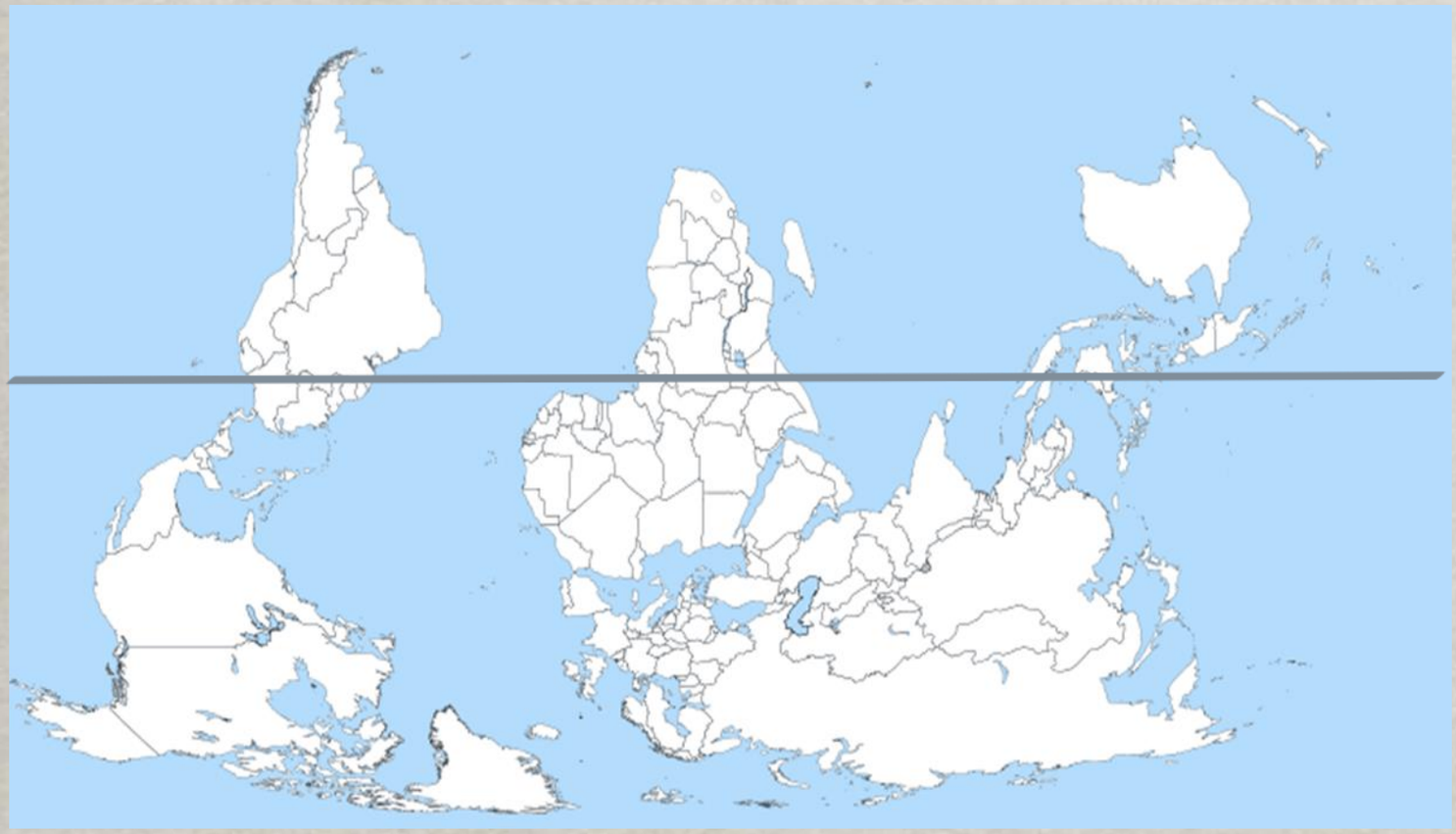
Conceptual Models for the Southern Hemisphere (CM4SH):

Results and Way Forward



Eduard Podgaiskii,
VLab/CoE Russian Federation

8th Virtual Laboratory Management group Meeting (VLMG-8)
9-13 May 2016, Caribbean Institute for Meteorology and Hydrology, Barbados

CM4SH is built up by:

Participants from Australia, South Africa, Argentina, Brazil and Indonesia:

Vlab + universities + weather services

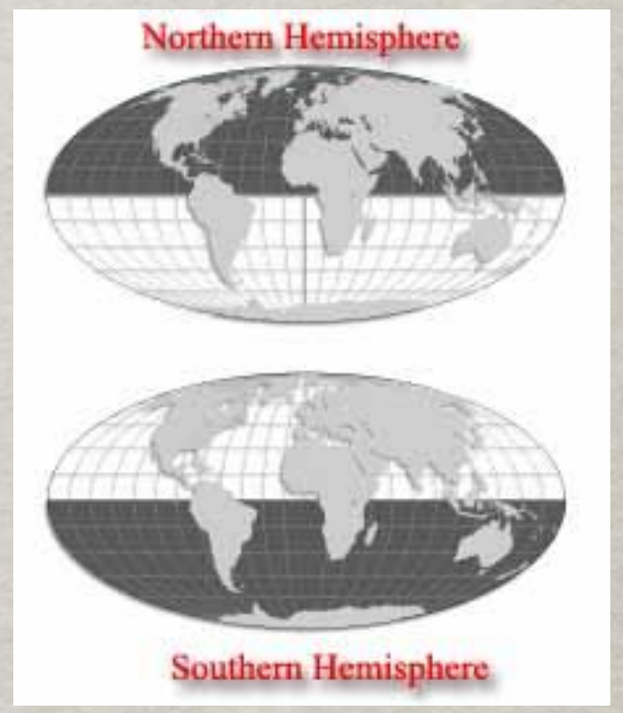
CM4SH history

Conceptual Models in Satellite Meteorology

- Project from 1995 – 2005
- Collaboration of several EU Met. Institutes with support of Eumetsat
- End Result: **MANUAL OF SYNOPTIC SATELLITE METEOROLOGY (SatManu)**
- **50 conceptual models described**
- The Manual is designed to be used by:
  1. University students with a basic knowledge of synoptic meteorology and satellite meteorology
  2. Meteorologists and forecasters
- The manual is maintained and modernized within Eumetrain

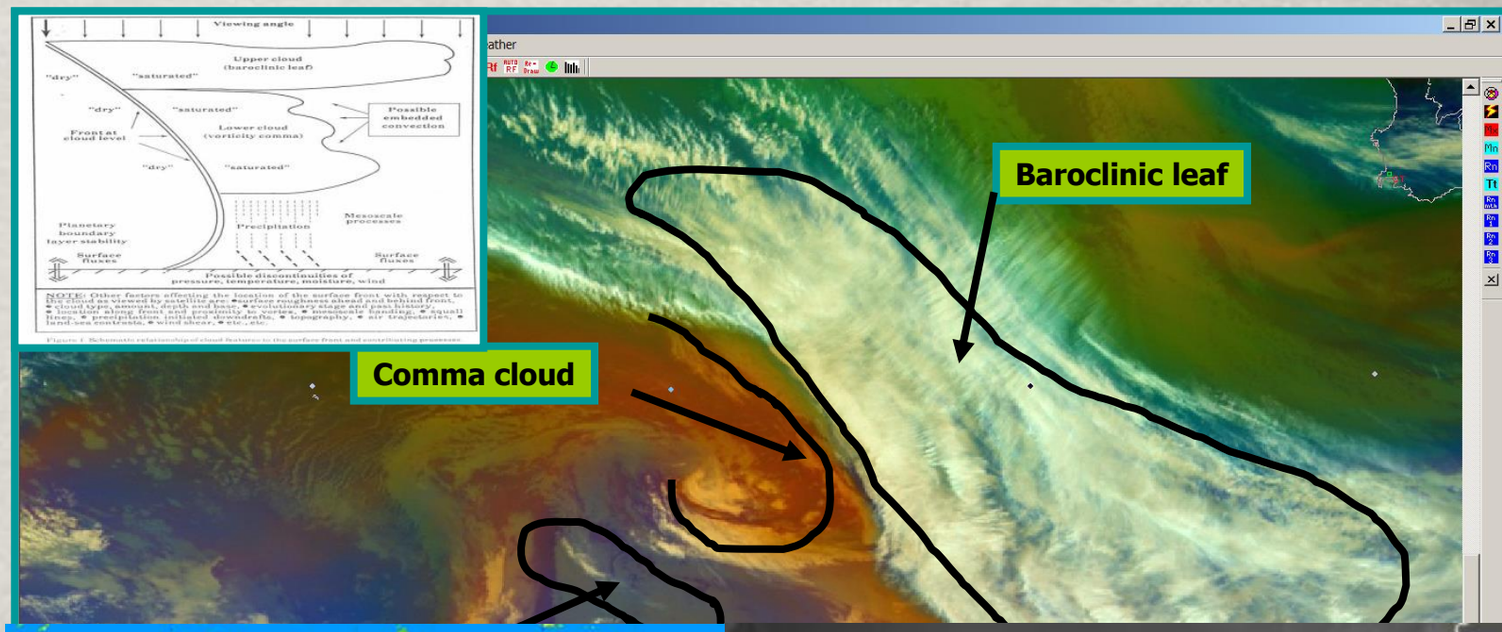
CM4SH history

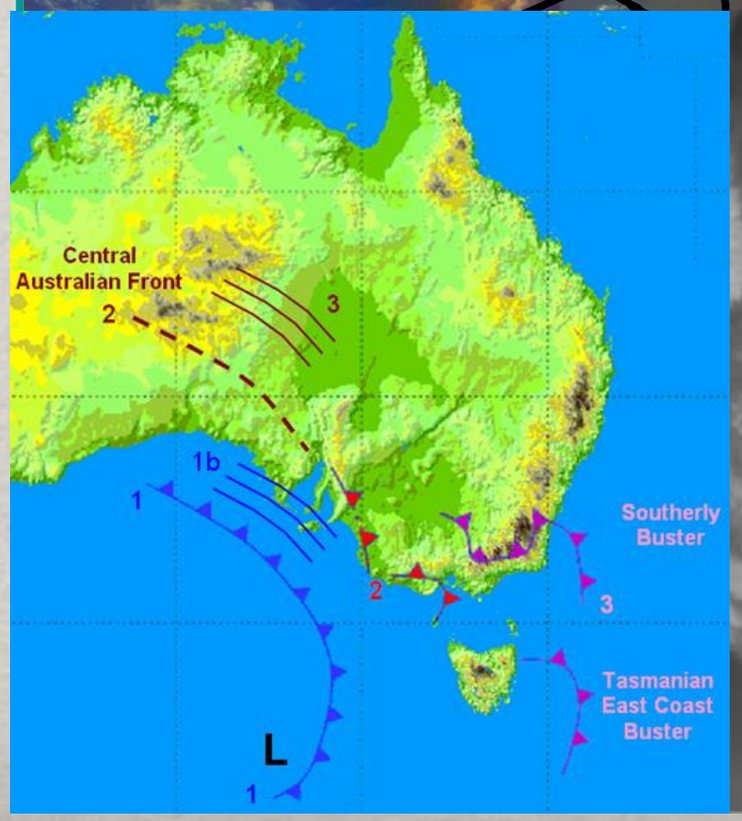
- Satmanu has proved its value as a training- and a forecasting tool throughout Europe and outside.
- The idea of using conceptual models in satellite meteorology was of course not only a European thought, there was an interest all over the world.
- More WMO Vlabs were interested.
- The CM4SH project started in January 2013, ran until March 2014 and then got an extension as CM4SH phase 2 from January 2015 till March 2016.

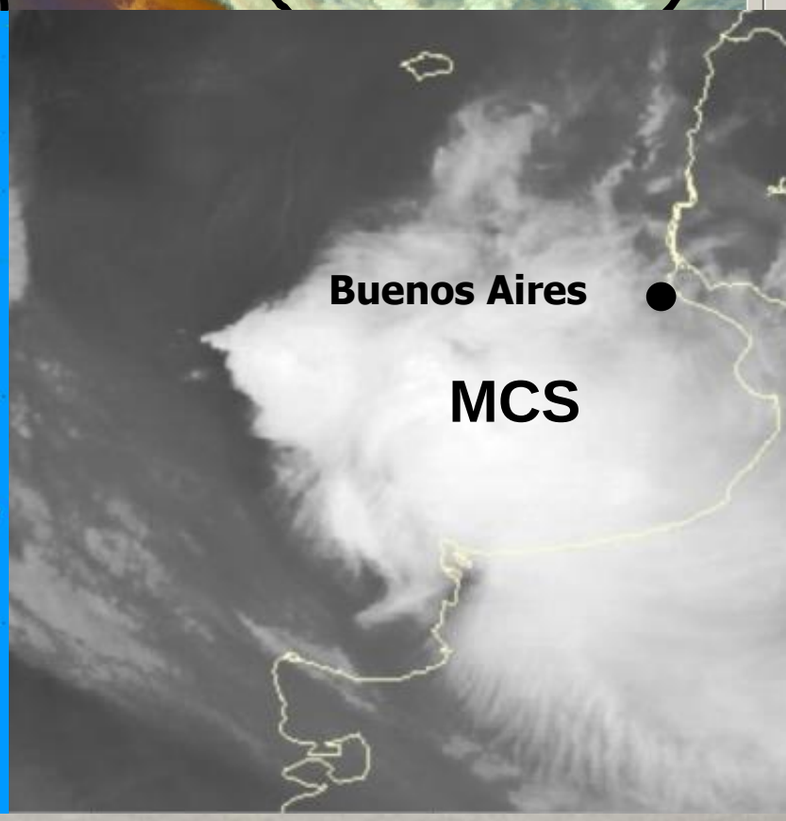


The Objectives

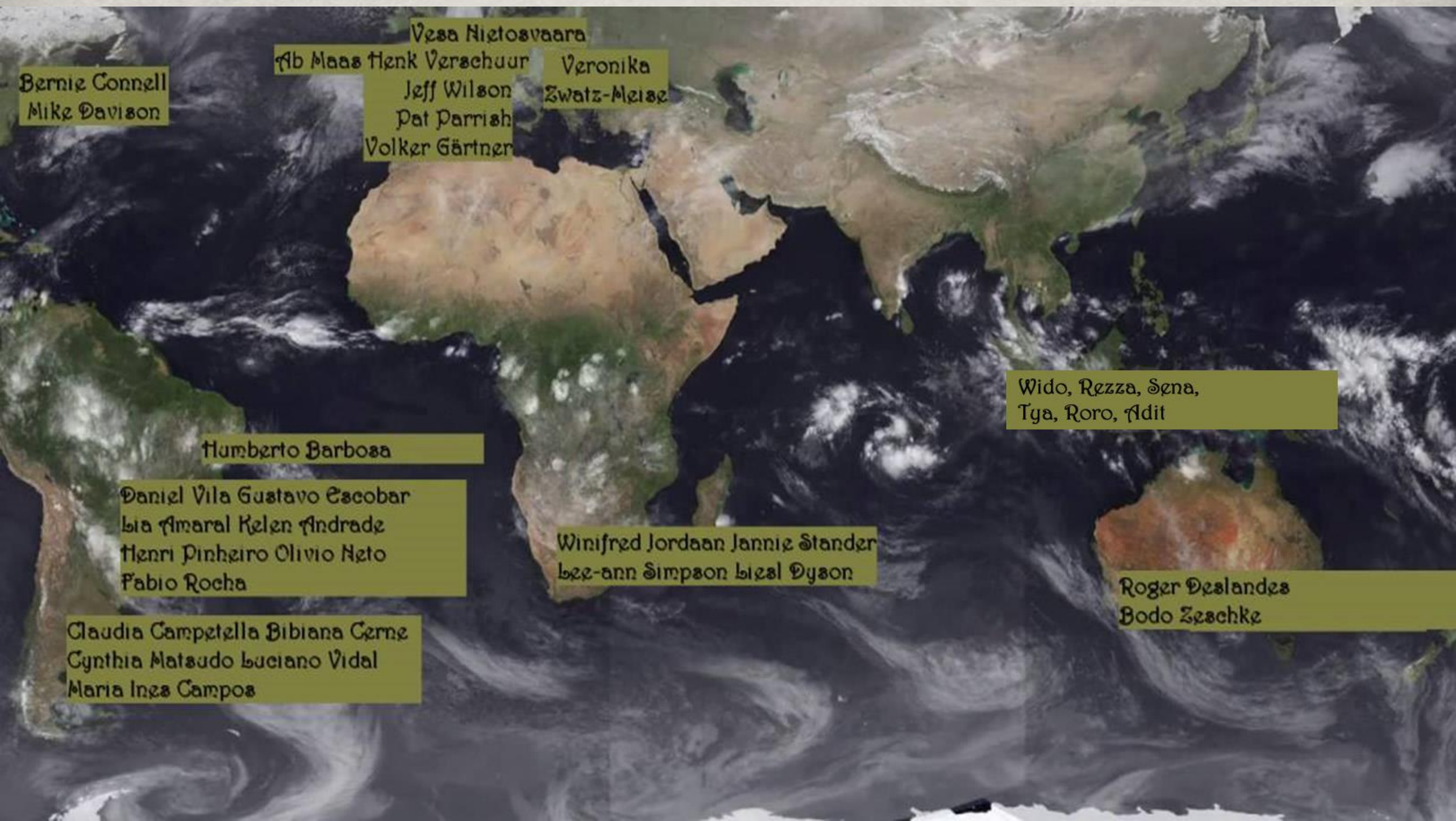
- To collect, create and share resources about CMs for Southern Hemisphere.
- To increase the operational forecasters' understanding of the weather systems with the help of CMs.







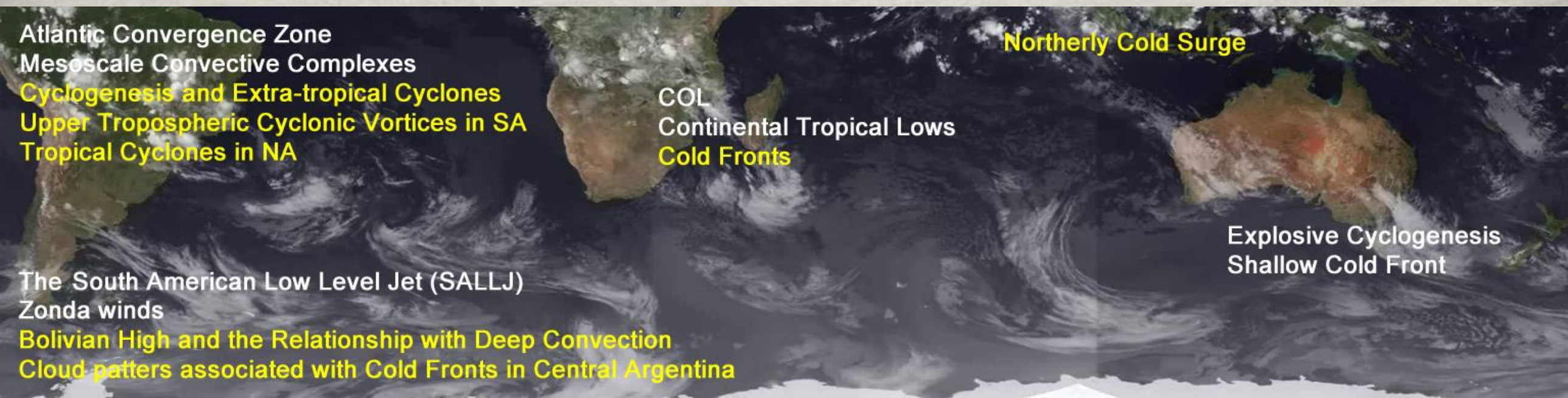
Project team: CoE experts
Review: CIRA + NOAA
Funding: WMO+EUMETSAT

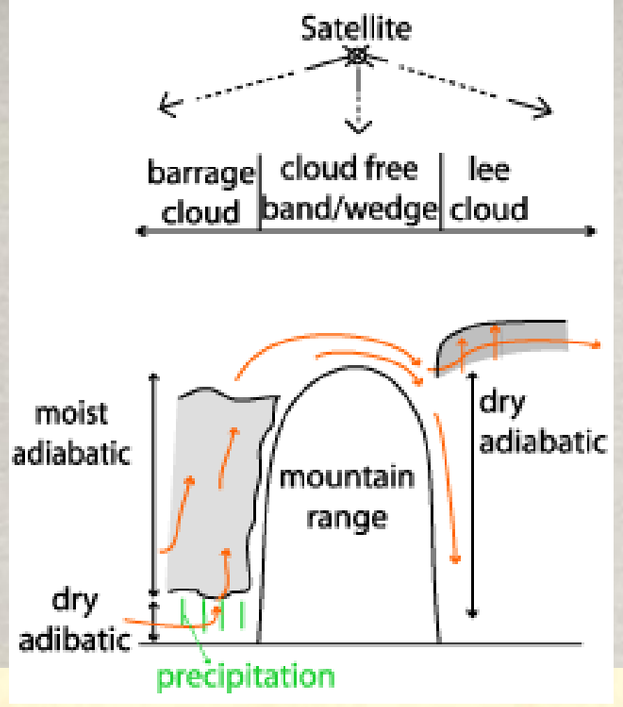


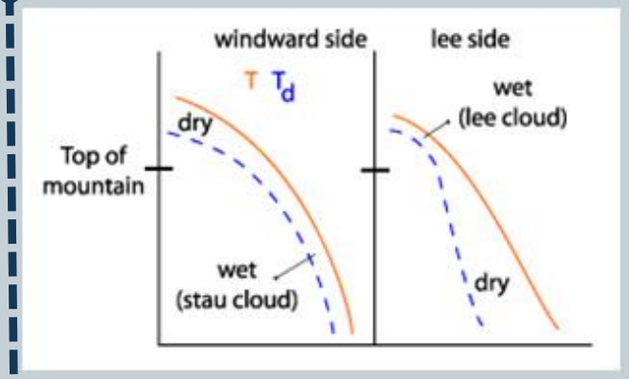
Project deliverables

1. A comprehensive list of existing literature
2. A quick-look collection of interesting cases
3. Conceptual Model descriptions

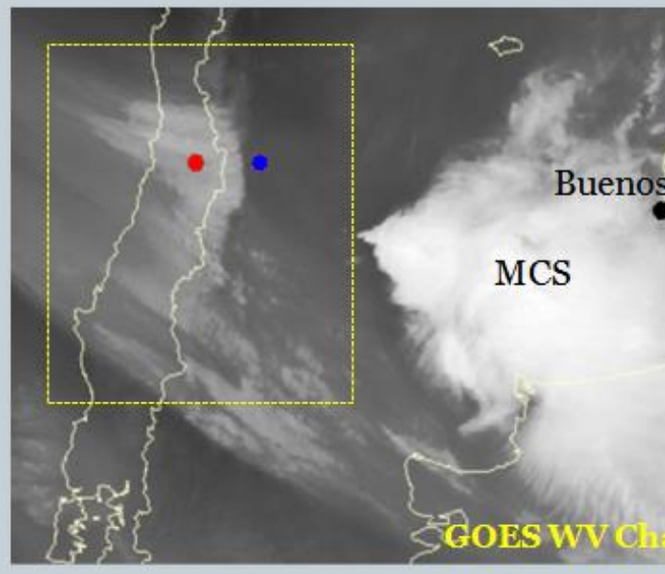
+ much more Orientation sessions ...Inventories of SH Conceptual Models ...
Training sessions...Sharing regional CMs across all teams

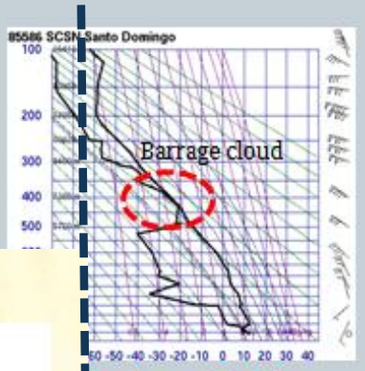


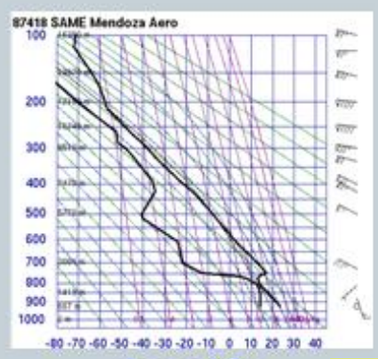




Zonda (Foehn



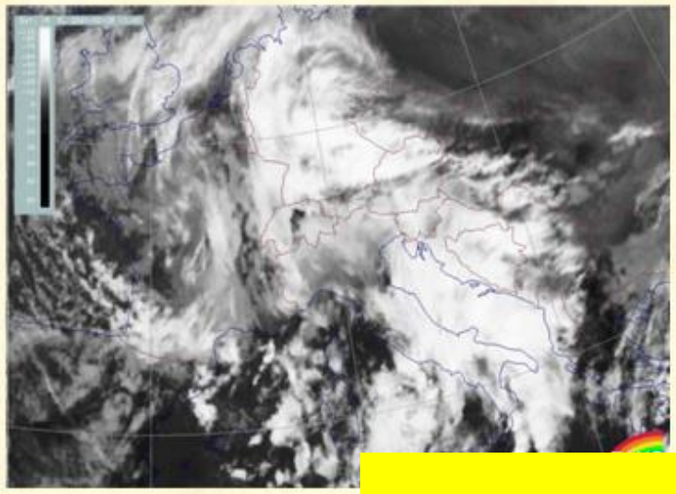


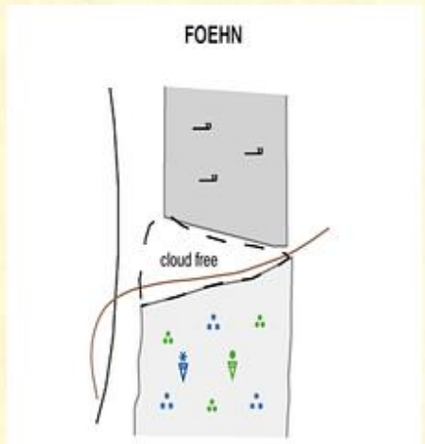


indward side
antiago, Chile)

Lee side
(Mendoza, Argentina

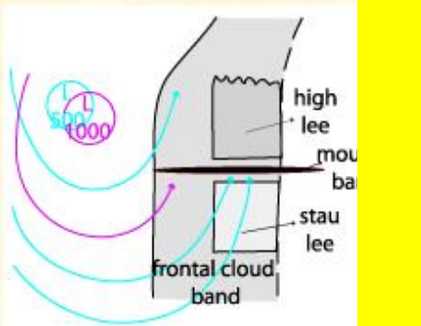
Zonda



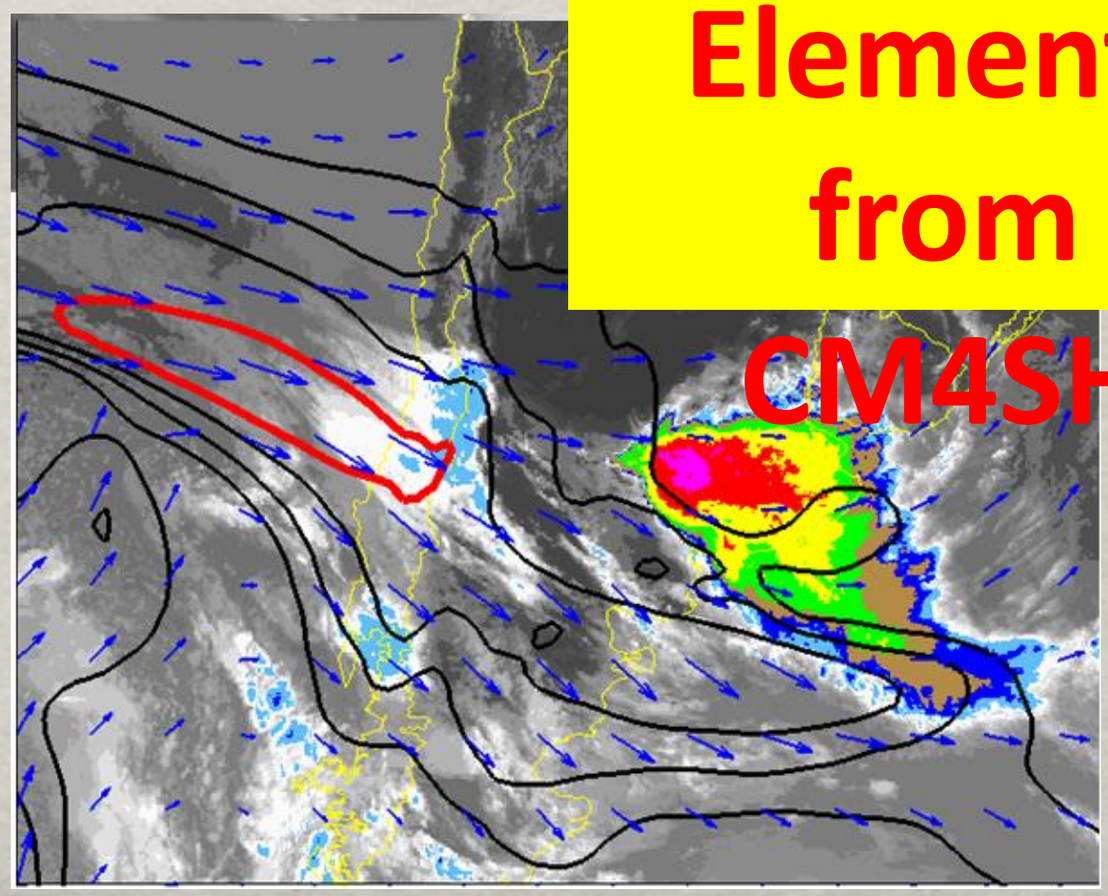


Föhn Elements from SatManu

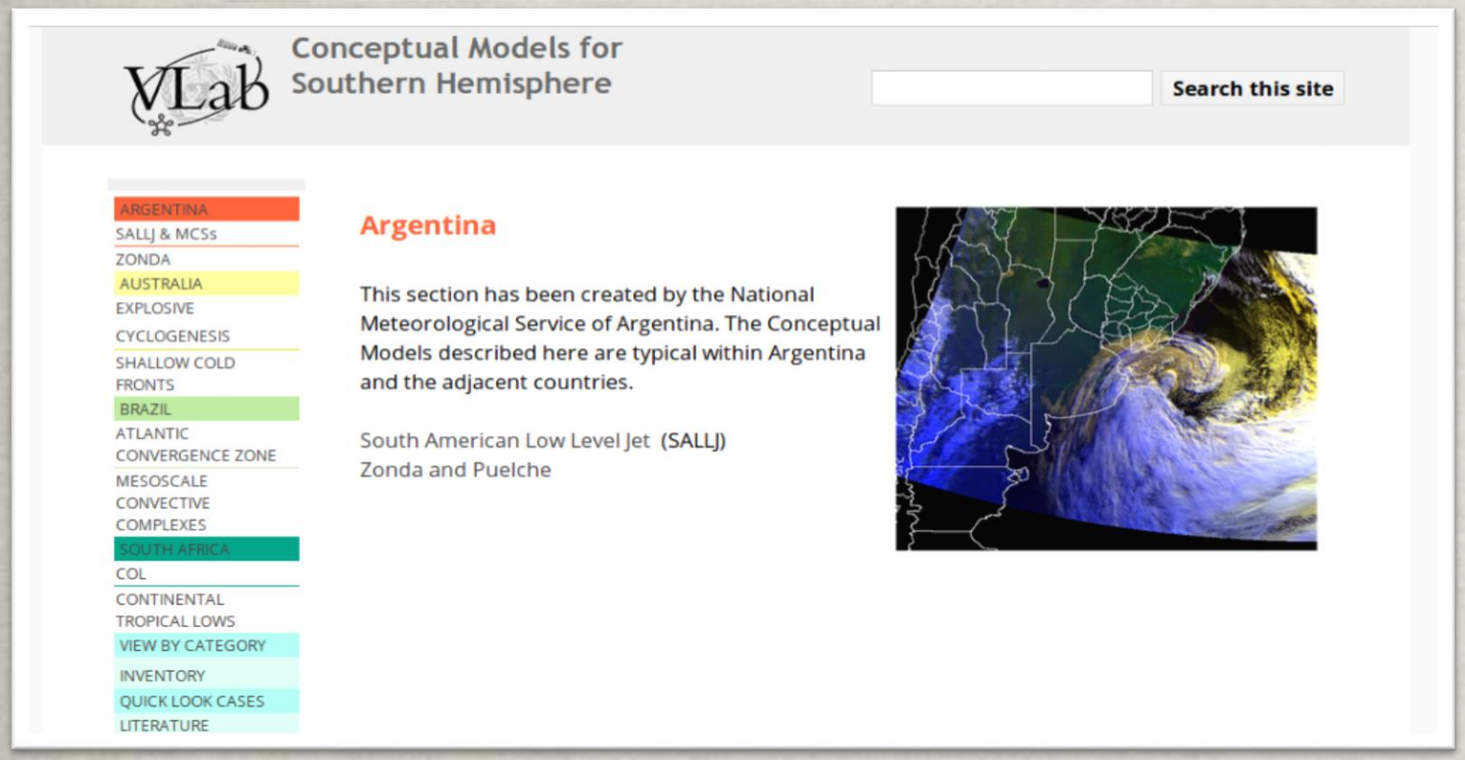
Key Parameters

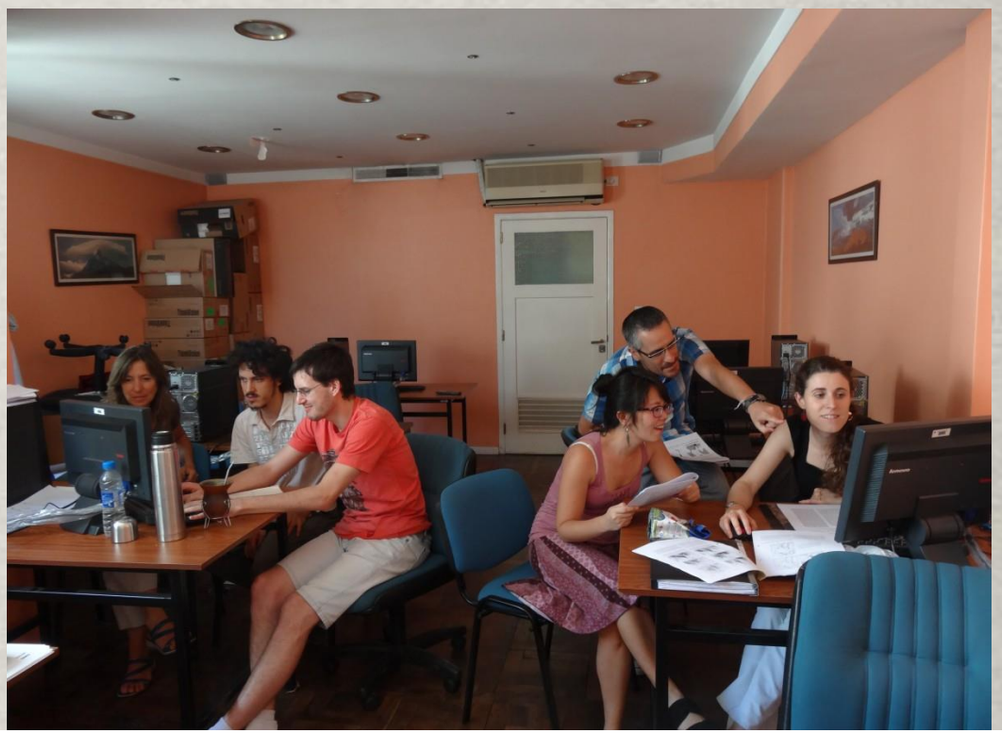


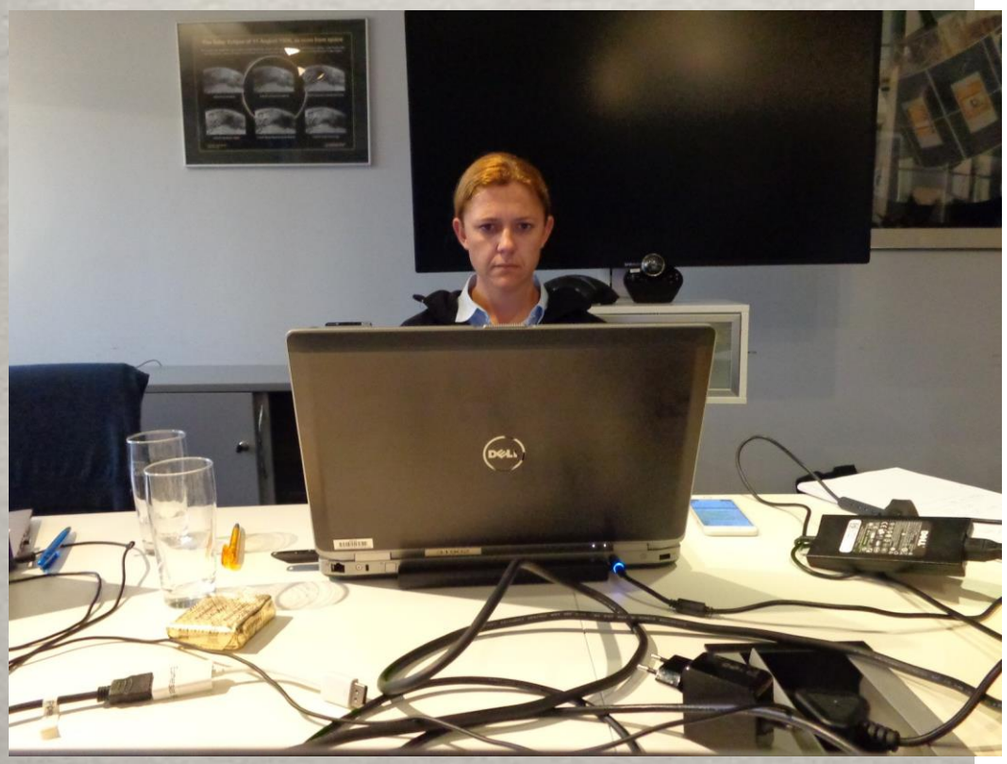
Zonda Elements from CM4SH

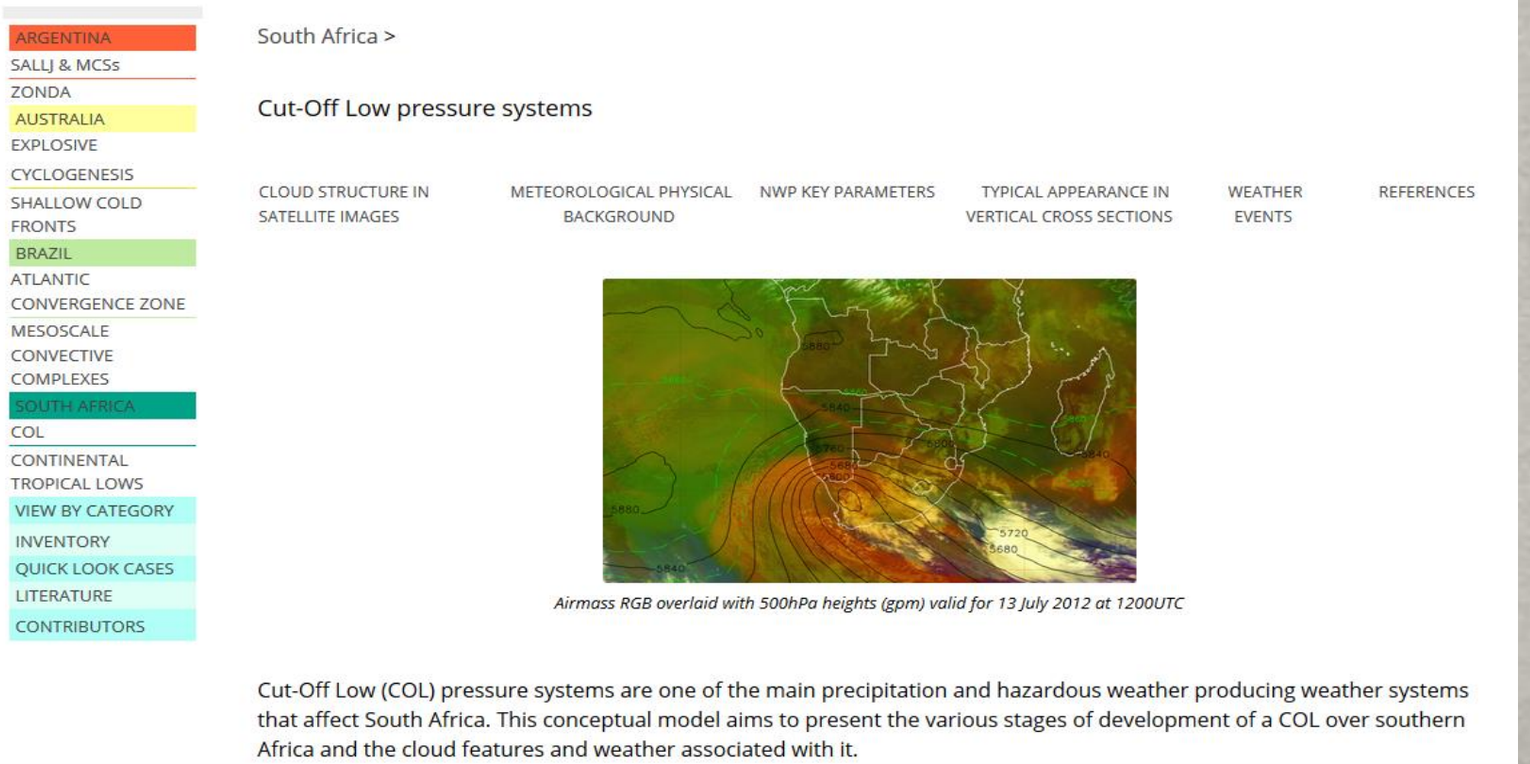


Development work



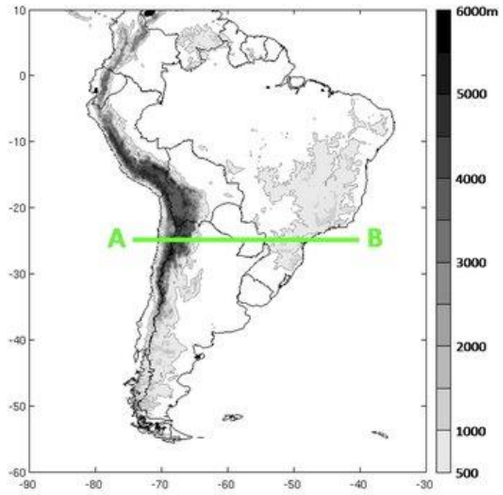


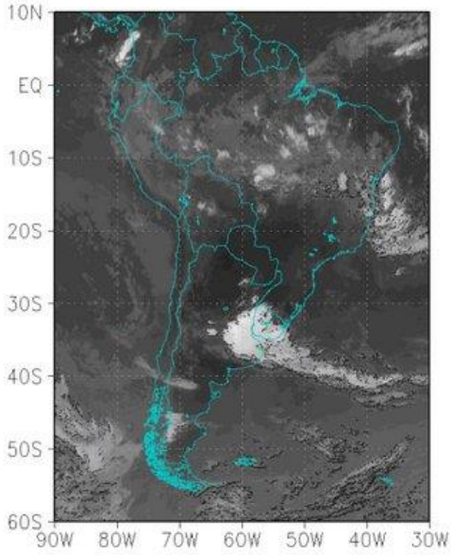




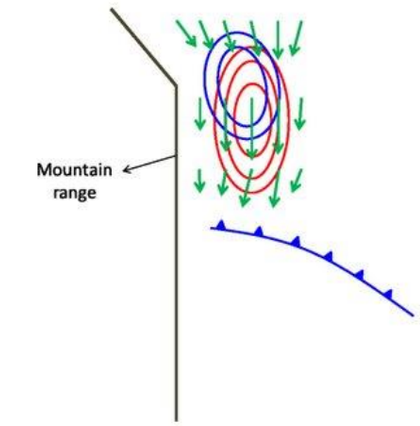
South American Low Level Jet

Zonal vertical cross section

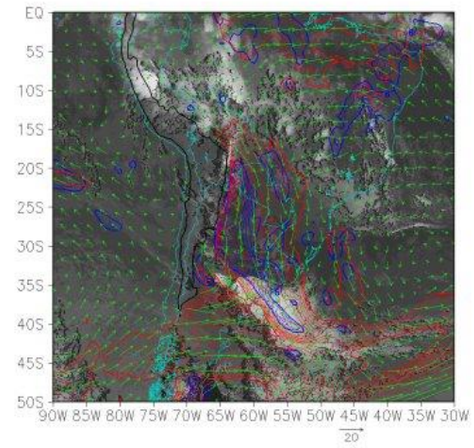




Bonner Criterion 1: Wind shear 850–700 hPa, isotachs and wind vectors at 850 hPa.

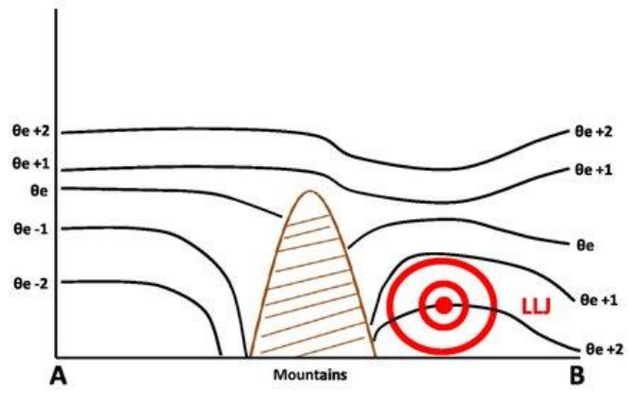


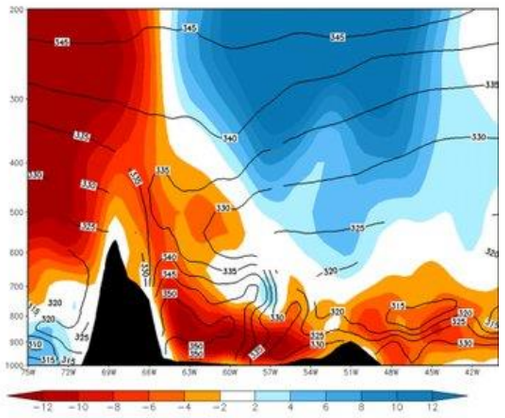
28 February 2002/06.00 UTC - GOES 13 IR 10.8 image; blue: wind shear 850-700 hPa, red: isotach at 850 hPa, green vector: wind at 850 hPa.



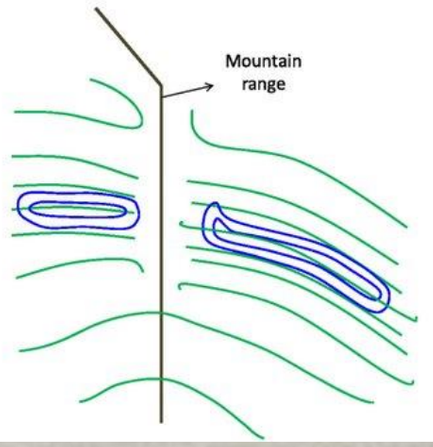
Meridional Wind and Theta–e

Lat: 27 °S. Meridional wind velocity (shaded, m/s); black: isentropes (theta-e, K) - 28 Dec 2002 12 UTC

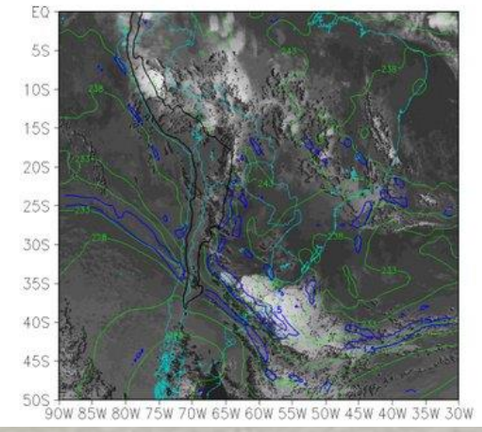




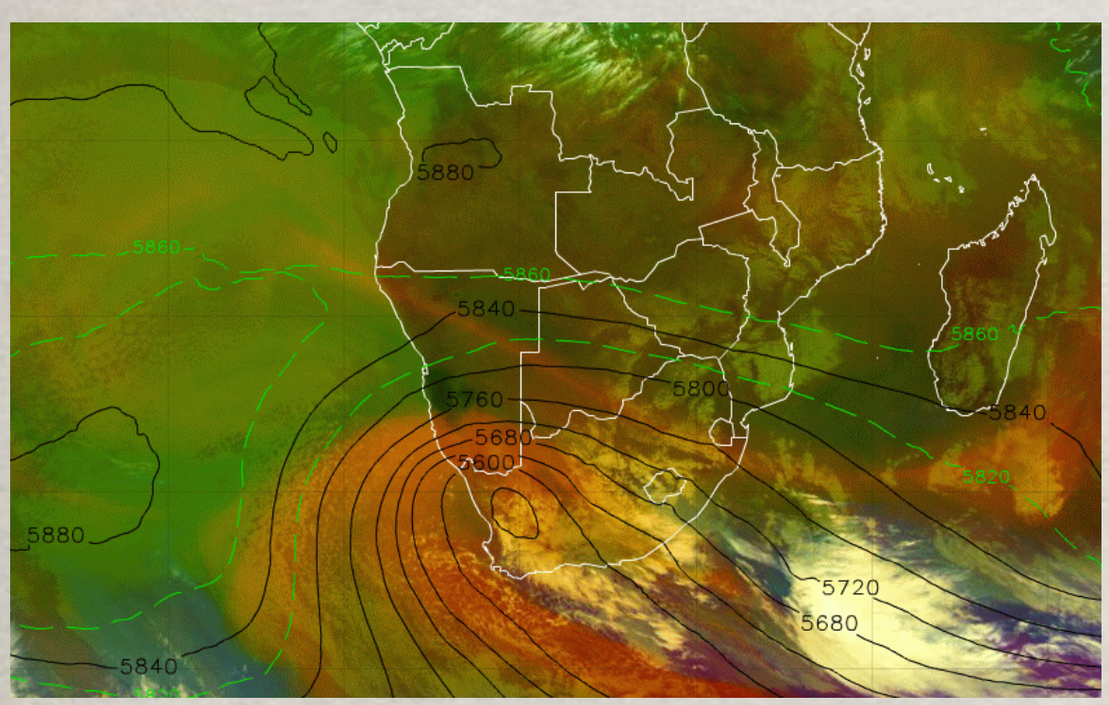
Equivalent Thickness 850–500 hPa and TFP



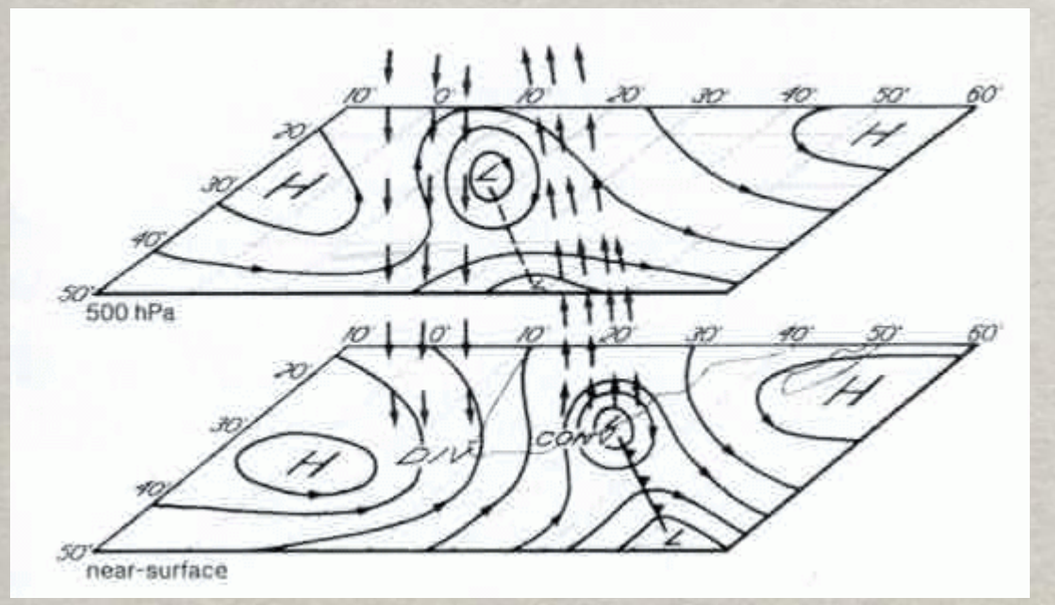
28 February 2002/06.00 UTC - GOES 13 IR 10.8 image; green: equivalent thickness, blue: TFP.



Cut-Off Lows



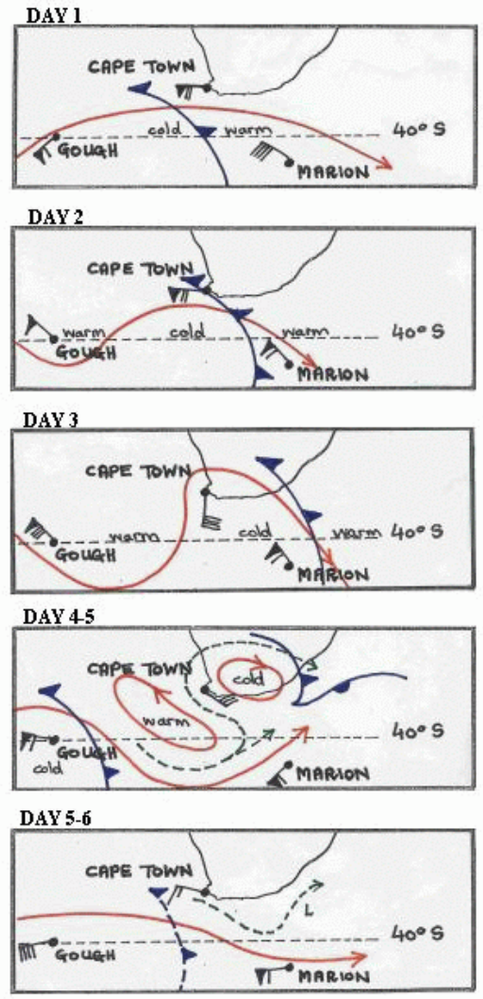
Airmass RGB overlaid with 500hPa heights (gpm) valid for 13 July 2012 at 1200UTC



Areas of convergence, divergence and uplift associated with COL systems, at the surface and 500hPa

South African Weather Service

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

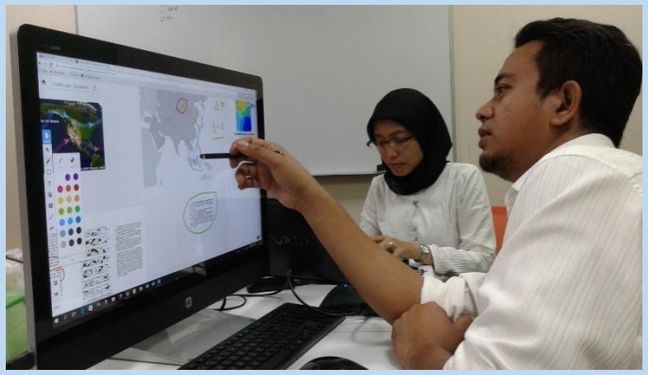


Life Cycle of COL

Development work (phase 2)

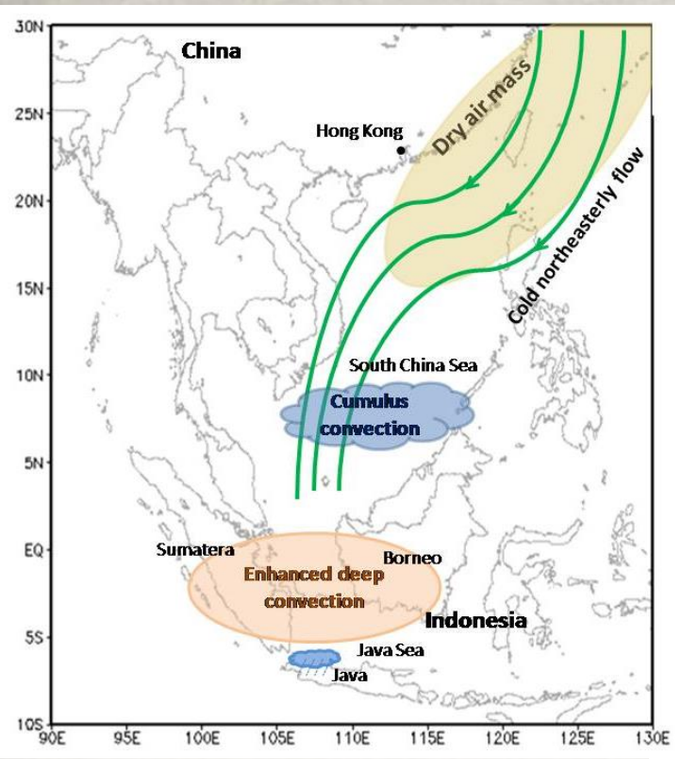
Tya, Adit and Roro were consulting CM with Vesa using Hangouts via mobile

Tya explained her finding in literature survey to the team

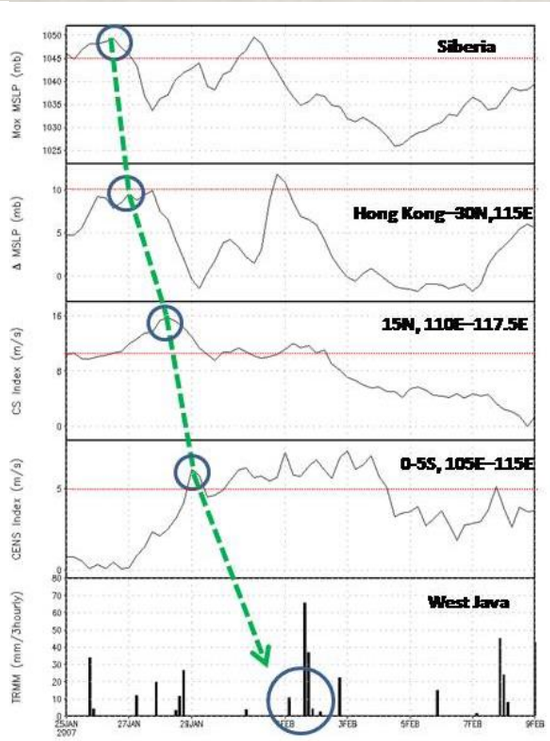


Adit and Roro (Jakarta) was in brainstorming with Rezza (Tokyo) using realtimeboard application and screen sharing facility

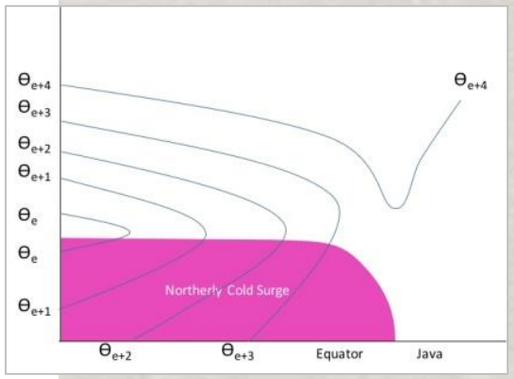
Northerly Cold Surge

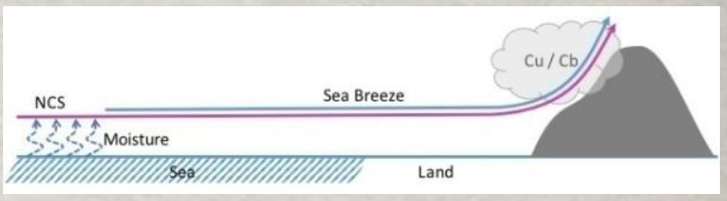


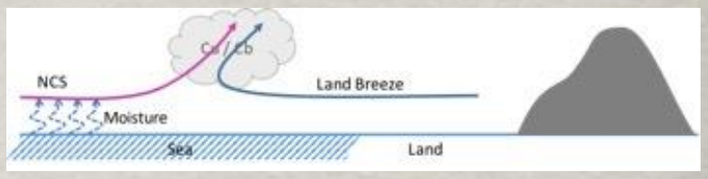
Schematic of an NCS event

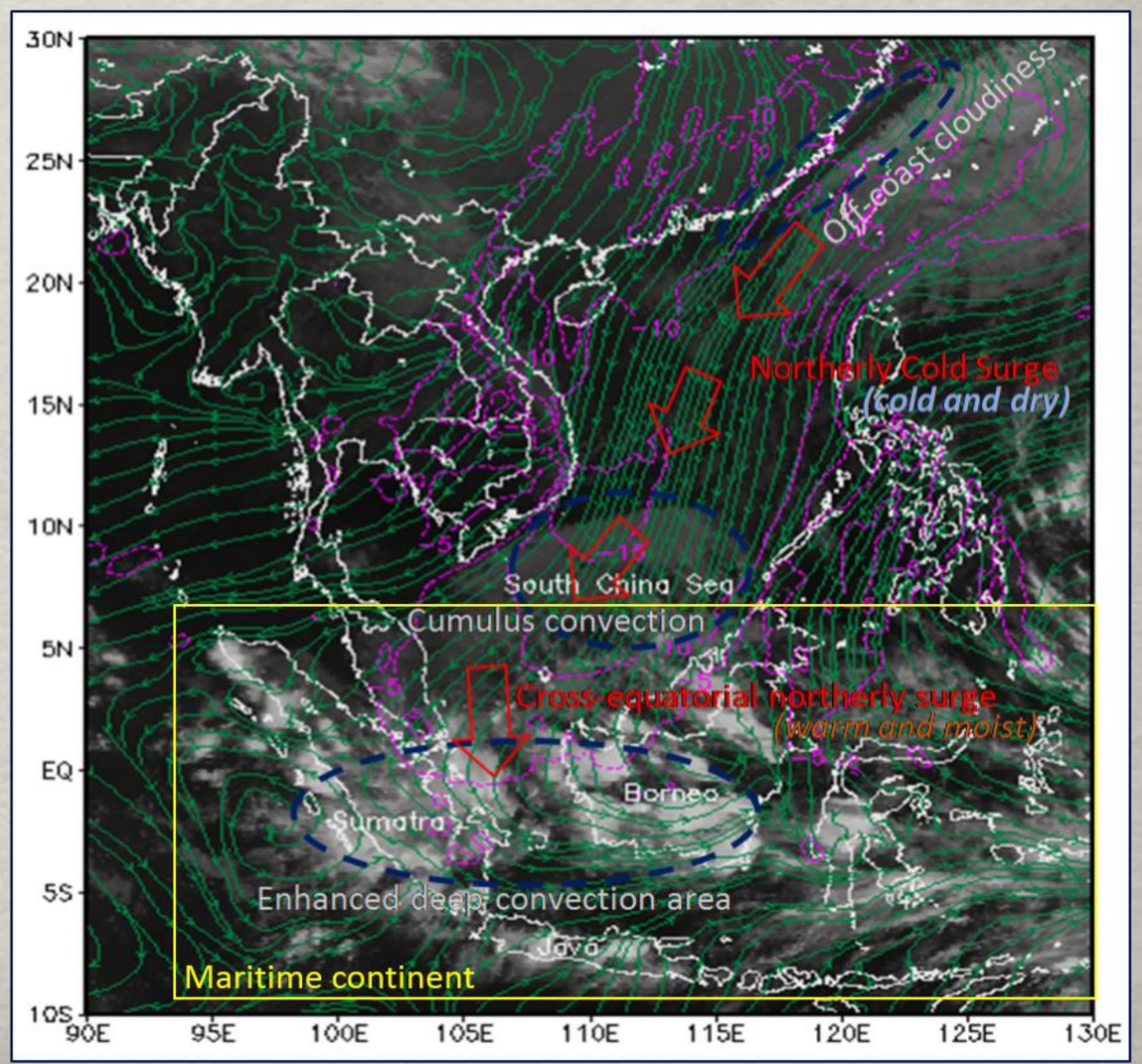


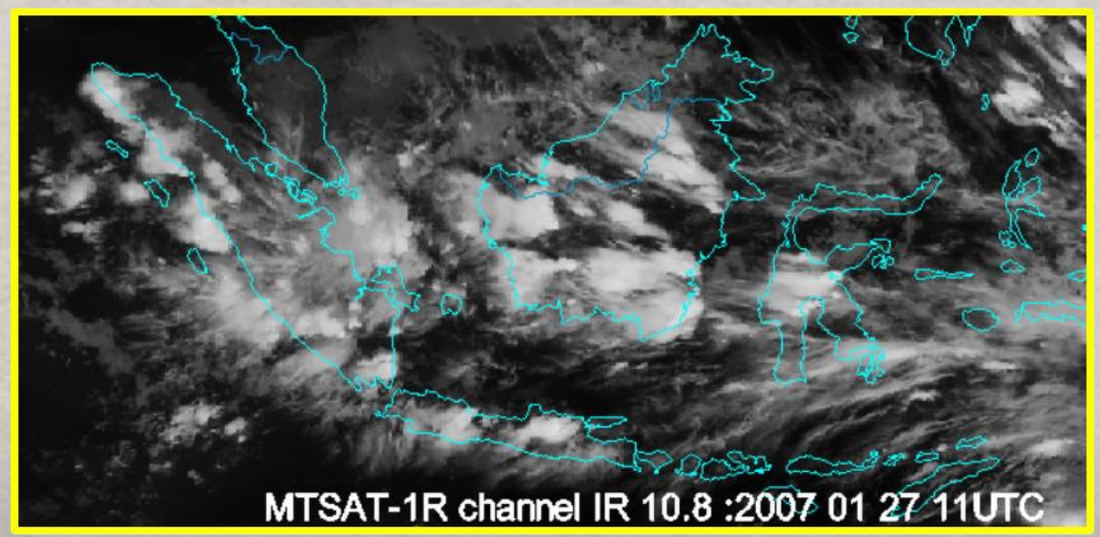
Meteogram showing the track of an NCS event











BMKG

Value for users

- The Meteorological education & training sector
  - Students and teachers, instructors
- The Meteorological forecast centres
  - More efficient work by combining satellite data with many other data;
  - better understanding of weather systems → nowcasting, warnings →
  - Benefit for user of weather forecasts

Value for the VLab

- Inspection of the actual training needs of forecasters
- Promote the activities of CoE for the relevant regions
- Reinforce interaction between institutions (university – weather services) and other countries
- Assistance from European experts -> benefit from their background

Value for CM4SH partners

- They learned a different way of looking into the weather systems through the CM approach and, by this, learning to use the applications and meteorological archives for scientific work.
- They increased a deeper interest in the CMs within the forecasting and training departments.
- They learned to organise the group work between different institutes, including new team members and promoting cooperation between different groups (~ 30 people, 5 continents, 2 hemispheres).

Future & Sustainability

Showing **48** items

Conceptual Model	Region	Category	Sub-category 1	Sub-category 2	Full CM	Link	Description
Sort	Sort	Sort	Sort	Sort	Sort	Sort	Sort
ZONDA	Argentina	Small scale, local, orographic			✓	Zonda	Föhn at Andes
Shallow Cold Front	Australia	Synoptic Scale	Polar fronts and cloud bands	Cold Fronts	✓	Shallow Cold Fronts	Class II summer cold front: East Australian Southerly Buster; New Zealand Southerly Buster; Central Australian Front
Continental tropical system – tropical Low	South Africa	Tropical			✓	Tropical Lows in Southern Africa	
MCCs	Brazil	Meso and Small Scale	Convective		✓	Mesoscale Convective Complexes (MCCs)	
Rapid Cyclogenesis	Australia	Synoptic Scale	Waves, cyclogenesis, low pressure centers		✓	Explosive Cyclogenesis in the southeast Australian region	
South American Low Level Jet (SALLJ)	Argentina	Synoptic Scale	South Hemisphere Jet	Mid – Low level Jet	✓	SALLJ and MCSs	Connected with convective cloudiness
Convection in central (Altiplano) and subtropical Andes	Argentina	Meso and Small Scale	Convective		✓	SALLJ and MCSs	
SALLJ	Argentine	Meso and Small Scale	Convective		✓	SALLJ and MCSs	Connected to Low level jet
Cut off Low	South Africa	Synoptic Scale	Waves, cyclogenesis, low pressure centers		✓	Cut-Off Low pressure systems	
MCC	Australia	Meso and Small Scale	Convective				
Tropical Waves	Australia	Tropical					

https://sites.google.com/site/cmsforsh/inventory

CM4SH-3?

Thank you
for your attention!

CM4SH website:
http://www.cm4sh.org

Vlab website:
http://vlab.wmo.int