

# Understanding weather and the weather forecast

Week 19

“Local” winds

Terry Hart

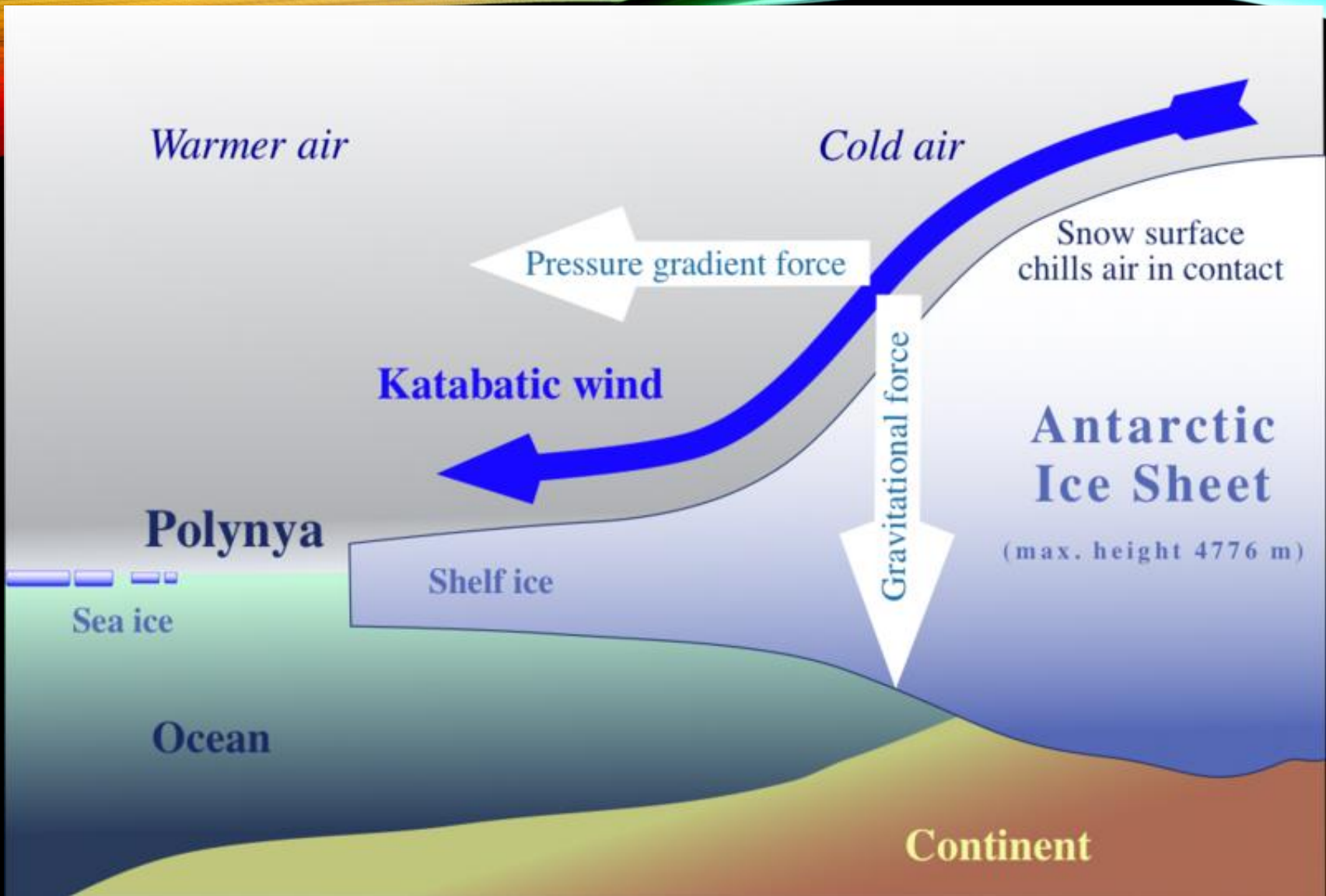
# Katabatic winds - Antarctica

<https://www.antarctica.gov.au/about-antarctica/weather-and-climate/weather/>

“Katabatic winds are created when radiative cooling over the elevated Antarctic ice sheet produces very cold, dense air. The cold, dense air flows downhill, and is replaced by subsiding air from above. The resulting katabatic winds accelerate downhill, enhanced by the confluence of glacial valleys.

“Katabatic winds blow with great consistency over large areas. At the coast they lose their driving force and soon dissipate offshore.

“Low-pressure systems near the coast can interact with katabatic winds to increase their strength. Resulting wind speeds can exceed 100 km/h for days at a time. Wind gusts well over 200 km/h have been measured.”



By Hannes Grobe, Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany - Own work, CC BY-SA 2.5, <https://commons.wikimedia.org/w/index.php?curid=2270406>

## Katabatic Wind

A **katabatic wind** carries high-density air from a higher elevation down a slope under the force of gravity. Air at and near the top of elevated land surfaces, cools relatively quicker than air at lower altitudes. As air cools it becomes denser and therefore heavier. The cold air then flows down the side of the mountain, resulting in a katabatic flow.



# Anabatic Wind

An **anabatic wind** is a warm wind which blows up a steep slope or mountain side, driven by heating of the slope through insolation. These winds typically occur during the daytime in calm sunny weather. A hill or mountain top will be radiatively warmed by the Sun which in turn heats the air just above it. This creates a lower pressure region into which the air at the bottom of the slope flows, causing the wind. It is common for the air rising from the tops of large mountains to reach a height where it cools adiabatically to below its dew point and forms cumulus clouds. These can then produce rain or even thunderstorms.



# Local winds and their names

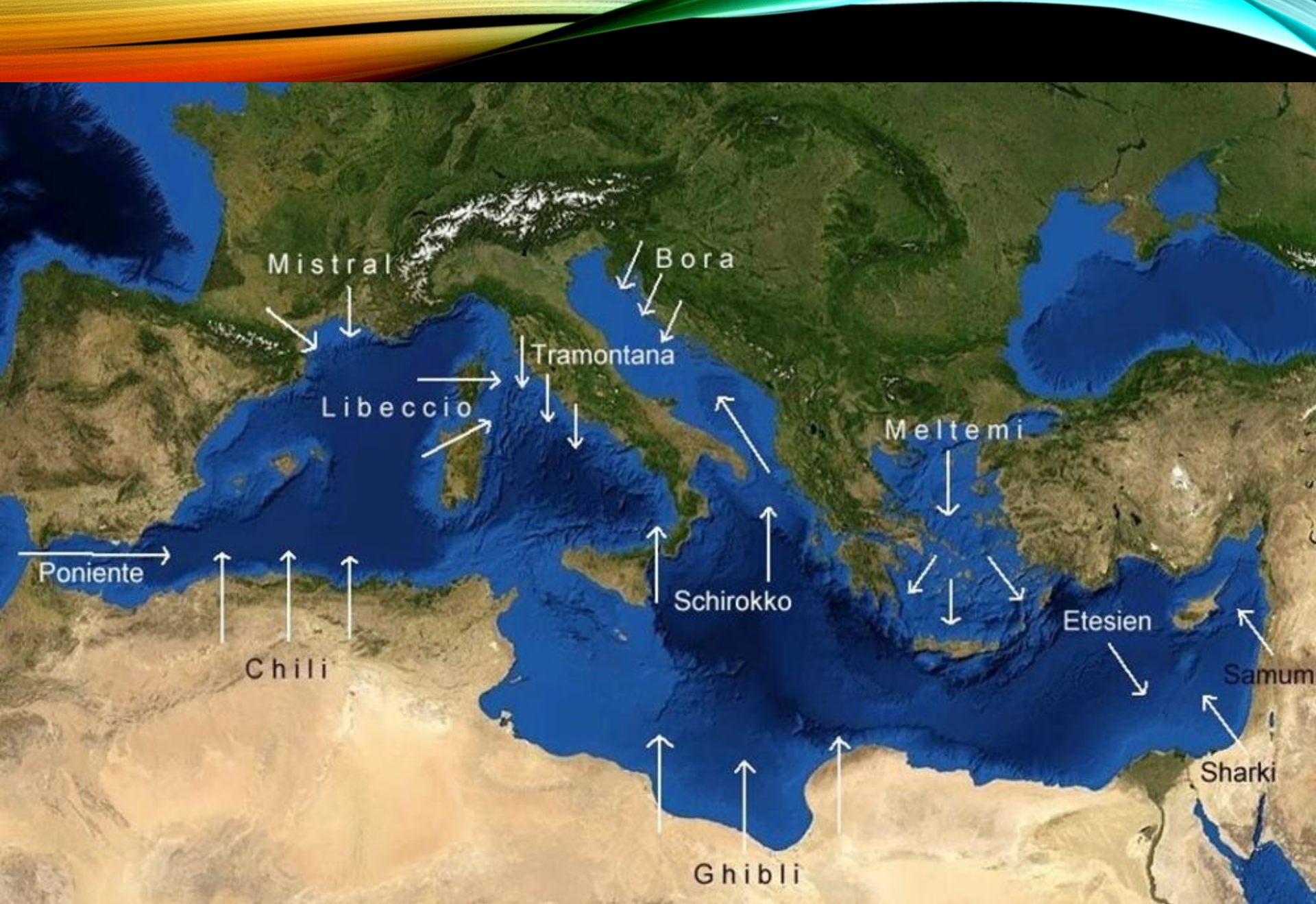
Australia?

## List of local winds

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From Wikipedia, the free encyclopedia

[https://en.wikipedia.org/wiki/List\\_of\\_local\\_winds](https://en.wikipedia.org/wiki/List_of_local_winds)



## Other katabatic winds


- Bora – Adriatic
- Santa Ana – California
- Bohemian or Böhm wind – southern Germany, Austria and Czech Republic





## Bora - Adriatic





The **Santa Ana winds** are strong, extremely dry downslope winds that originate inland and affect coastal Southern California and northern Baja California. They originate from cool, dry high-pressure air masses in the Great Basin.

Santa Ana winds are known for the hot, dry weather that they bring in autumn (often the hottest of the year), but they can also arise at other times of the year.- They often bring the lowest relative humidities of the year to coastal Southern California, and “beautifully clear skies.”

These low humidities, combined with the warm, compressionally-heated air mass, plus high wind speeds, create critical fire weather conditions and fan destructive wildfires.



## Channelling of winds

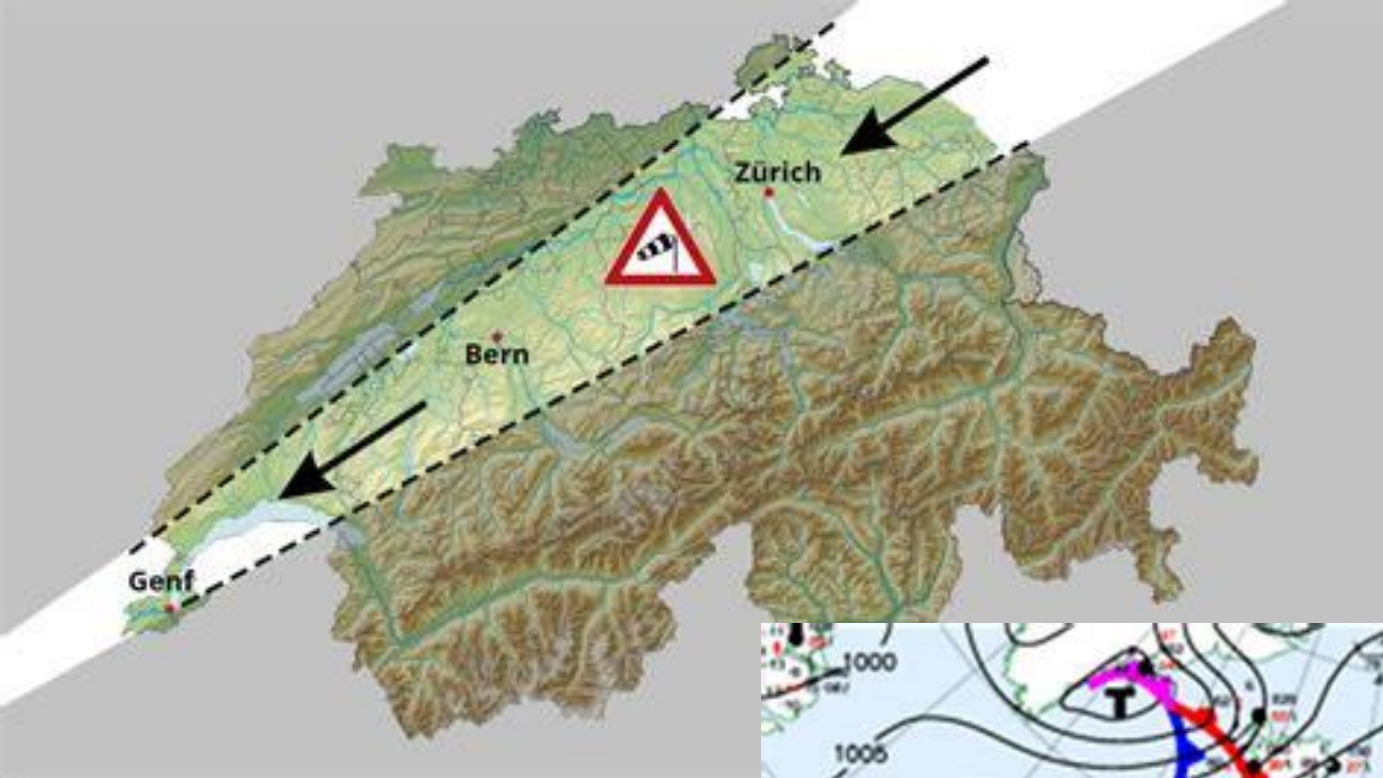
- Bise – Lake Geneva; Rhone Valley
- Mistral – Southern France



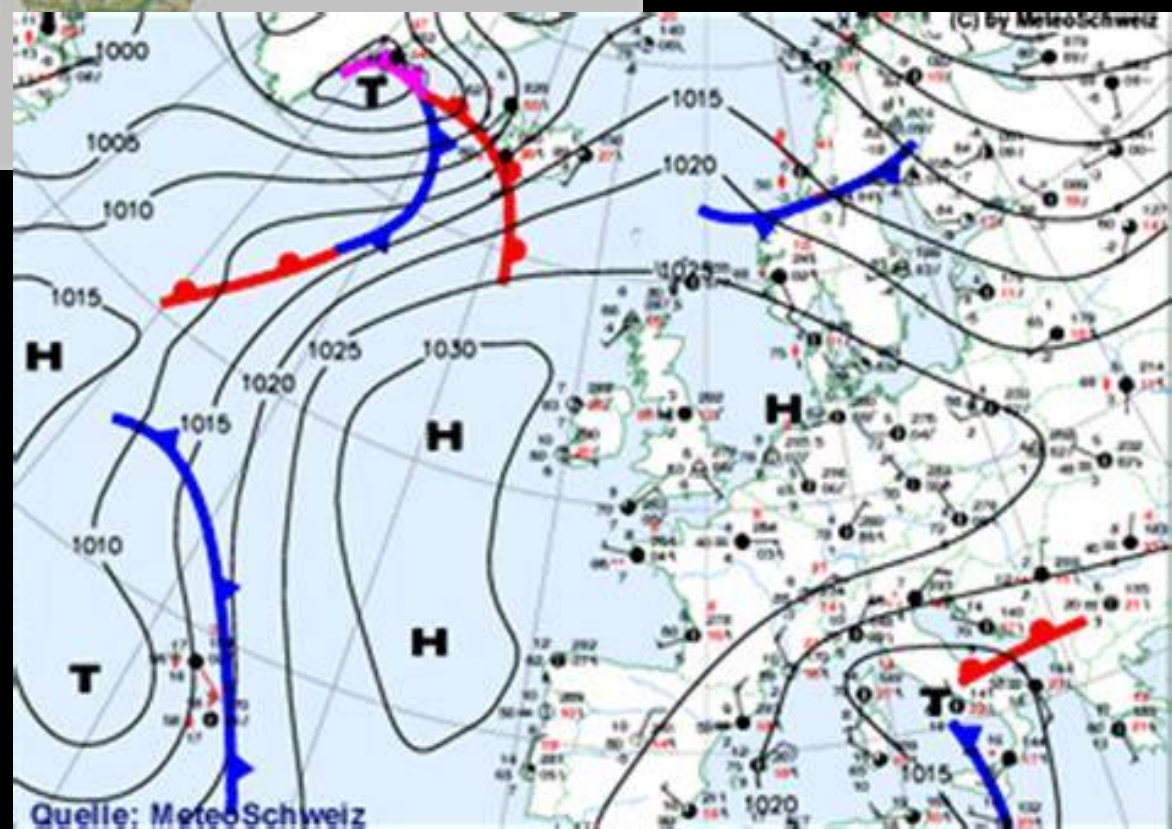
<http://home.chpc.utah.edu/~u0453210/homepage/bora.gif>

# Local winds of the Balkan Peninsula





Bise  
(Geneva)



## Bise

It is caused by channelling of the air-current along the northern edge of the Alps, during high-pressure conditions in northern or eastern Europe. Towards western Swiss Plateau, the Bise is pressed between the Jura mountains and Pre-Alps whereby it strengthens and mostly climaxes on the western shore of Lake Geneva.

In summer, the Bise wind causes rather dry and sunny weather whereas in winter, it frequently forms low stratus clouds over the Swiss Plateau.

The Bise can sometimes lead to severe icing during winter months in Geneva and nearby communities.







## Mistral

The long and enclosed shape of the Rhône Valley, and the effect of funnelling the air through a narrowing space, is frequently cited as the reason for the speed and force of the mistral, but the reasons are apparently more complex.

# Rain Shadow Winds

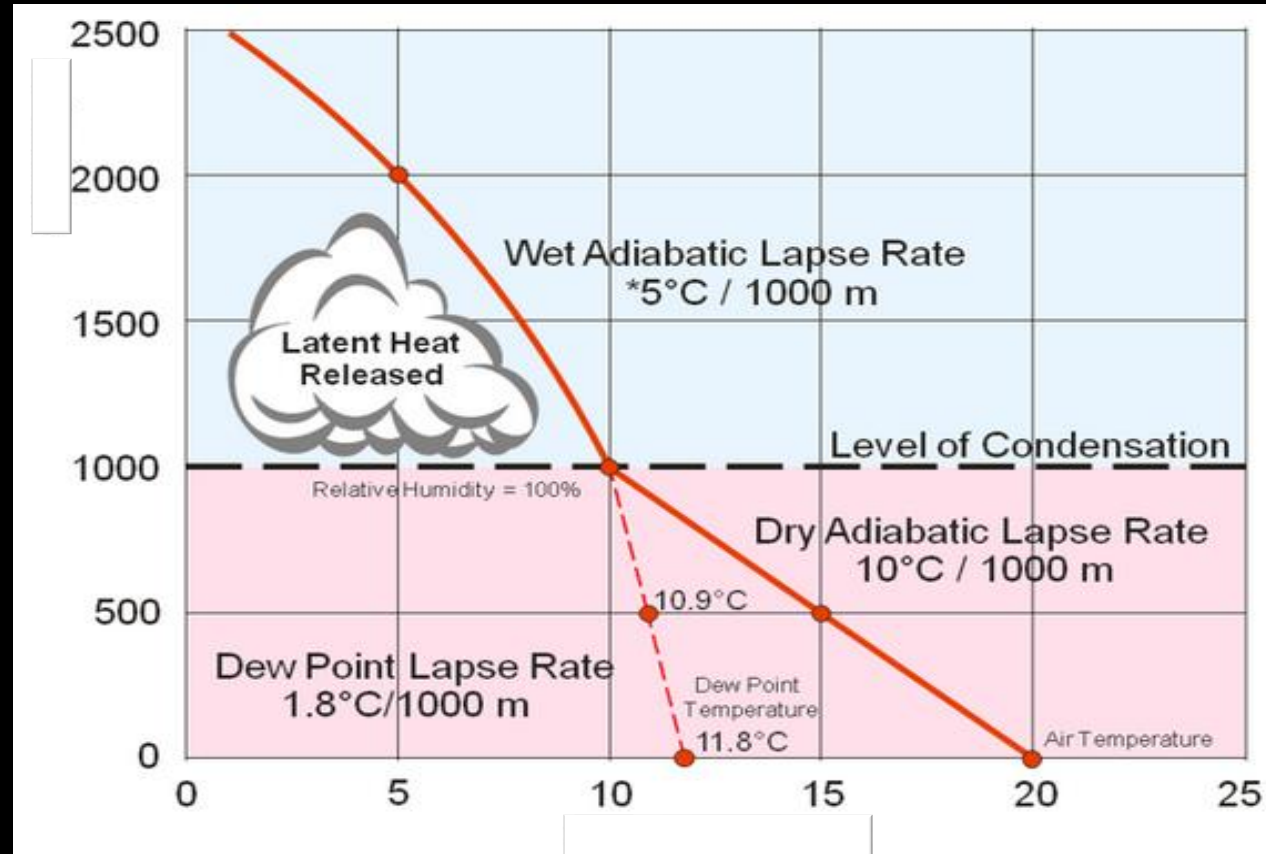
- Foehn - Europe
- Chinook – Pacific Northwest – USA and Canada
- Zonda - Argentina

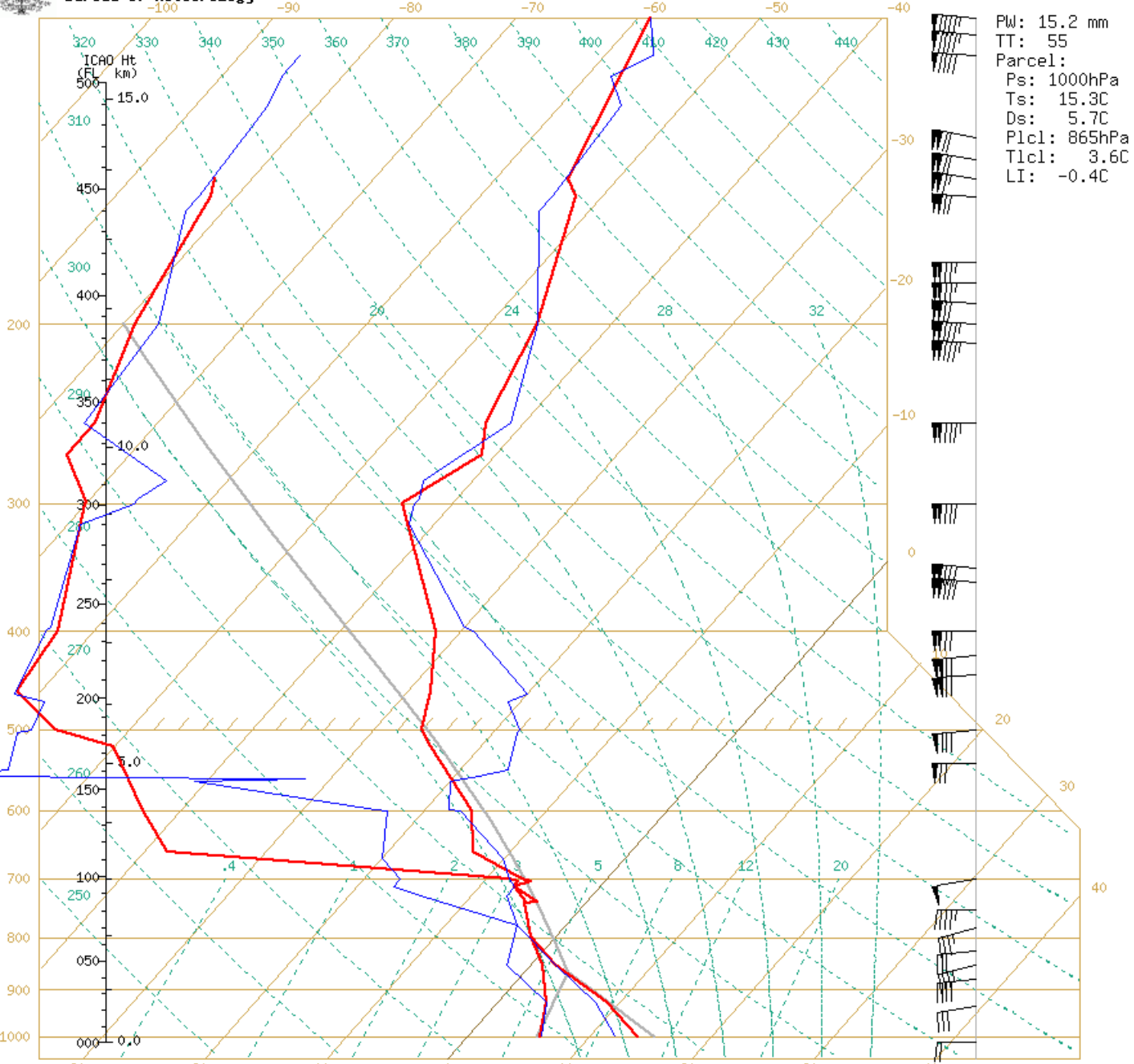
<https://youtu.be/e0C7XkTA9sg>

# Phase changes in water

Water vapour is a powerful fuel for the atmosphere

It can make a big difference once condensation starts, particularly in thunderstorms and tropical cyclones.



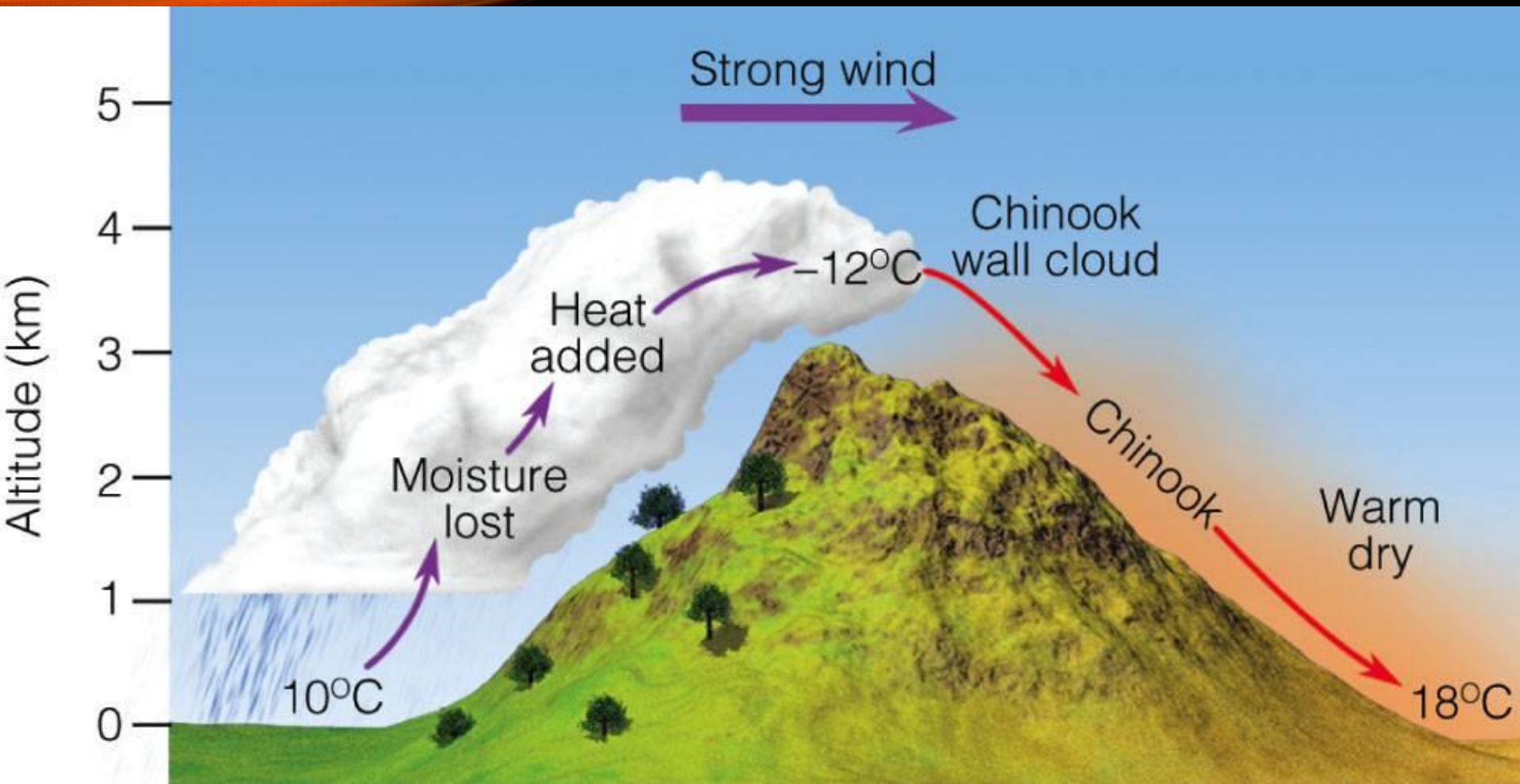


Radsonde trace

Perth Airport

Red 10 am 3 August

Blue 5 am 3 August



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[http://apollo.lsc.vsc.edu/classes/met130/notes/chapter9/graphics/chinook\\_schem.jpg](http://apollo.lsc.vsc.edu/classes/met130/notes/chapter9/graphics/chinook_schem.jpg)

## **Derecho (USA)**

a widespread, long-lived wind storm. Derechos are associated with bands of rapidly moving showers or thunderstorms variously known as bow echoes, squall lines, or quasi-linear convective systems. (not tornadoes)

## **Haboob (Arabic) – term used in Africa and also USA (?)**

a type of intense dust storm carried on a sharp atmospheric trough or front. Haboobs occur regularly in dry land area regions throughout the world.

Riyadh (Saudi Arabia)

