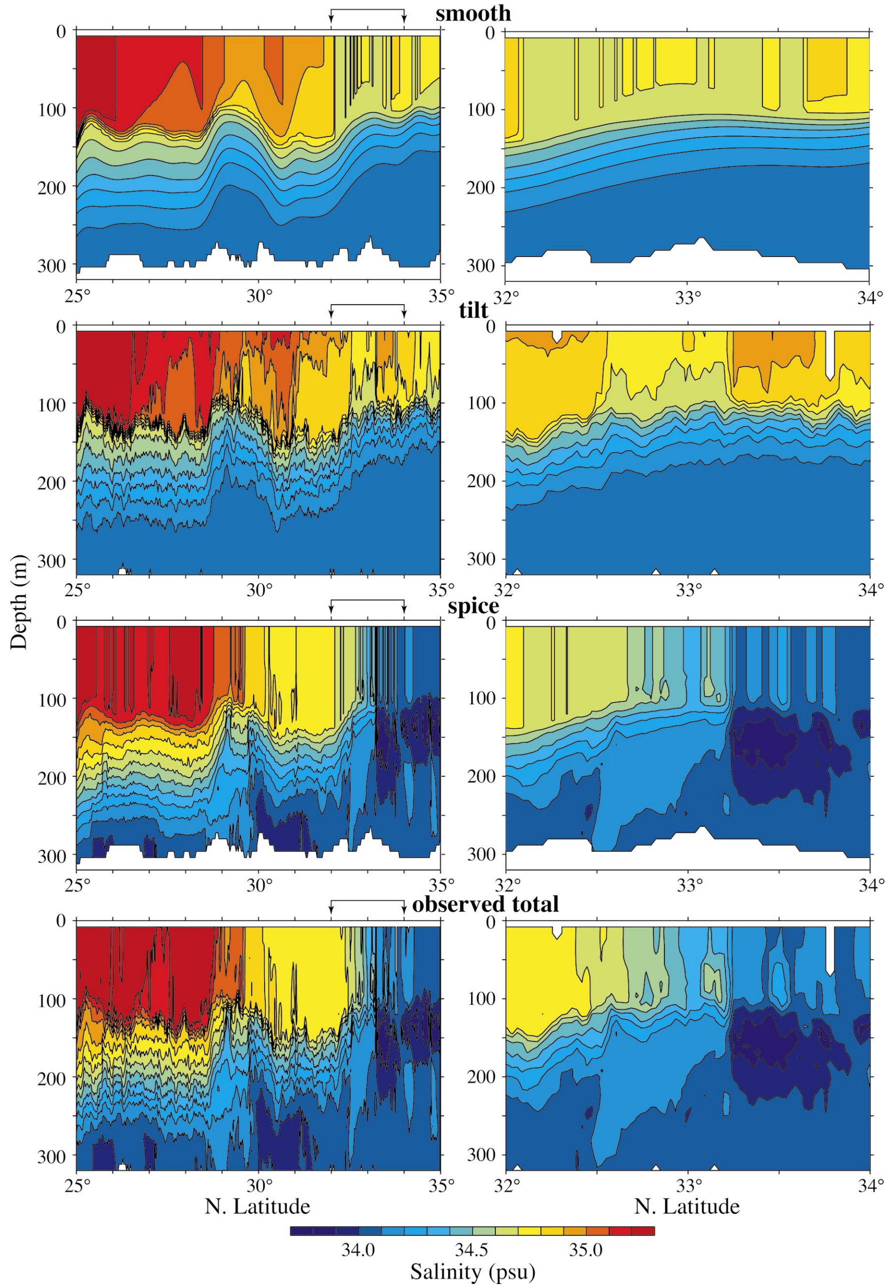

FIG. 7. Fields of salinity with 0.1 psu contour intervals for the entire section (left) and a subsection (right).

features of the region (Yuan and Talley, 1992), although their exact positions may vary. There are also variations of relatively short vertical scale, as for example, near 32 °N and 1505 m s^{-1}. This small vertical scale variability changes significantly between successive occupations of the section several days apart.

In the thoroughly mixed upper layer the sound-speed perturbations associated with internal-wave-induced vertical displacements are small, and the effect of spice fronts dominates. In the mixed layer at 48 m, $\Delta C = 0.24$ m/s for the rms difference at the resolved 3-km spacing. Beneath the mixed layer at 200 m we find $\Delta C = 0.74$ m/s and 0.35 m/s associated with internal waves and spice, respectively. For comparison, the pronounced frontal feature at 29 °N has differences of order 0.5 m/s per 3 km. A mean slowing by -0.1 m/s in 3 km is associated with the south-to-north cooling along the 1000 km profile. The statistical distribution of the horizontal gradients associated with isopycnal tilting are nearly Gaussian (as has long been known), whereas the frontallike distribution of spice leads to large departures from a Gaussian distribution.

B. Patching the upper ocean to Levitus climatology

We have patched Levitus February climatology (Levitus, 1994; Levitus *et al.*, 1994) to the upper 320-m section taken by SeaSoar 23 January–20 February 1997 (Fig. 9). There is no good way of splicing a single section to a decadal climatology. After many tries we have settled on a least-square vertical cubic spline applied separately to the temperature and salinity fields, and subsequently converted to sound-speed. The cubic spline allows for the disparate error bars,