**Wind gust** is the short-lived peak of wind speed caused by turbulent eddies that momentarily mix faster air from aloft down to 10 m. Forecast models like ECMWF and GFS often *diagnose* a 10 m gust directly, but you can estimate it from common fields: (a) surface wind and boundary-layer turbulence, or (b) surface wind and low-level wind just above the surface. A practical pair of recipes used in operations are:

1. **Turbulence (TKE) method:**

Where TKE is the turbulent kinetic energy (m² s⁻²) from the boundary layer, C≈2.4, and U10 is 10 m wind speed (m s⁻¹).

1. **Mix-down (shear) method:**

In mixed daytime boundary layers, gusts approach a fraction of the 100 m – 925 hPa wind; a simple proxy is:

where U925 is the wind speed at 925 hPa (m s⁻¹).