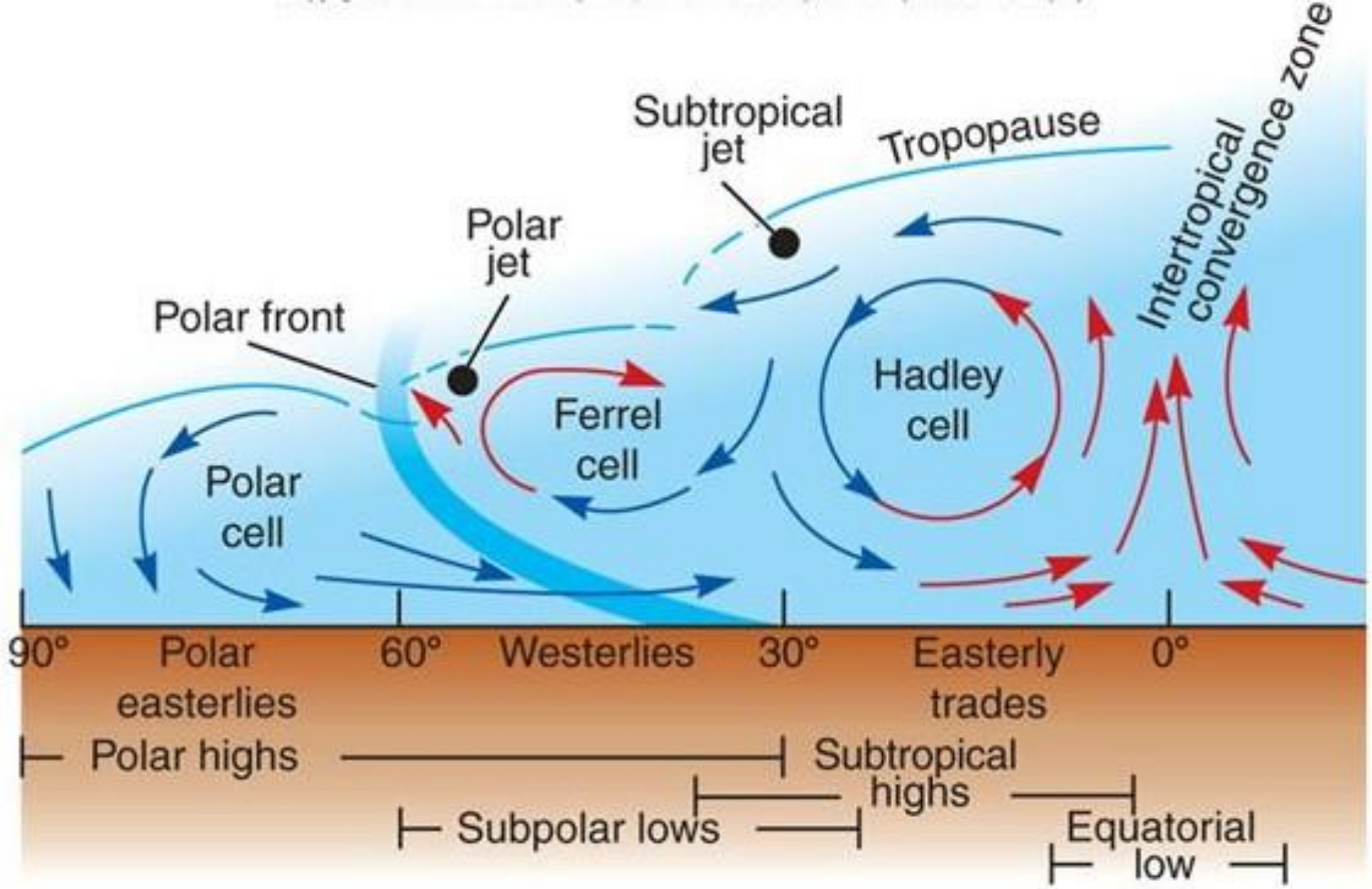
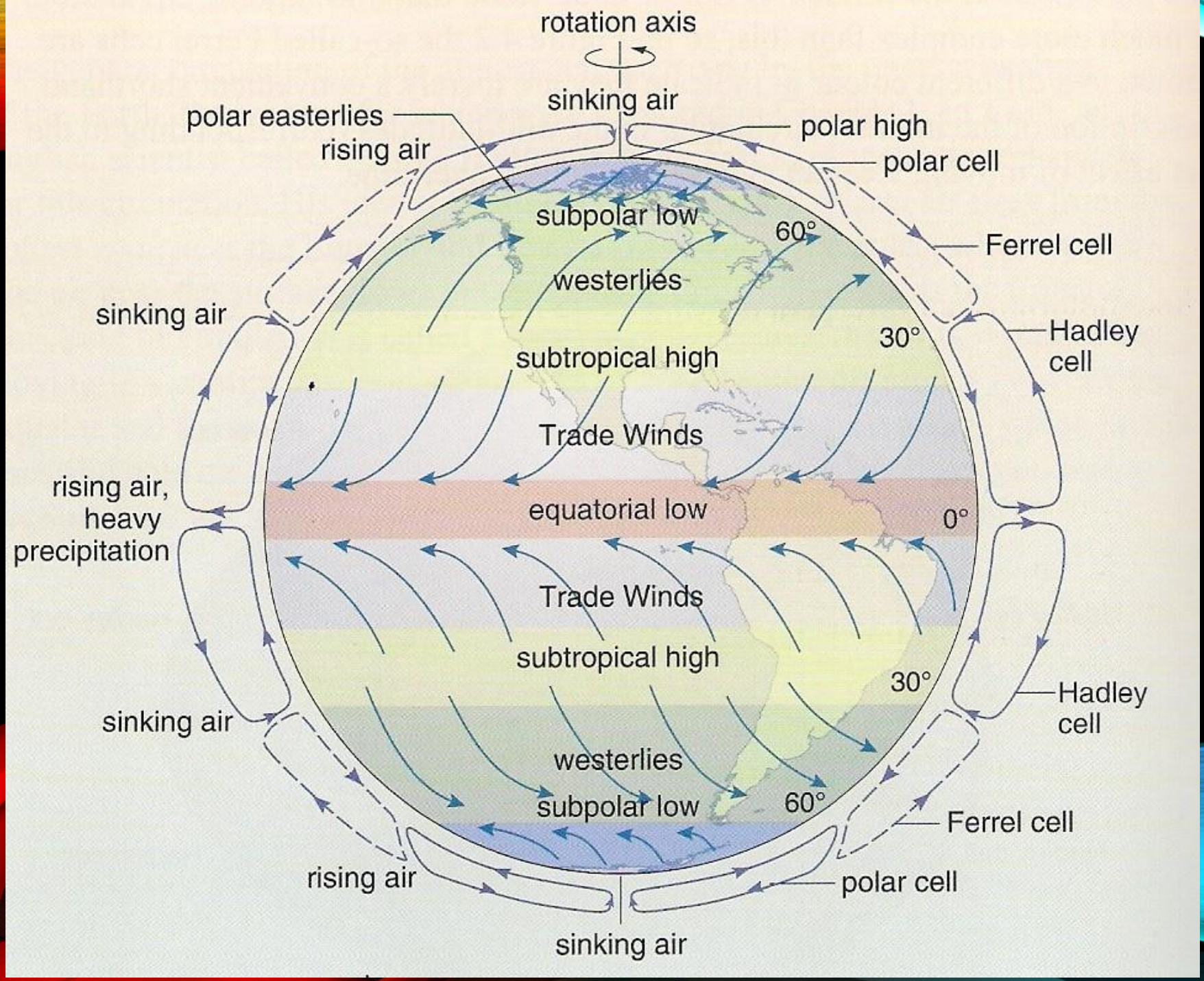
Understanding weather and the weather forecast

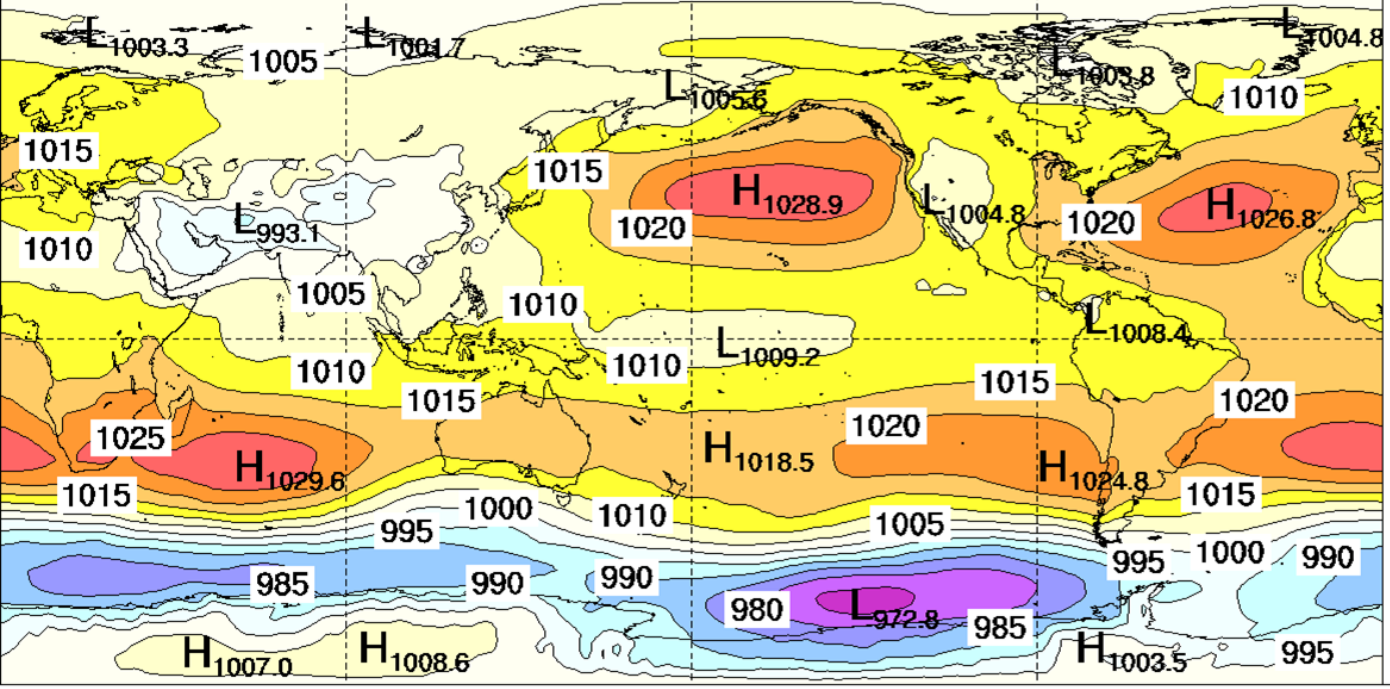
Week 9 Clouds and the Global Circulation

Terry Hart



The **Ferrel cell** is really a statistical average of the lows and highs in the zone of westerly winds.


rotation axis
sinking air
polar easterlies
rising air
polar high
polar cell
subpolar low
60°
Ferrel cell
westerlies
sinking air
30°
Hadley cell
subtropical high
Trade Winds
rising air, heavy precipitation
equatorial low
0°
Trade Winds
subtropical high
30°
Hadley cell
sinking air
westerlies
subpolar low
60°
Ferrel cell
rising air
polar cell
sinking air



July 2021

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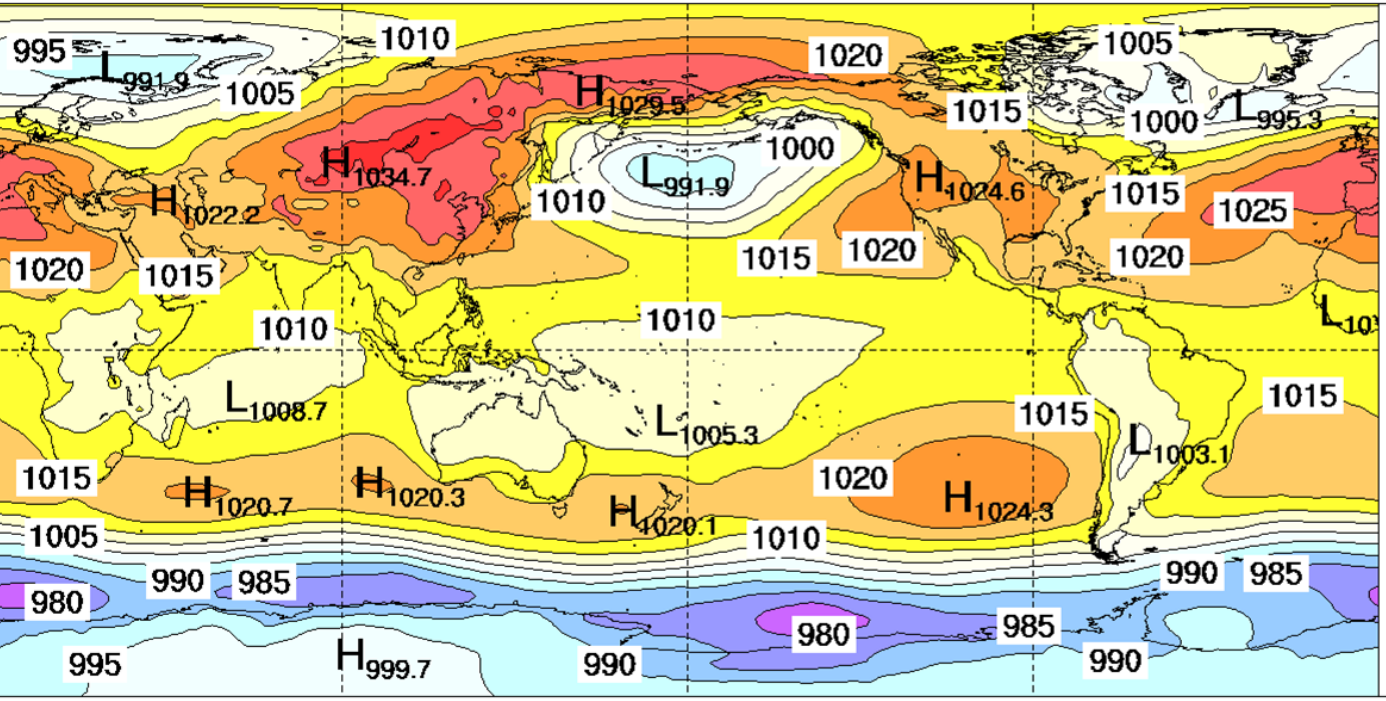
Issued: 01/08/2021



January 2022

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Clouds

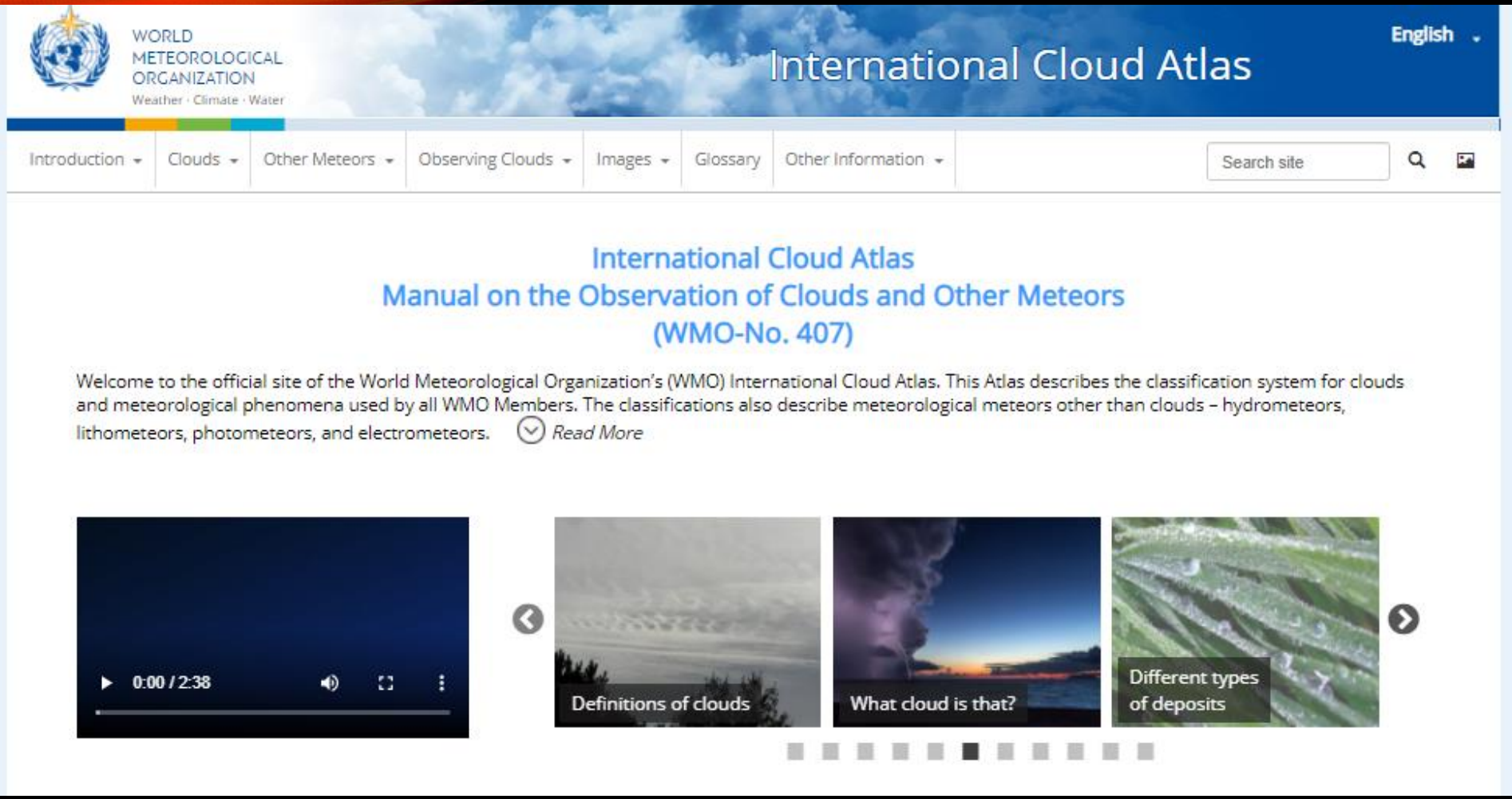
The first widely accepted classification – Luke Howard (1803) . It was regarded as the beginning of the formal science of meteorology and Howard is sometimes regarded as "the father of meteorology"

Originally had four primary terms (although terms could be combined):

- **Cirrus ('curl of hair) for wispy clouds**
- **Stratus ('layer') for horizontal sheet-like clouds**
- **Cumulus ('heap') for puffy clouds**
- **Nimbus ('rain') for rain-bearing clouds**

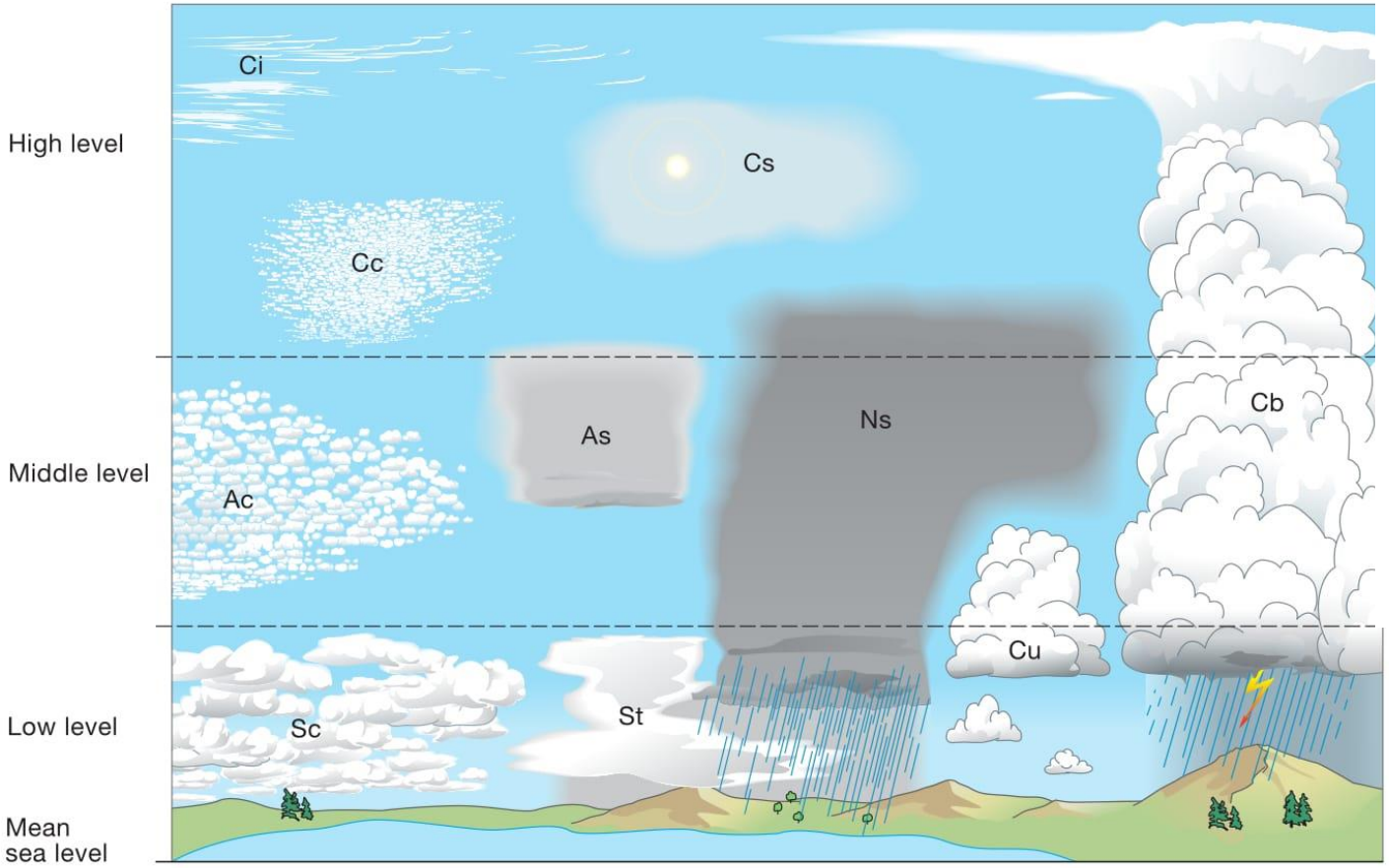
Its success was due to use of the universal Latin and his adaptation of the biological (Linnaen) nomenclature – genera, species, varieties

1887 – modified to allow for height of cloud – 'alto' added for middle level clouds
1896 – first International Cloud Atlas
2017 revised International Cloud Atlas (World Meteorological Organization)



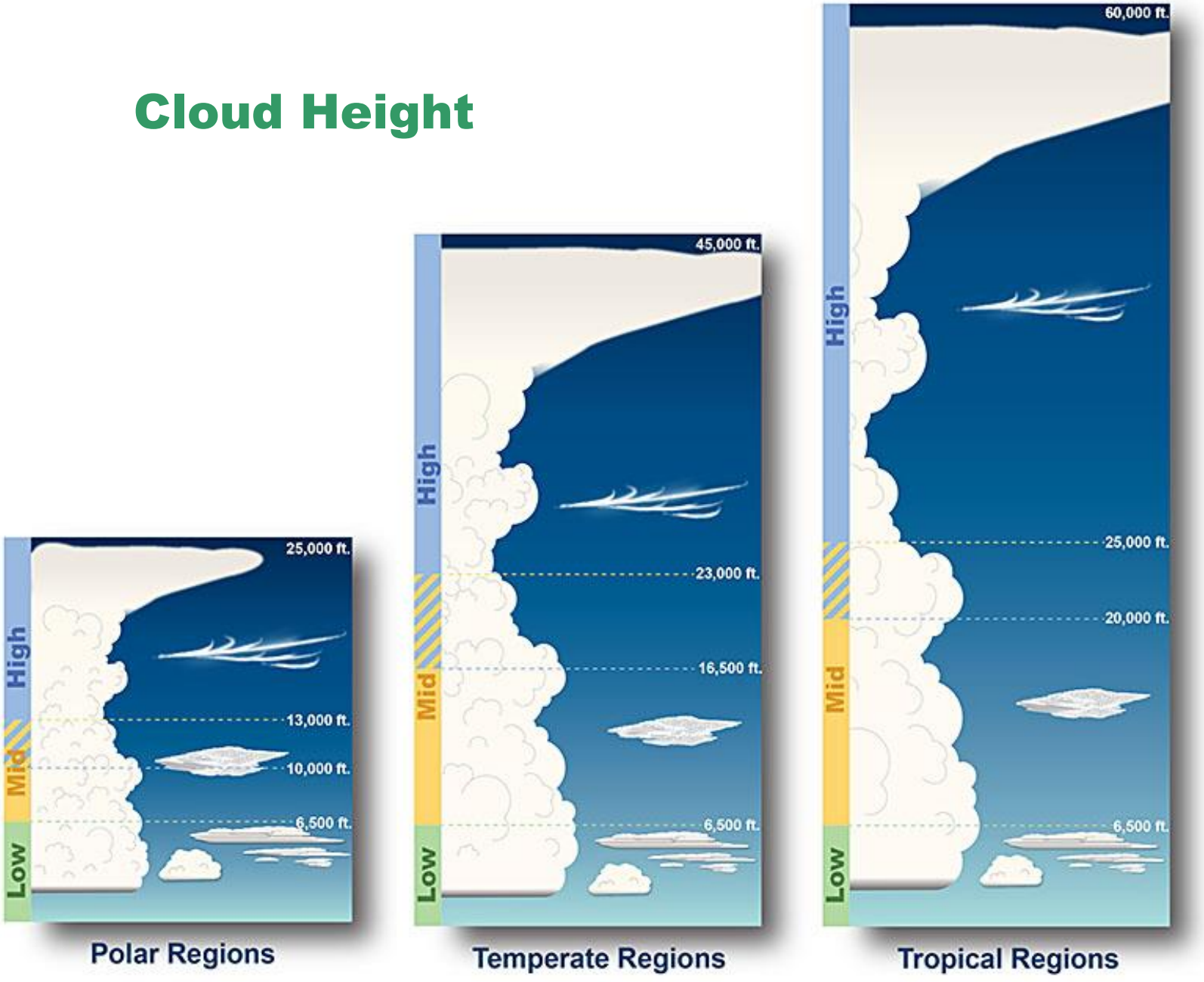
https://cloudatlas.wmo.int/en/home.html

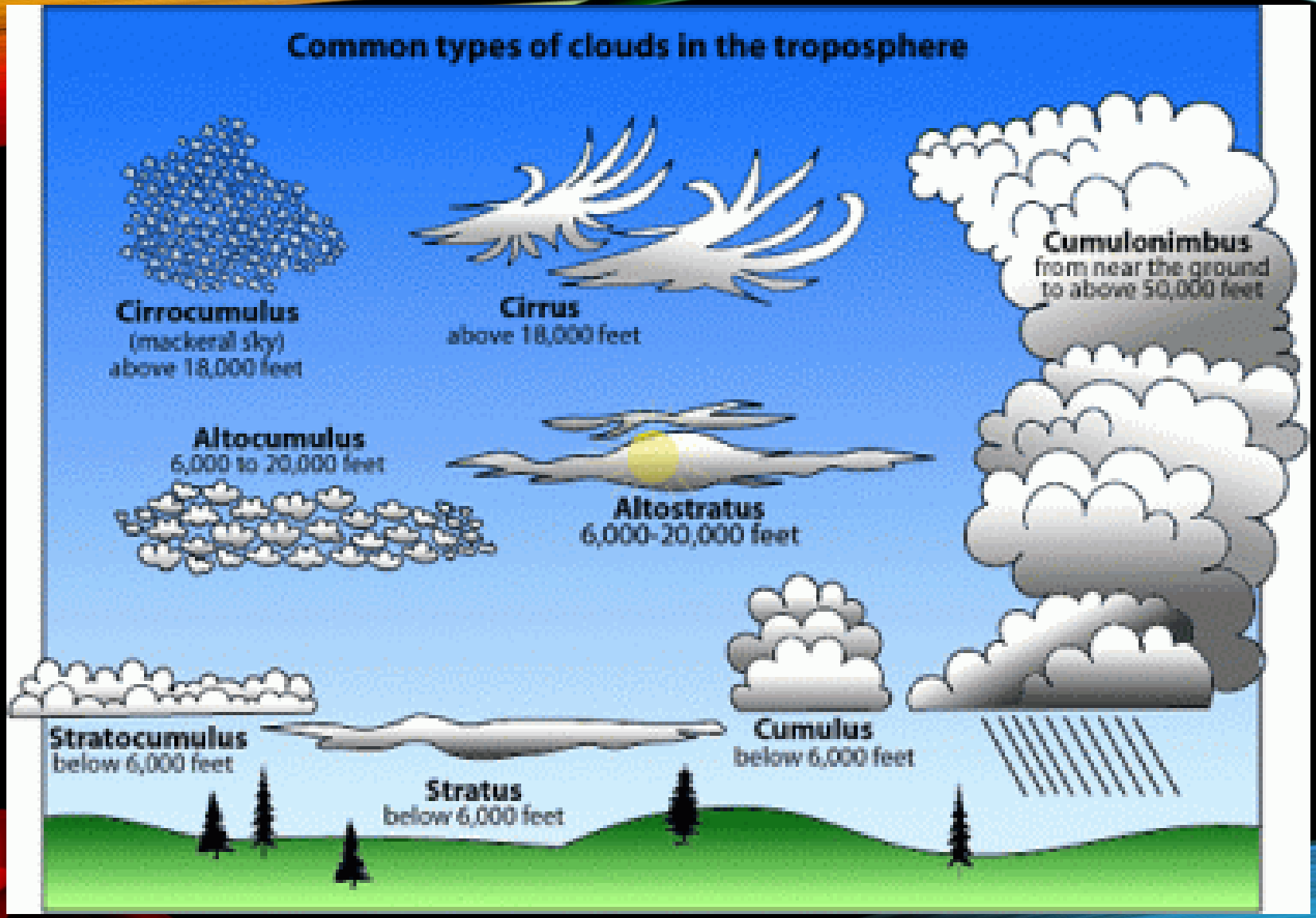
Cloud Genera



Level	*Genera*
High	Cirrus Cirrocumulus Cirrostratus
Middle	Altocumulus Altostratus Nimbostratus
Low	Stratus Stratocumulus Cumulus Cumulonimbus

Cloud Height





Video: A tutorial on cloud types. US NWS

https://www.youtube.com/watch?v=FMagDRCpJ14

High level clouds

Cirrus

Cirrus (Ci)

- Most common high level clouds
- thin white wispy clouds often with hook shape
- strands in tufts called 'mares tails'
- composed of ice crystals formed from super-cooled water droplets
- appear in advance of a low pressure area .

Cirrostratus

Cirrostratus (Cs)

- Thin, sheet-like clouds composed of ice crystals
- can be 100 metres or more thick but are translucent
- sometimes only obvious by presence of halo around the sun or moon

Low level clouds

Stratus and nimbostratus

Stratus

- Featureless low altitude clouds with diffuse edges
- essentially above ground fog
- form when moist air lifts and expands,
- Can be associated with fronts and rain

Nimbostratus

- Thick sheets of low to middle level clouds
- associated with persistent rain

Stratocumulus

Stratocumulus

- Appear as lumpy shallow clouds
- may appear as rounded masses or rolls
- form in weak convective currents with an overlying inversion or stable layer that inhibits vertical development.

Middle level clouds

Altocumulus bands

Altocumulus castellanus

Altocumulus (Ac)

- Characterised by globular masses or rolls in layers or patches
- form by convection or wave propagation
- towering altocumulus castellanus may indicate impending thunderstorms

Why are there clouds?
https://youtu.be/QC2x_RRnk8E

How do clouds float?
https://www.youtube.com/watch?v=bjZ-vVOeeRk

Helpful ABC On-line article

https://www.abc.net.au/news/2020-04-20/a-guide-to-what-each-cloud-formation-means-for-weather/12157826

EUMETSAT - A Year of Weather 2021

https://youtu.be/RlswRI_-6DY

Our annual year of weather visualisation rounds up the planet's weather in just under 10 minutes. With narration from EUMETSAT's Training Manager, Mark Higgins, we have highlighted the major storms across the globe and provided detail on what you can see from space.

Major storms are labelled from light yellow to red depending on their intensity.

It displays imagery from the geostationary satellites of EUMETSAT, the National Ocean and Atmospheric Administration (NOAA) in the US, the China Meteorological Administration (CMA) and the Japan Meteorological Agency (JMA). Merging our data, we are able to get these very comprehensive views of the entire planet

The visualisation is composed of a satellite infrared data layer, provided by Météo-France's Centre de Météorologie Spatiale, superimposed over NASA's 'Blue Marble Next Generation' ground maps, which change with the seasons.

The flickering in the video is due to the combination of data from the various satellites.