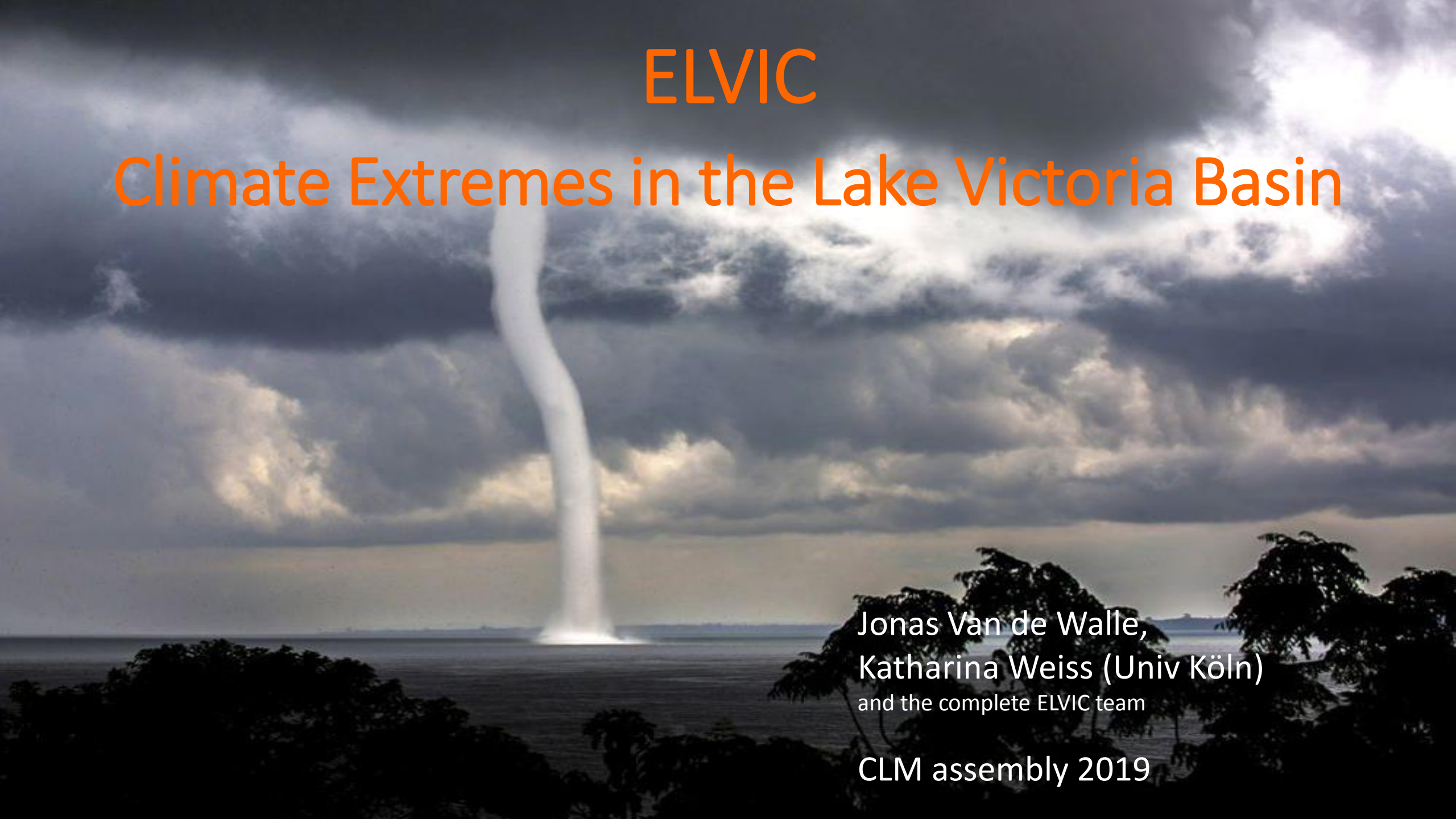


ELVIC

Climate Extremes in the Lake Victoria Basin

Jonas Van de Walle,
Katharina Weiss (Univ Köln)
and the complete ELVIC team

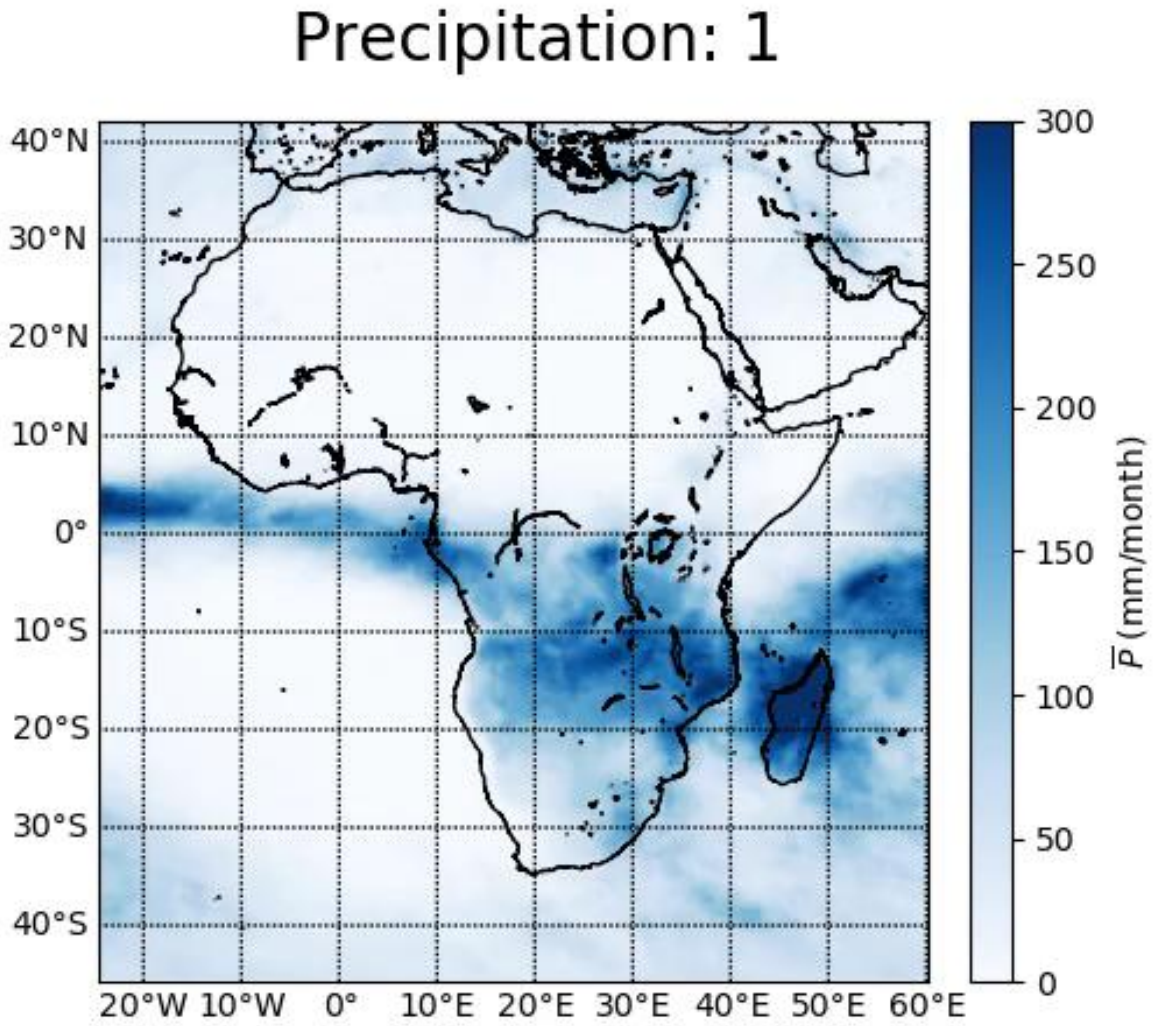
CLM assembly 2019

Meet the ELVIC team:

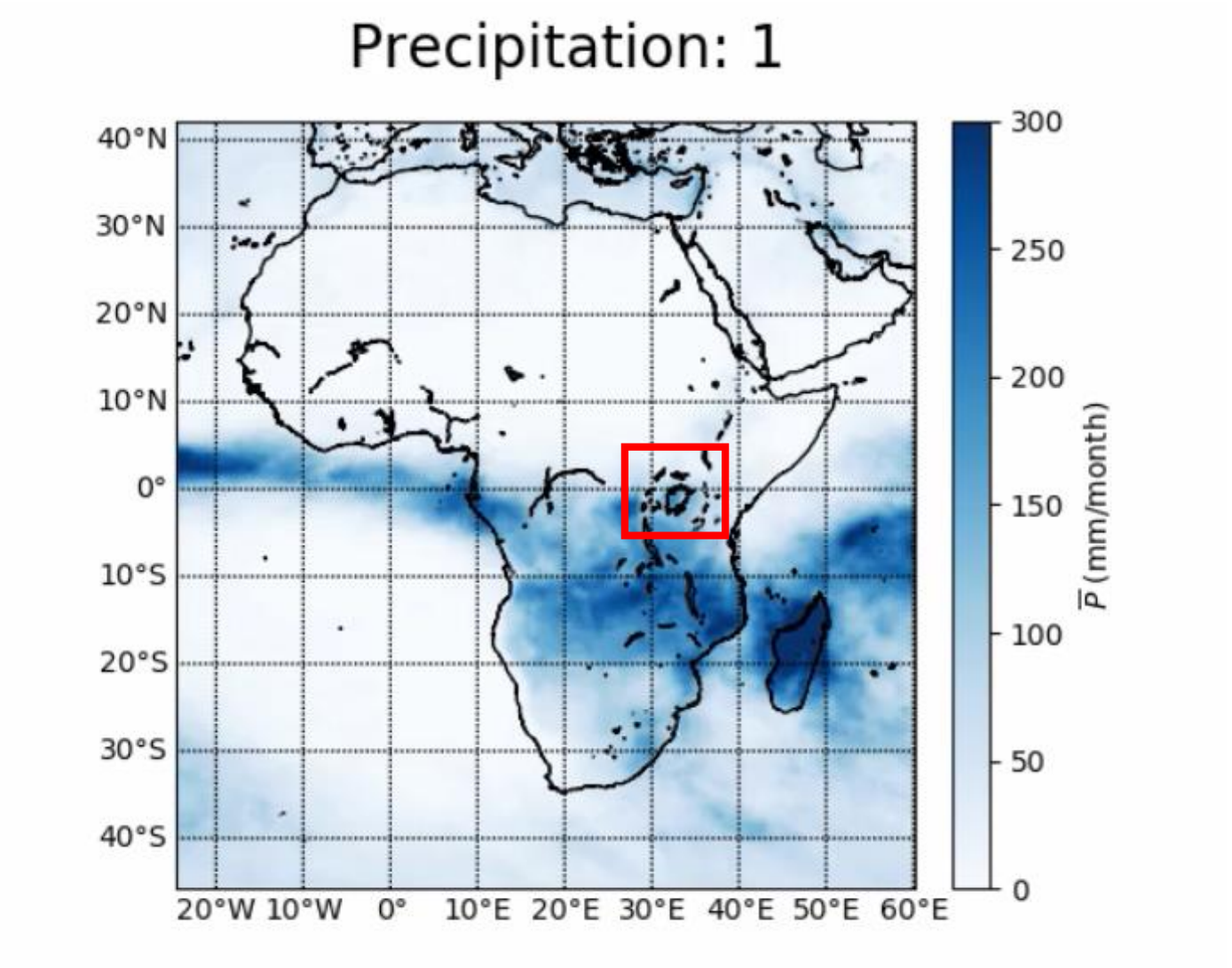
Name	Organization	E-mail	Model
Nicole P.M. van Lipzig	KUL, Leuven, Belgium	nicole.vanlipzig[at]kuleuven.be	COSMO5.0 – CLM9
Jonas Van de Walle	KUL, Leuven, Belgium	Jonas.vandewalle[at]kuleuven.be	COSMO5.0 – CLM9
Grigory Nikulin	SMHI, Norrköping, Sweden	grigory.nikulin[at]smhi.se	AROME
Danijel Belusic	SMHI, Norrköping, Sweden	Danijel.belusic[at]smhi.se	AROME
Minchao Wu	SMHI, Norrköping, Sweden	Minchao.wu[at]smhi.se	AROME
Erika Coppola	ICTP, Trieste, Italy	Coppolae[at]ictp.it	RegCM 4.7.0
Russell Glazer	ICTP, Trieste, Italy	Mrruss89[at]gmail.com	RegCM 4.7.0
David Rowell	Met Office Hadley Centre, Exeter, UK	Dave.rowell[at]metoffice.gov.uk	MO-UKV
John Marsham	University of Leeds, Leeds, UK	j.Marsham[at]leeds.ac.uk	MO-UKV
Declan Finney	University of Leeds, Leeds, UK	D.L.Finney[at]leeds.ac.uk	MO-UKV
Andreas Fink	KIT, Karlsruhe, Germany	Andreas.fink[at]kit.edu	WRF V3.9.1.1 + COSMO-CLM 5.0 (stat.)
Joaquim Pinto	KIT, Karlsruhe, Germany	Joaquim.pinto[at]kit.edu	WRF V3.9.1.1 + COSMO-CLM 5.0 (stat.)
Patrick Ludwig	KIT, Karlsruhe, Germany	Patrick.ludwig[at]kit.edu	WRF V3.9.1.1 + COSMO-CLM 5.0 (stat.)
Eleni Katragou	Aristotle University of Thessaloniki, Greece	Katragou[at]auth.gr	WRF
Maria Karypidou	Aristotle University of Thessaloniki, Greece	Karypidou[at]geo.auth.gr	WRF
Wim Thiery	VUB, Brussels, Belgium	Wim.thiery[at]vub.be	
Richard Anyah	University of Connecticut, Storrs, US	Richard.anyah[at]uconn.edu	
Fredrick Semazzi	NCSU, Raleigh, US	Fred_semazzi[at]ncsu.edu	
Harald Kunstmann	IMK-IFU, Garmisch-Partenkirchen, Germany	Harald.kunstmann[at]kit.edu	
Dominikus Heinzeller	IMK-IFU, Garmisch-Partenkirchen, Germany	Dominikus.heinzeller[at]kit.edu	

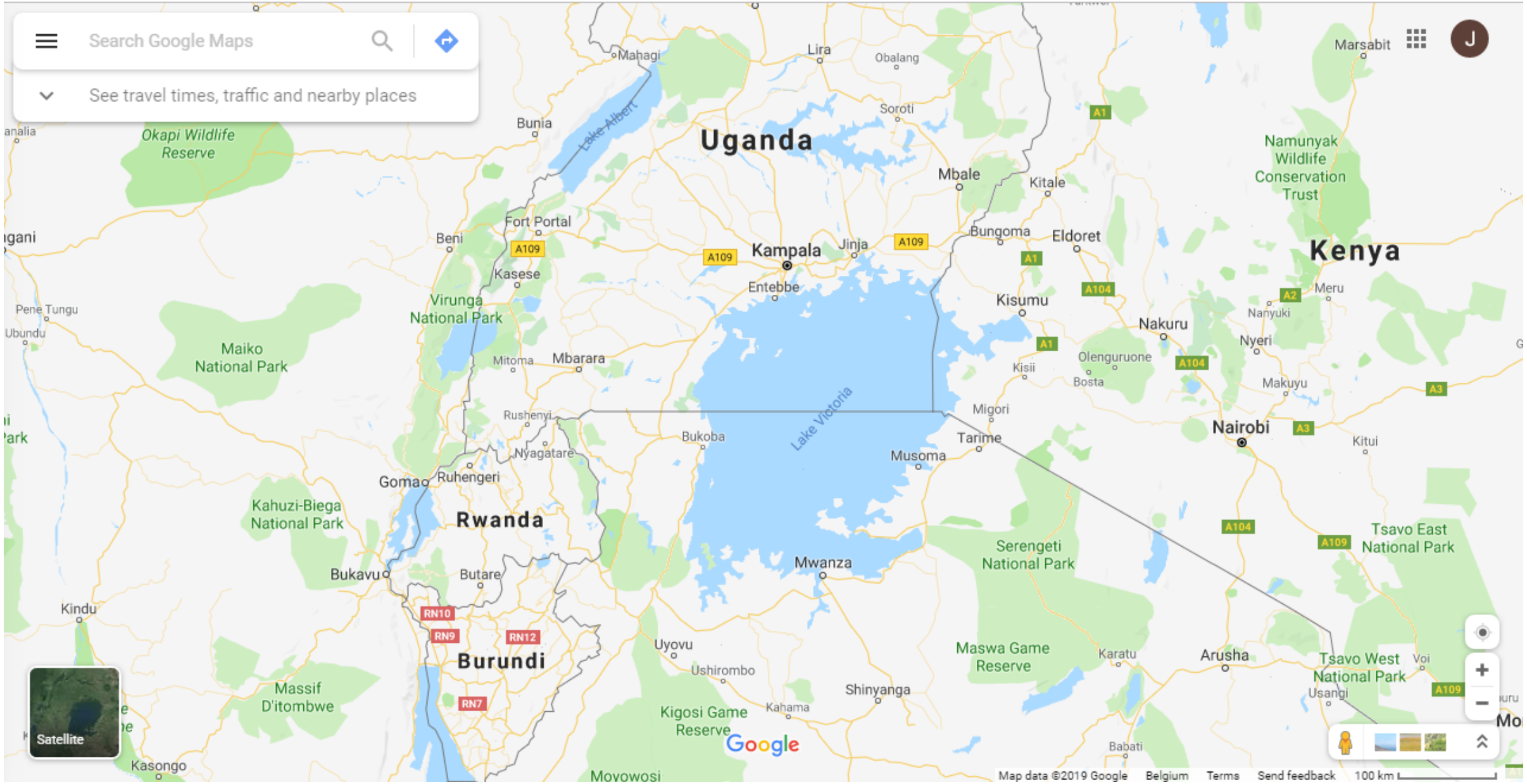
Matthias Demuzere	KUL, Leuven, Belgium Universiteit Gent, Ghent, Belgium, Ruhr University, Bochum, Germany	Matthias.demuzere[at]rub.de	
Hendrik Wouters	Universiteit Gent, Ghent, Belgium	Hendrik.wouters[at]ugent.be	
Christopher Lennard	UCT, Cape Town, South Africa	lennard[at]csag.uct.ac.za	
Martin Drews	DTU, Kongens Lyngby, Denmark	Mard[at]dtu.dk	
Olivier Dewitte	Royal Museum For Central Africa, Tervuren, Belgium	Olivier.dewitte[at]africamuseum.be	
Elise Monsieurs	Royal Museum For Central Africa, Tervuren, Belgium ULg, Liège, Belgium	Elise.monsieurs[at]africamuseum.be	
Matthieu Kervyn	VUB, Brussels, Belgium	Makervyn[at]vub.ac.be	
Lies Jacobs	VUB, Brussels, Belgium KUL, Leuven, Belgium	Liesbet.jacobs[at]kuleuven.be	
Segele Zewdu Tessema	ICPAC, Nairobi, Kenya	Zsegele[at]icpac.net	
Franklin Opijah	University of Nairobi, Nairobi, Kenya	Fopija[at]uonbi.ac.ke	
Pascal Waniha	DITS, Dar es Salaam, Tanzania	Pascal.waniha[at]meteo.go.tz	
Prince Kaleme	CRSN / LWIRO, Bukavu, Democratic Republic of Congo	Pkaleme[at]gmail.com	
Sabiiti Geoffrey	Makerere University, Kampala, Uganda	Geosabiiti[at]caes.mak.ac.ug	

What's known about LV general climate?



What's known about LV regional climate?

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Nairobi
Mombasa
Kisumu
Nakuru
Eldoret
Kitale
Mbale
Lira
Gulu
Arusha
Tarime
Musoma
Mwanza
Bukavu
Goma
Ruhengeri
Kigali
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Maiko National Park
Kahuzi-Biega National Park
Okapi Wildlife Reserve
Serengeti National Park
Tsavo East National Park
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Massif D'itombwe
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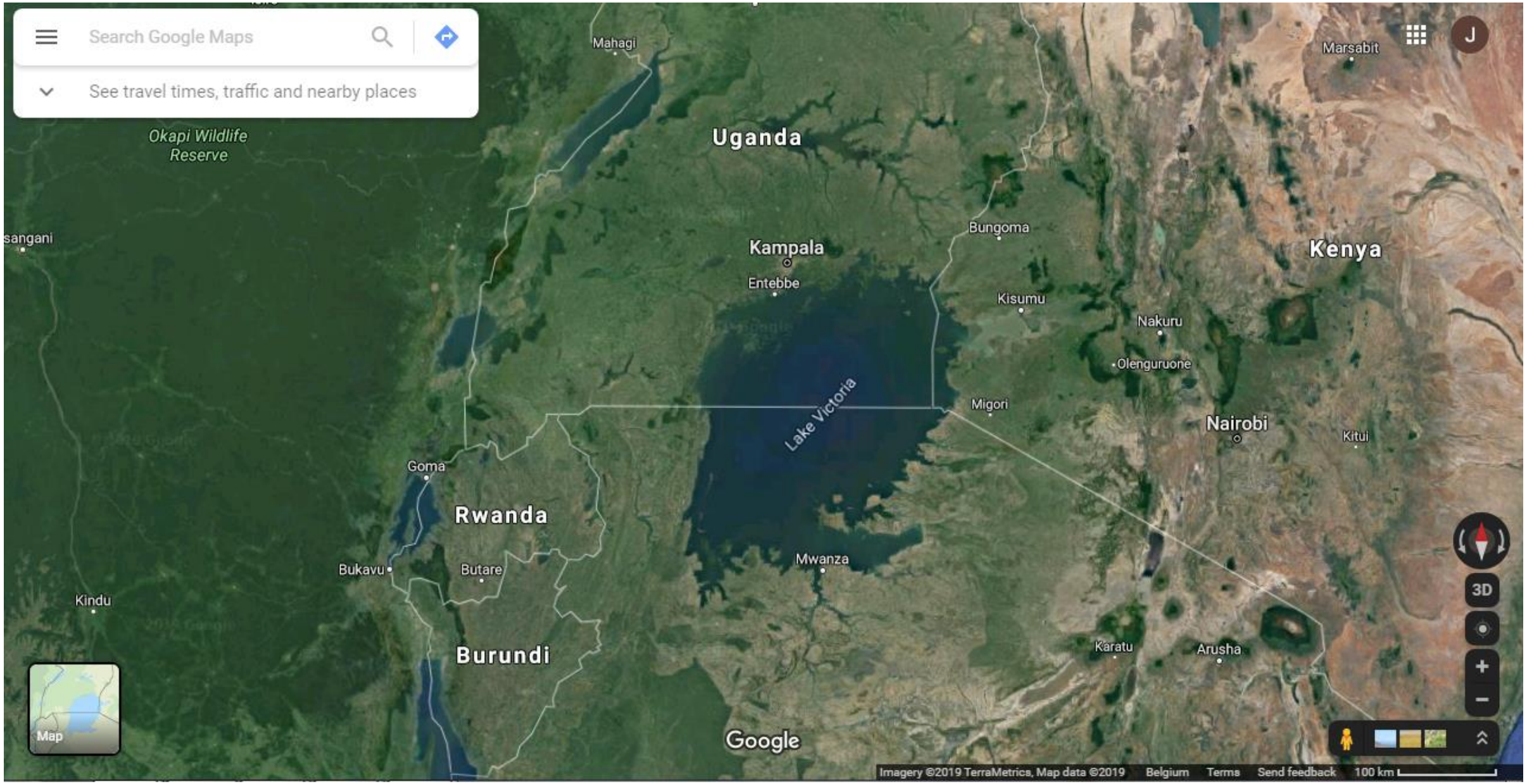
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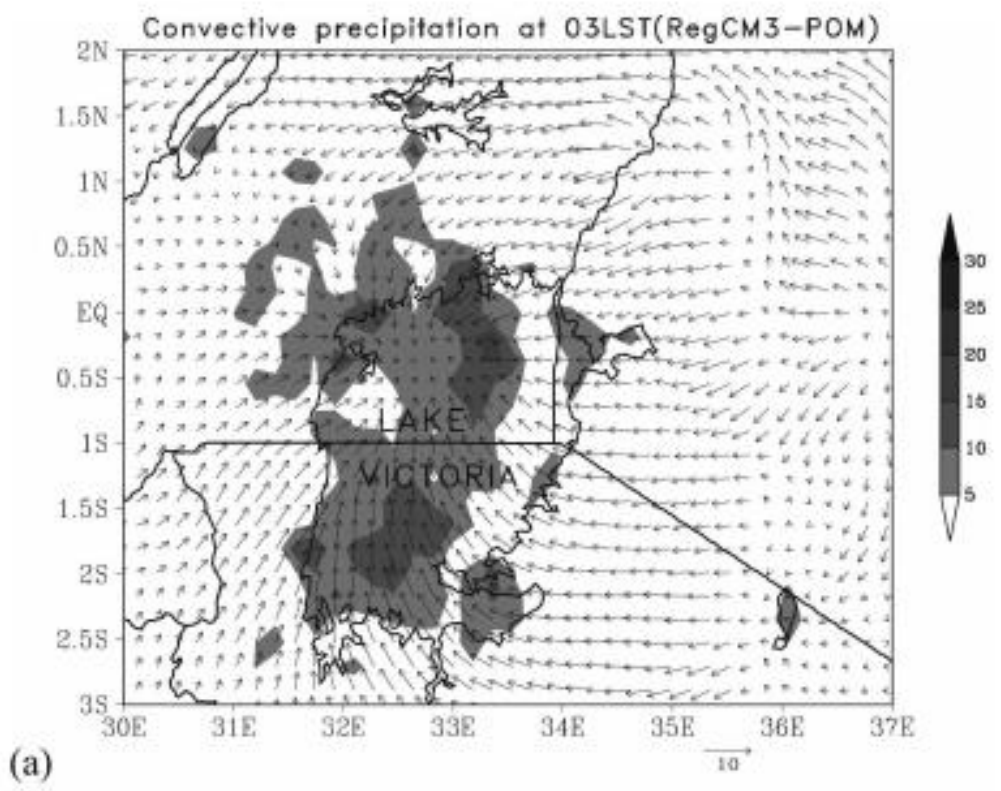
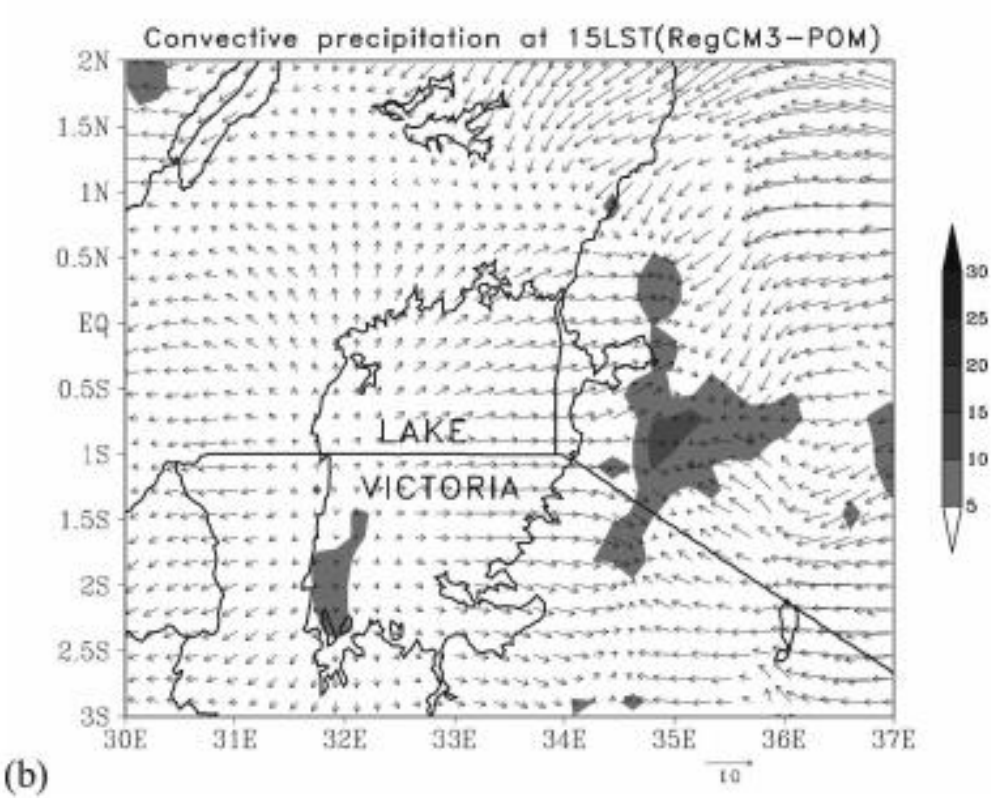
What's known about LV regional climate?

Lake / Land breezes drive convective triggering

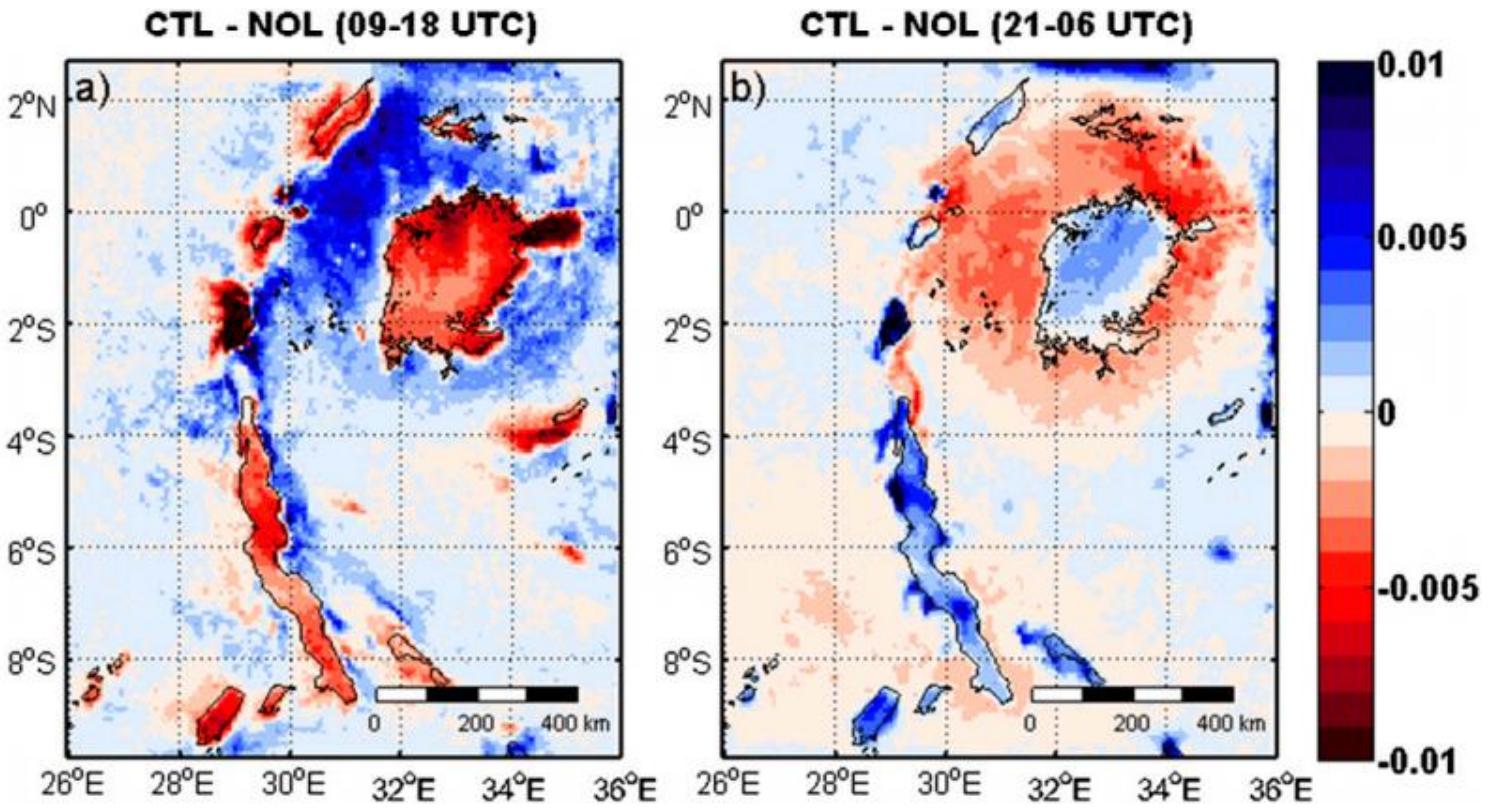




Anyah et al. (2006) 20km res. RegCM3

What's known about LV regional climate?

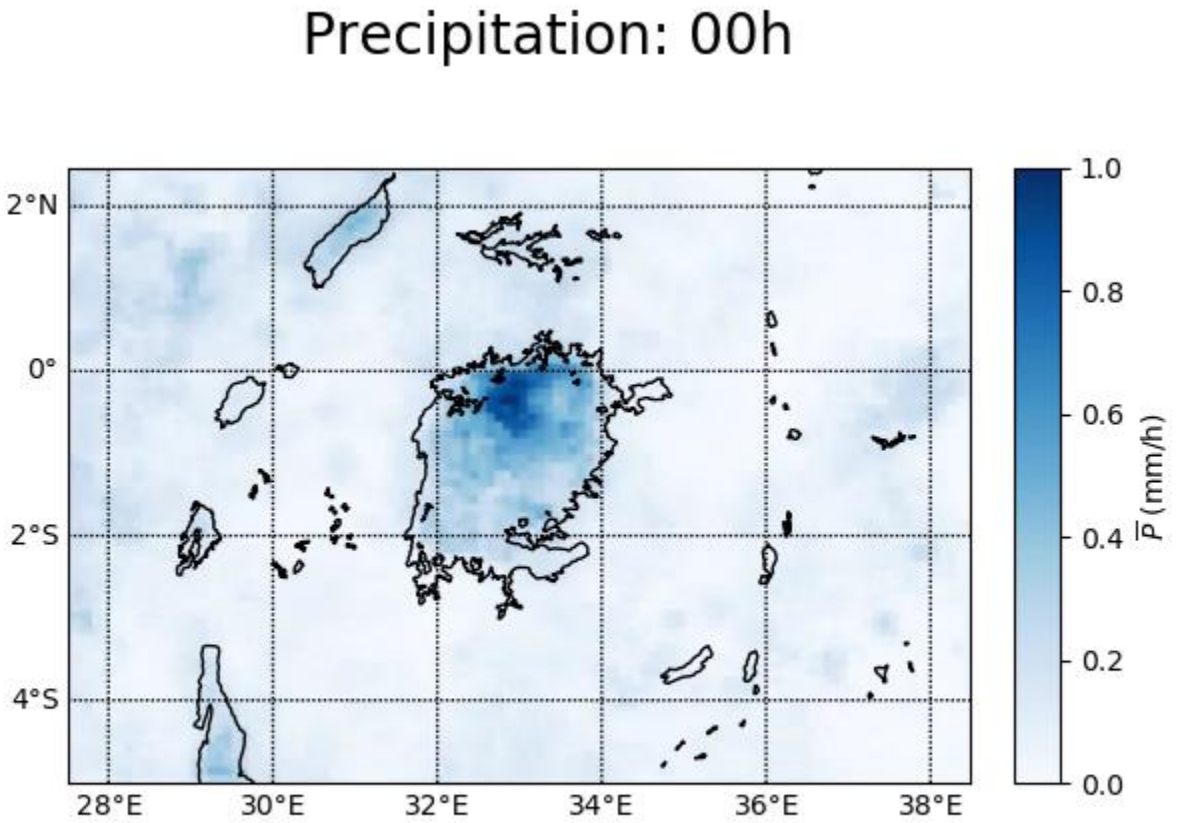
Lake / Land breezes drive convective triggering



Thiery et al. (2015) 7km res CCLM2

What's known about LV regional climate?

Clear day / night precipitation pattern

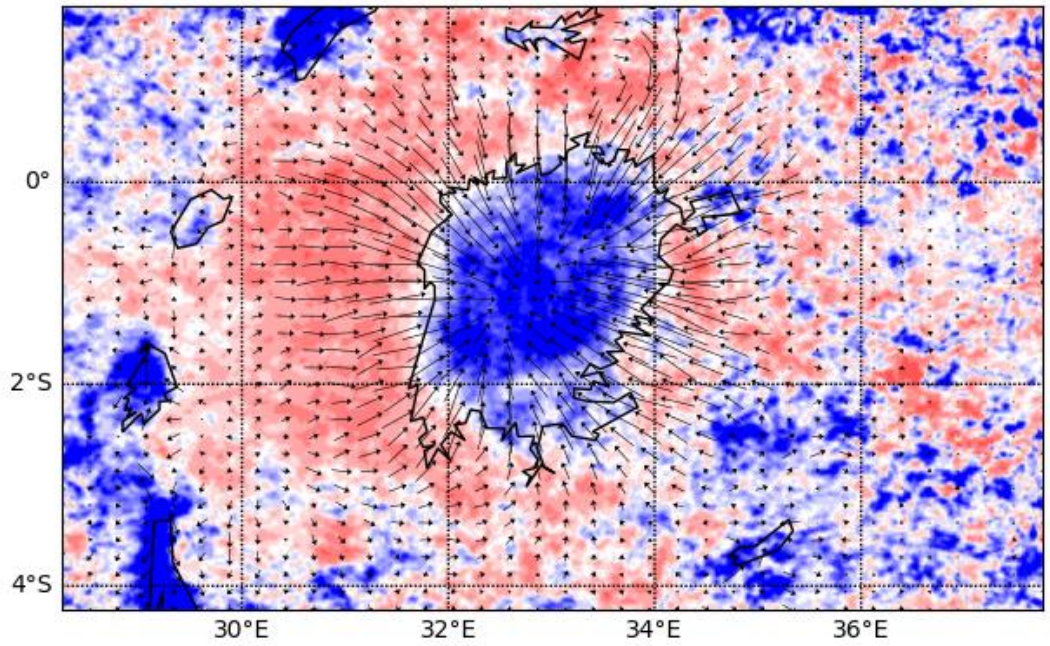


TRMM IMERG

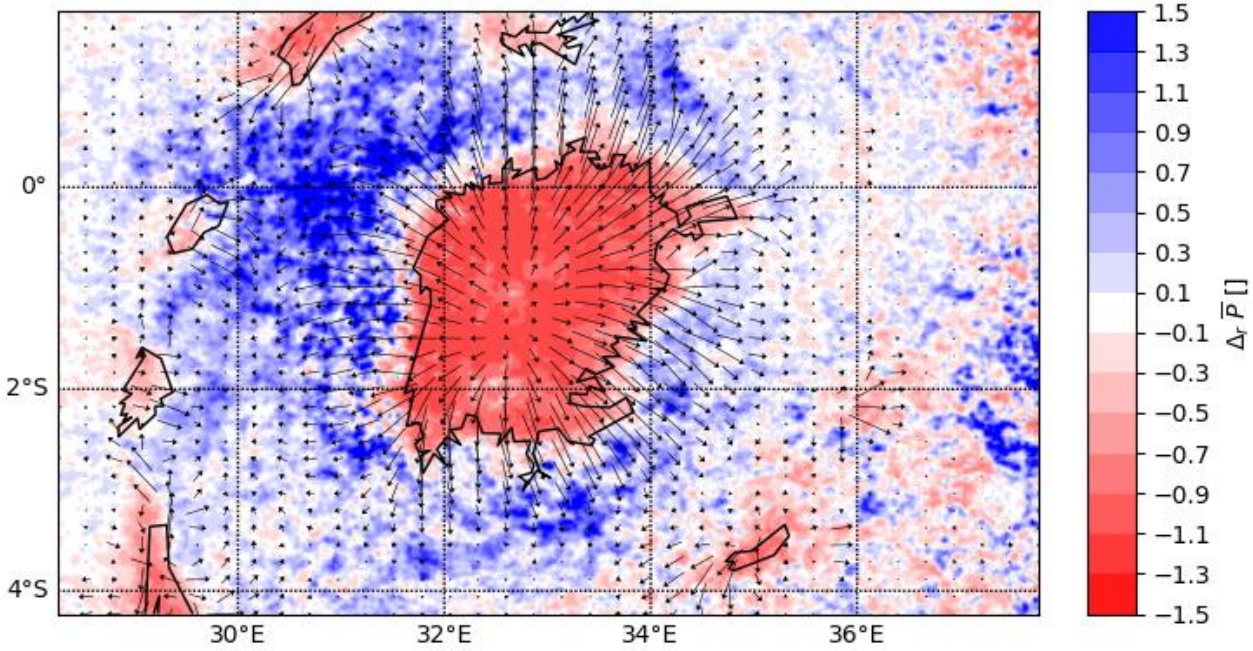
What's known about LV regional climate?

Clear day / night precipitation pattern due to the lake presence

CTR – NOL ; 00:00-06:00



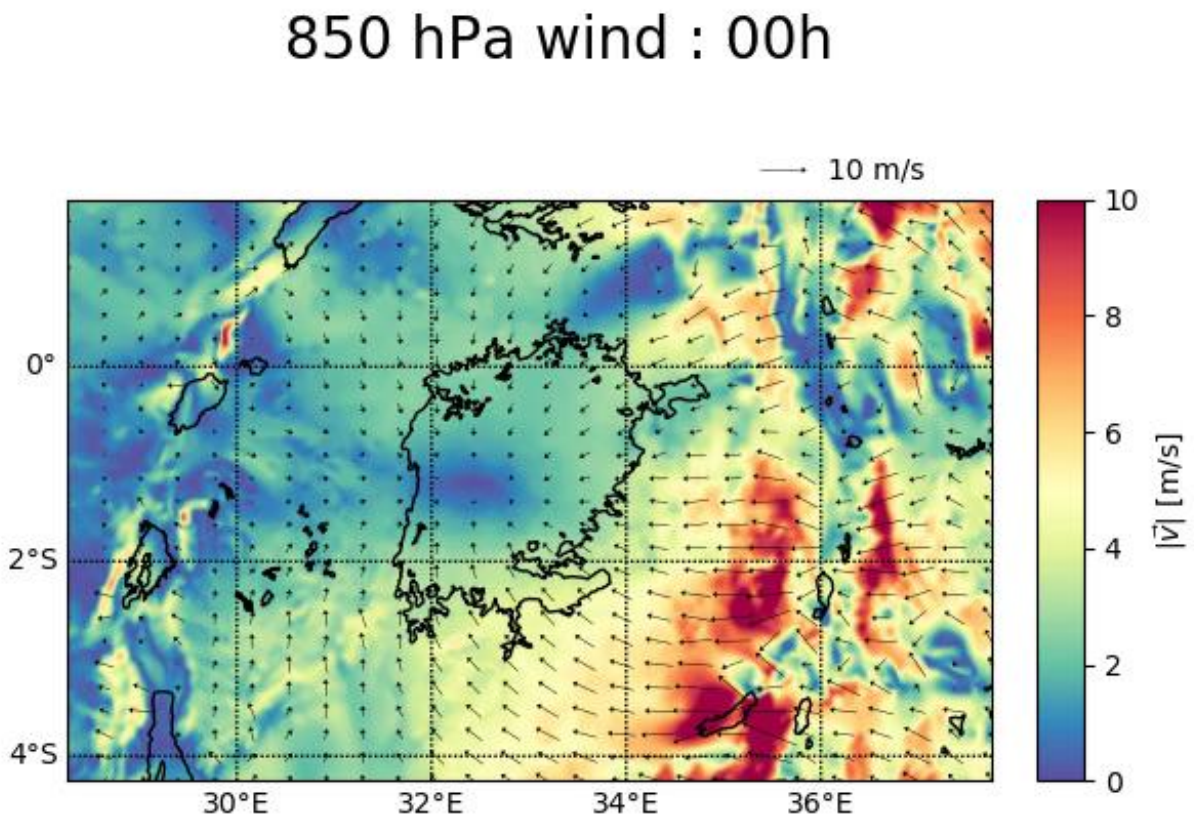
CTR – NOL ; 12:00-18:00



Van de Walle et al. (2019) **2.8km res. CCLM (era5, 2mom)**

What's known about LV regional climate?

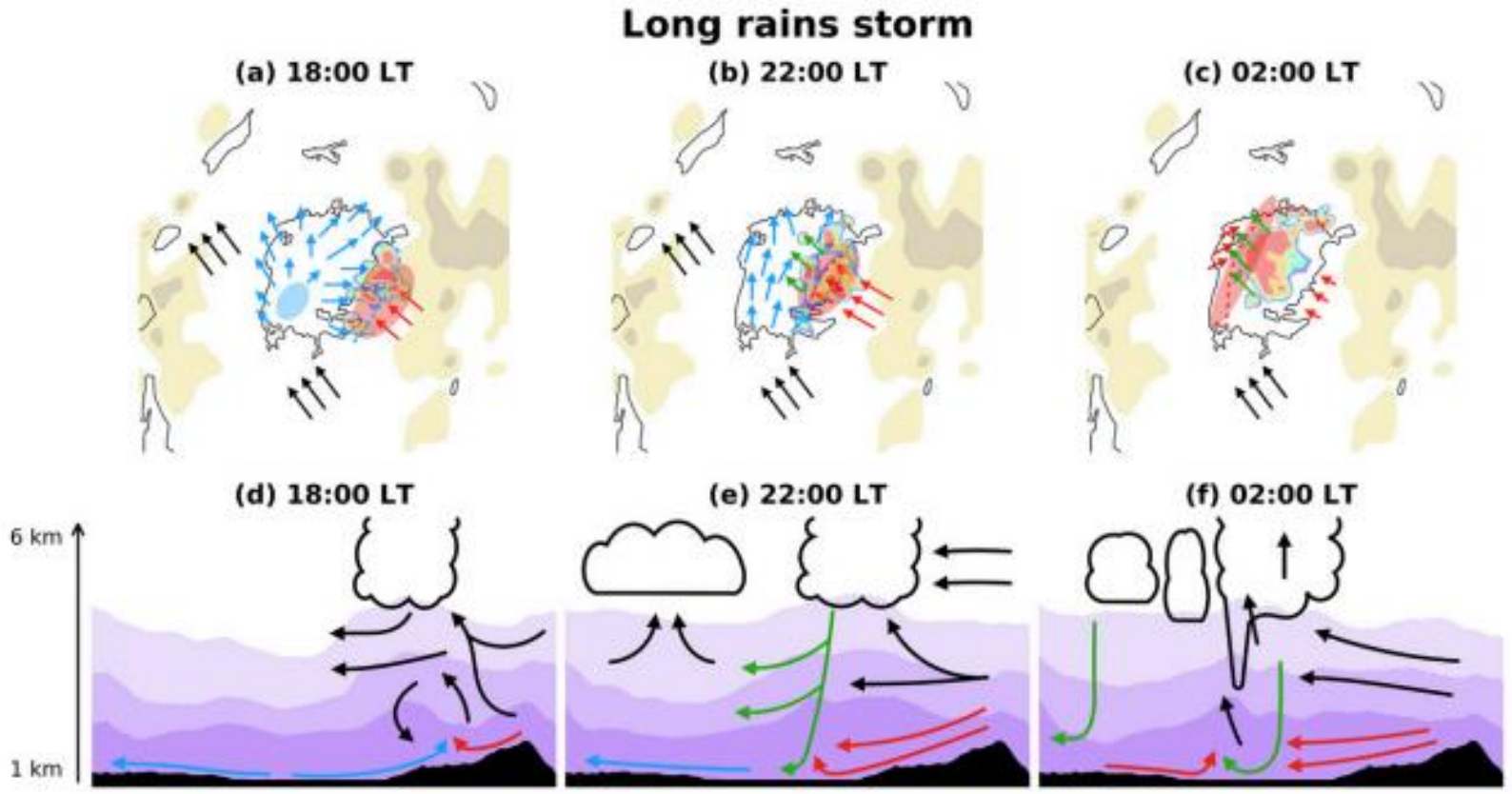
Strong effect of mountains and easterlies



Van de Walle et al. (2019) 2.8km res. CCLM (era5, 2mom)

What's known about LV regional climate?

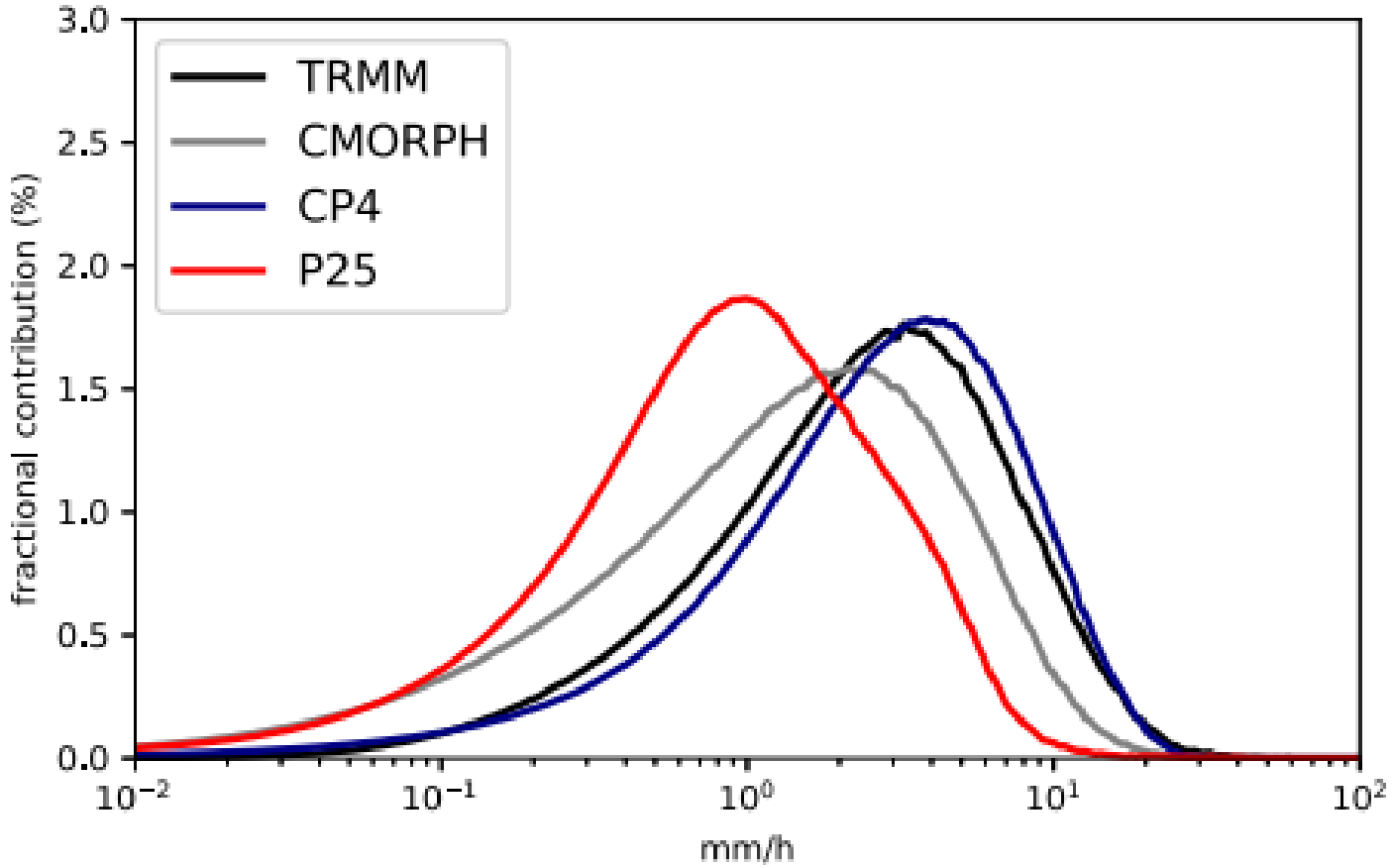
Interaction between lake breeze and easterlies



Woodhams et al. (2019) 4 km res MetOffice UM

What's known about LV regional climate?

For extremes, we need high resolution modeling



Finney et al. (2019)
4 km res MetOffice UM

ELVIC: Climate Extremes in the Lake Victoria Basin

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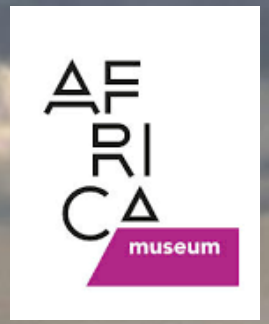
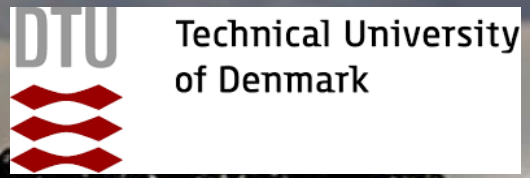
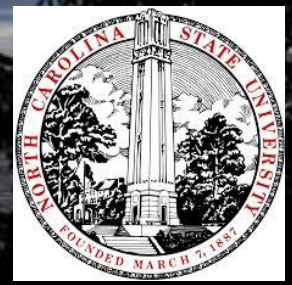
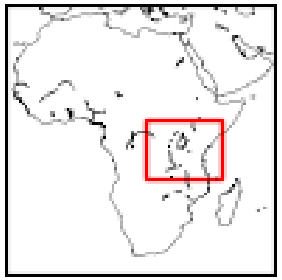






ELVIC: Climate Extremes in the Lake Victoria Basin



Region

One of world's convectively most active regions: very vulnerable to heavy precipitation, heat waves, severe droughts and wind storms

FPS tool

Coordinate ensemble climate projections at the Convection-Permitting scale

WCRP CORDEX
FLAGSHIP PILOT STUDIES

Project goals

- Assess added value of Convection-Permitting
- Project evolution of future climate extremes
- Provide information to impact community

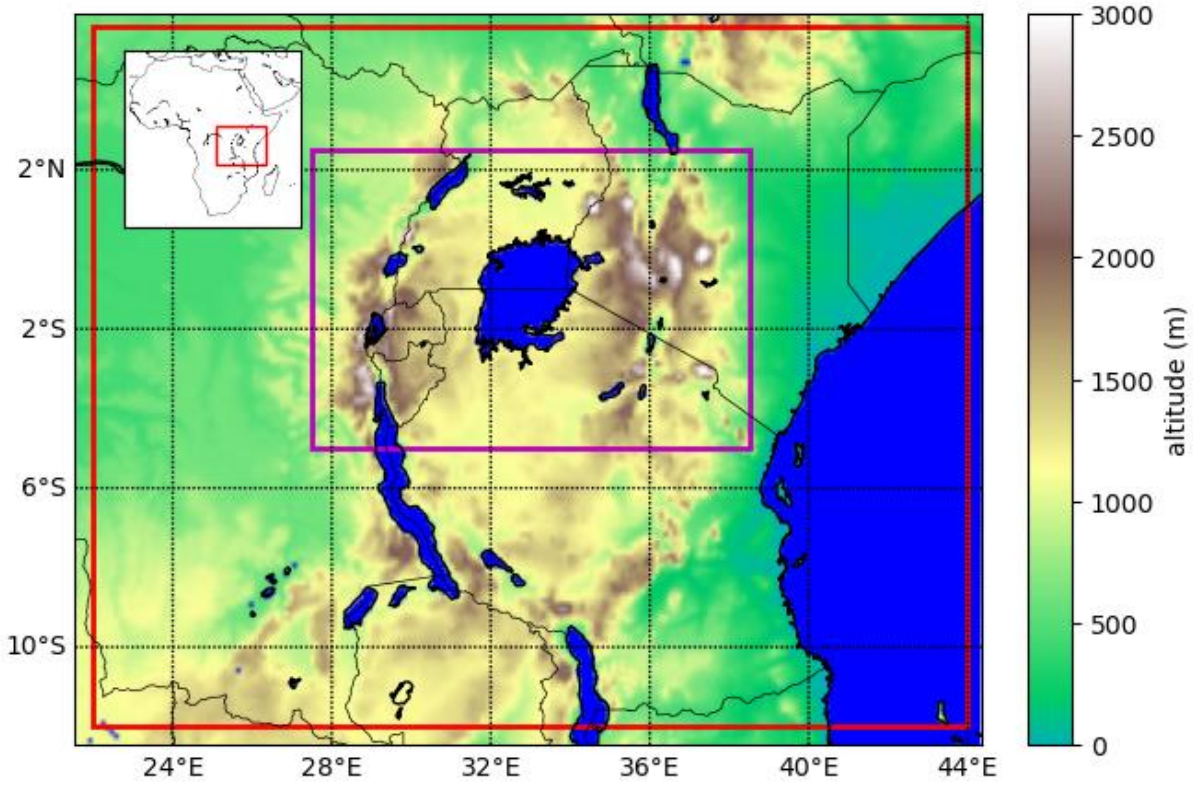
More information

https://ees.kuleuven.be/elvic/

jonas.vandewalle@kuleuven.be & nicole.vanlipzig@kuleuven.be

ELVIC: main protocols

- Evaluation simulation: 2005-2016
- Driver: ERA-Interim (ERA5 optional)
- Nesting: global – 12 km – 2.8 km
- Lake model coupled
- https://ees.kuleuven.be/elvic/protocols/



Set-up of different models

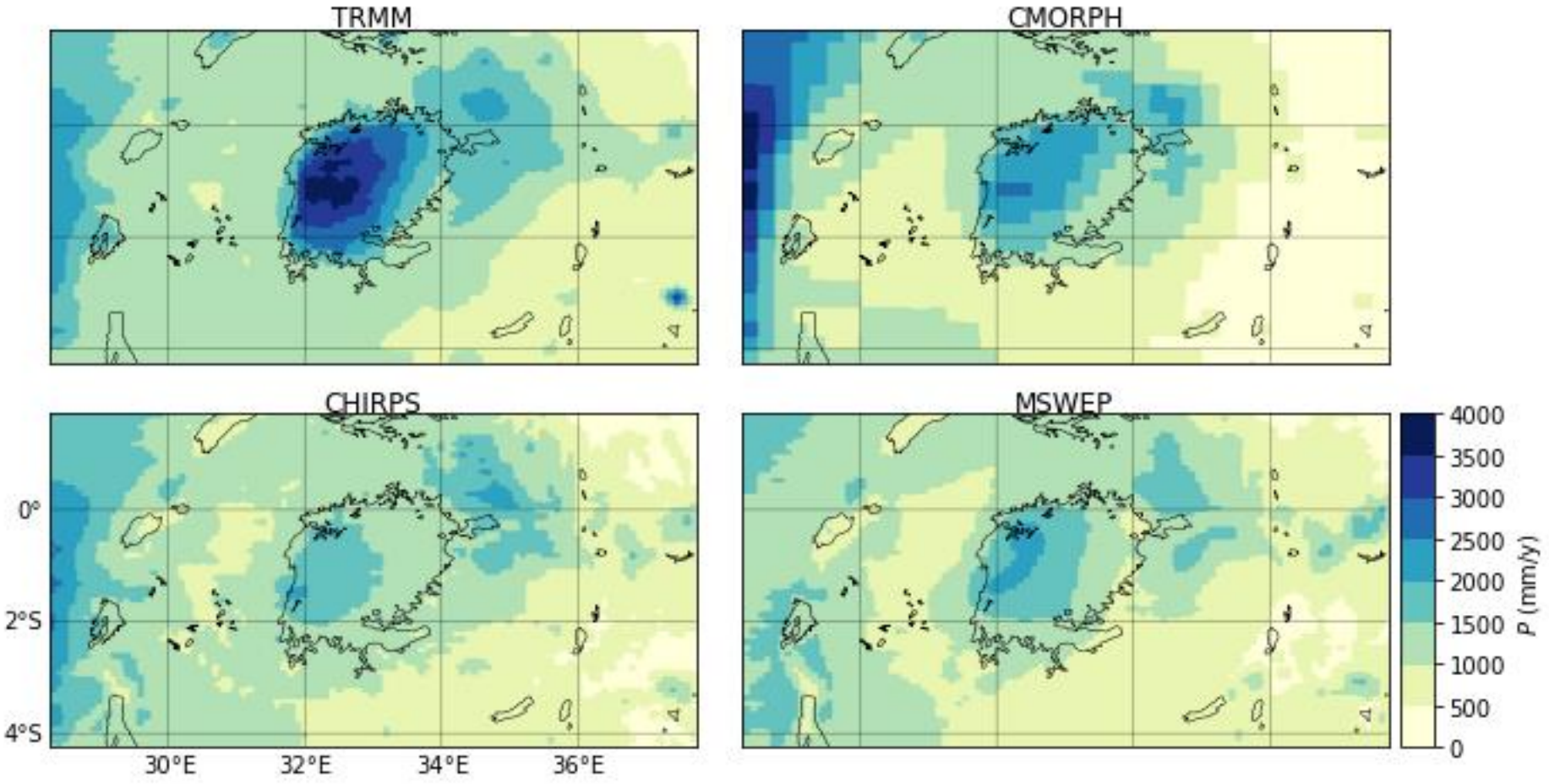
Model	Institute	Timing	Driver	Coarse resol	Fine resol	Lake model
CCLM	KUL	2005-2015	ERA-Int	12 km	2.8 km	Flake
CCLMe5	KUL	2005-2015	ERA 5		2.8 km	Flake
ALADIN-AROME (*)	SMHI	2005-2015	ERA-Int	12 km	2.5 km	Flake
RegCM	ICTP	2005-2015	ERA-Int	25 km	3.0 km	Hostetler
WRF	KIT	2005-2015	ERA-Int	12 km	2.8 km	Flake
MO-UKV	MO	1997-2007	HadGEM + OBS SST	25 km	4.4 km	Obs LST

Status of the evaluation run:

KU LEUVEN	Completed 2005-2015
SMHI	Completed 2005-2015
ICTP	Ongoing 2005-2011
KIT Karlsruher Institut für Technologie	Ongoing 2005-2009
Met Office Hadley Centre	Completed 1997-2007
ARISTOTLE UNIVERSITY OF THESSALONIKI	Starting

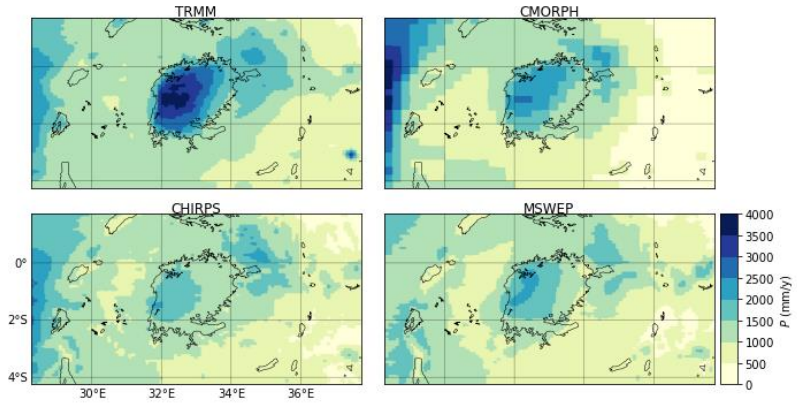
Evaluation of precipitation

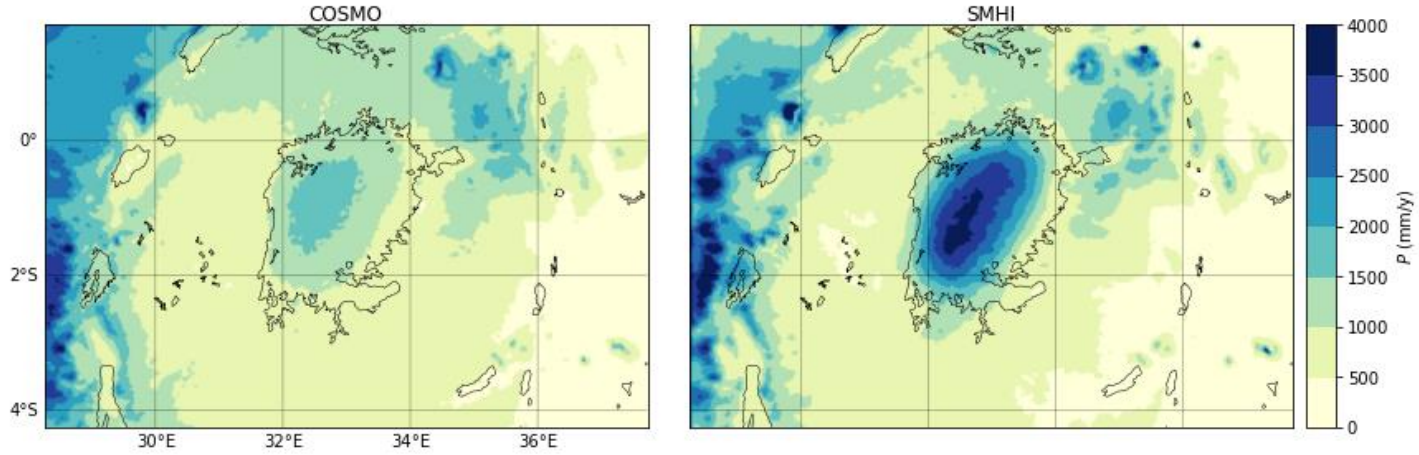
Observations for 2006-2015



Evaluation of precipitation

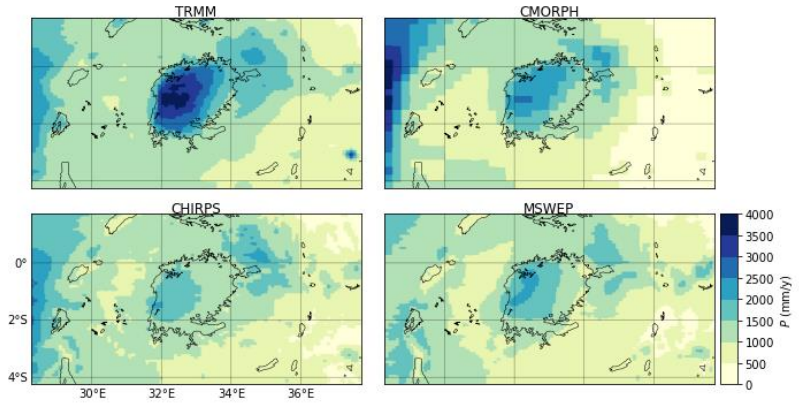
CPM for 2006-2015

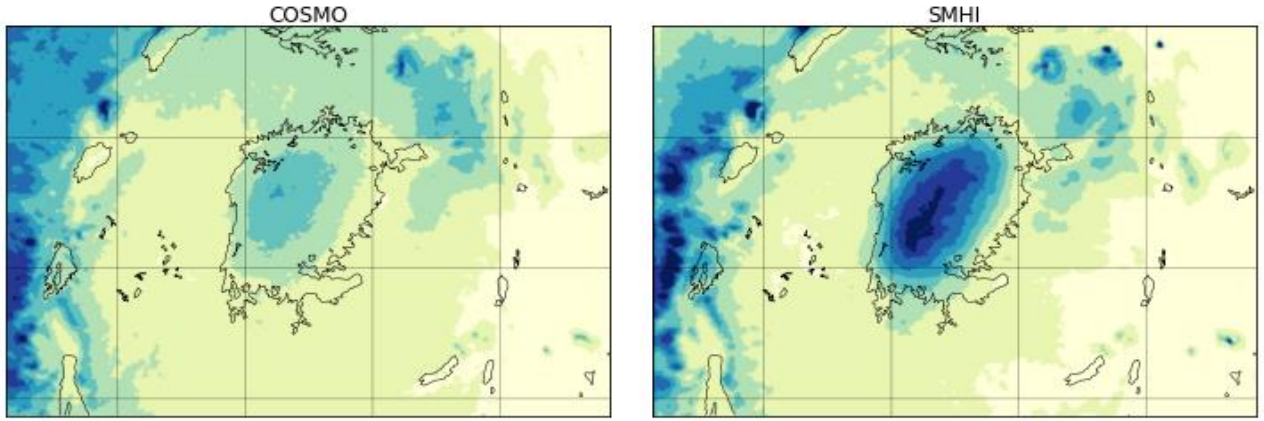


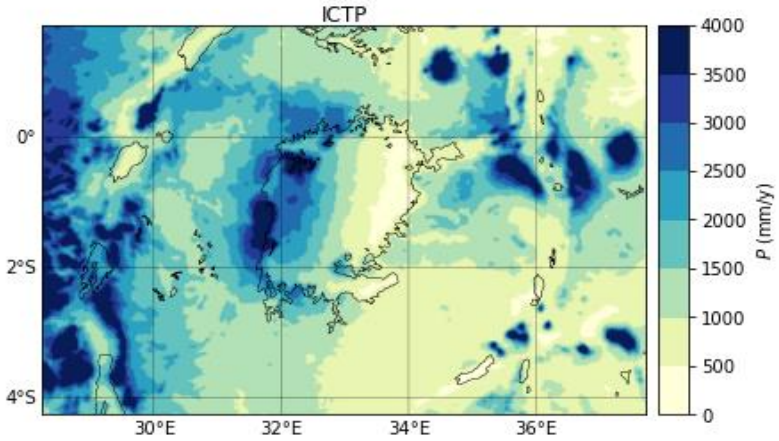


Evaluation of precipitation

CPM for 2006-2011

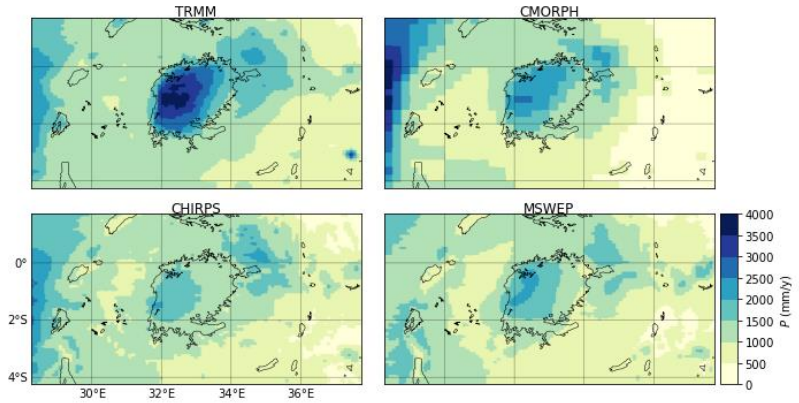


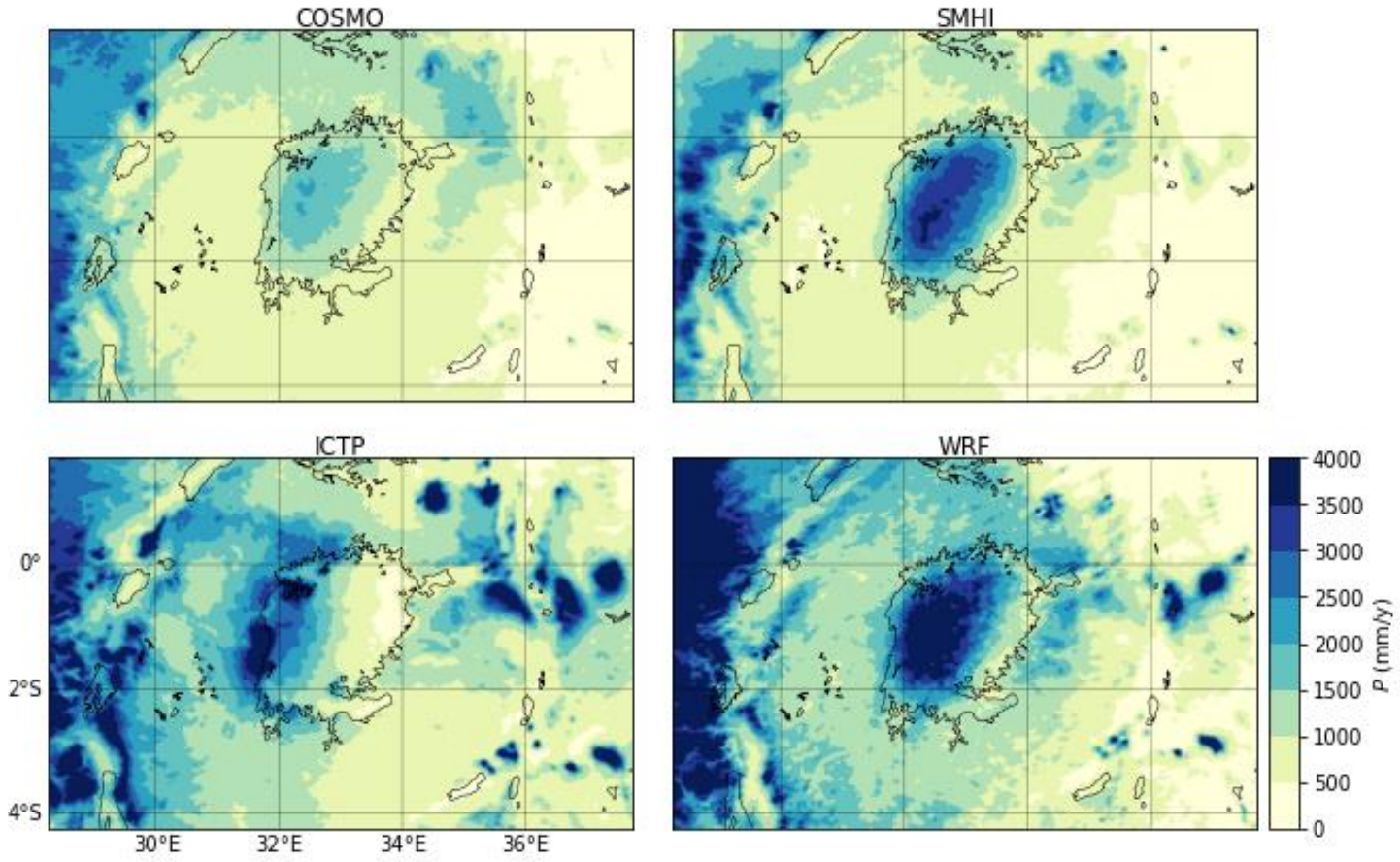




Evaluation of precipitation

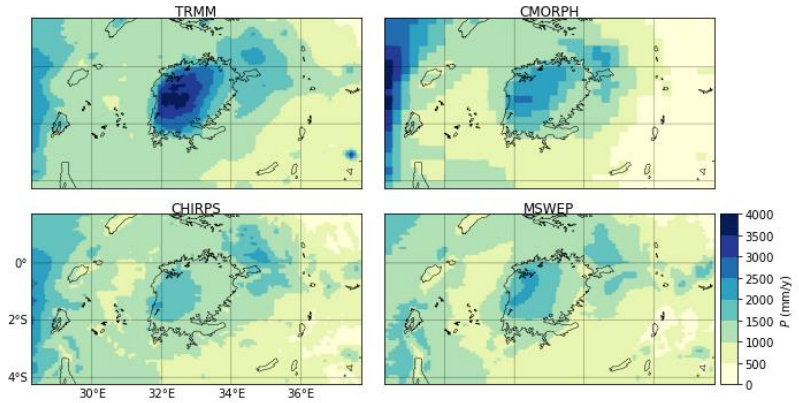
CPM for 2006-2009

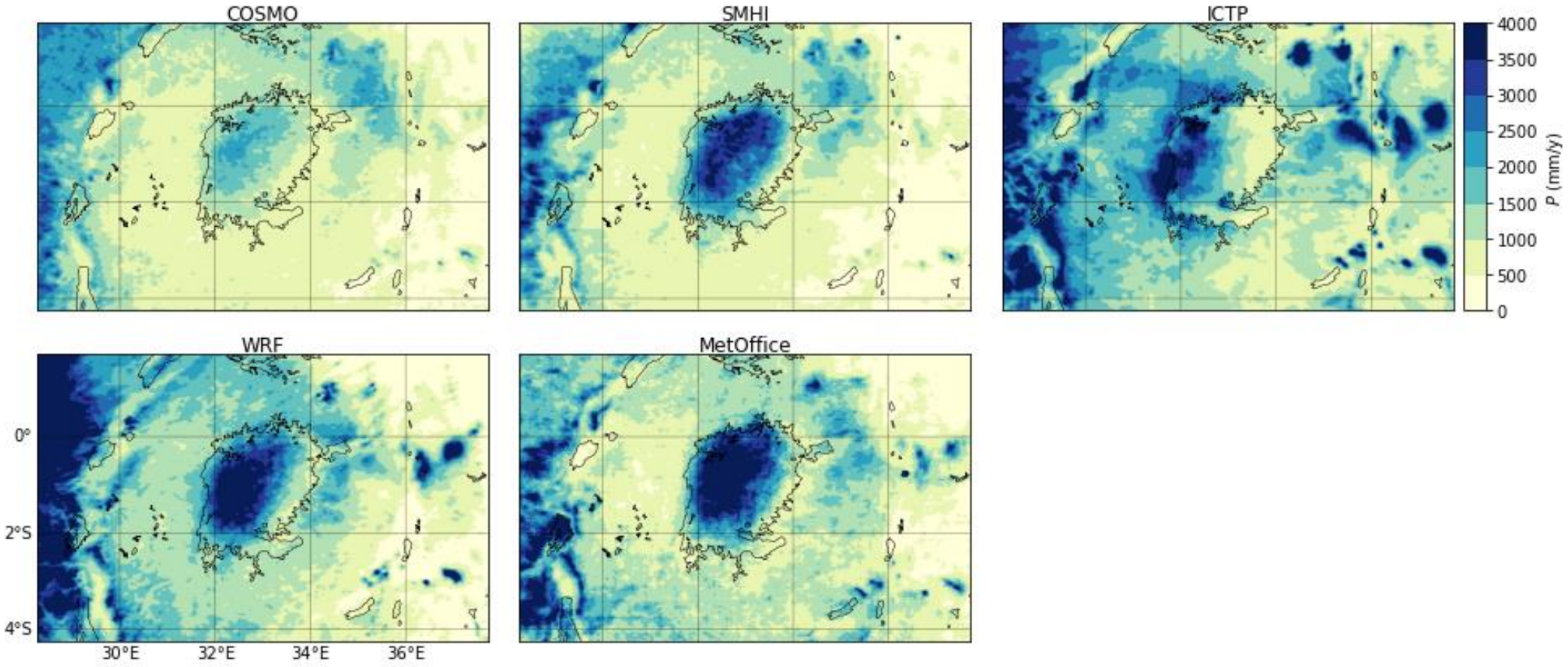




Evaluation of precipitation

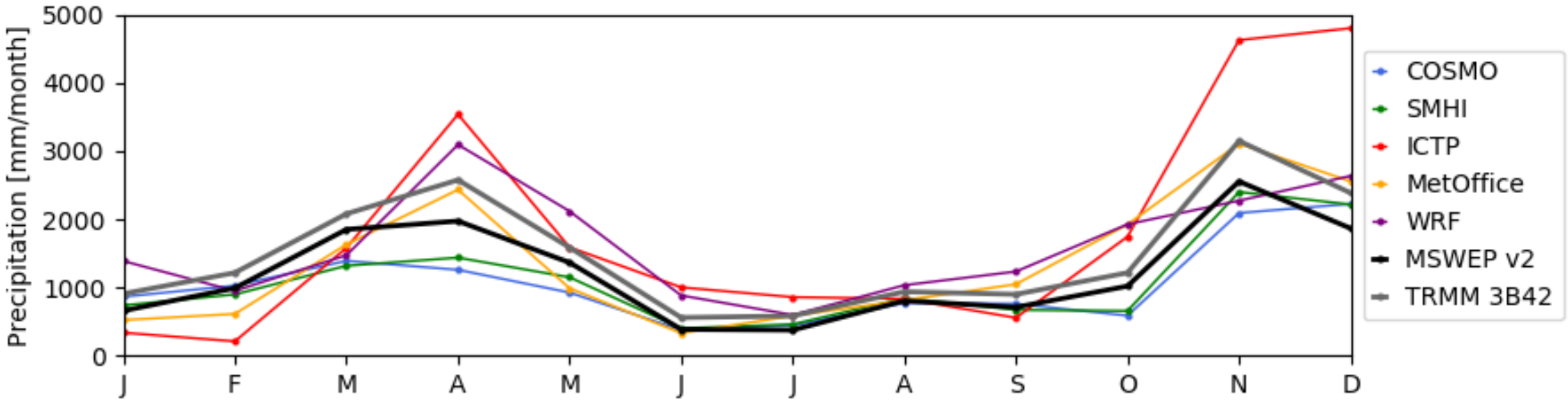
CPM for 2006





Evaluation of precipitation: AC

CPM for 2006



Evaluation of precipitation: DC

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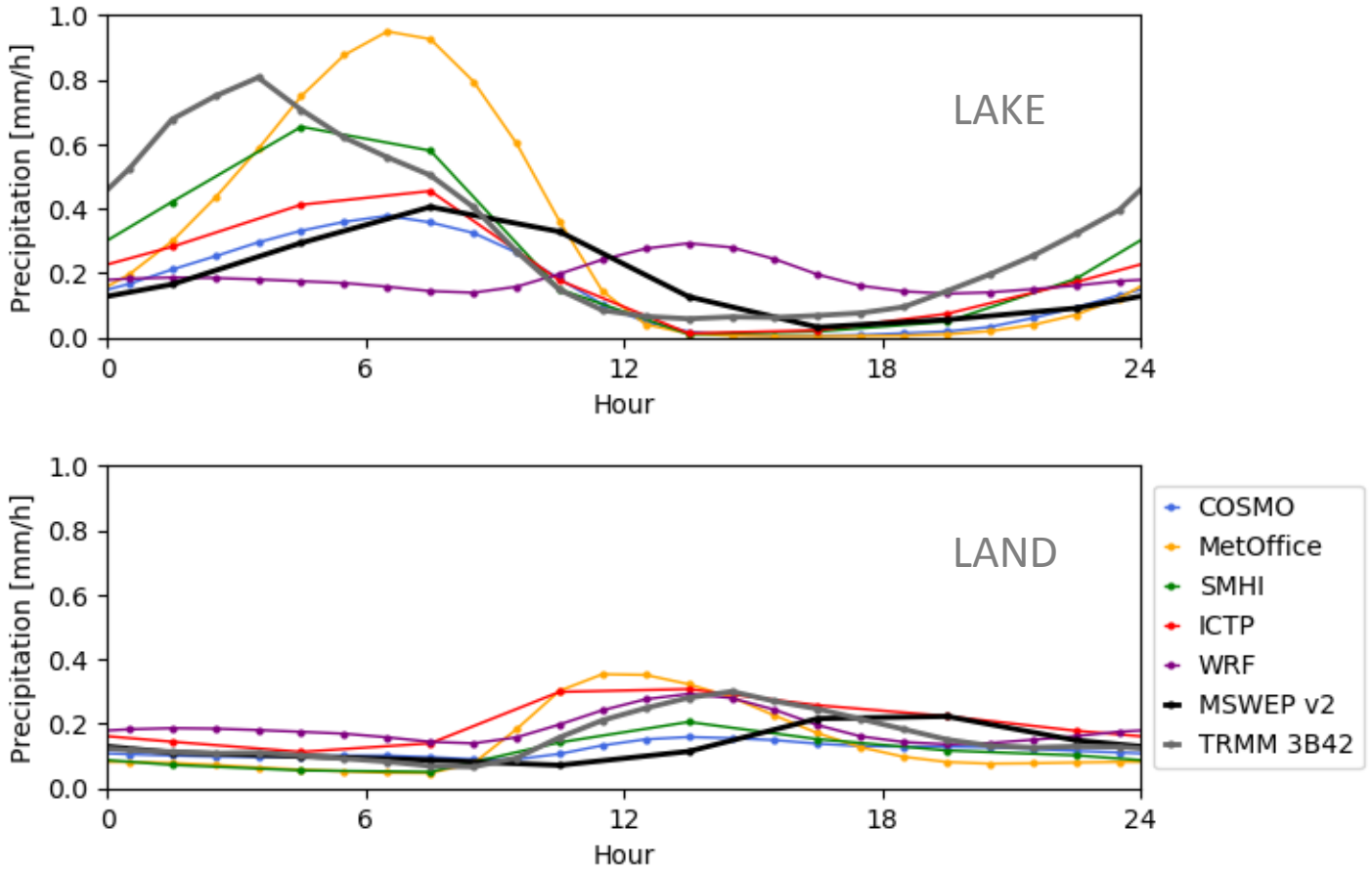
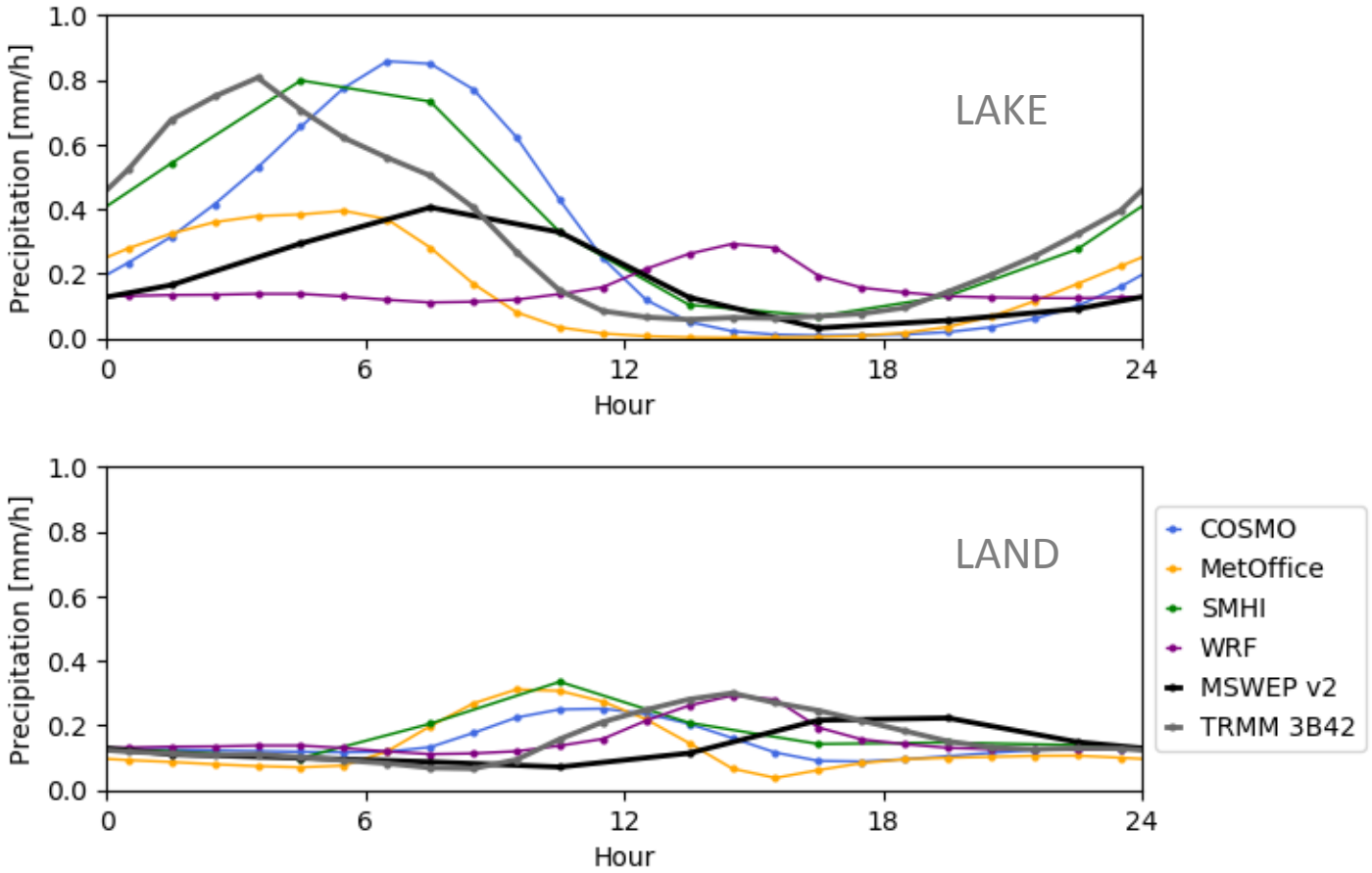


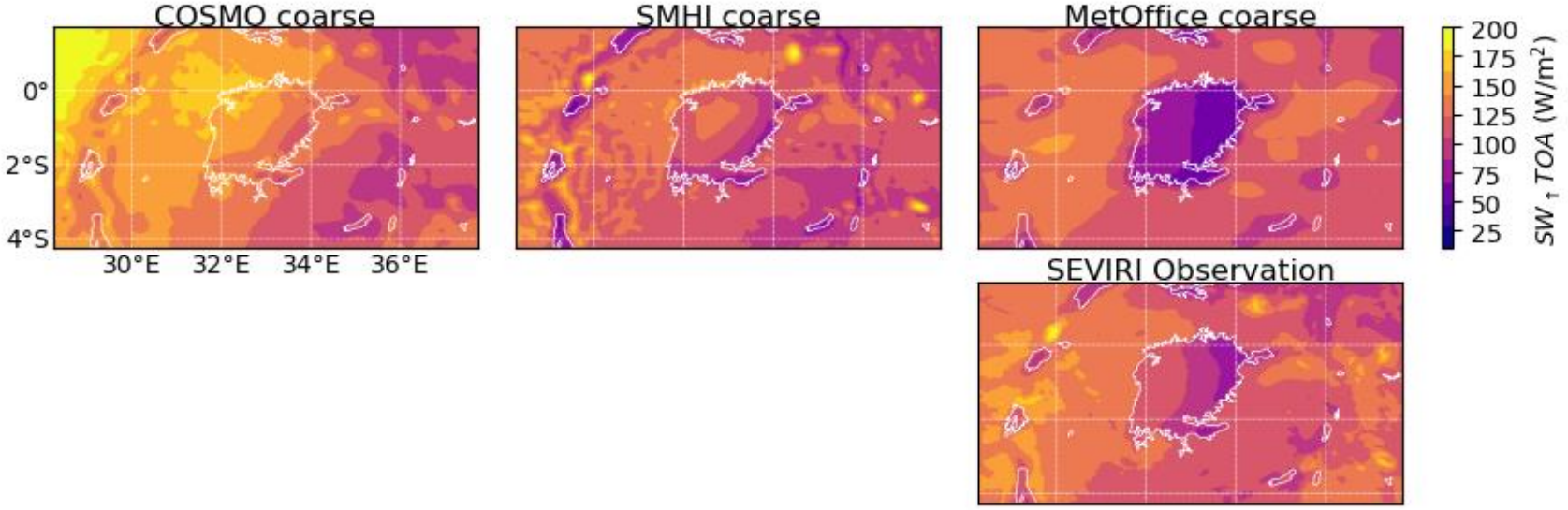
Evaluation of precipitation: DC

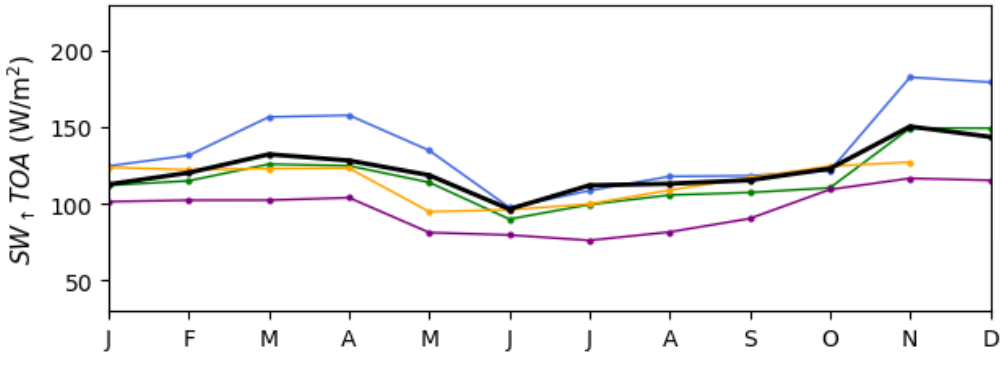
Coarse resolution (12km) for 2006

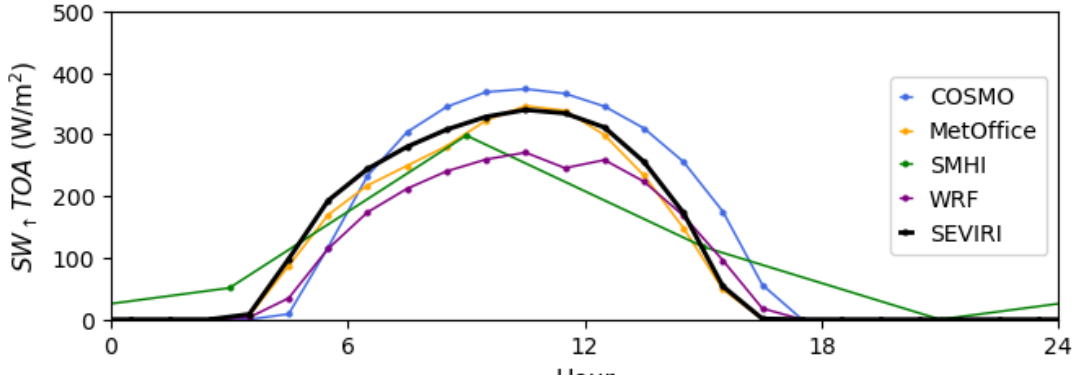


Evaluation of SW TOA radiation

Coarse resolution (12km) for 2006

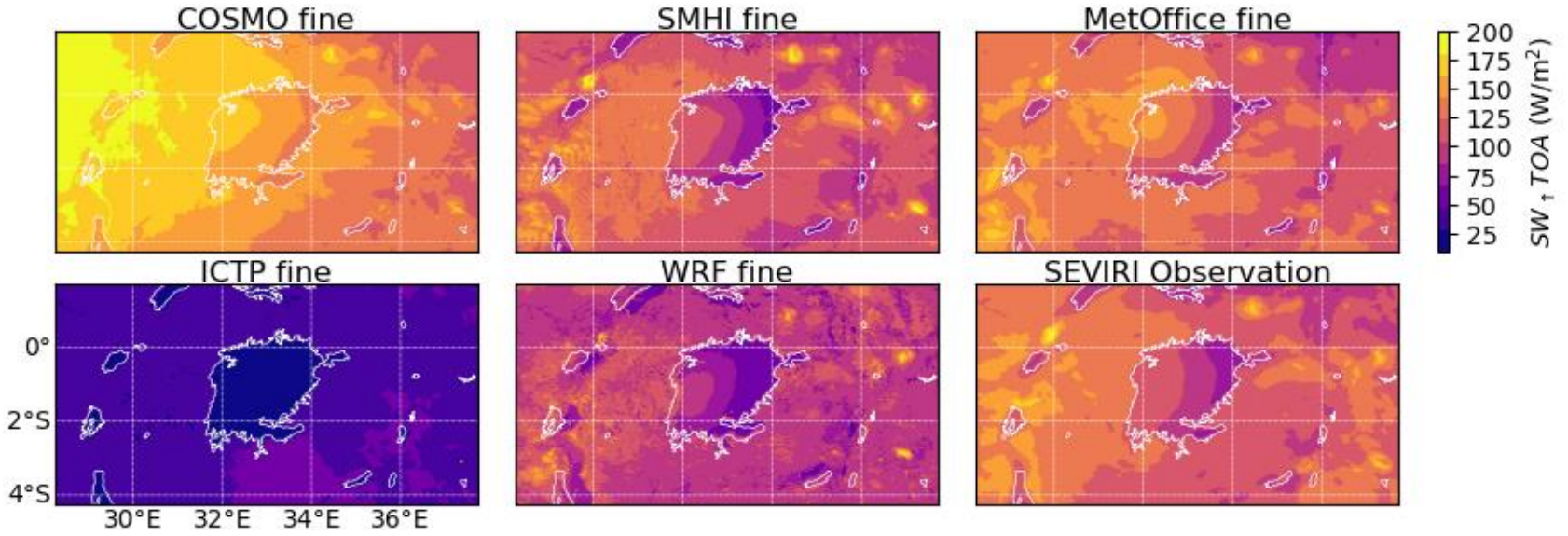


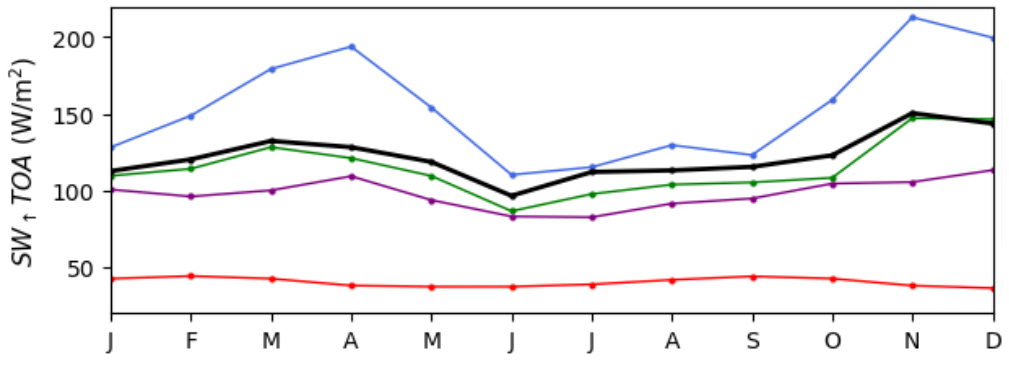


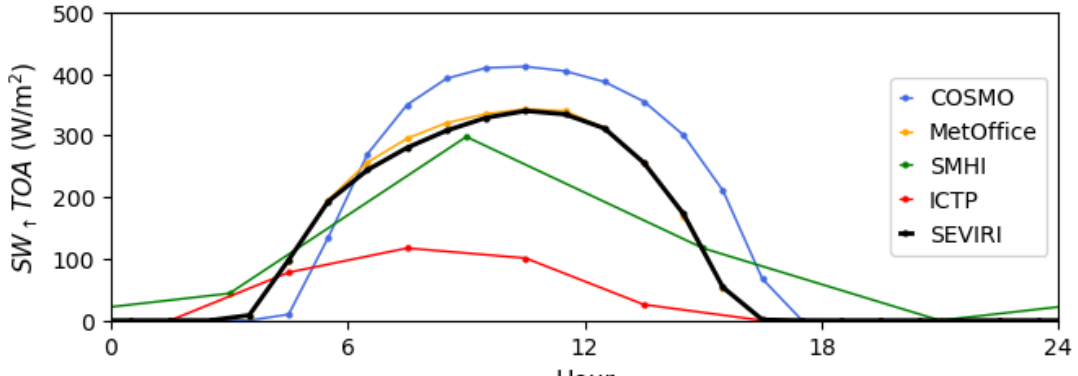


Evaluation of SW TOA radiation

CPM for 2006

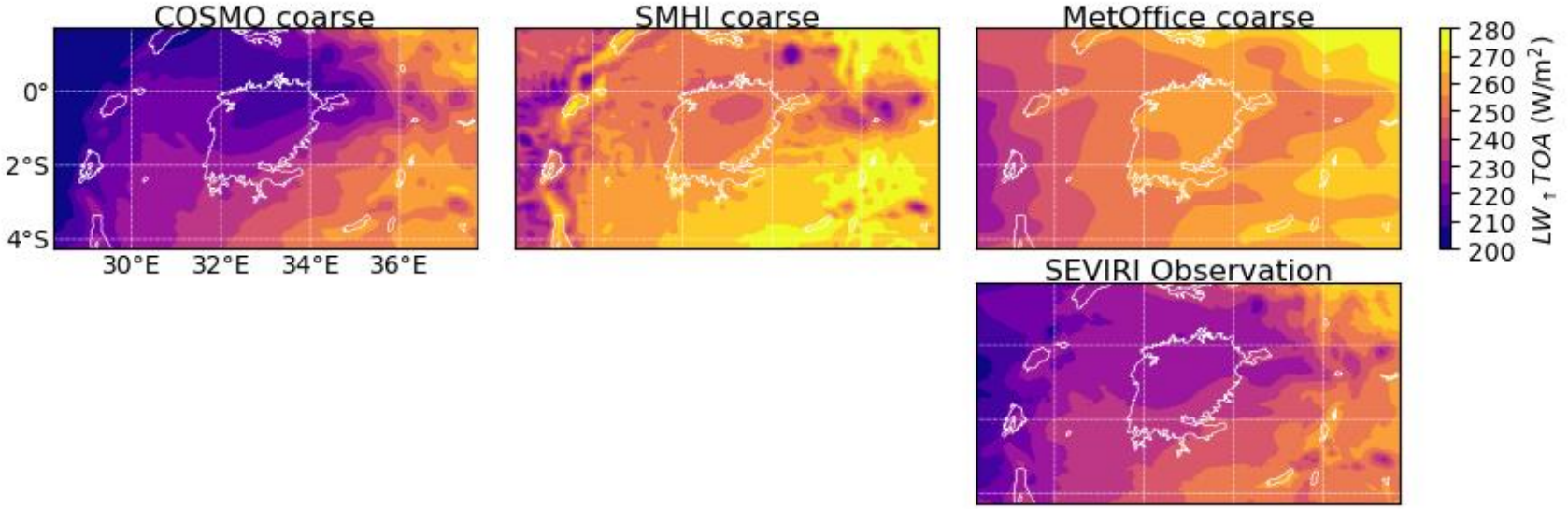


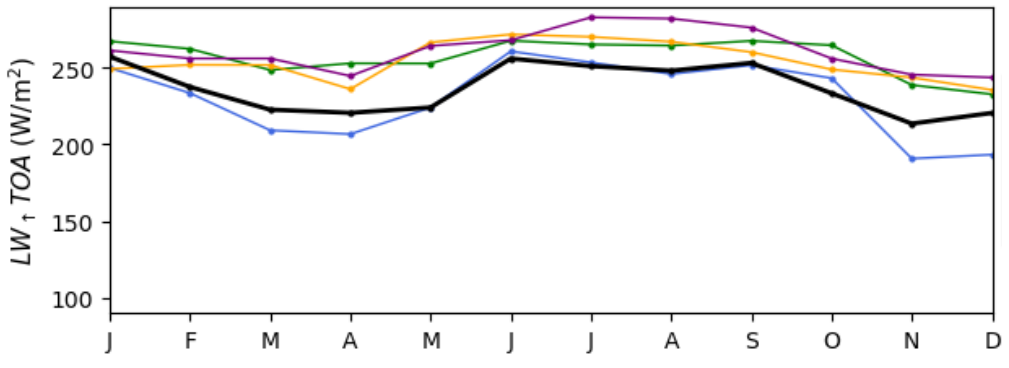


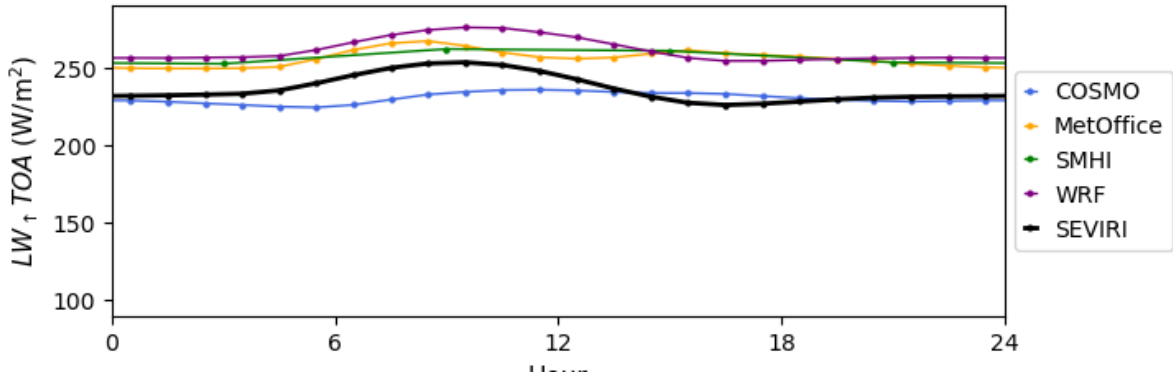


Evaluation of LW TOA radiation

Coarse resolution (12km) for 2006

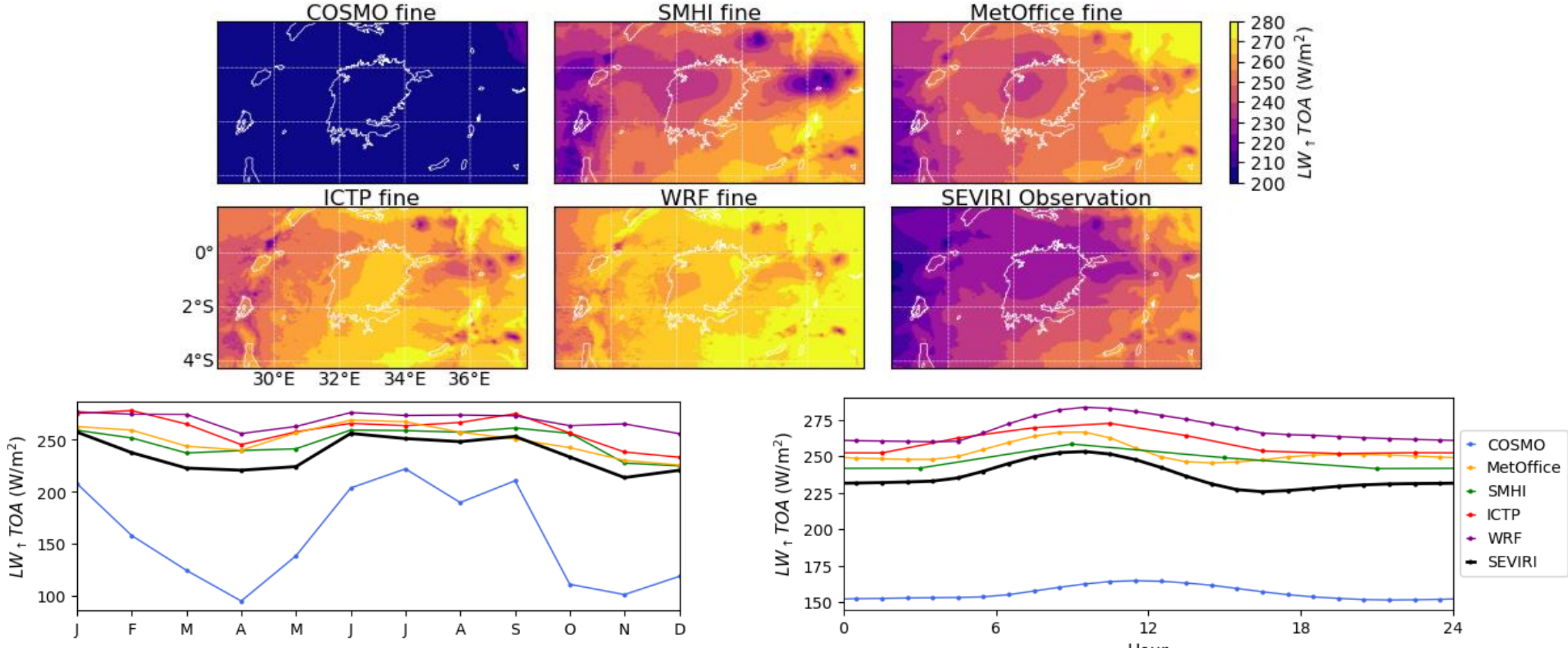






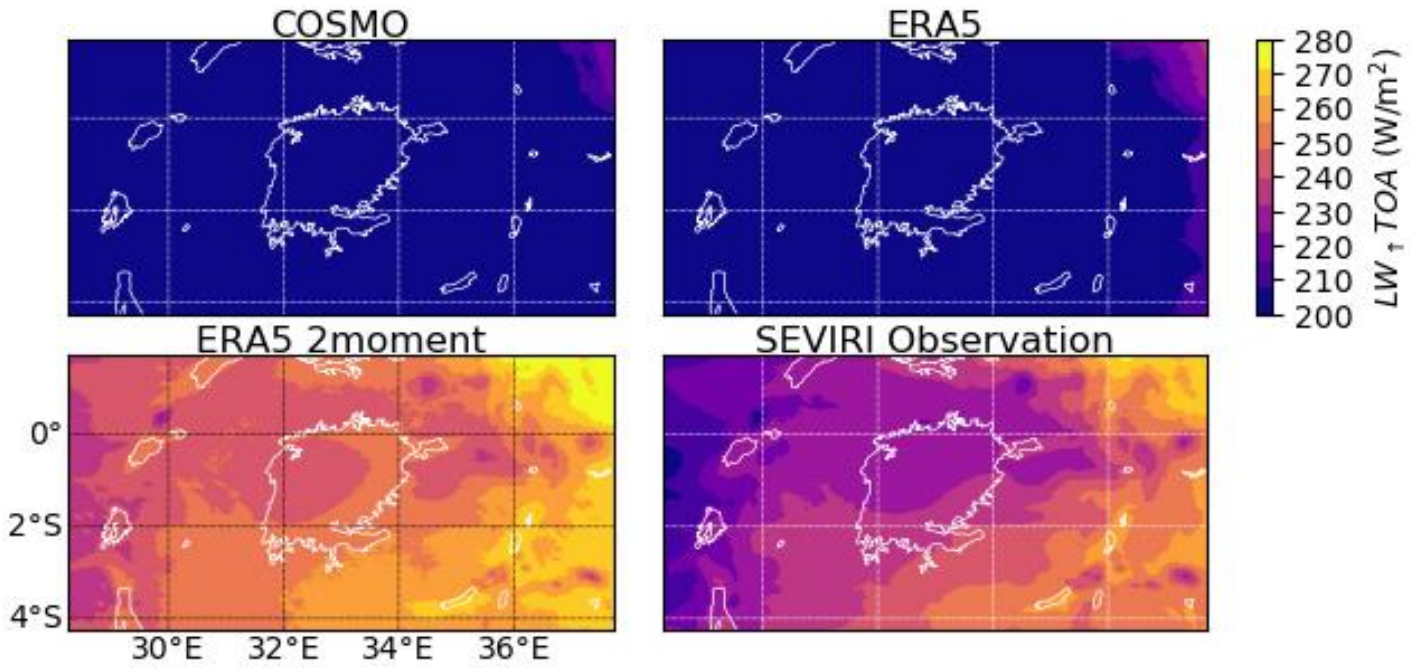
Evaluation of LW TOA radiation

CPM for 2006



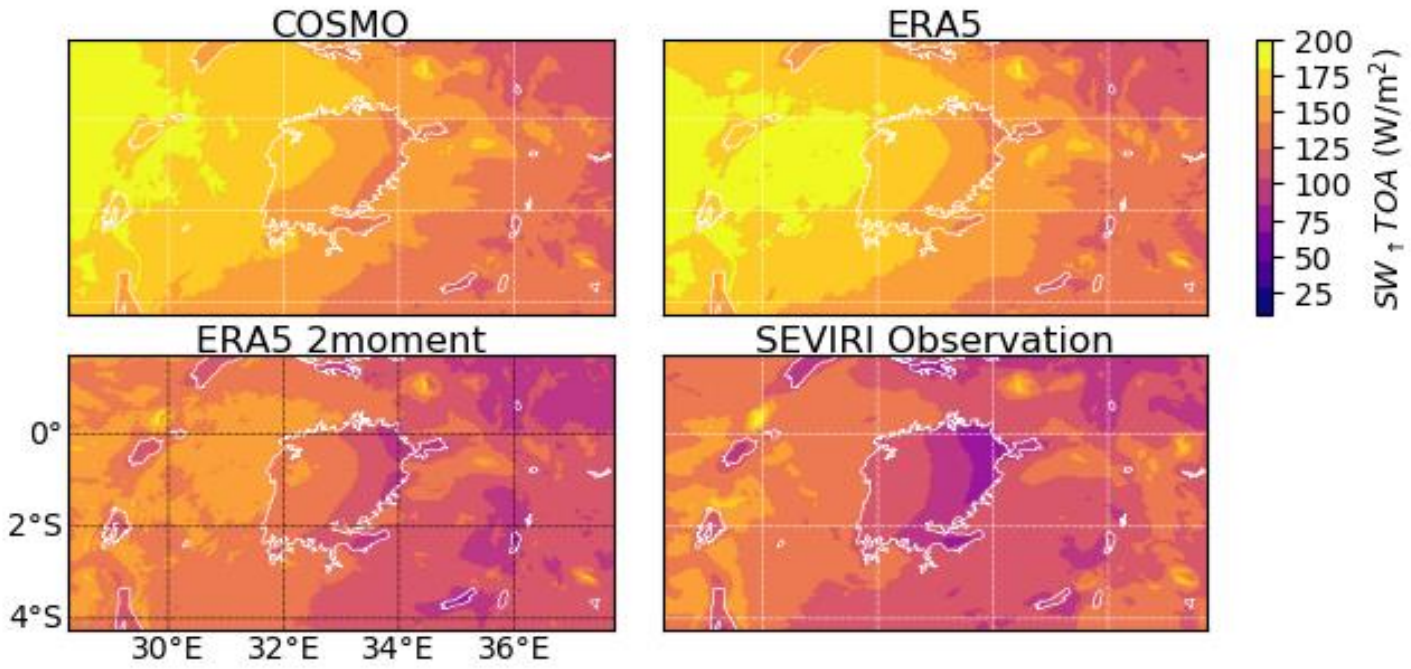
Sidejump: ERA5 driven, 2moment scheme test

CPM for 2006 , LW TOA radiation



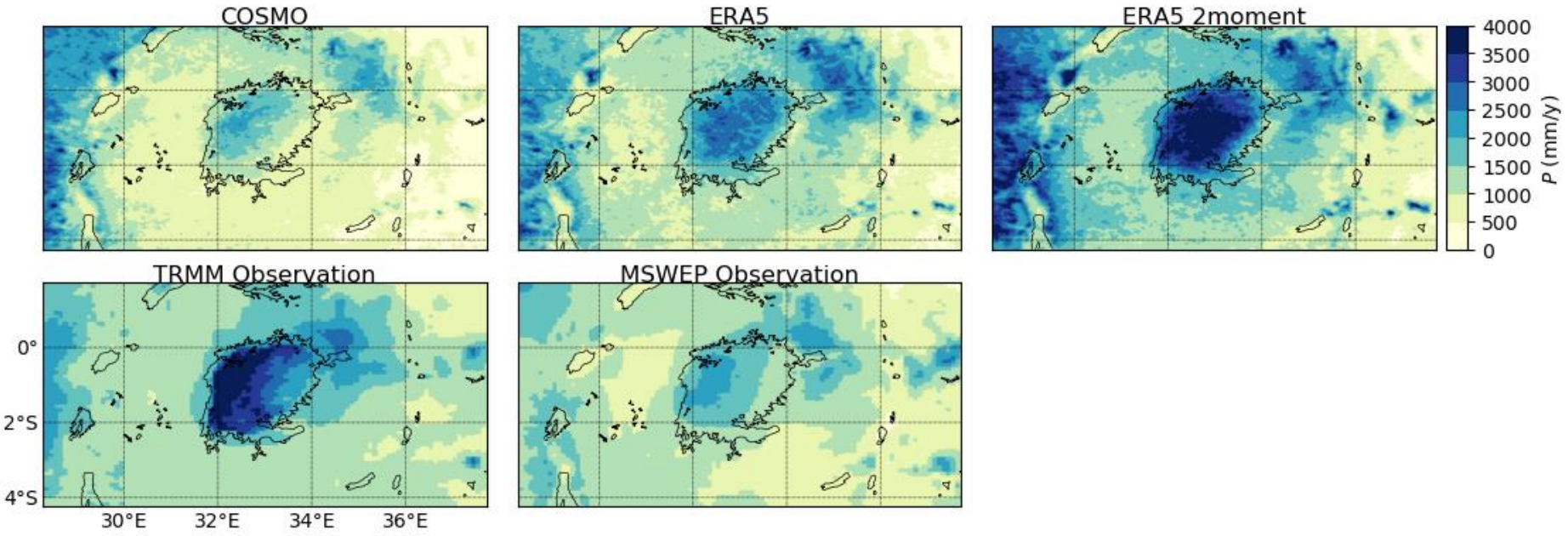
Sidejump: ERA5 driven, 2moment scheme test

CPM for 2006 , SW TOA radiation



Sidejump: ERA5 driven, 2moment scheme test

CPM for 2006 , precipitation

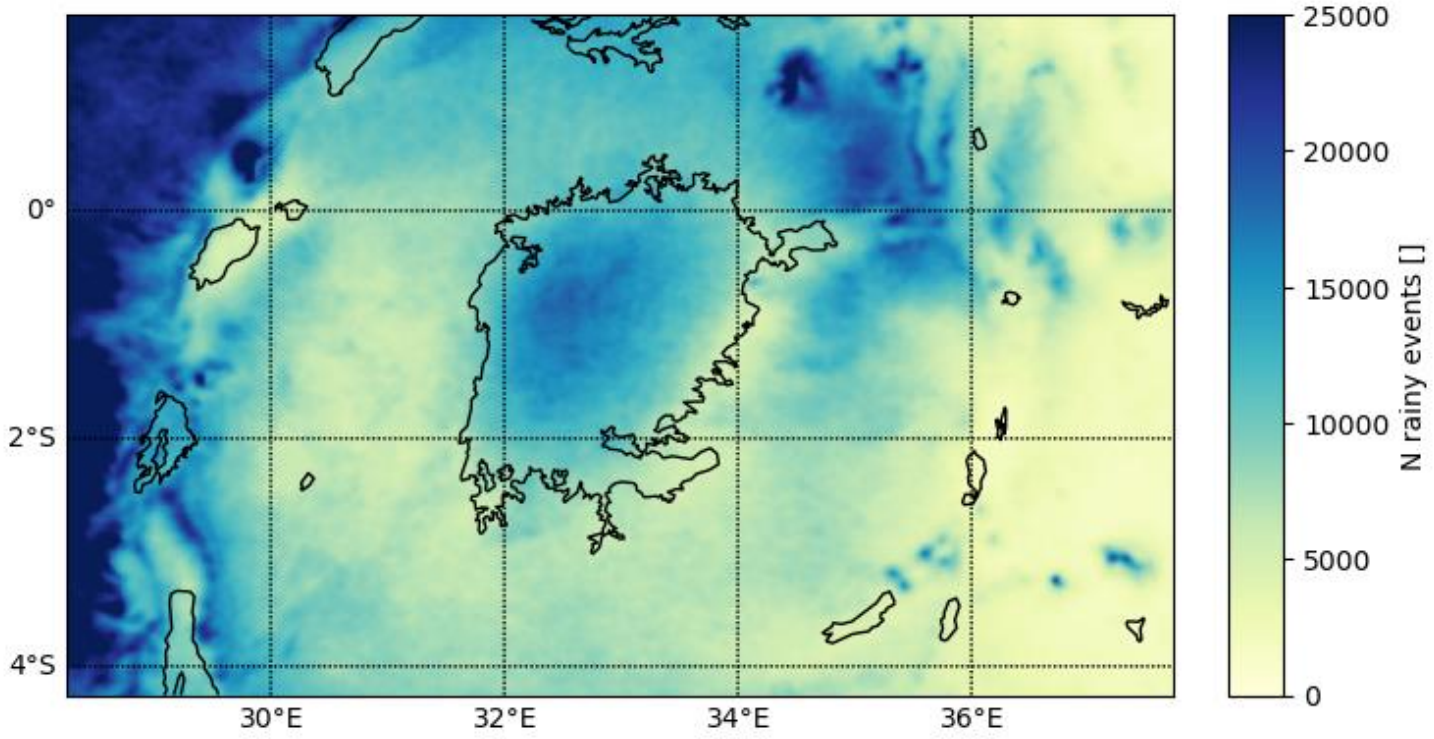


Conclusion

- CP RCM over Lake Victoria
- Ensemble of 6 members
- First evaluation for: Precip, Lake Temp, Toa Radiation
- CCLM improvements using ERA5 as driver,
  two-moment microphysics scheme
- Outlook: GCM driven historical run,
  Future projections
- https://ees.kuleuven.be/elvic/

About LV regional climate?

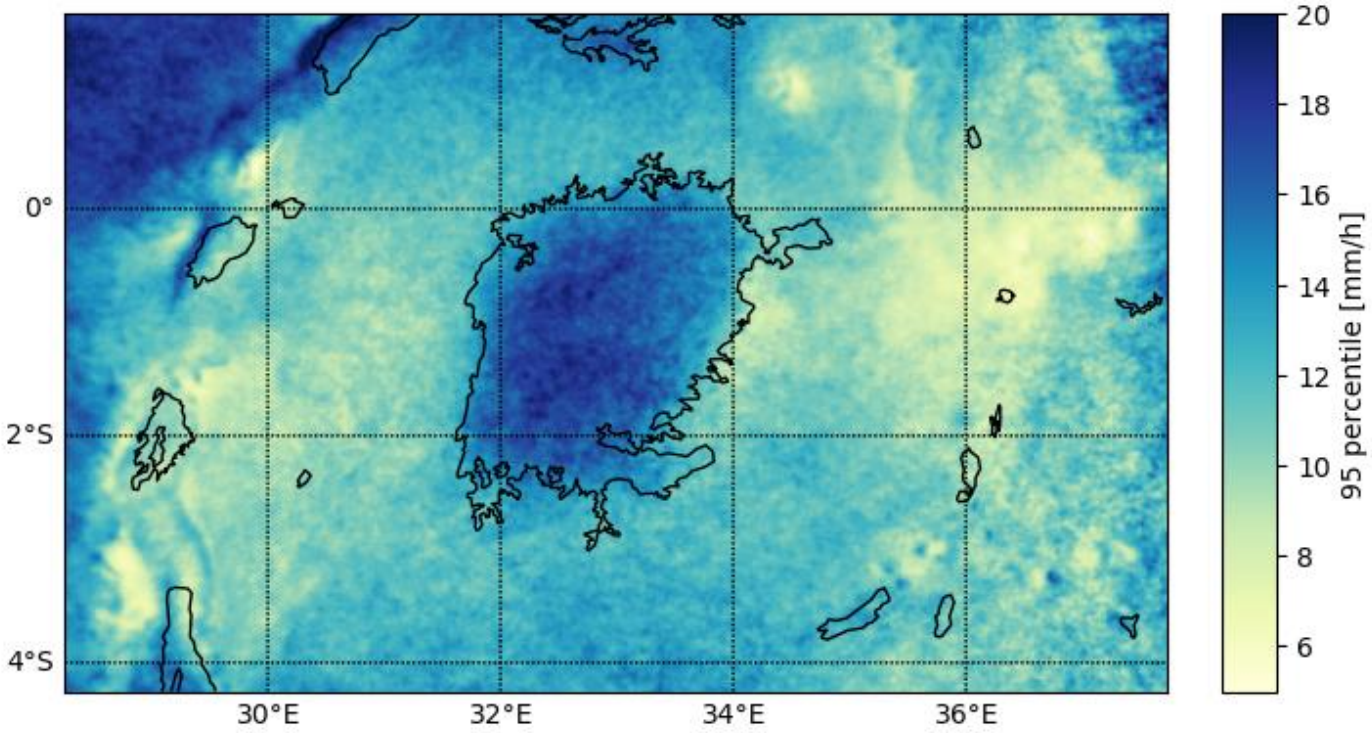
Number of rainy events (>0.1 mm/h)



ELVIC CCLM SIMULATION

About LV regional climate?

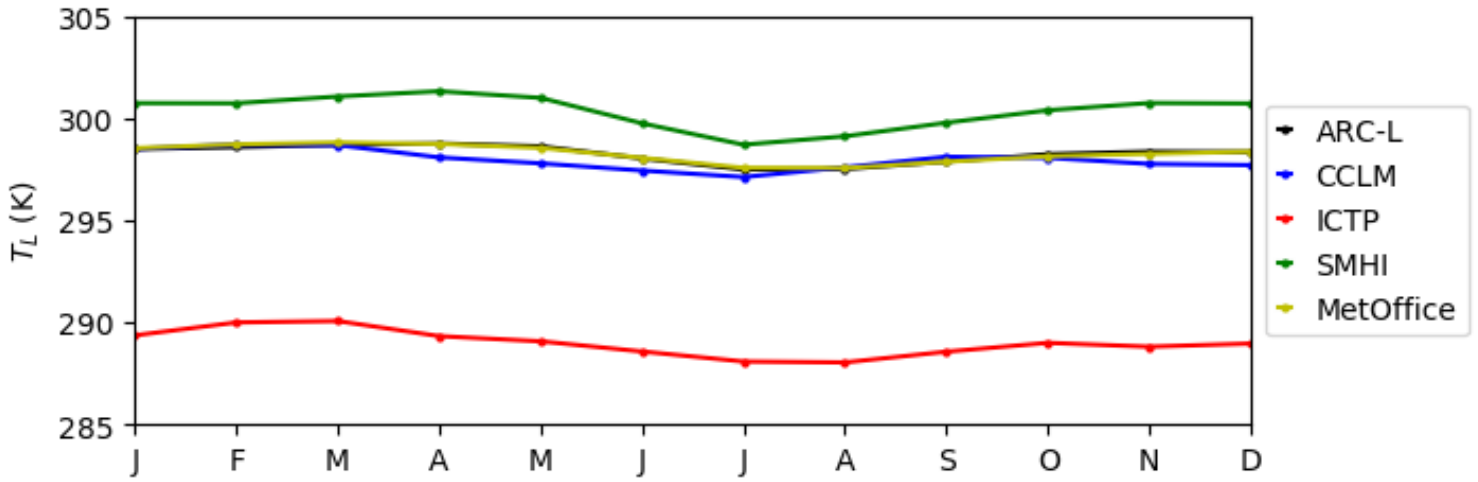
95th percentile (only considering rainy events >0.1 mm/h)



ELVIC CCLM SIMULATION

Evaluation of lake surface temperature: AC

CPM for 2006



Sidejump: ERA5 driven, 2moment scheme test

CPM for 2006 , precipitation