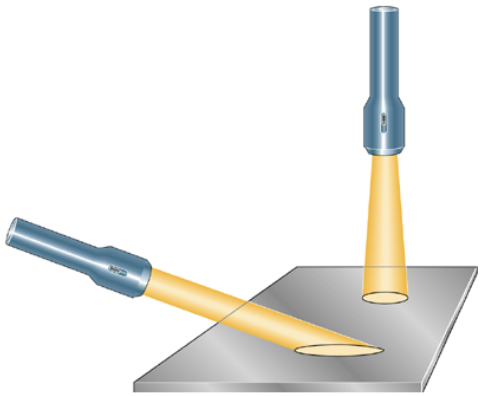
Insolation



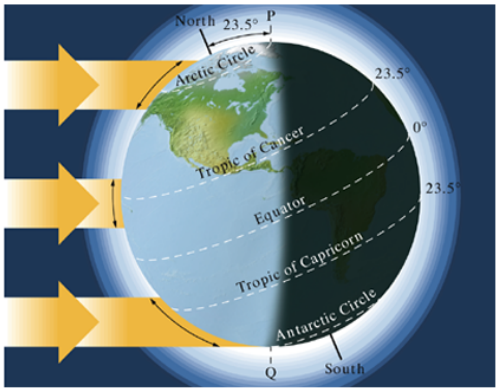


Fig. 11.2a; source: Marshak "The Earth"

insolation per area:
greater when Sun is
overhead than near poles

annually 2.4 times lower
at poles than at equator

Heat Transport in the Atmosphere

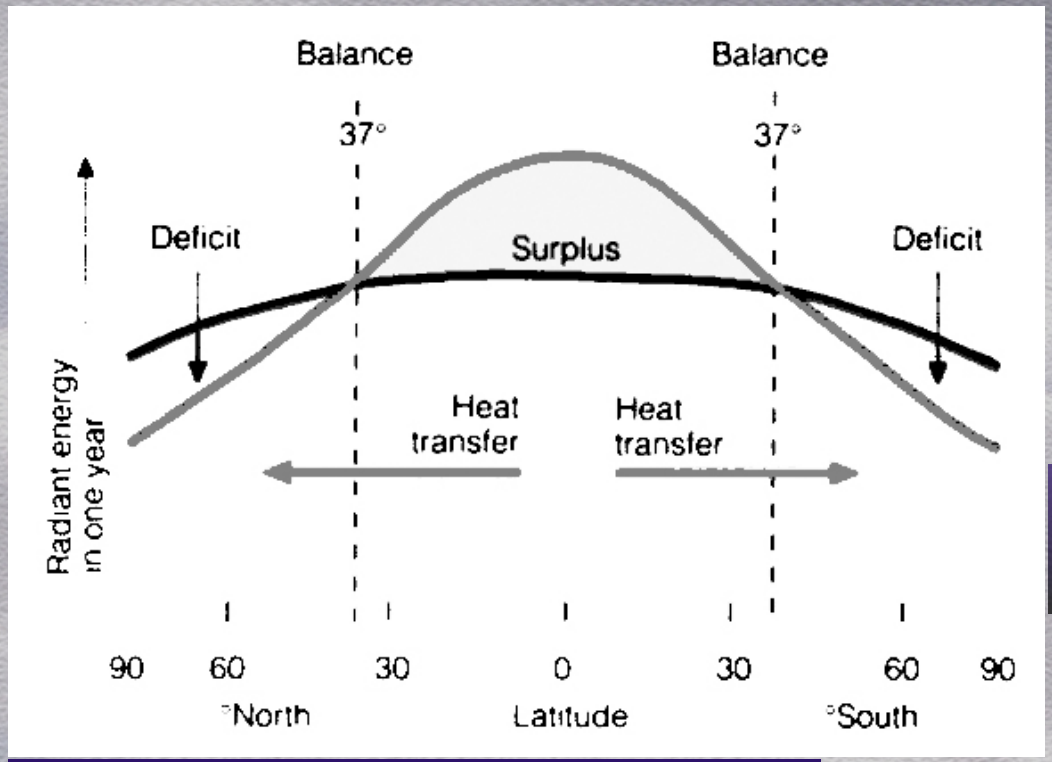


Fig. 11.3a; source: Ahrens "Meteorology Today"

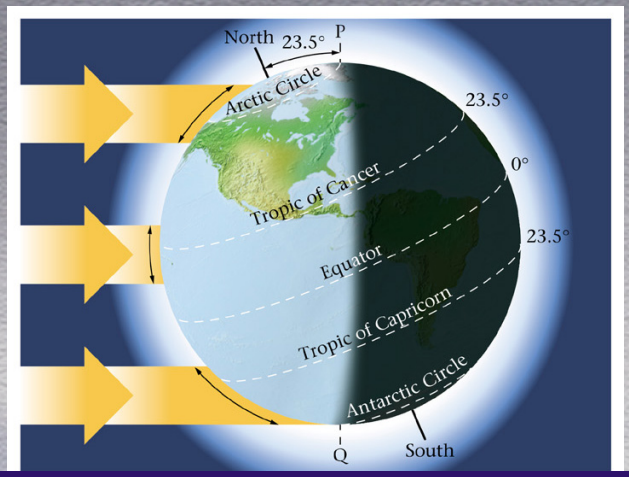


Fig. 11.2a; source: Marshak "The Earth"

2.4 less insolation/area near poles higher albedo (snow/ice)

- low lat.: solar rad. absorbed
- high lat.: Earth rad. lost

-> heat transfer from equator to poles

Air Circulation on Idealized (non-rotating) Earth

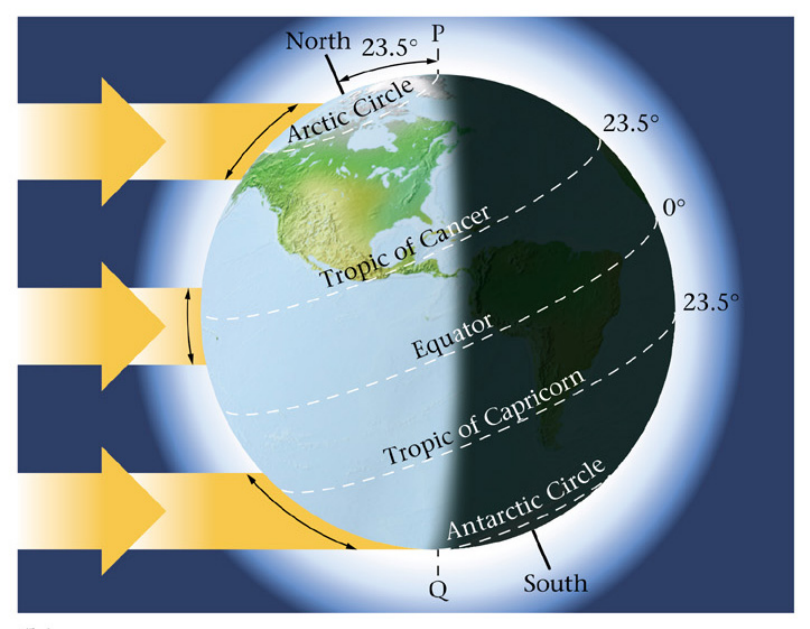
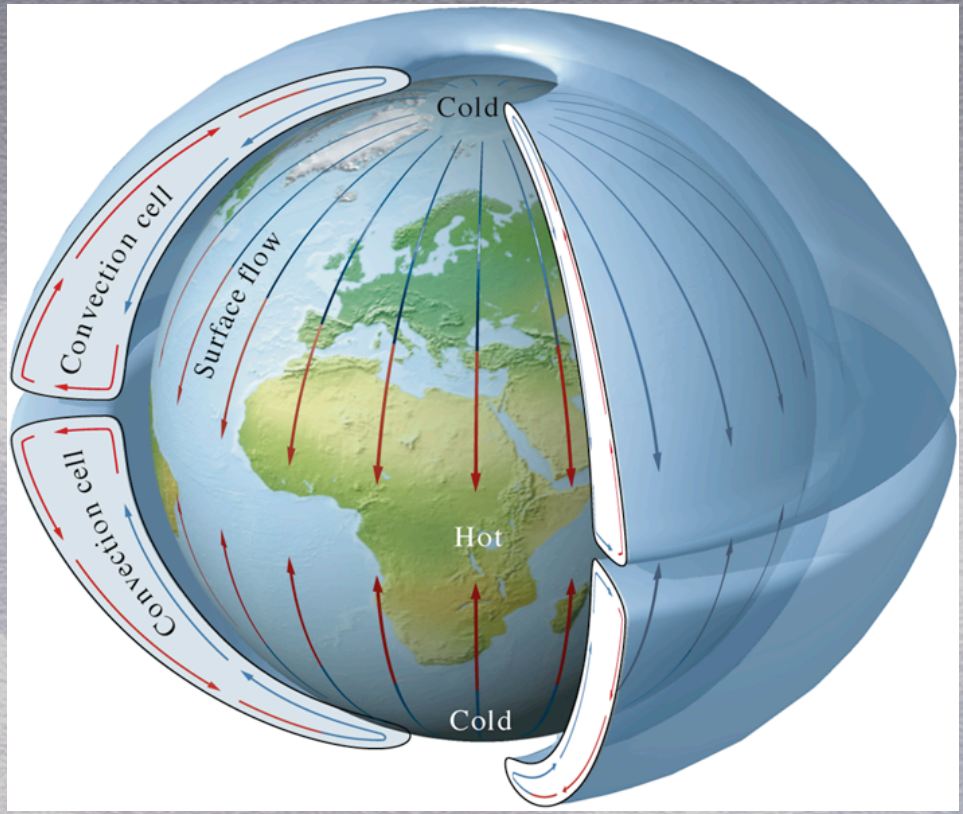


Fig. 11.2a; source: Marshak "The Earth"



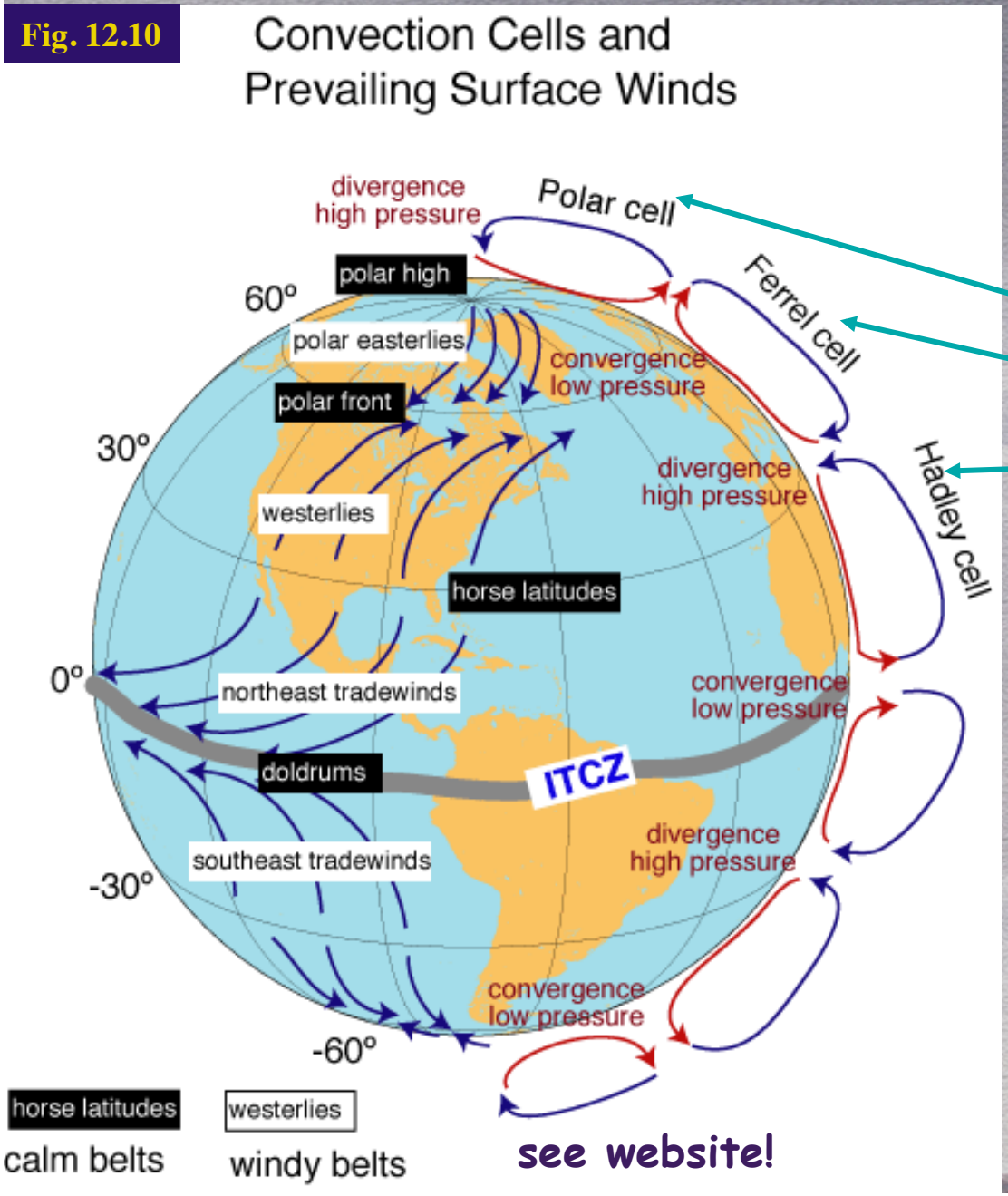
due to difference in insolation:

- adiabatic cooling near equator (formation of low-pressure system)
- adiabatic heating near poles (formation of high-pressure system)

-> convection cells forms

The 3 Basic Convection Cells

Fig. 12.10

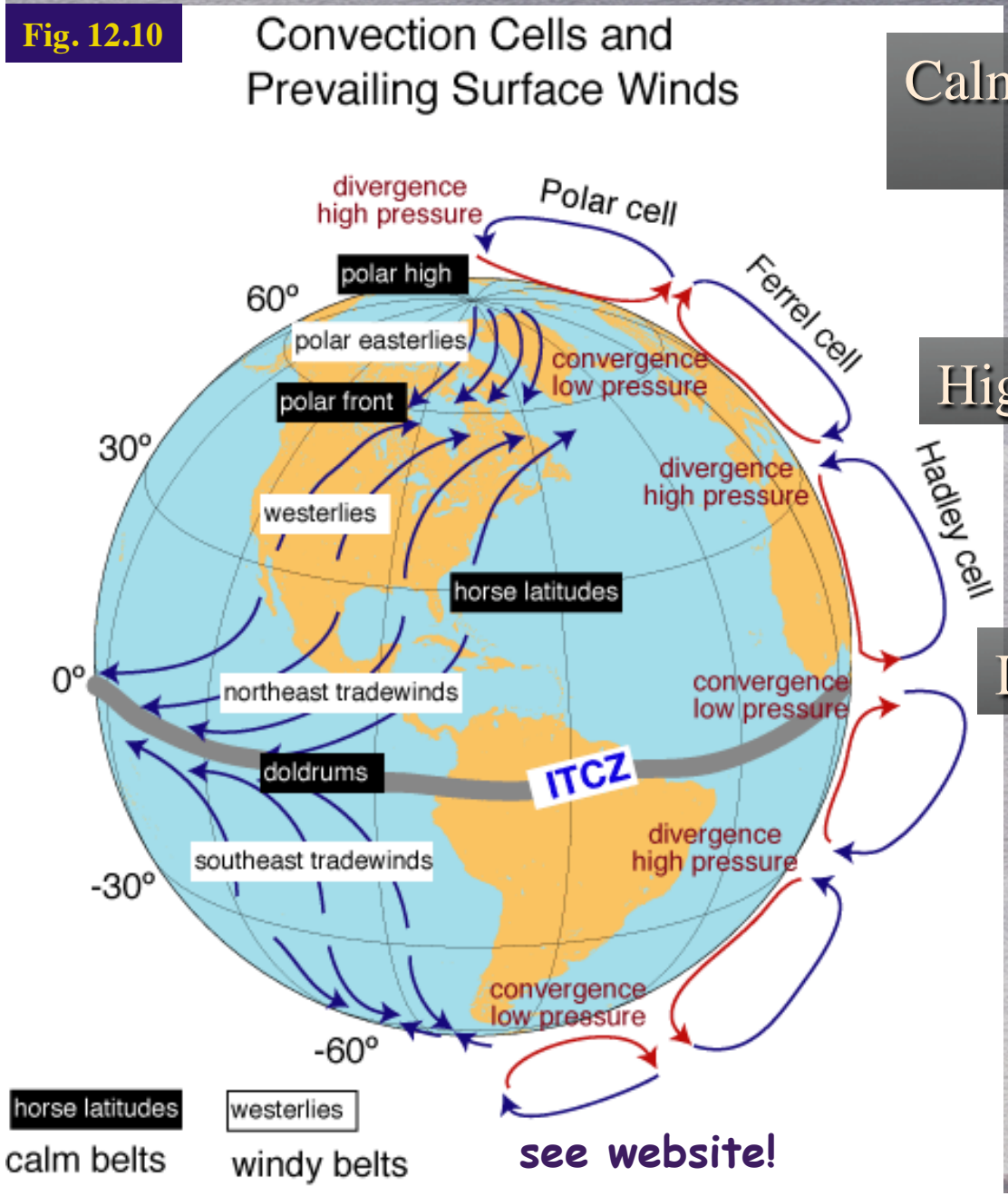


Coriolis Effect
(causes 3 cells!)

1) polar
2) Ferrell
3) Hadley

Pressure Systems and Surface Winds

Fig. 12.10



see website!

Calm Zones: * divergence (dry)
* convergence (wet)

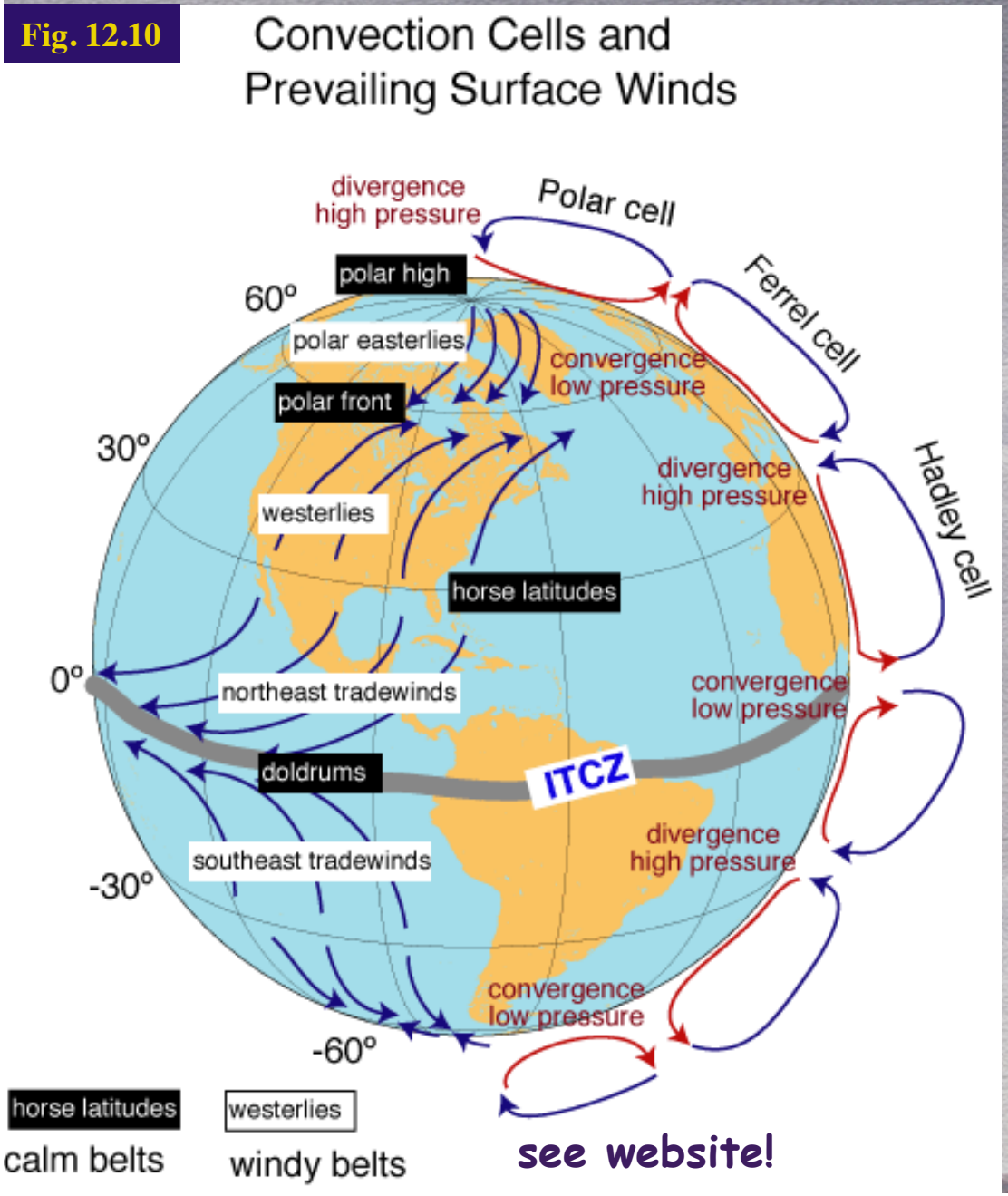
High Pressure (30º, 90º)

Low Pressure (0º, 60º)

wind blows from
high to low pressure!!

Prevailing Winds at the Surface

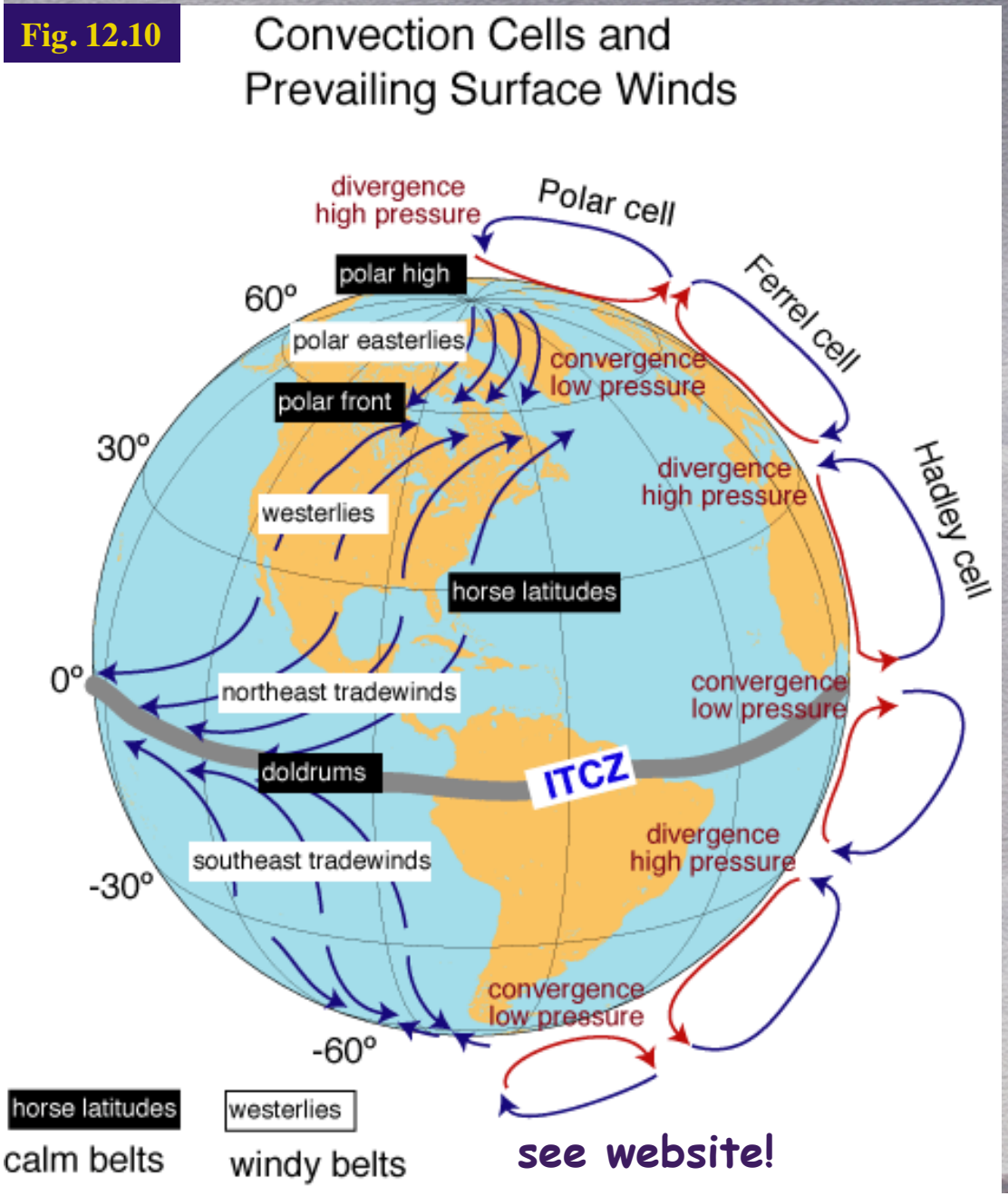
Fig. 12.10



Windy areas:
- polar easterlies
- prevailing westerlies
- trade winds

The Intertropical Convergence Zone (ITCZ)

Fig. 12.10



see website!

ITCZ: inter-tropical convergence zone

- moves throughout year
- controls monsoons