturbations is set as 14 days.

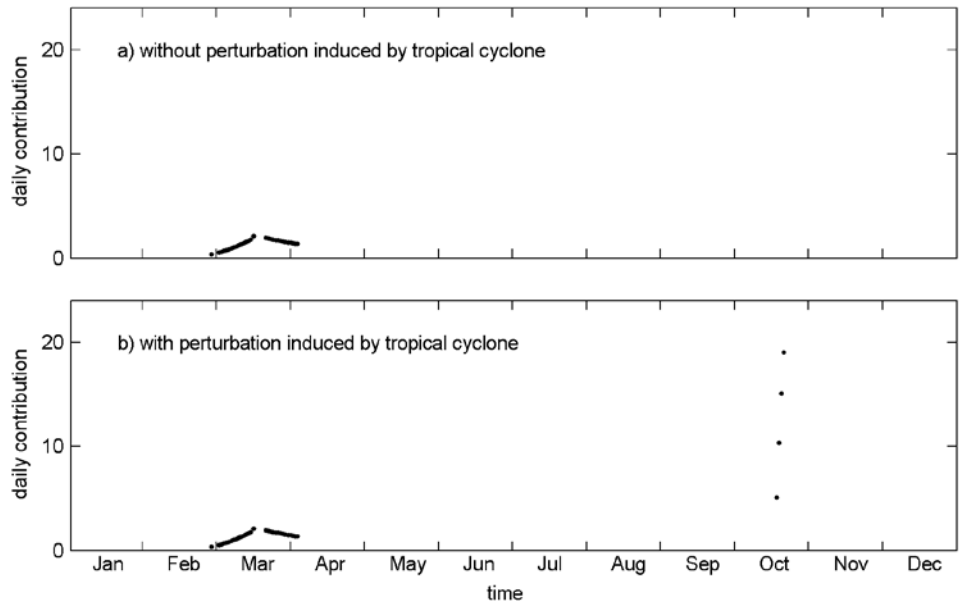

Figure 4. The daily effective detrainment at the given station (153.75°E, 16.75°N) in year 2001: a) for the case without mixed layer depth perturbations induced by the tropical cyclones; b) for the case with the perturbations.

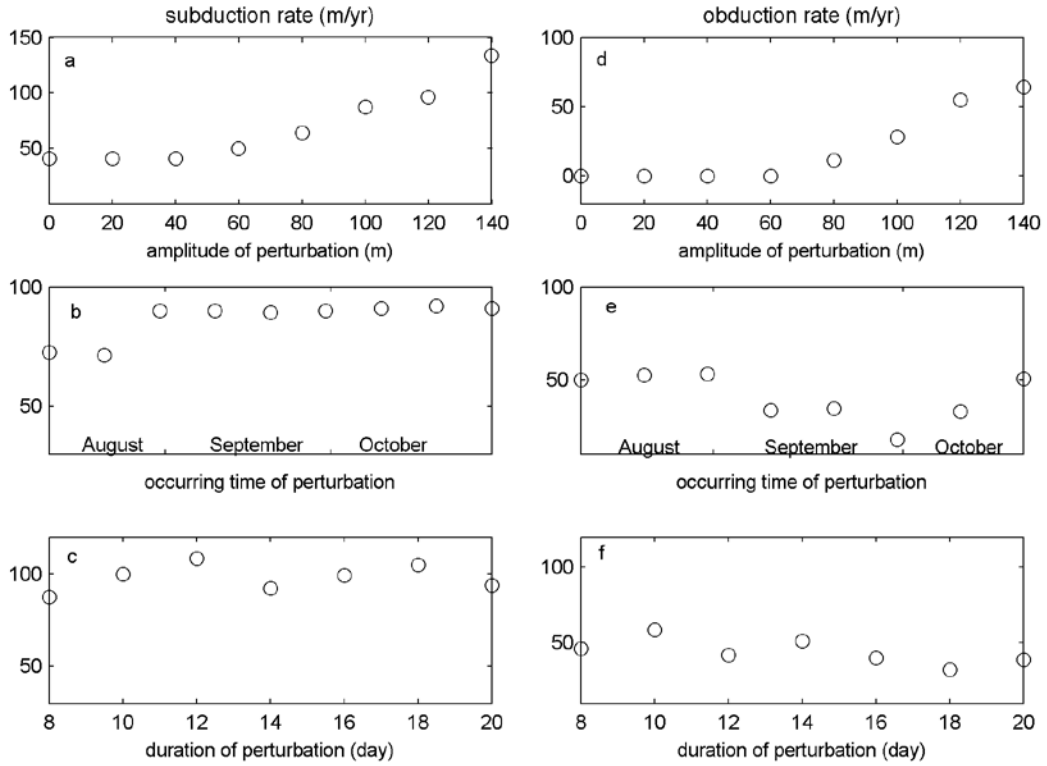

Figure 5. The annual subduction (left)/obduction (right) rate at the given station (153.75°E, 16.75°N) in the year 2001 as a function of: the amplitude of perturbation (upper); the occurring time of perturbation (middle); and the duration of perturbation (lower).

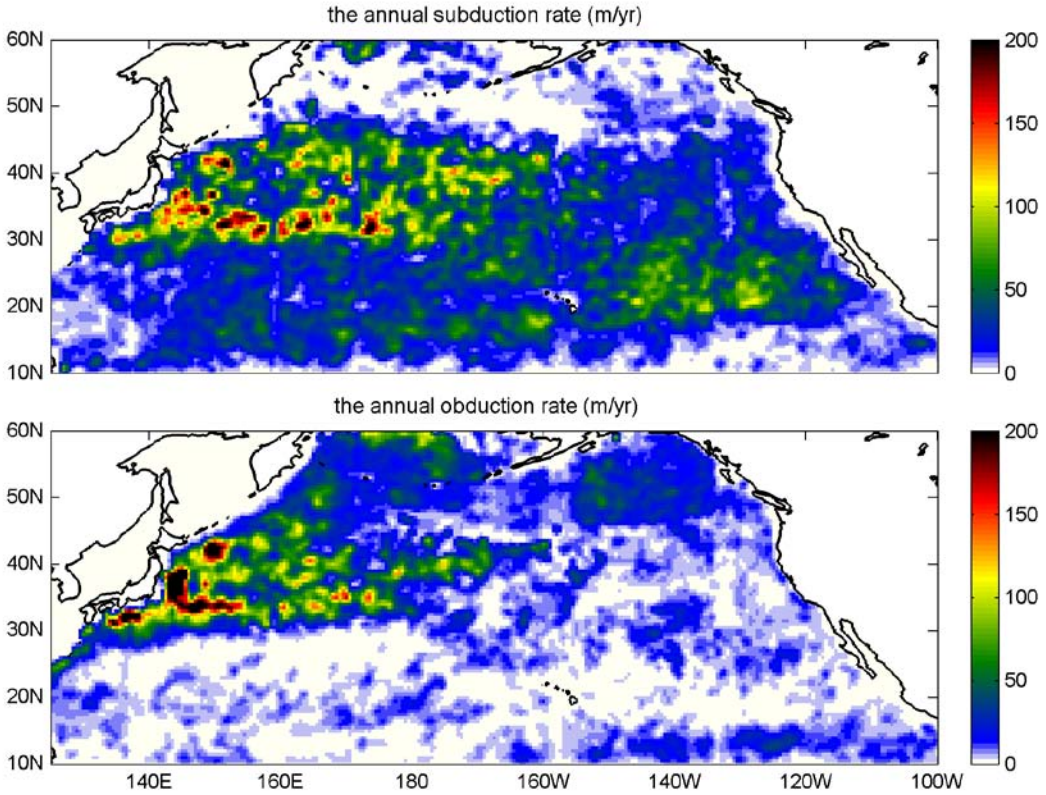

Figure 6. Distribution of the annual subduction (upper)/obduction (lower) rate from SODA outputs in the North pacific averaged from 2001 to 2004, in unit of *m/yr*.

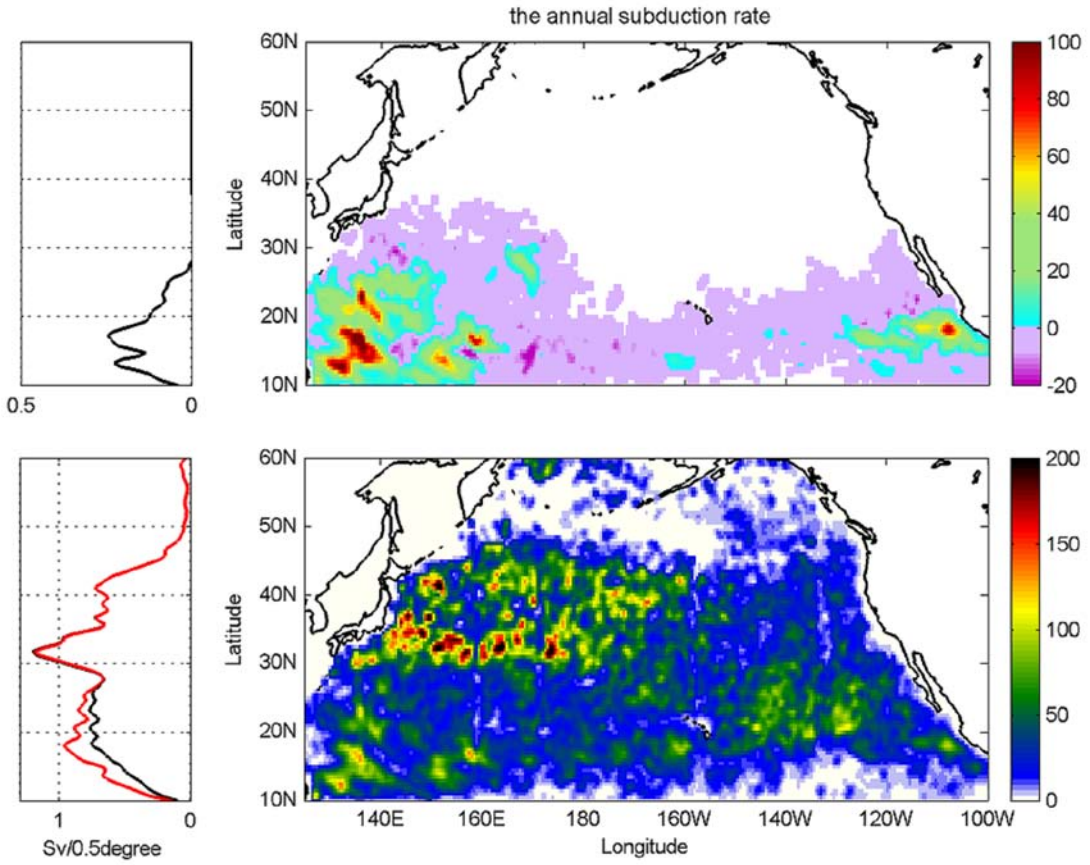

Figure 7. Upper: (right) Distribution of the annual subduction rate induced by tropical cyclones and (left) the meridional distribution of the zonal integrated subduction rate. Lower: (right) Distribution of the annual subduction rate for the case including tropical cyclone-induced perturbations and (left) its meridional distribution in the North Pacific averaged from 2001 to 2004; the black line is the subduction rate for the case without the perturbations and the red is for the case with perturbations.

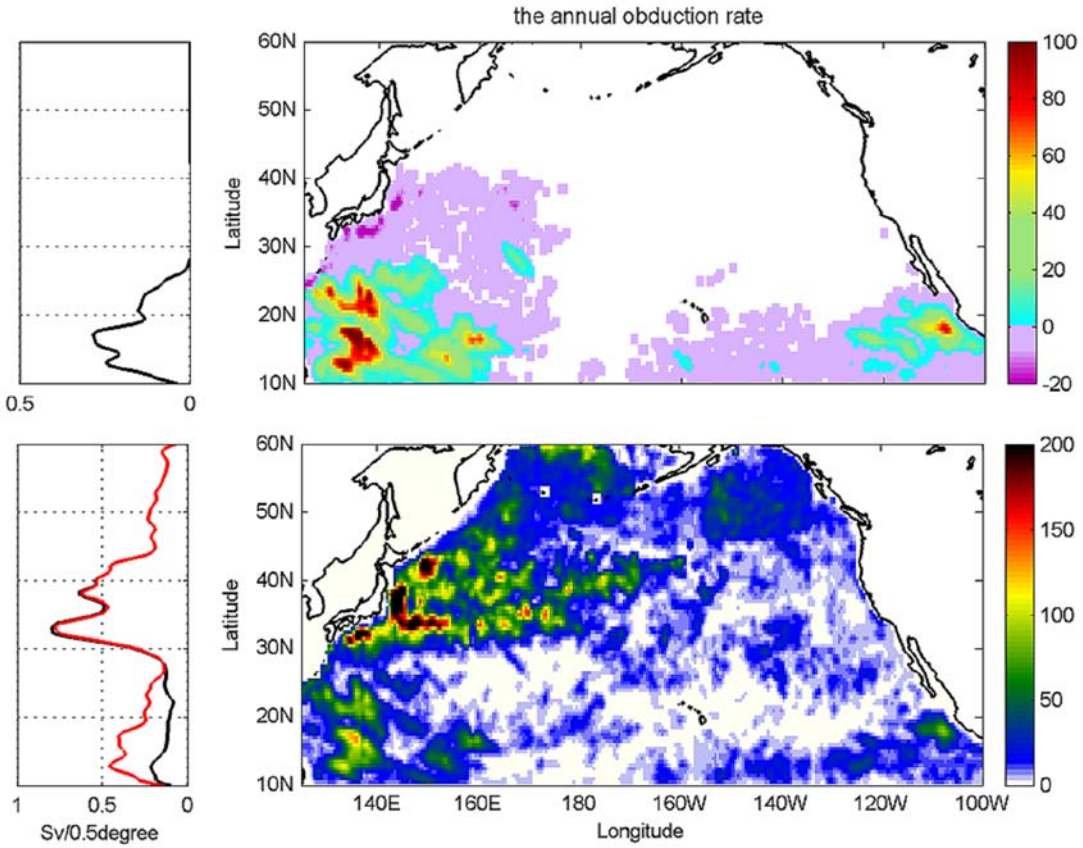

Figure 8. Upper: (right) Distribution of the annual obduction rate induced by tropical cyclones and (left) the meridional distribution of the zonal integrated obduction rate. Lower: (right) Distribution of the annual obduction rate for the case including tropical cyclone-induced perturbations and (left) its meridional distribution in the North Pacific averaged from 2001 to 2004; the black line is the obduction rate for the case without the perturbations and the red is for the case with perturbations.