



Meso-scale variation over the sea

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The ocean surface is quite homogenous compared to a typical land surface both with respect to roughness and surface temperature characteristics. It is probably therefore that atmospheric mesoscale variation establish itself more easily over the sea than over land, where it tend to be disrupted by the stronger turbulence and the response to the larger surface heterogeneity. We present the characteristics and some climatology of the mesoscale variability for thermally unstable to neutral conditions and for thermally stable to neutral conditions. For unstable conditions the mesoscale variability takes the form of open or closed cells of mixed thermal and dynamic origin. Typical and well known examples of closed cells are the longitudinal rolls, often associated with cloud streets on the top. Both phenomenon induce fluctuations in the meteorological fields with spatial scales of 2-20 km and time scales of 10-100 minutes.

For stable atmospheres the gravity waves can exist and will often manifest themselves a mixture of gravity waves with a distinct origin and a universal saturation gravity wave spectrum reaching to the surface from the stable atmosphere aloft. Even when the atmospheric boundary layer is neutral the pressure fluctuations in the wave aloft induce wind fluctuations at the surface.