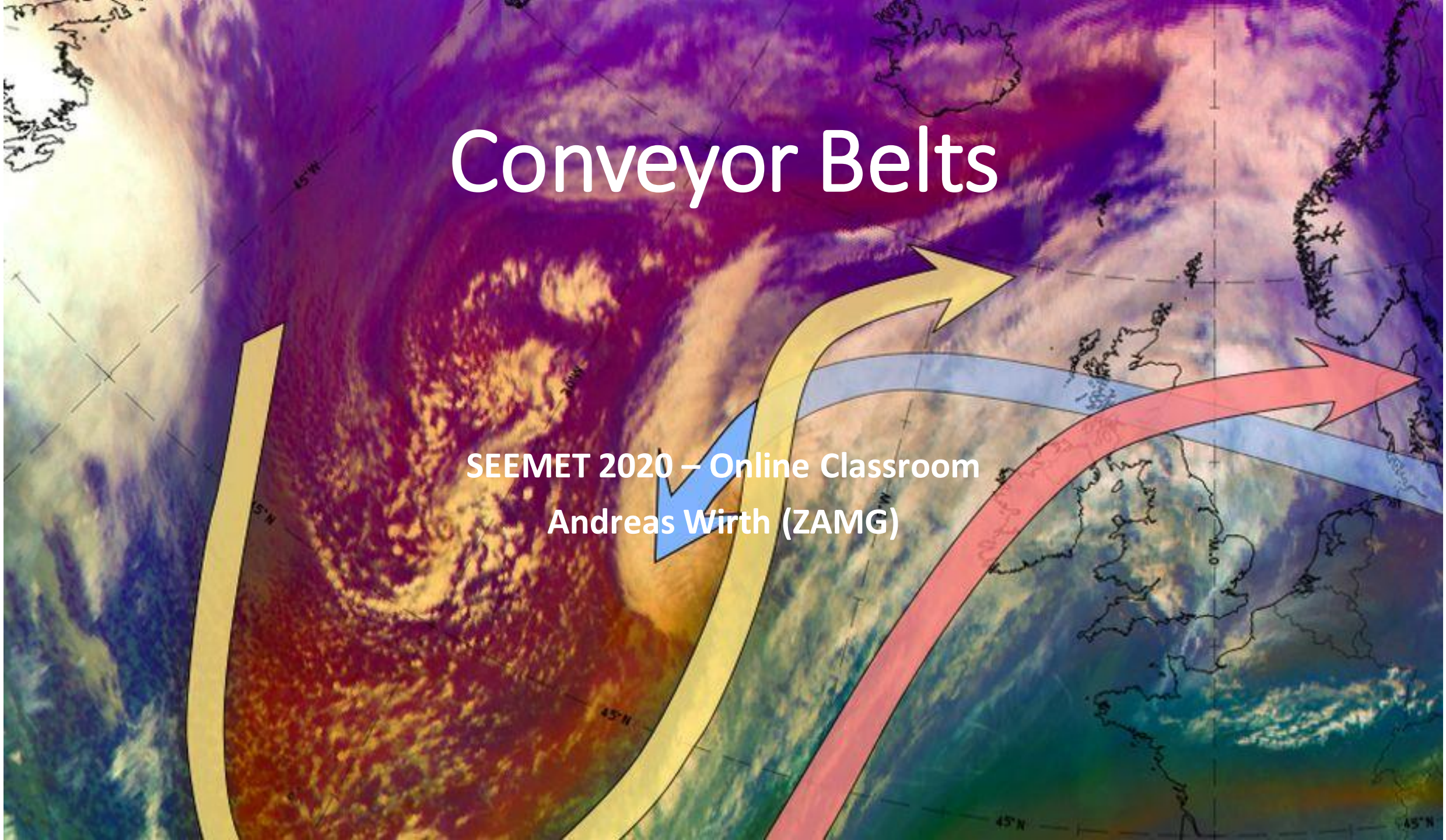
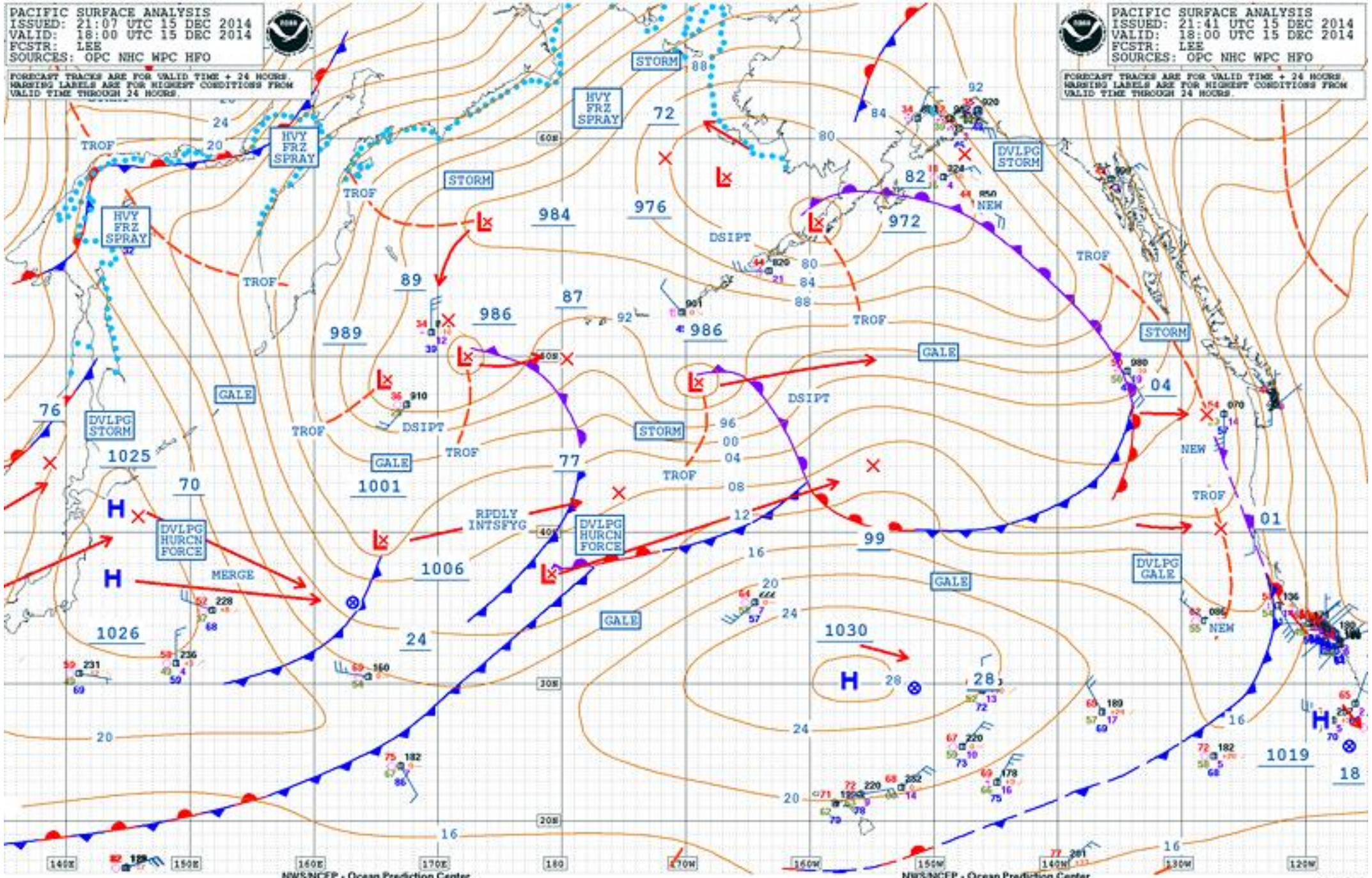


Conveyor Belts

SEEMET 2020 – Online Classroom

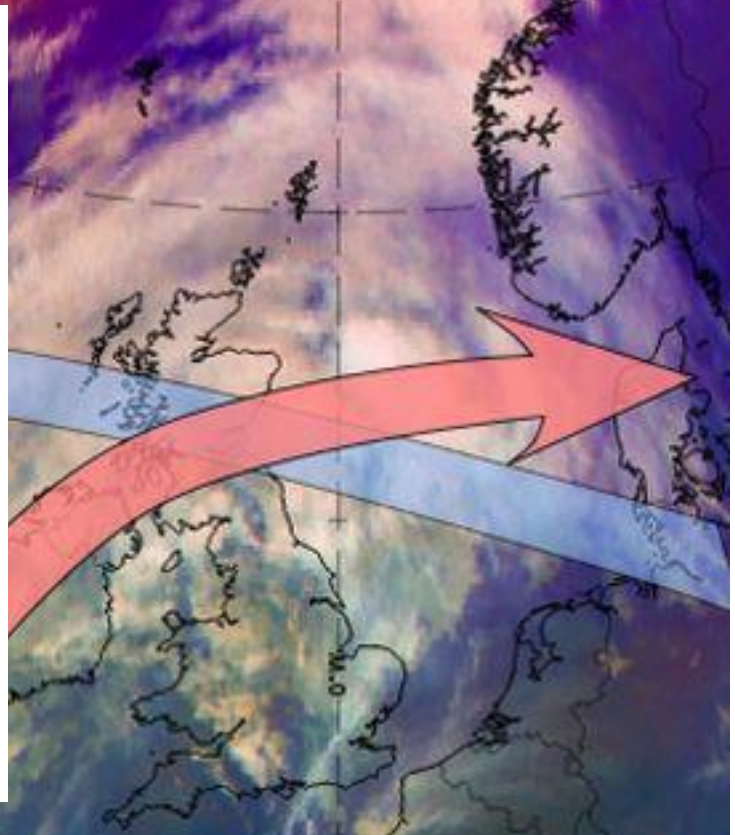
Andreas Wirth (ZAMG)


PACIFIC SURFACE ANALYSIS
ISSUED: 21:07 UTC 15 DEC 2014
VALID: 18:00 UTC 15 DEC 2014
FCSTR: LEE
SOURCES: OPC NHC WPC HFO
FORECAST TRACKS ARE FOR VALID TIME + 24 HOURS.
WARNING LABELS ARE FOR HIGHEST CONDITIONS FROM VALID TIME THROUGH 24 HOURS.
PACIFIC SURFACE ANALYSIS
ISSUED: 21:41 UTC 15 DEC 2014
VALID: 18:00 UTC 15 DEC 2014
FCSTR: LEE
SOURCES: OPC NHC WPC HFO
FORECAST TRACKS ARE FOR VALID TIME + 24 HOURS.
WARNING LABELS ARE FOR HIGHEST CONDITIONS FROM VALID TIME THROUGH 24 HOURS.
HVY FRZ SPRAY
STORM
DVLPG STORM
GALE
DVLPG HURCN FORCE
DVLPG GALE
TROF
DSIPT
RPDLY INTSFYG
MERGE
NEW
1025
1001
1006
1026
1030
1019
984
976
972
986
989
H
NWS/NCEP - Ocean Prediction Center
www.opc.ncep.noaa.gov
NOAA

The wind speed and direction of a relative stream is calculated as a function of the system velocity.

$$V_{rel} = V_{abs} - V_{sys}$$

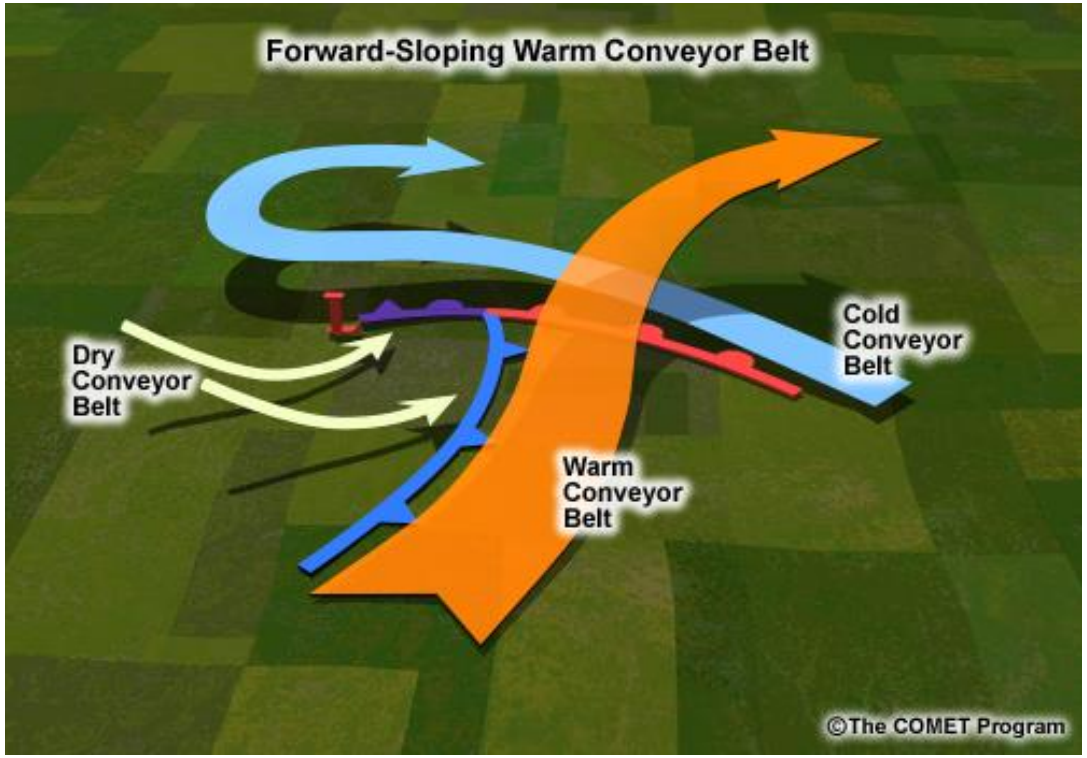
V_{rel}	relative wind velocity
V_{abs}	absolute wind velocity
V_{sys}	system velocity



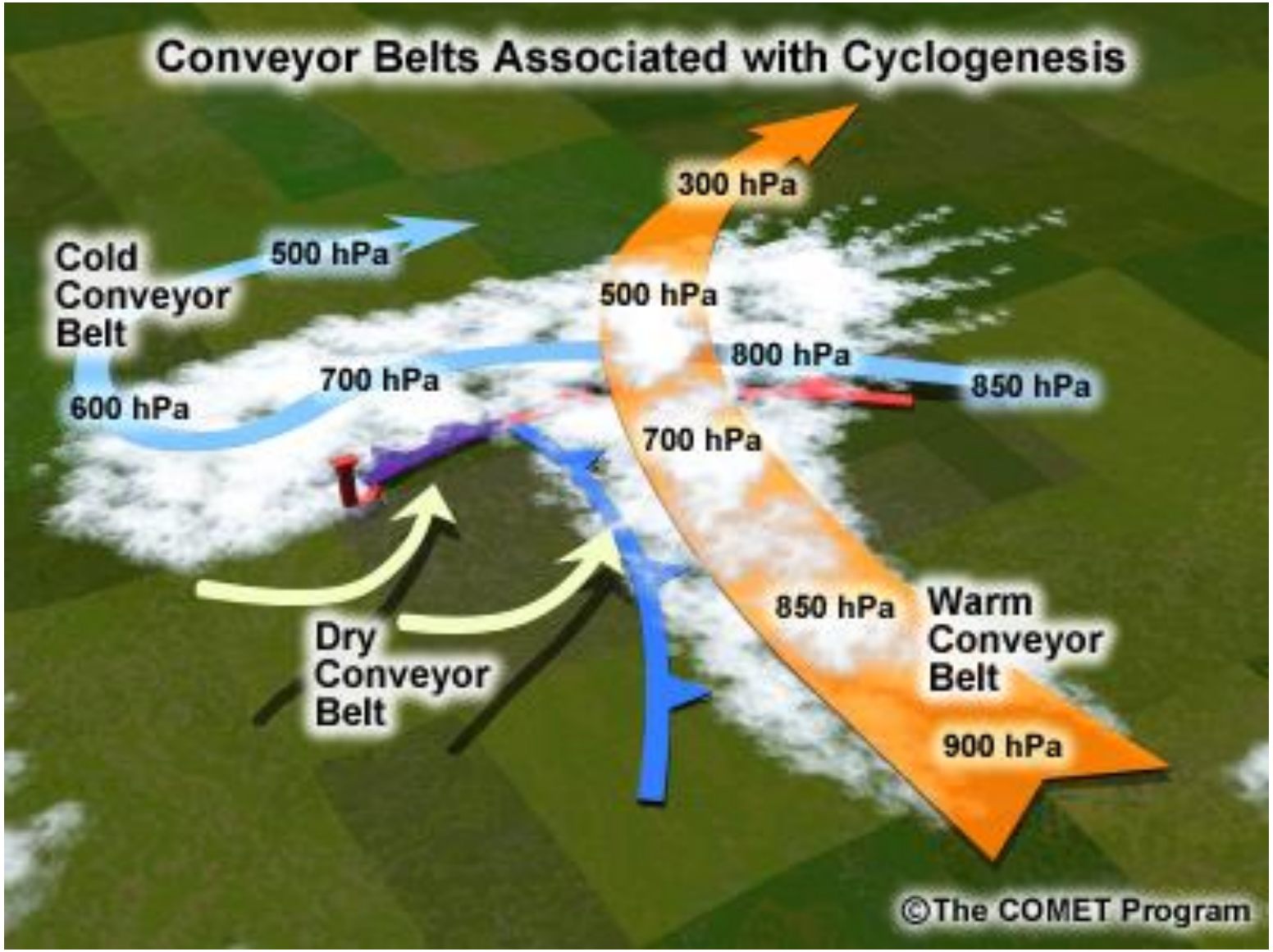
The different air masses involved in a weather system are visualized through the relative streams which transport them; therefore, sharp cloud boundaries and other cloud structures can be easily explained.

The concept of conveyor belts

- The conveyor belt model is a different view on cyclone structure and evolution.
- The conveyor belt view consists in relatively narrow ribbons of air along sloping isentropic surfaces.

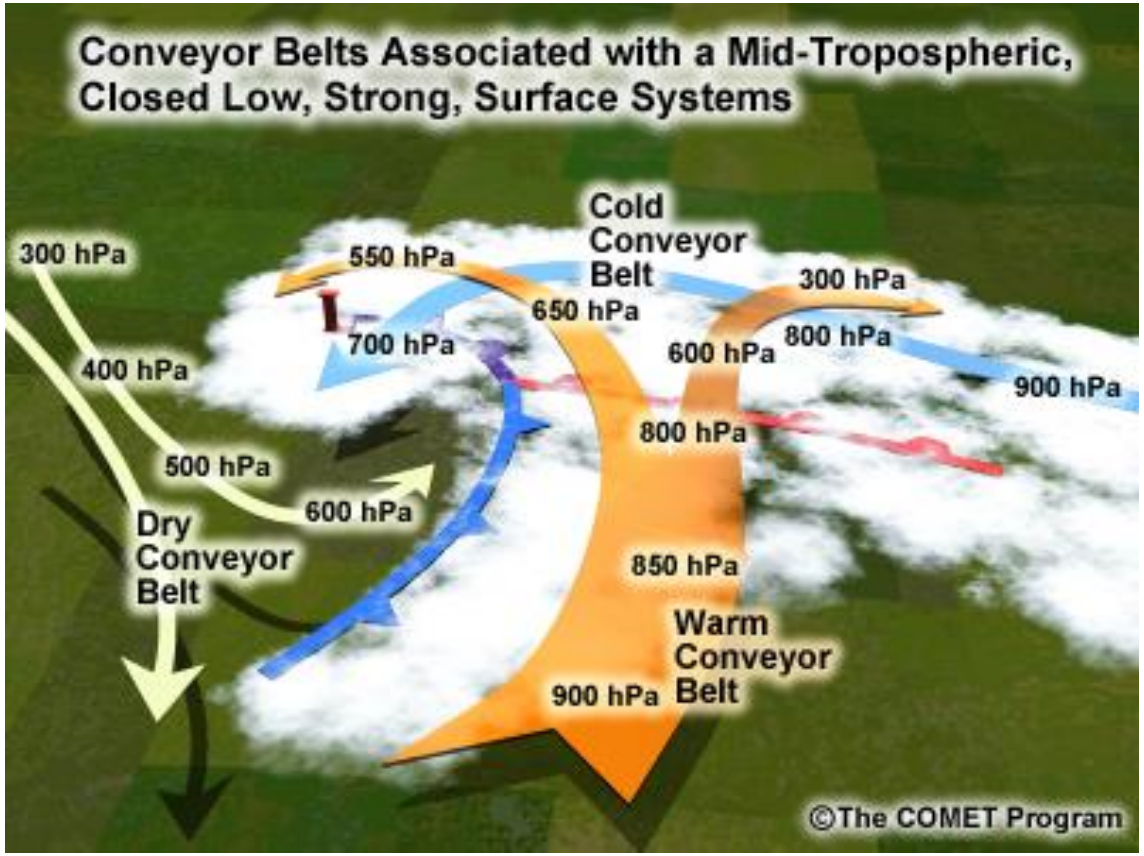


Conveyor belt theory (alternate display)

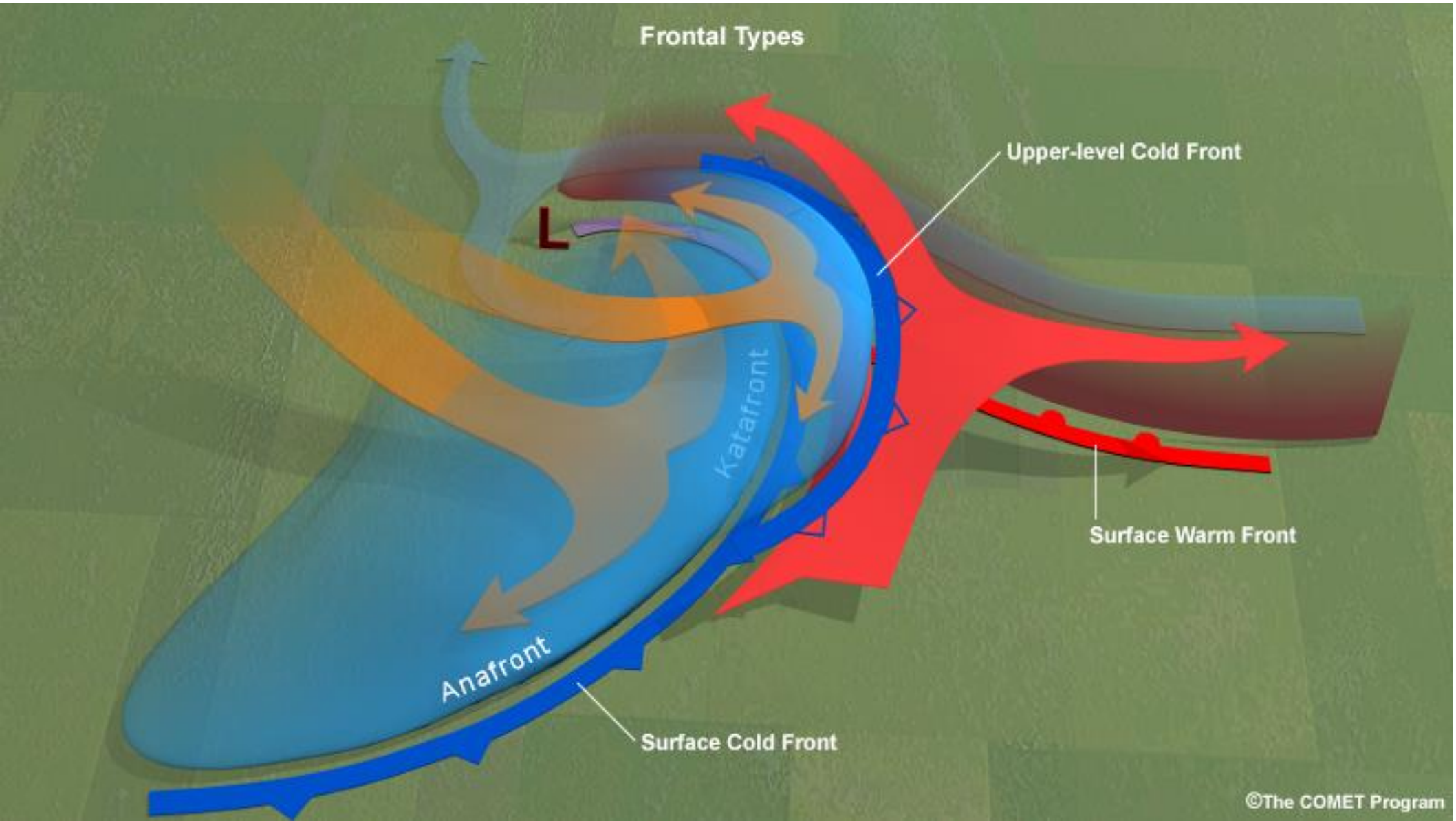


The warm conveyor belt (WCB)

The WCB carries warm and moist air from south to north (mainly horizontal moisture transport). It can be either merged with the cold front or separated from it.

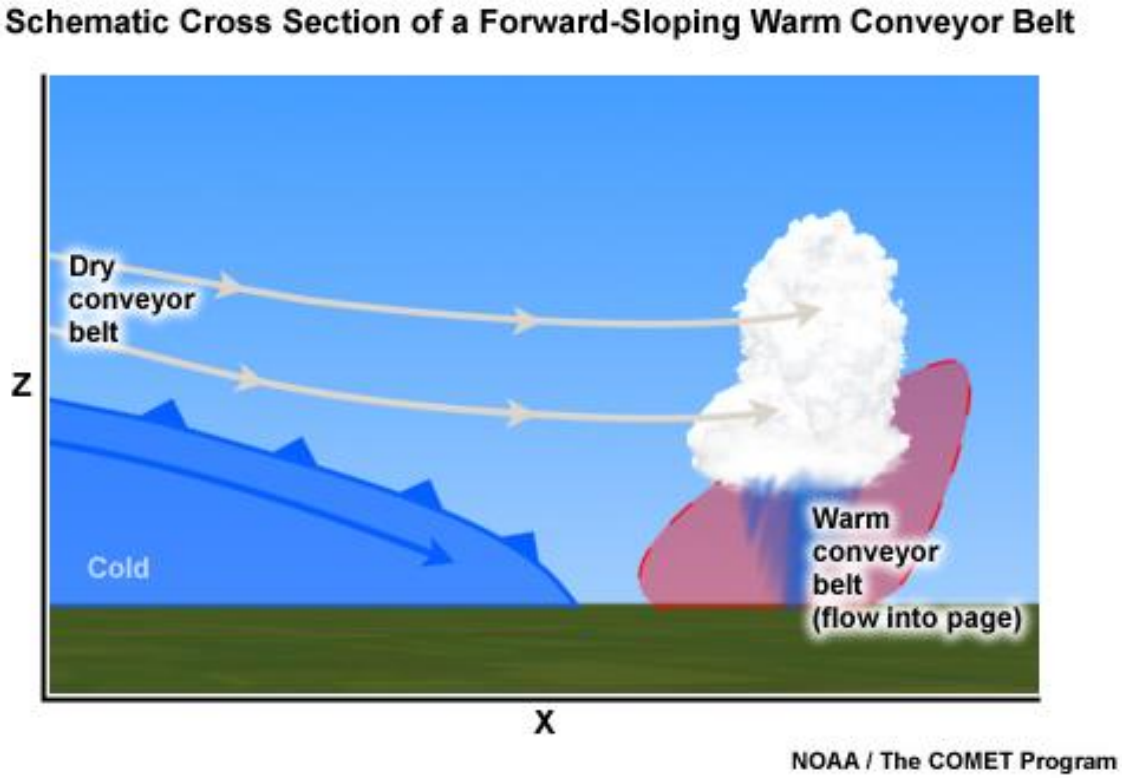


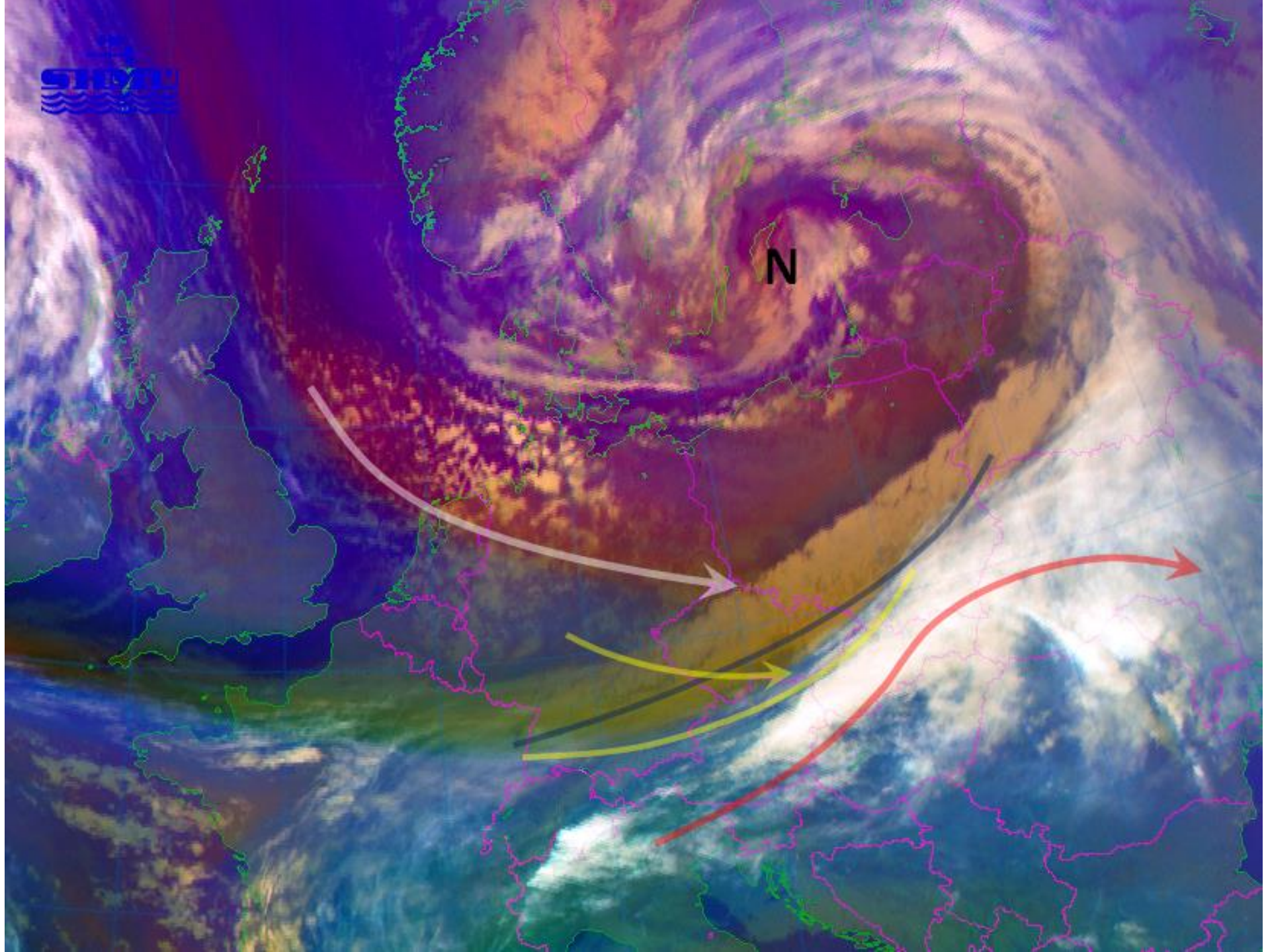
Ana- and Kata cold front



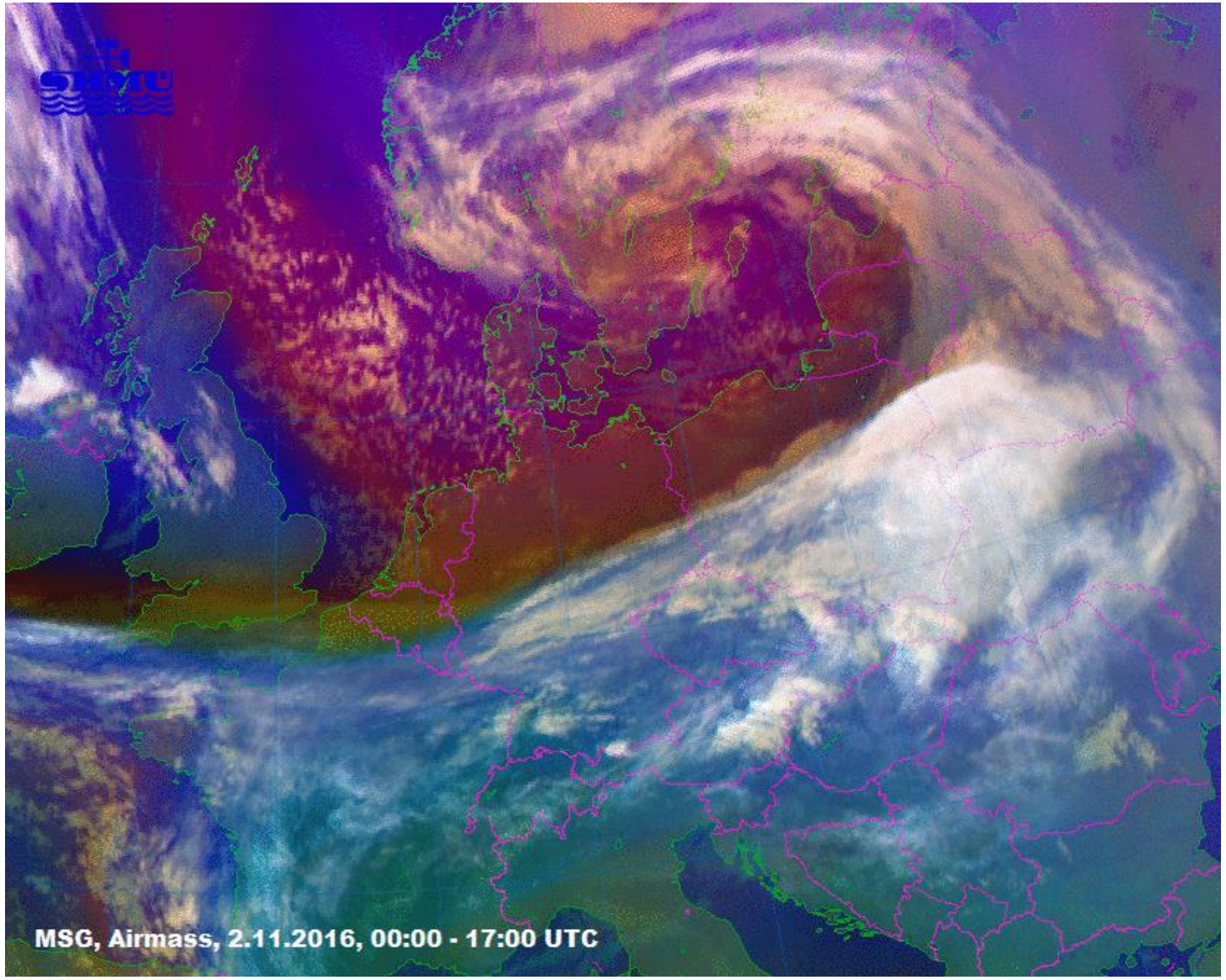
The warm conveyor belt (WCB) and the Kata-cold front

- A pronounced case of the forward-sloping warm conveyor belt results in the split-front structure. Heavy convective rain may fall from this deeper shelf of cloudiness.

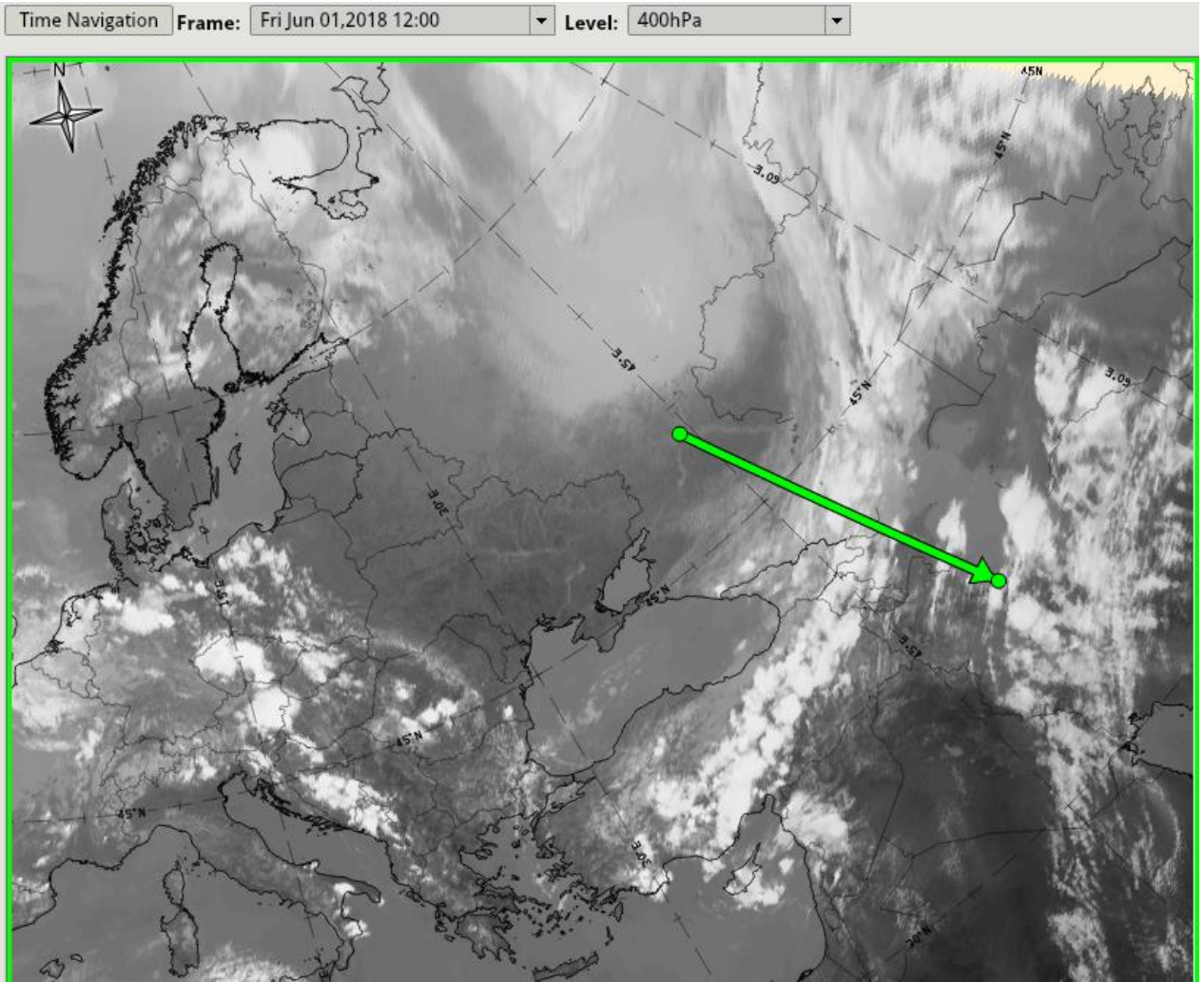


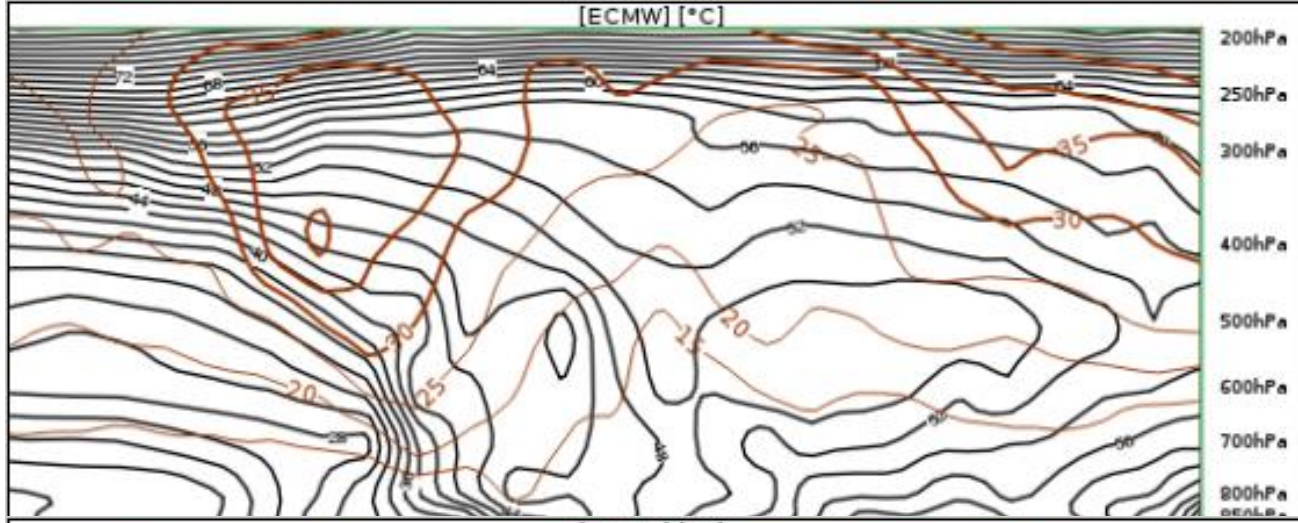

N

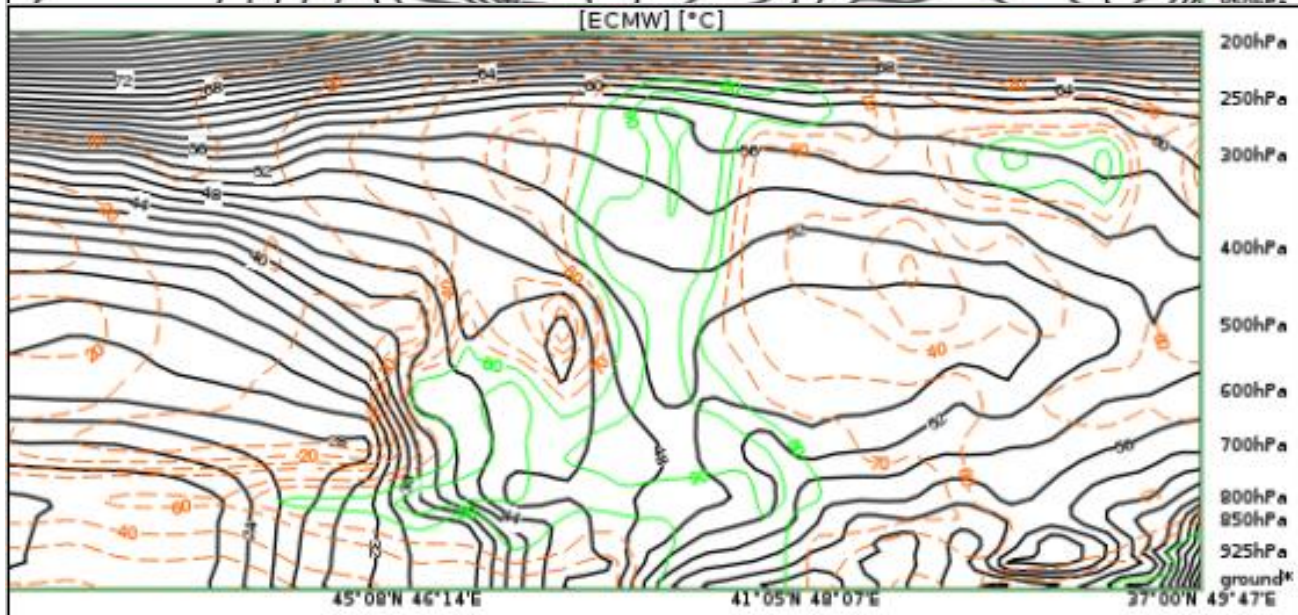
Katafront (or split front)



The Kata-cold front in vertical cross section



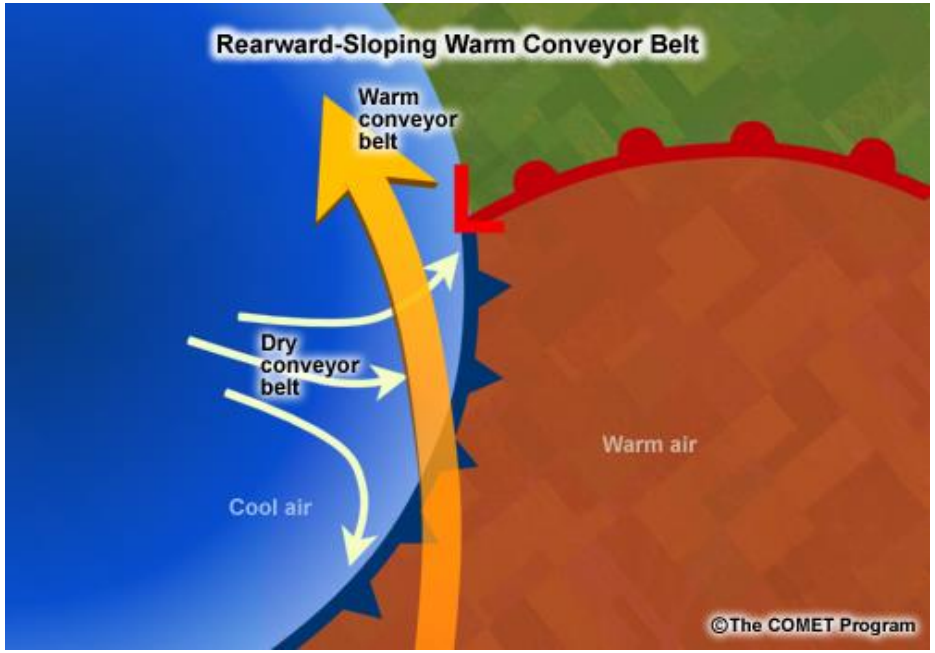


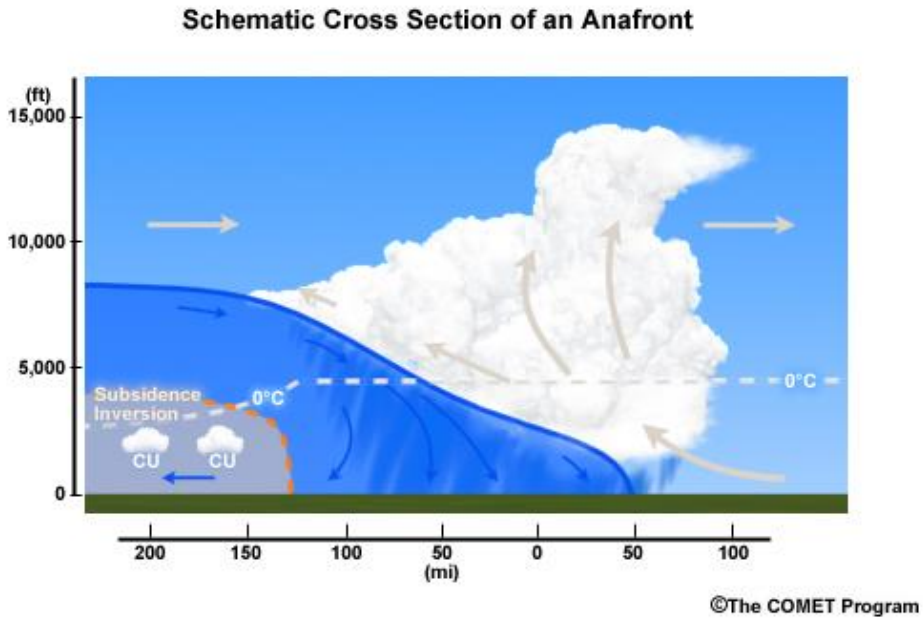


Cross-Section from map **Equivalent Potential Temperature** and **Relative Humidity**
for 49°09'N 44°04'E - 37°00'N 49°47'E, valid 01.06.2018 12:00

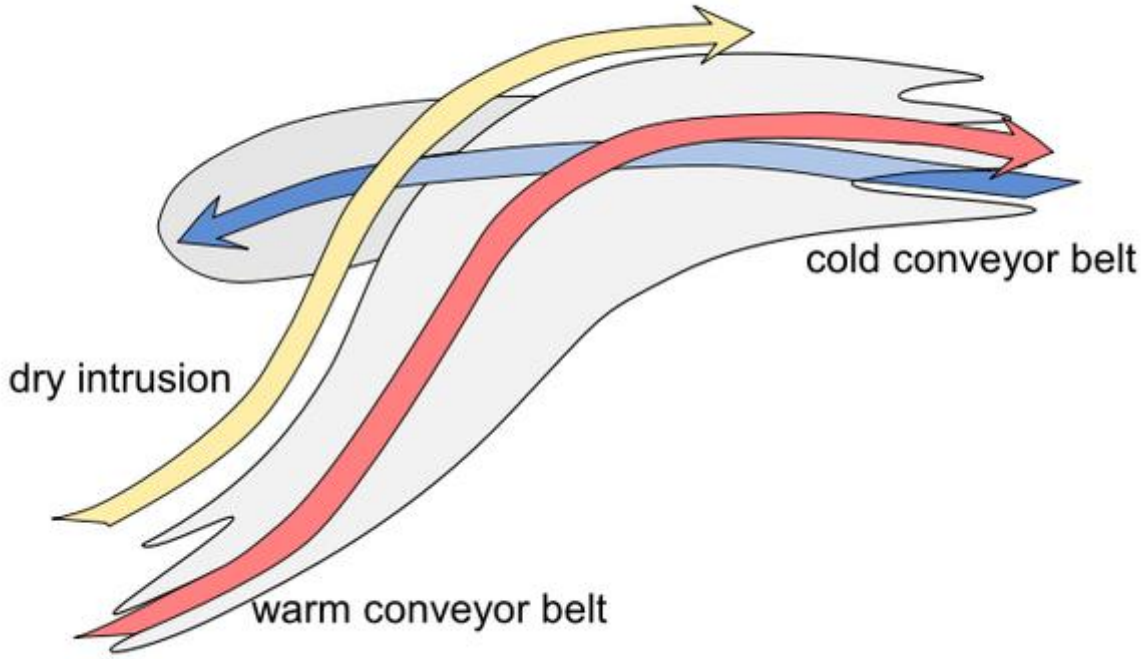
The warm conveyor belt (WCB) and the Ana-cold front

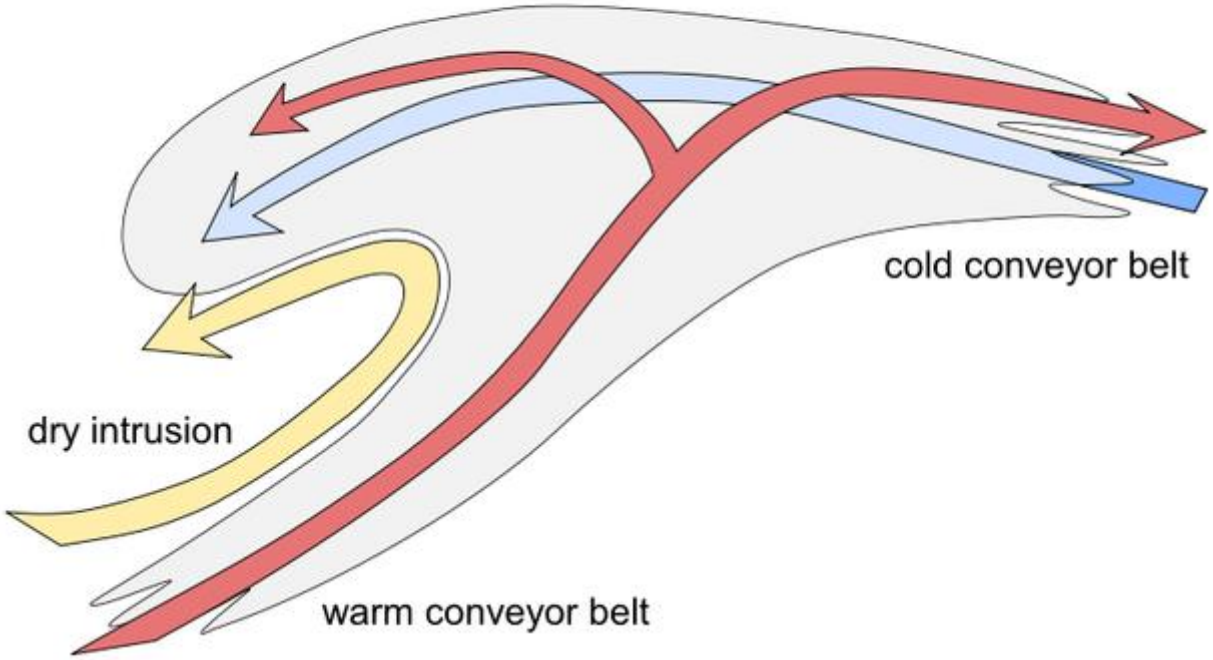
- The rearward-sloping warm conveyor belt is similar to a cold Anafront. Most of the warm conveyor flow is parallel to the front with a slight component up and over the advancing cold air.



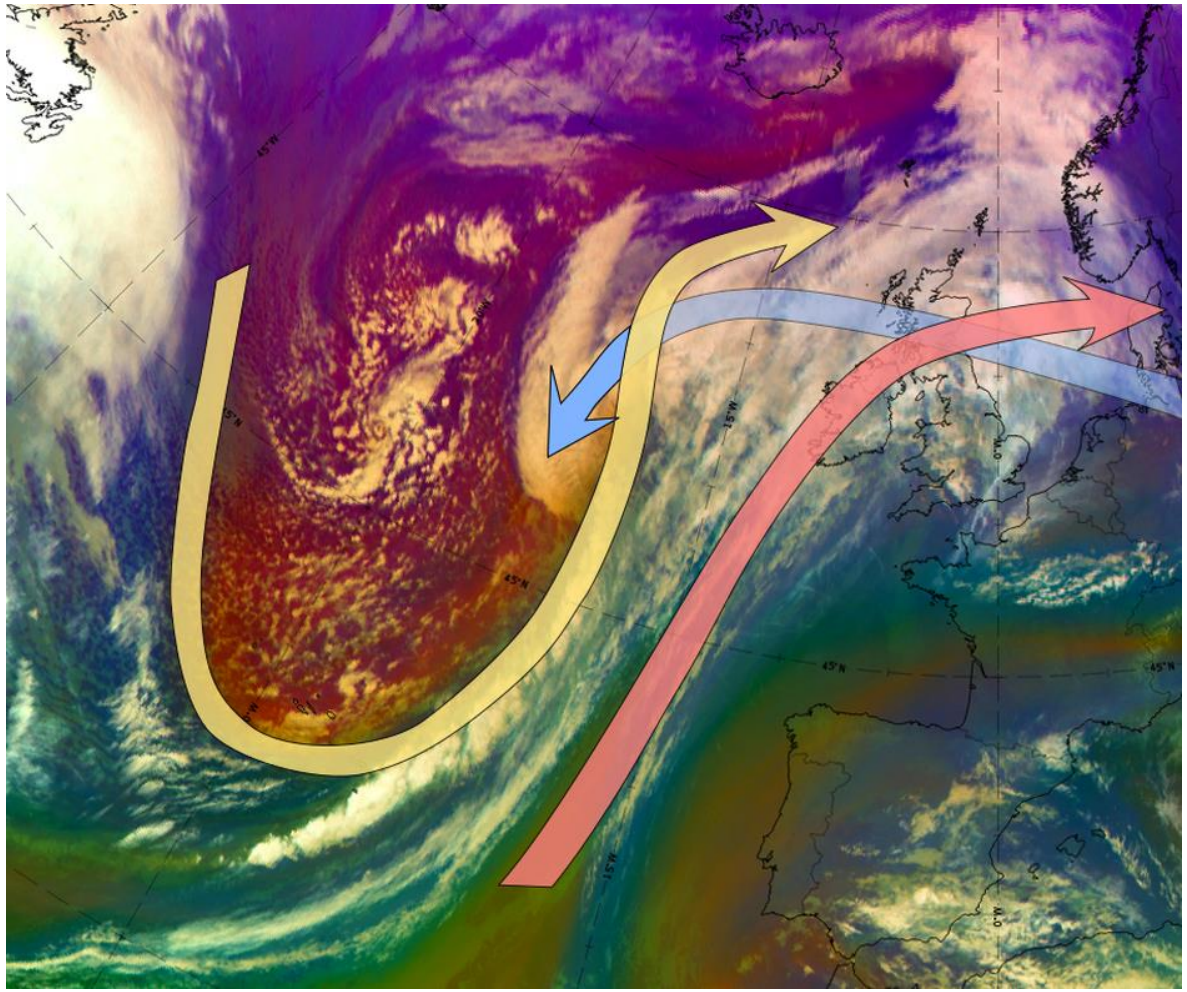


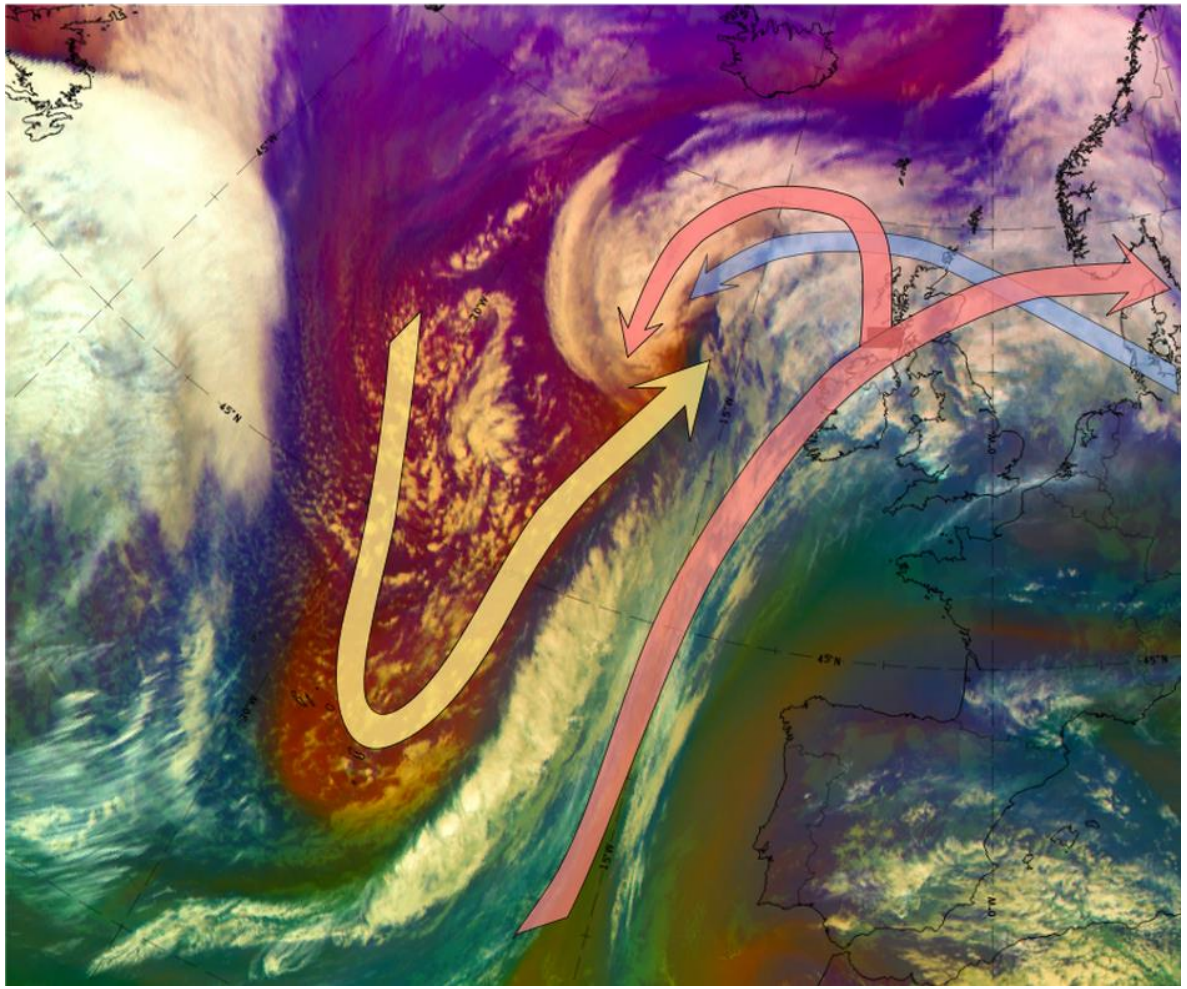
Typical configurations of the three conveyor belts for two different stages of occlusion cloud bands

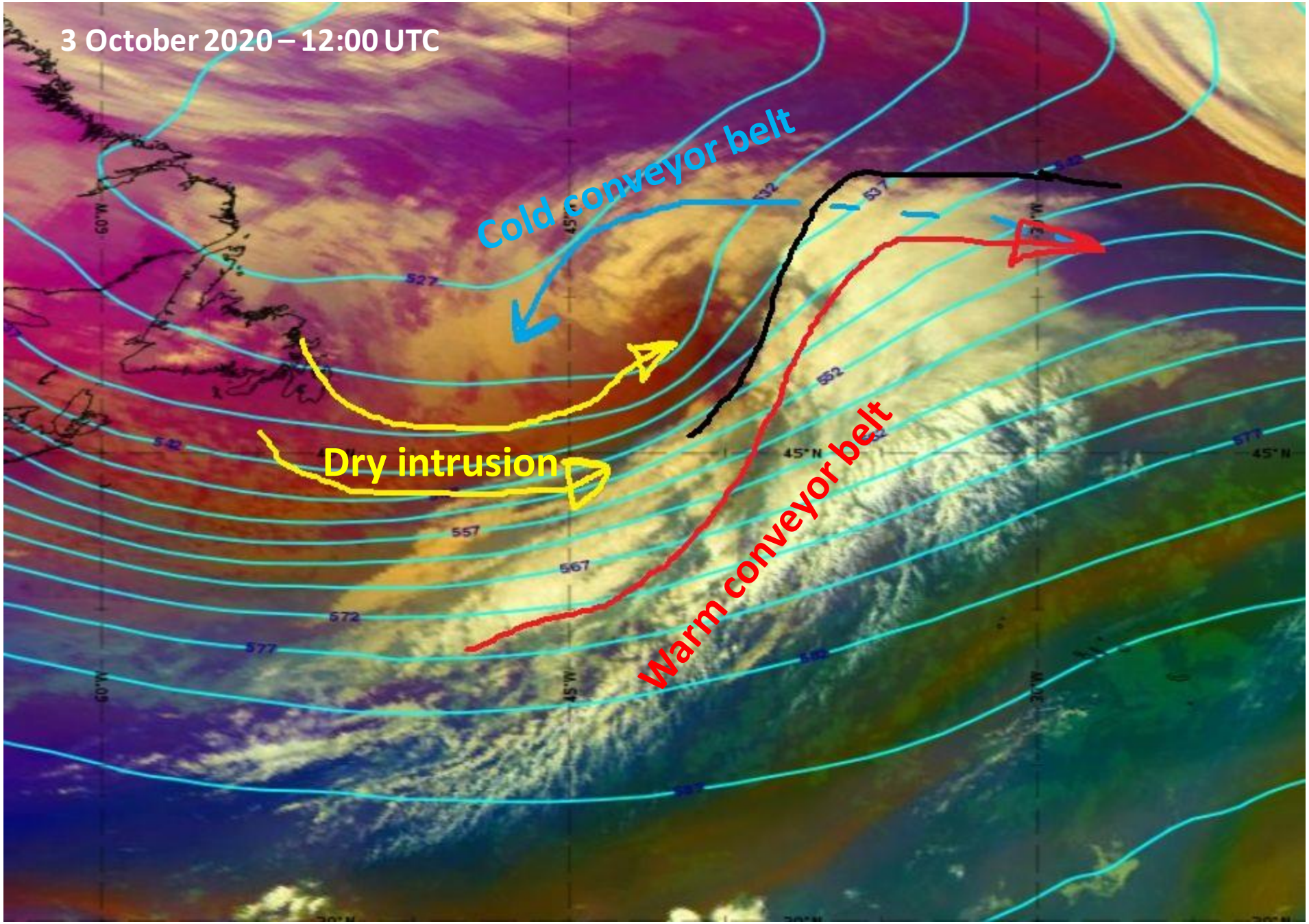




Typical configurations of the three conveyor belts for two different stages of occlusion cloud bands






3 October 2020 – 12:00 UTC
Cold conveyor belt
Dry intrusion
Warm conveyor belt
527
532
537
542
547
552
557
562
567
572
577
582
45°N
60°W
45°W
30°W

VIS + IR combination