Stable BL features

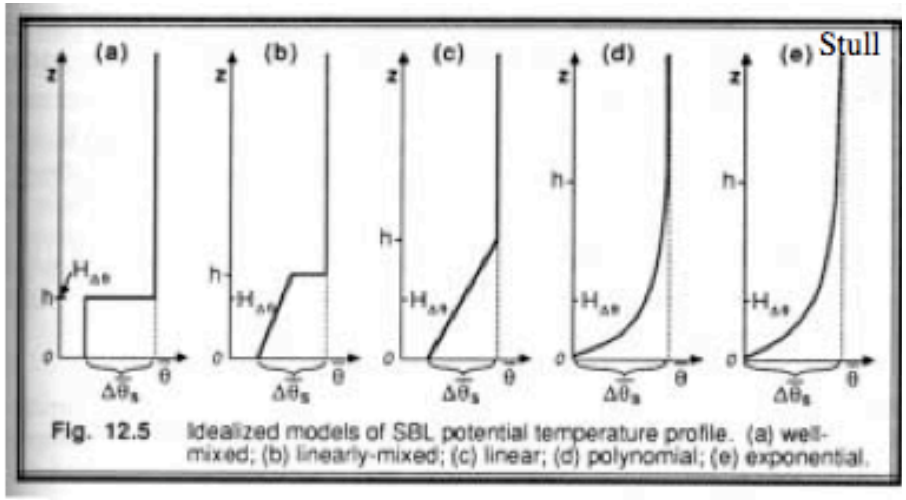


Fig. 12.5 Idealized models of SBL potential temperature profile. (a) well-mixed; (b) linearly-mixed; (c) linear; (d) polynomial; (e) exponential.

(b) typifies strong-wind NBL, (d) a weak-wind NBL under clear sk

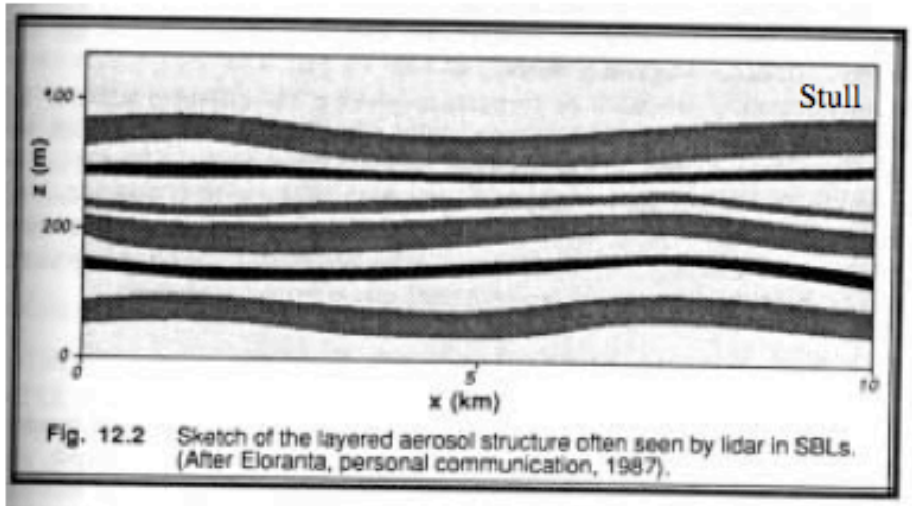
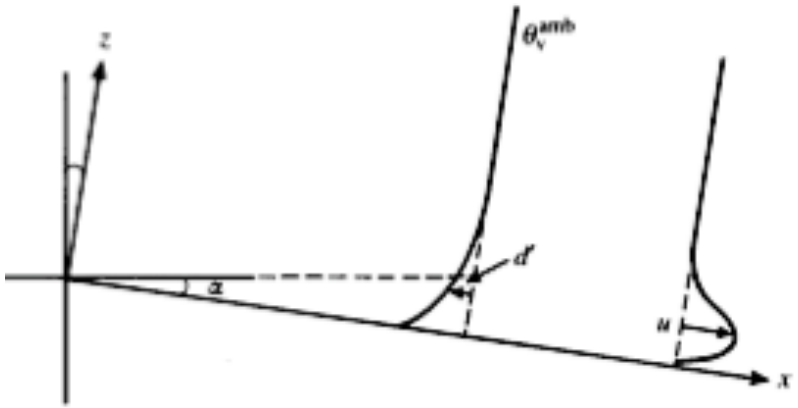


Fig. 12.2 Sketch of the layered aerosol structure often seen by lidar in SBLs. (After Eloranta, personal communication, 1987).

Layered NBL with gravity wave undulations that can modulate local shear, stratification, and hence turbulence.



Katabatic downslope flow

Garratt

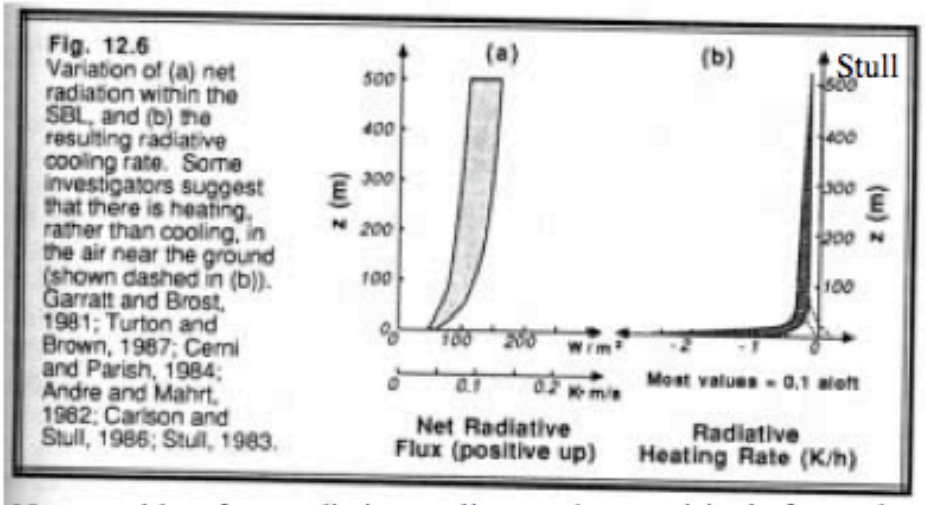


Fig. 12.6 Variation of (a) net radiation within the SBL, and (b) the resulting radiative cooling rate. Some investigators suggest that there is heating, rather than cooling, in the air near the ground (shown dashed in (b)). Garratt and Brost, 1981; Turton and Brown, 1987; Cerni and Parish, 1984; Andre and Mahrt, 1982; Carlson and Stull, 1986; Stull, 1983.

Near a cold surface, radiative cooling can be surprisingly fast and helps maintain a stable stratification.

Nocturnal jet development

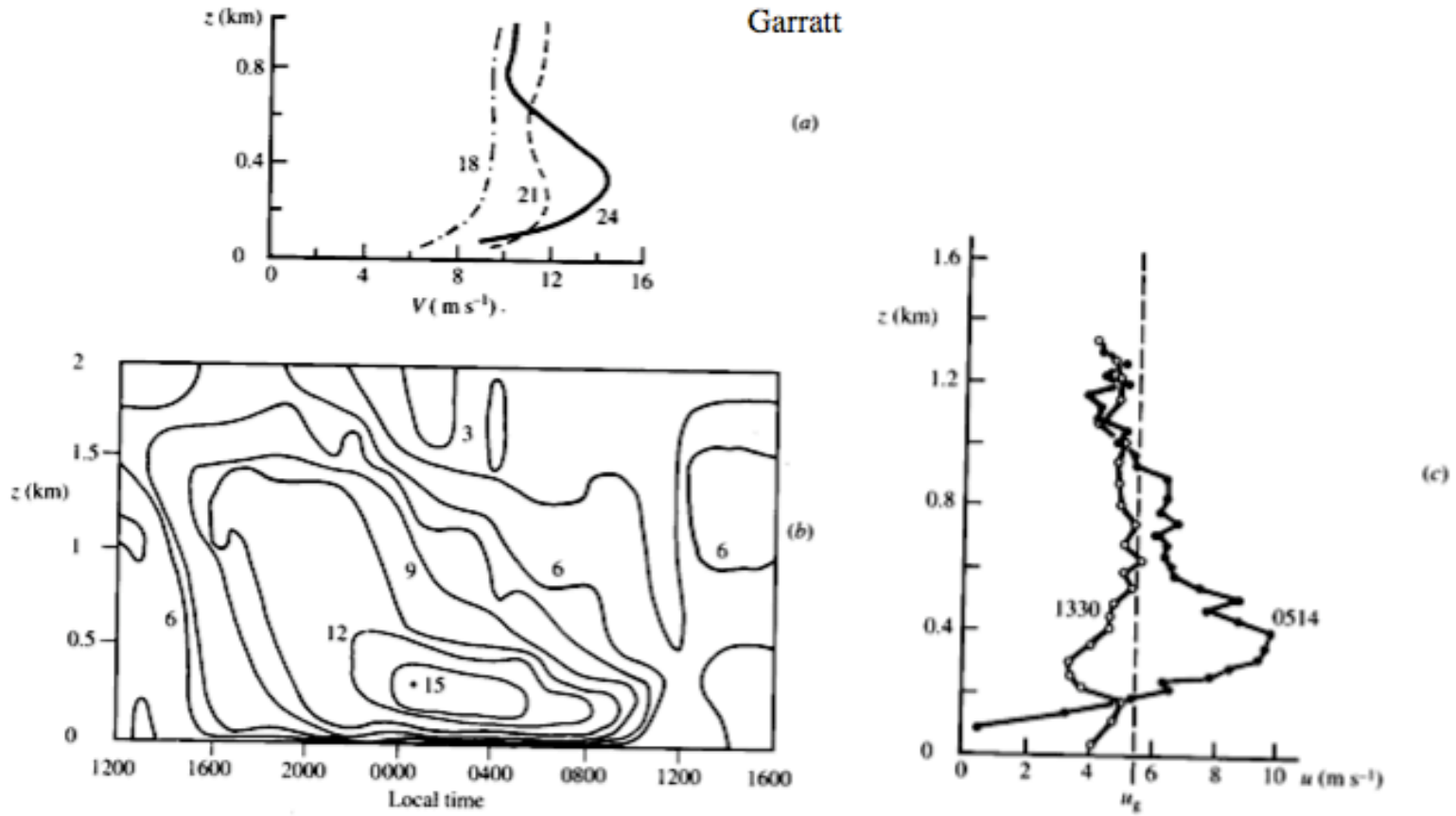


Fig. 6.18 Observations illustrating the formation of the nocturnal jet. (*a*) Wind-speed profiles on day 13 of WANGARA, local times indicated. (*b*) Height–time cross-section of wind speed (in $m\,s^{-1}$) on days 13/14 at WANGARA. Isopleths of wind speed are drawn at $1.5\,m\,s^{-1}$ intervals. (*c*) Profiles of the *u*-component of the wind velocity, with the *x*-axis along the geostrophic wind direction, for mid-afternoon (1330 UT, 6 August, 1974) and early morning (0514, 7 August, 1974) near Ascot, England. After Thorpe and Guymer (1977), *Quarterly Journal of the Royal Meteorological Society*.

Inertial oscillation and nocturnal jet

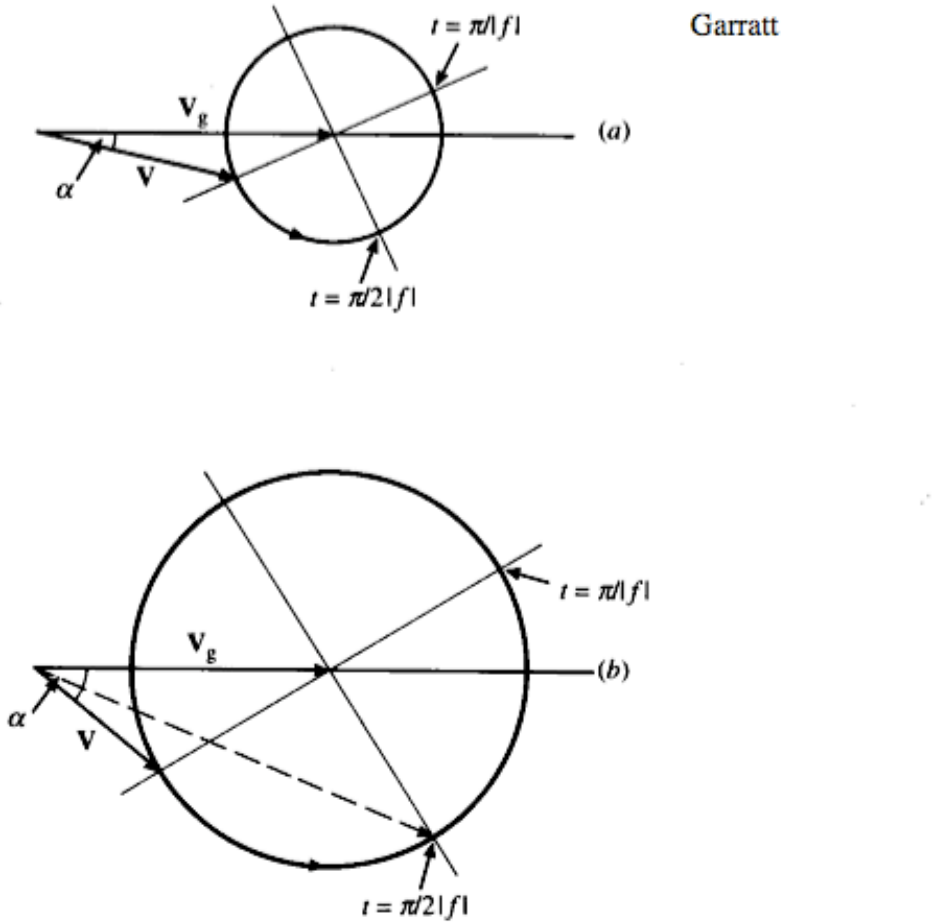


Fig. 6.19 Illustrated solutions of the unbalanced momentum equation (Eq. 6.77) for (*a*) a low-roughness surface and (*b*) a high-roughness surface; undamped inertial oscillations are shown for the southern hemisphere in the form of anticlockwise rotation of the wind vector ($\mathbf{V}$) about the geostrophic wind vector ($\mathbf{V}_g$).