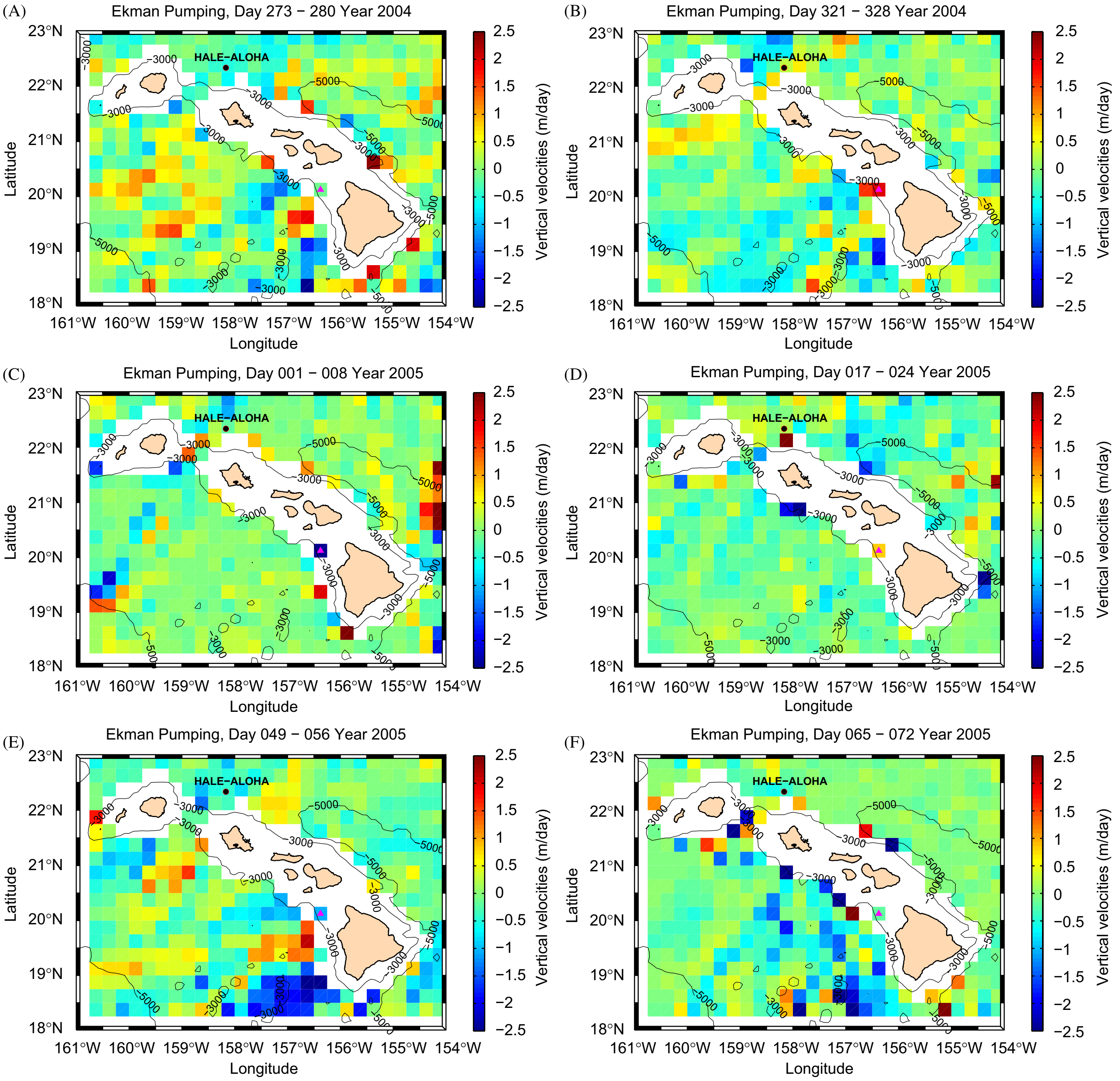

Fig. 16. Vertical velocities computed from wind-stress curl (Eq. (2)) using QuikScat data before (September 29–October 6, 2004; YD 273–280) and during (November 16–23, 2004; YD 321–328) E-Flux I, (A) and (B), E-Flux II (January 1–8, 2005; YD 1–8) and (January 17–24, 2005; YD 17–24), (C) and (D), and E-Flux III (February 18–25, 2005; YD 49–56) and (March 6–13, 2005; YD 65–72), (E) and (F). As expected, the upwelling velocities are much greater for E-Flux I and III than for E-Flux II.

diameter scales downwind as evidenced in SST images shown in Figs. 2B and C and 11B and C. Figs. 16A and E clearly show that during trade wind conditions (before E-Flux I and III), strong upwelling patterns occur with values reaching maximum values of roughly 1.5–2.5 m day^{-1} just downwind of the ’Alenuihaha Channel where we also see the formation of cyclonic eddies (i.e. Cyclone *Noah* during E-Flux I and Cyclone *Opal* during E-Flux III). These values are comparable to those reported in the same general oceanic region by Chavanne et al. (2002), who reported values of about 3 m day^{-1}. They commented that instantaneous values may well be higher and our coarse resolution of the wind field also would suggest that values presented here are likely lower limit estimates. Because of the Ekman pumping, the local thermoclines must necessarily be lifted in upwelling areas and depressed in downwelling zones. This effect likely contributes to the formation of cold-core cyclones and