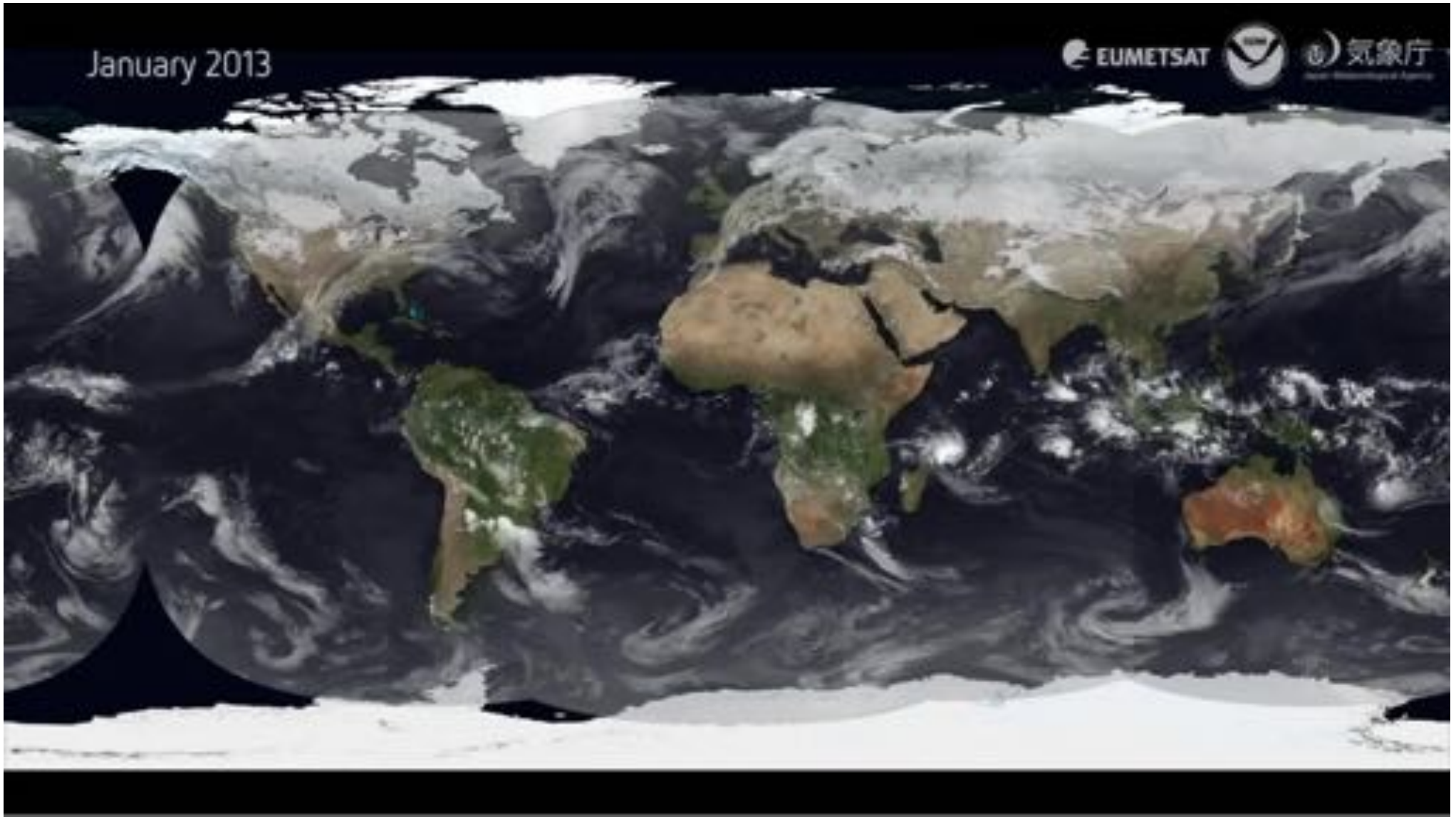
Clouds and Atmospheric convection

Caroline Muller



A Year of Weather 2013

This visualisation, comprised of imagery from the geostationary satellites of EUMETSAT, NOAA and the JMA, shows an entire year of weather across the globe during 2013, with audio commentary from Mark Higgins, Training Officer at EUMETSAT. The satellite data layer is superimposed over NASA's 'Blue Marble Next Generation' ground maps, which change with the seasons.

Remarque :
Pourquoi cyclone = sens inverse des aiguilles d'une montre dans l'hemisphere nord VERSUS sens des aiguilles d'une montre dans l'hemisphere sud?

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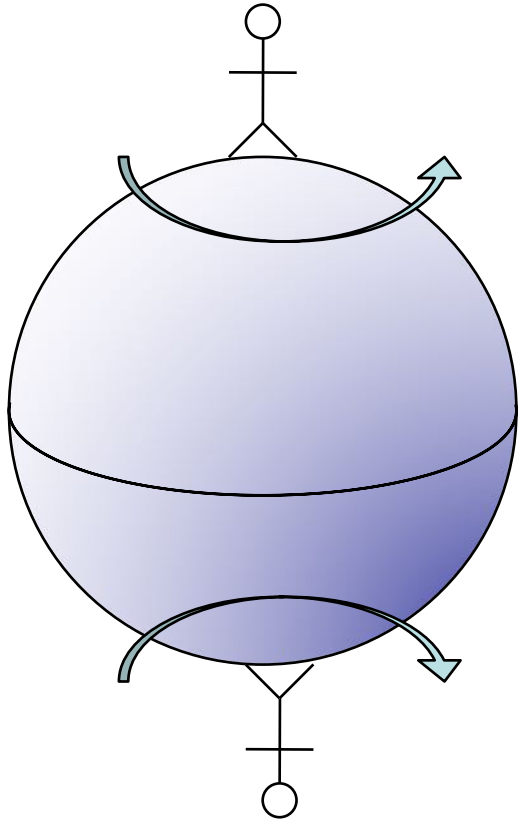
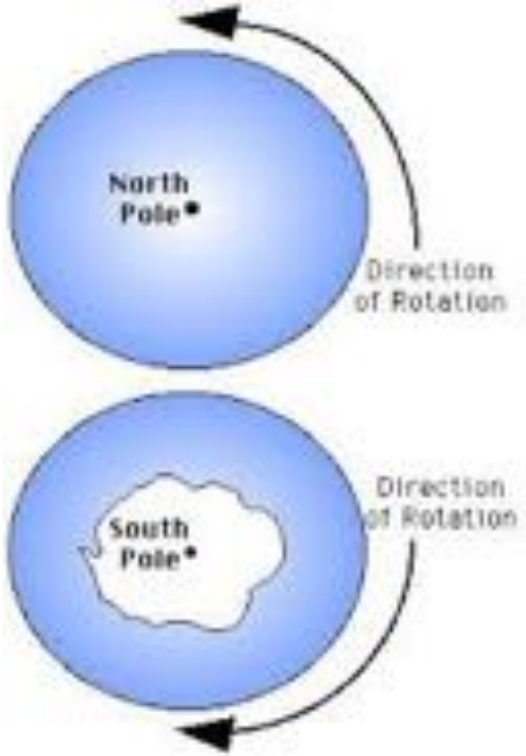
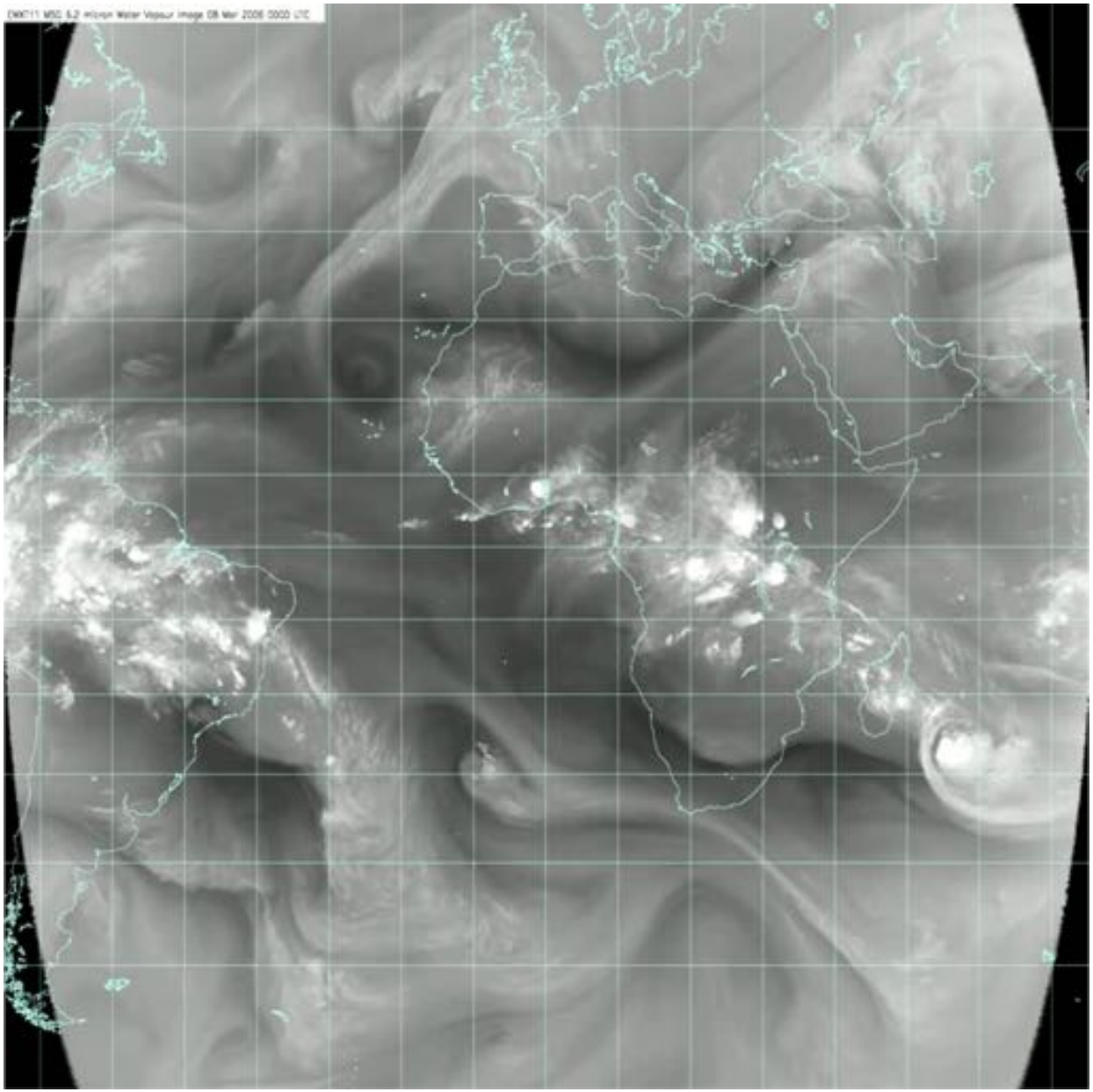




atmospheric water vapor (white=humid)



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Cloud types

Cumulus: heap, pile

Stratus: flatten out, cover with a layer

Cirrus: lock of hair, tuft of horsehair

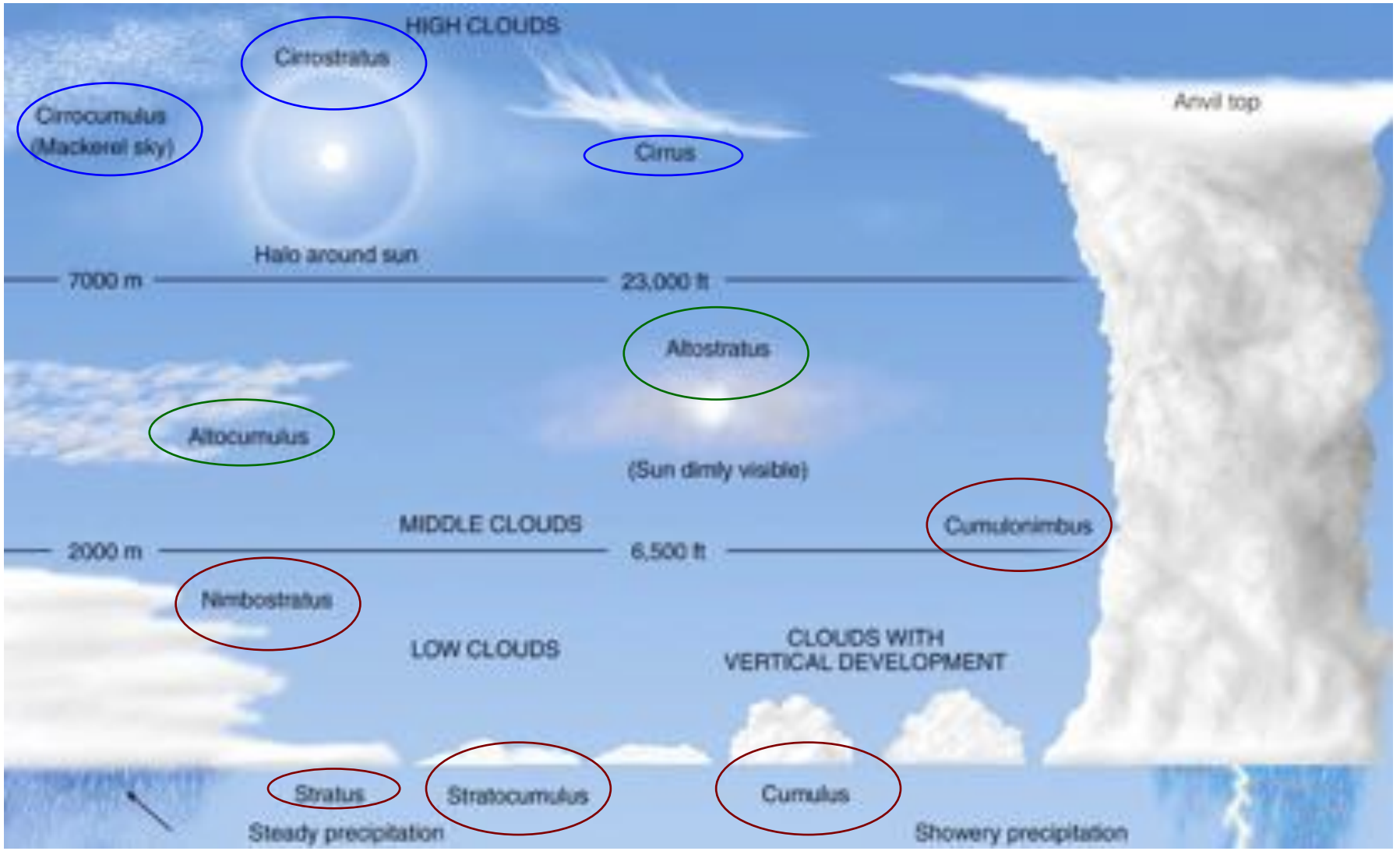
Nimbus: precipitating cloud

Altum: height

Combined to define
10 cloud types

Cloud types

Clouds are classified according to height of cloud base and appearance



High clouds
Base: 5 to 12km

Middle clouds
Base: 2 to 6km

Low clouds
Base < 2km

High Clouds

Almost entirely ice crystals

Cirrus

Wispy, feathery

Cirrostratus

Widespread, sun/moon halo

Cirrocumulus

Layered clouds, cumuliform lumpiness

Middle Clouds

Liquid water droplets, ice crystals, or a combination of the two, including supercooled droplets (i.e., liquid droplets whose temperatures are below freezing).

Altostratus

Flat and uniform type texture in mid levels

Altocumulus

Heap-like clouds with convective elements in mid levels

May align in rows or streets of clouds

Low Clouds

Liquid water droplets or even supercooled droplets, except during cold winter storms when ice crystals (and snow) comprise much of the clouds.

The two main types include **stratus**, which develop horizontally, and **cumulus**, which develop vertically.

Stratocumulus

Hybrids of layered stratus and cellular cumulus

Stratus

Uniform and flat, producing a gray layer of cloud cover

Nimbostratus

Thick, dense stratus or stratocumulus clouds producing steady rain or snow

Low Clouds

Liquid water droplets or even supercooled droplets, except during cold winter storms when ice crystals (and snow) comprise much of the clouds.

The two main types include **stratus**, which develop horizontally, and **cumulus**, which develop vertically.

Cumulus (humili)

Scattered, with little vertical growth on an otherwise sunny day

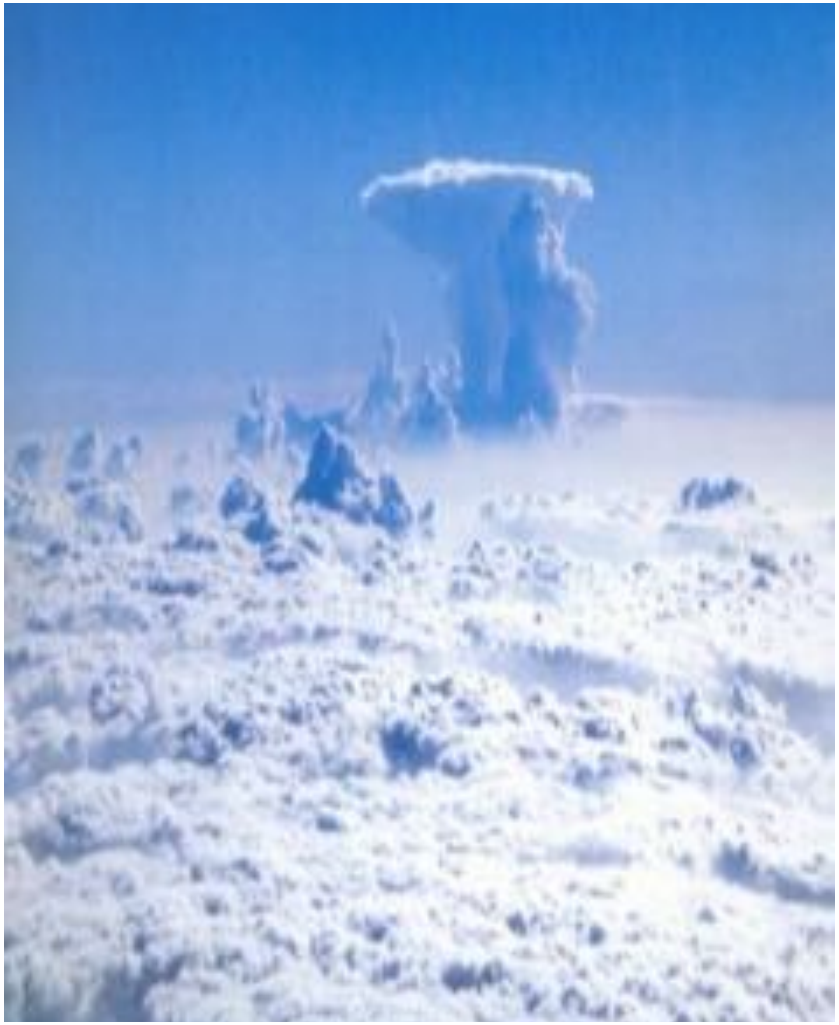
Also called "fair weather cumulus"

Cumulus (congestus)

Significant vertical development (but not yet a thunderstorm)

Cumulonimbus

Strong updrafts can develop in the cumulus cloud => mature, deep cumulonimbus cloud, i.e., a thunderstorm producing heavy rain.



High Clouds

High Clouds

Cirrostratus

Cirrus

Cirrocumulus

Middle Clouds

Middle Clouds

Altocumulus

Altostratus

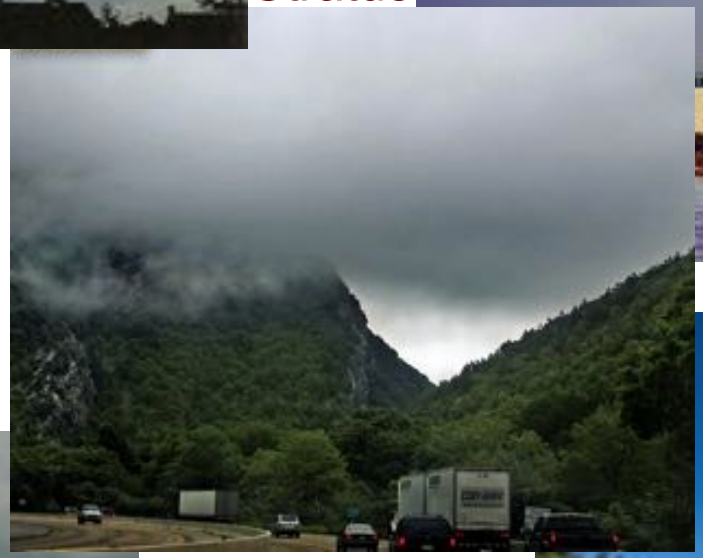
Low Clouds

Low Clouds

Stratocumulus

Cumulonimbus

Stratus



Cumulus

Nimbostratus

Other spectacular Clouds…

Mammatus clouds (typically below anvil clouds)

Shelf clouds (gust front)

Lenticular clouds (over orography)

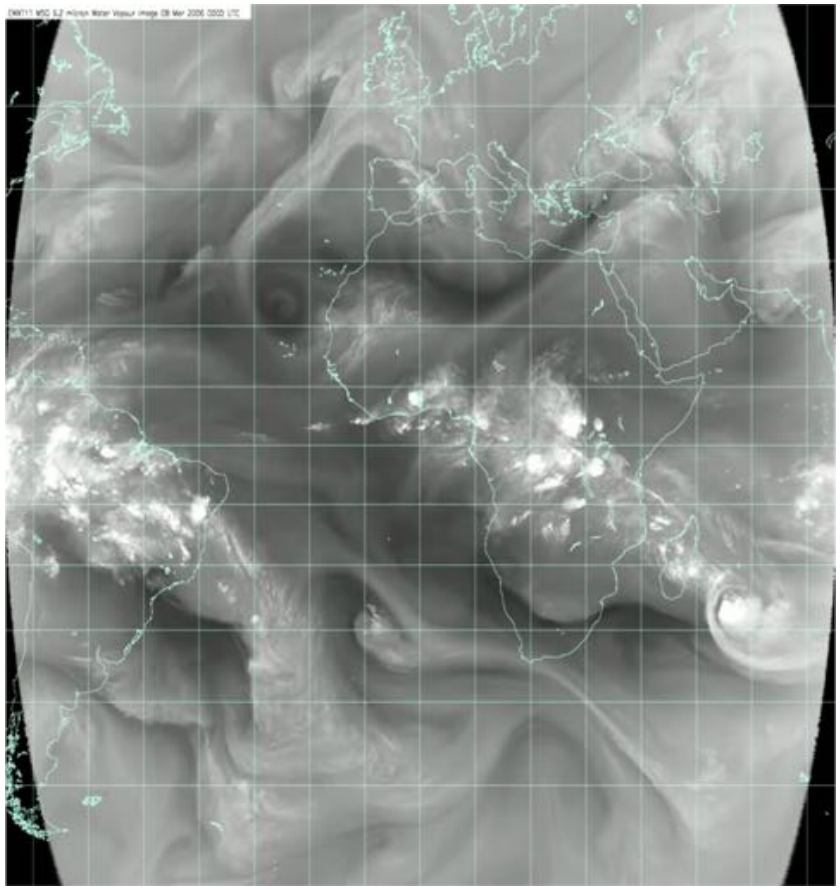
Other spectacular Clouds…

Courtesy: D.-D. Rousseau

Other spectacular Clouds…

Cloud types

Water vapor from satellite

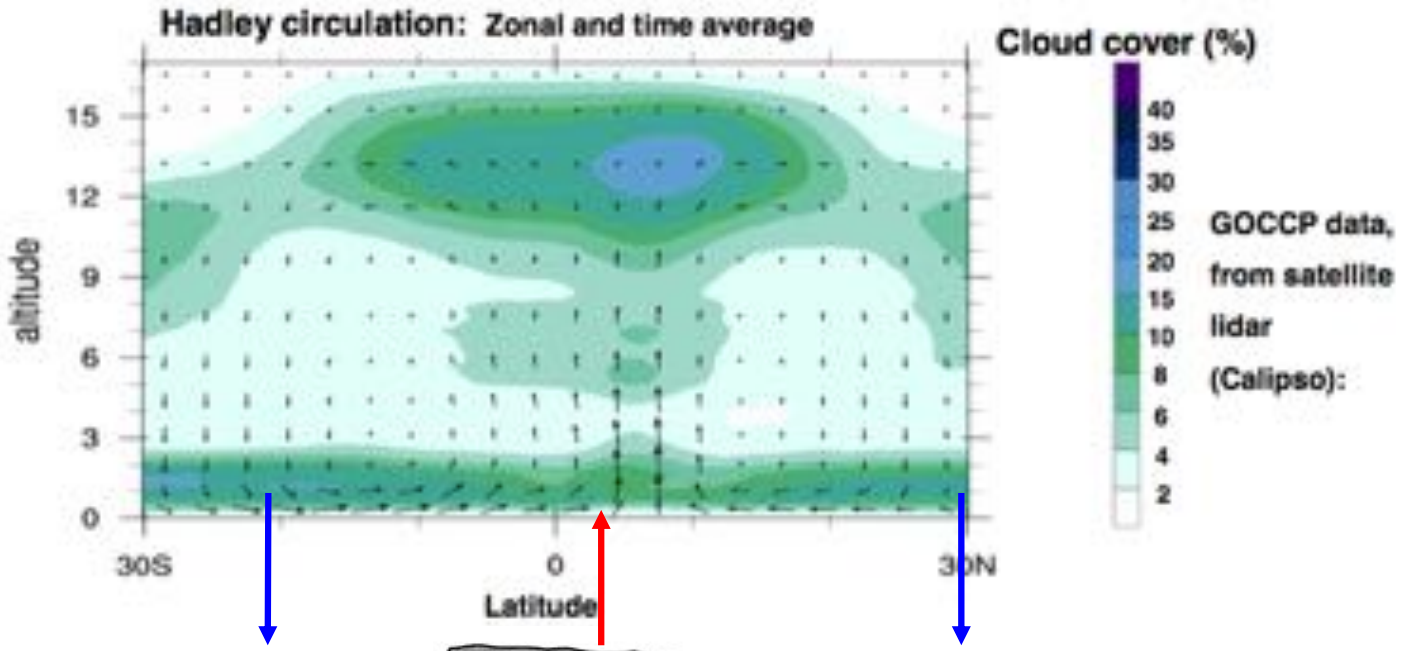


Larger-scale extratropical convection

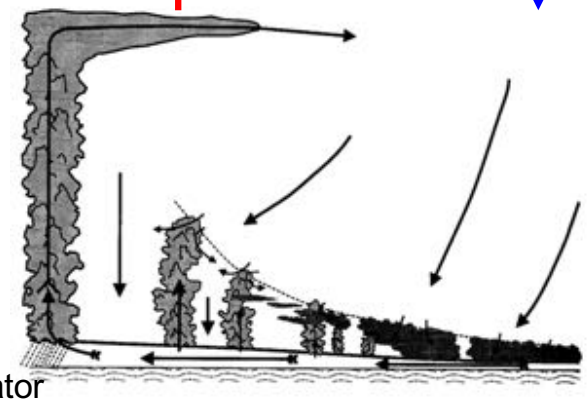
Small-scale tropical convection

Deep convective system over Brazil

Clouds and Circulation: Hadley cell & ITCZ



Cloud types:



equator

subtropics (30°)

Deep cumulonimbus

Fair weather cumulus

stratus