Verification and Case studies

Overview of activities

Flora Gofa

Status of PPCARMA: Amalia Iriza-Burca Alexander Kirshanov
COSMO Common verification: Alexander Kirshanov
Model Equivalent Calculator (MEC) overview: Roland Potthast


Software
PPCARMA
NWP Test
Suite
Verification
Applications
High Impact
Weather
Common
Plots (CP)
WG5
activities

- Versus new patches (September 2017 - present)

- **5.1.4/5.1.5 (Sept17/May18): implementation of verification for new BUFR format buoy data, correct visualization for cross verification graphics and for EPS verification pdf.**

- **5.1.6 (Oct 2018): management of the new synop messages BUFR template (SYNN), concerning cumulated/averaged fields defined by “time period” descriptor (windgust, precipitation…)**

- **5.1.7 (Jan 2019): bug fixing on software installation process, availability of txt output file for every EPS verification score.**

- **5.1.8 (May 2019): bug fixing on the EPS verification system (rank histogram graphics production), implementation of the code for the management of the new buoy/sounding wind speed descriptor (bufr mapping setting).**

- **5.1.9 (May 2019): implementation of the code for the management of the new bufr template for sounding observations (obs type = 2, obs subtype = 109/111).**

Advances in Rfdbk and Feedback File Verification at DWD

Felix Fundel

Deutscher Wetterdienst

FE 15 – Predictability & Verification

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II Feedback File Verification

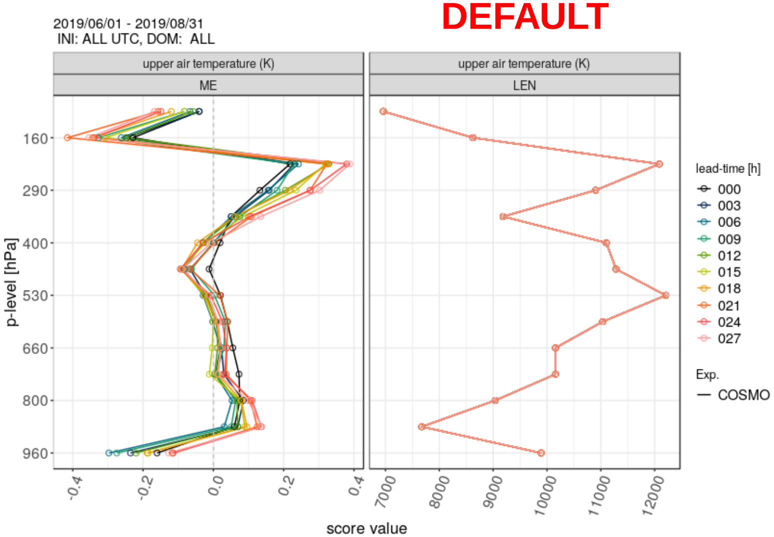
Deutscher Wetterdienst
Wetter und Klima aus einer Hand

New namelist options

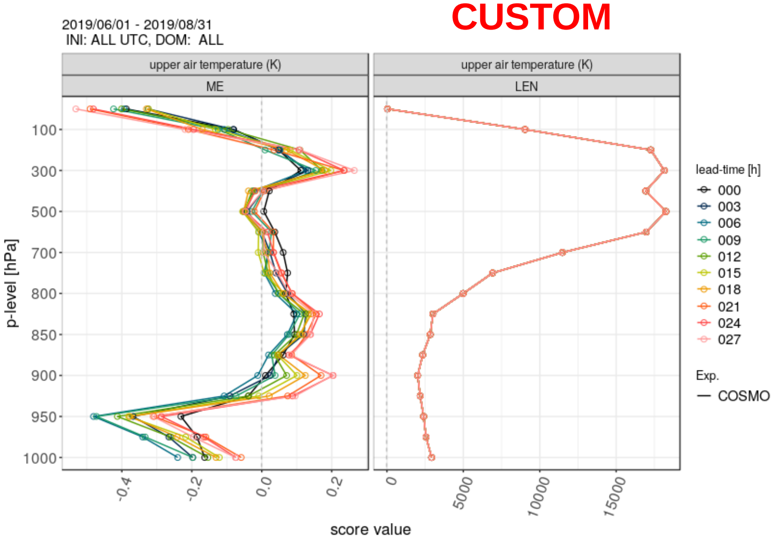
NAME	*VALUE (example)*	*DESCRIPTION*
customLevels	*‘1000,900,850,500’*	*user defined bin centers [hPa] for COSMO TEMP verification*
conditionX	*’ list(T2M='obs<273)‘*	*conditions now also for SYNOP EPS*
shinyServer	*’remote.machine.de’*	*copies results to this server*
shinyAppPath	*’ /data/user/shiny/’*	*copies results to this folder*

II Feedback File Verification

DEFAULT



CUSTOM

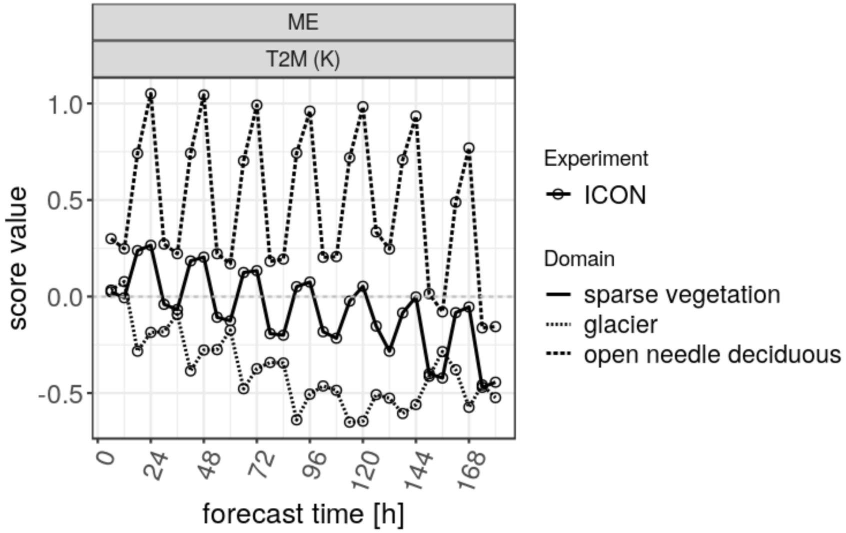


- Selection of vertical binning by namelist entry ‘customLevels‘
- User can define the bin centers
- Bins extend to the middle between bin centers
- Observations outside are attributed to the lowest/highest bin
- Only implemented for COSMO verification

II Feedback File Verification

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

- User defined stratification of the verification domain
- Station or polygon based
- Initiated via namelist
- ASCII File with domain specification has to be provided by the user
- Only condition: Domains must not overlap!



Example polygon domain table
name lon lat
NORD 8 50.001
NORD 15 50.001
NORD 15 55
NORD 8 55
SUED 8 45
SUED 15 45
SUED 15 50
SUED 8 50

Example station domain table
name id DE Q887
DE 10837
DE 10184
CH 06670
CH 06612
CH 06610

II Feedback File Verification

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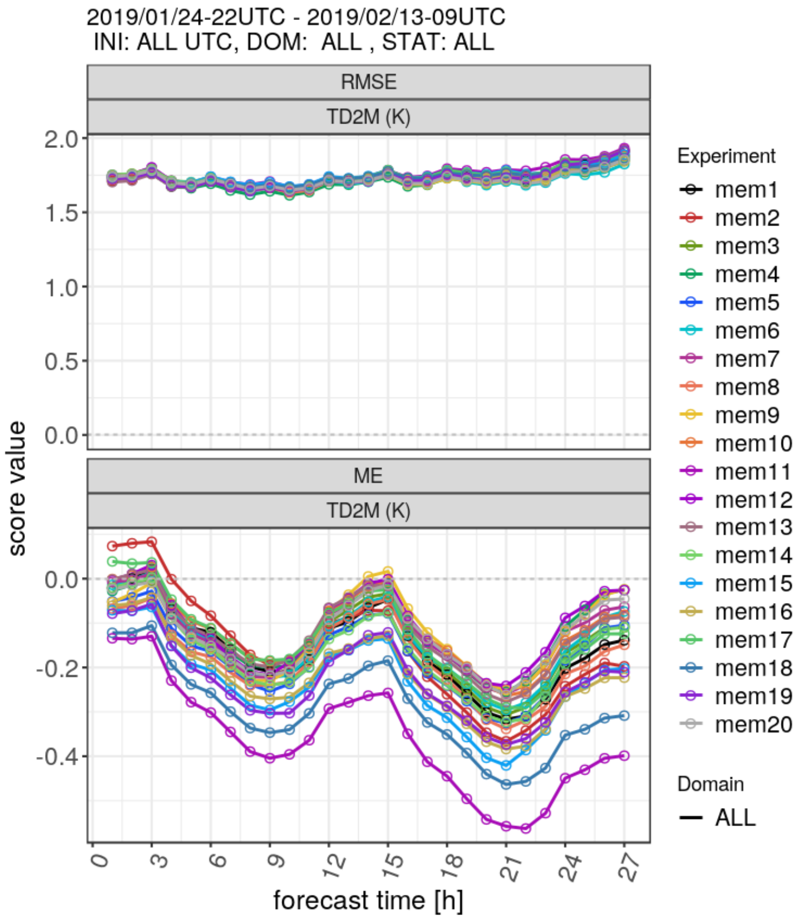
Wetter und Klima aus einer Hand



- Deterministic verification can be used to perform a single member verification
- Set 'veri_ens_member' and according repetition of 'expIds' and 'fdbkDirs' in namelist
- Comparatively time consuming as it does not use *fbk_wide* functionality

II Feedback File Verification

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

Revised EPS Verification

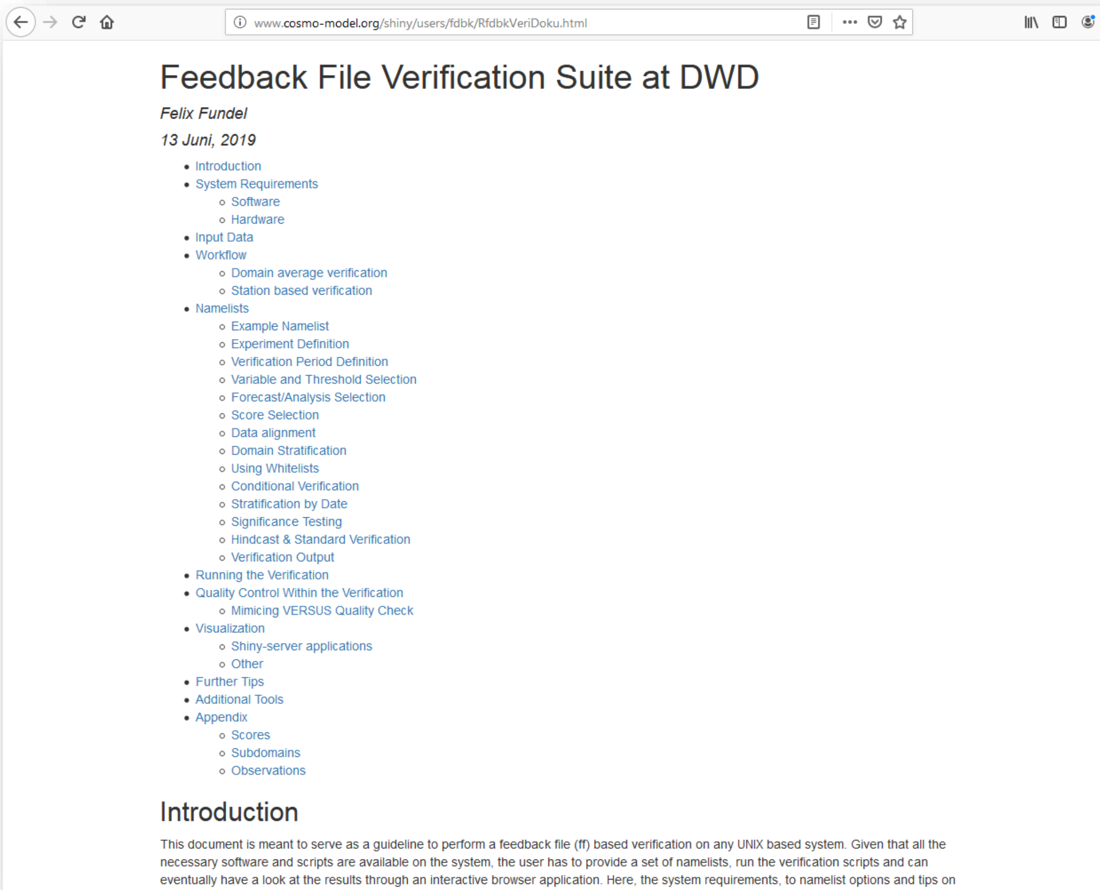
- Before: keeping intermediate Score files with station based scores
- Now: keeping only domain averages scores as in deterministic verification
- Additional efficiency plus from fdbk_wide function in Rfdbk
- Time series and significance test for ensemble scores are now possible
- Low memory usage allows for high degree of parallelization
- Verification results in a single score file, and one app was written to show ensemble (e.g. CRPS) and probabilistic (e.g. ROC) scores

All verification scripts can now be run on multiple cores

II Feedback File Verification

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

http://www.cosmo-model.org/shiny/users/fdbk/RfdbkVeriDoku.html



www.cosmo-model.org/shiny/users/fdbk/RfdbkVeriDoku.html

Feedback File Verification Suite at DWD

Felix Fundel

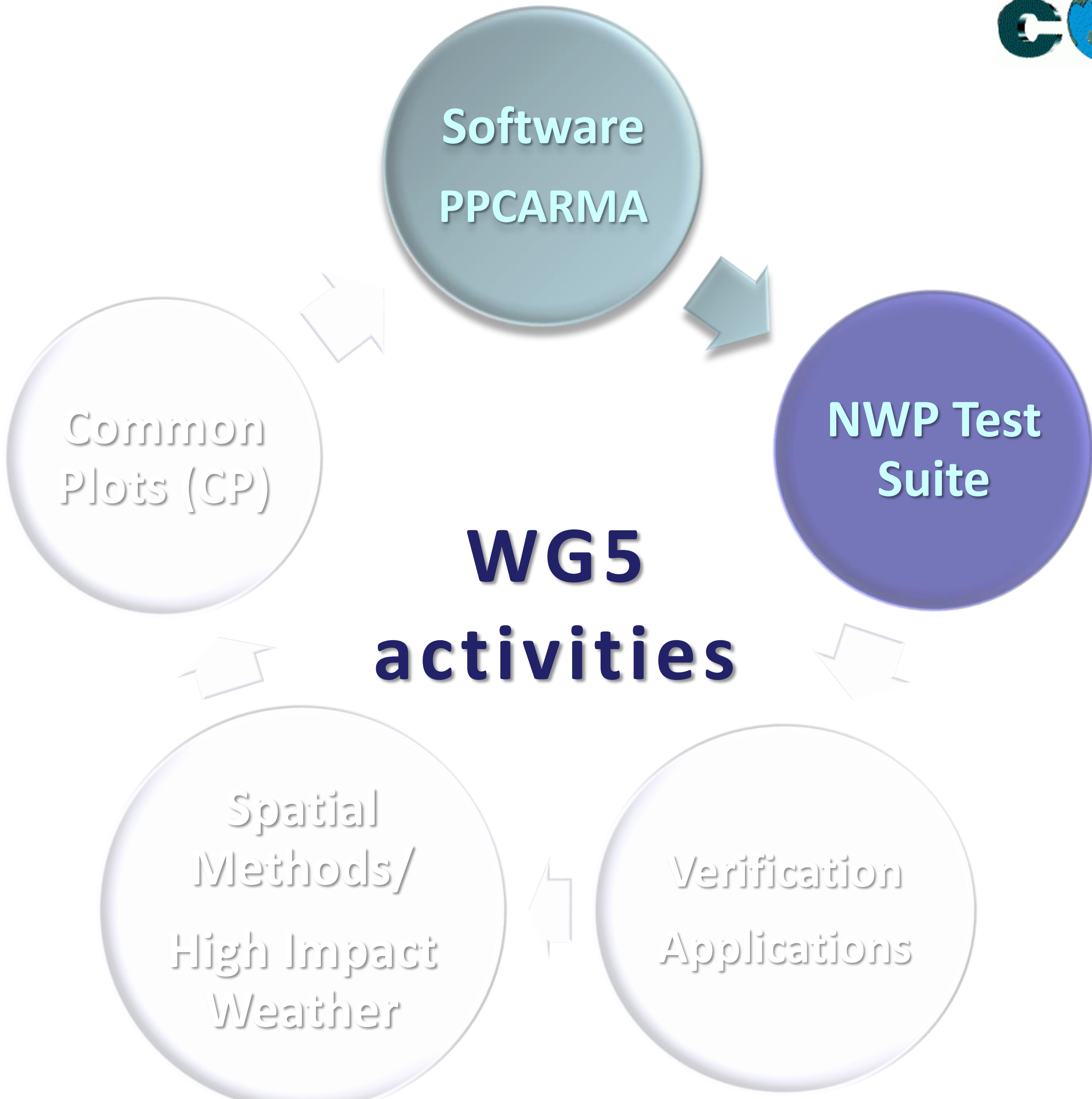
13 Juni, 2019

- Introduction
- System Requirements
  - Software
  - Hardware
- Input Data
- Workflow
  - Domain average verification
  - Station based verification
- Namelists
  - Example Namelist
  - Experiment Definition
  - Verification Period Definition
  - Variable and Threshold Selection
  - Forecast/Analysis Selection
  - Score Selection
  - Data alignment
  - Domain Stratification
  - Using Whitelists
  - Conditional Verification
  - Stratification by Date
  - Significance Testing
  - Hindcast & Standard Verification
  - Verification Output
- Running the Verification
- Quality Control Within the Verification
  - Mimicing VERSUS Quality Check
- Visualization
  - Shiny-server applications
  - Other
- Further Tips
- Additional Tools
- Appendix
  - Scores
  - Subdomains
  - Observations

Introduction

This document is meant to serve as a guideline to perform a feedback file (ff) based verification on any UNIX based system. Given that all the necessary software and scripts are available on the system, the user has to provide a set of namelists, run the verification scripts and can eventually have a look at the results through an interactive browser application. Here, the system requirements, to namelist options and tips on

Also the CARMA Training presentations and exercises on http://www.cosmo-model.org/shiny/users/fdbk/



21TH COSMO General Meeting , 9-12 Sept 2019, Roma, WG5 Overview

MODEL OUTPUT VERIFICATION

- **Verification modules**:
  - ➔ V5.05 against v5.06 (7 km, DP, hindcast)
  - ➔ V5.05 against v5.06 (2.8 km, DP, hindcast)
  - ➔ V5.06 DP against SP (7km, hindcast)
  - ➔ V5.05 against v5.06 (7km, SP, hindcast)

- **MEC+Rfdbk verification procedure**
  - ➔ conversion of observations (**bufr2netcdf)**
  - ➔ pre-processing of model output in grib format for ingestion in MEC
  - ➔ processing model output and corresponding observations to obtain feedback files
    - ✓ MEC-1.57
  - ➔ execution of verification procedures (Rfdbk)
    - ✓ R 3.5.2 version
  - ➔ New R scripts by Felix
  - ➔ Mimic VERSUS capability Station list from VERSUS (adapted for Rfdbk)

RESULTS available on the COSMO shiny server

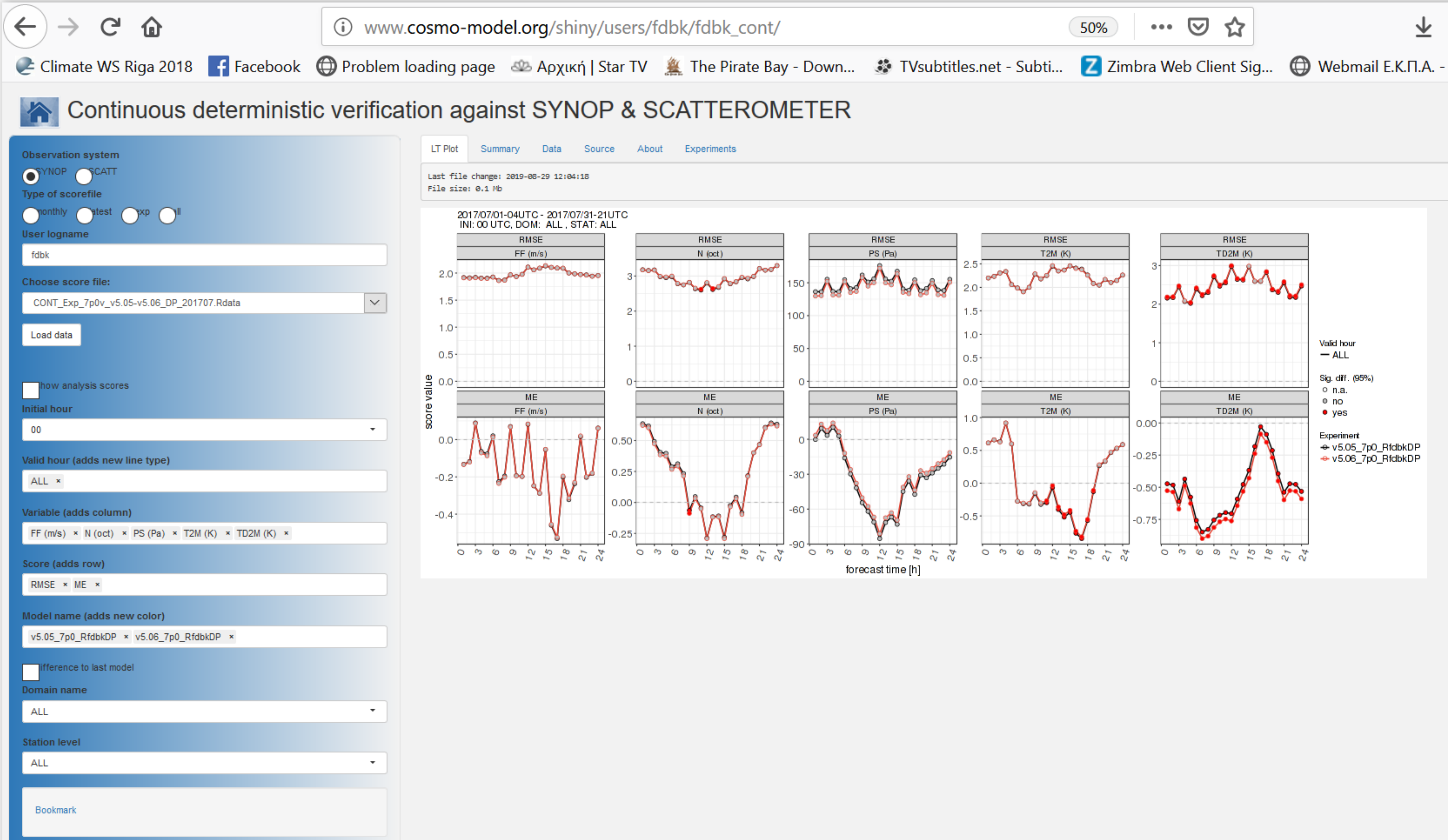
(complete overview of statistical analysis/graphs/numbers)

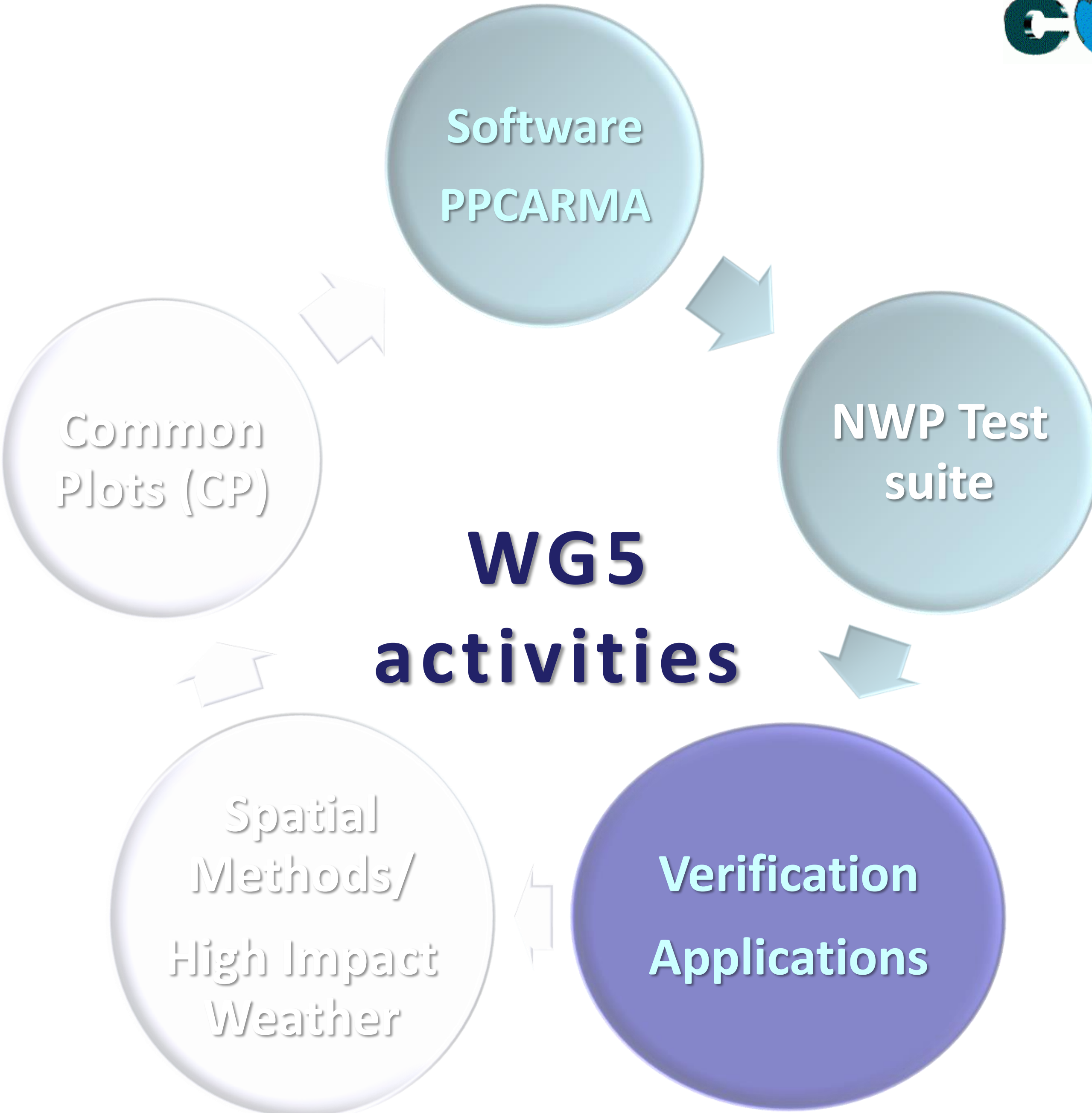
REPORT IS DRAFTED, will be available soon if it is not already!

NWP Test Suite (COSMOv5.06)

http://www.cosmo-model.org/shiny/users/fdbk/

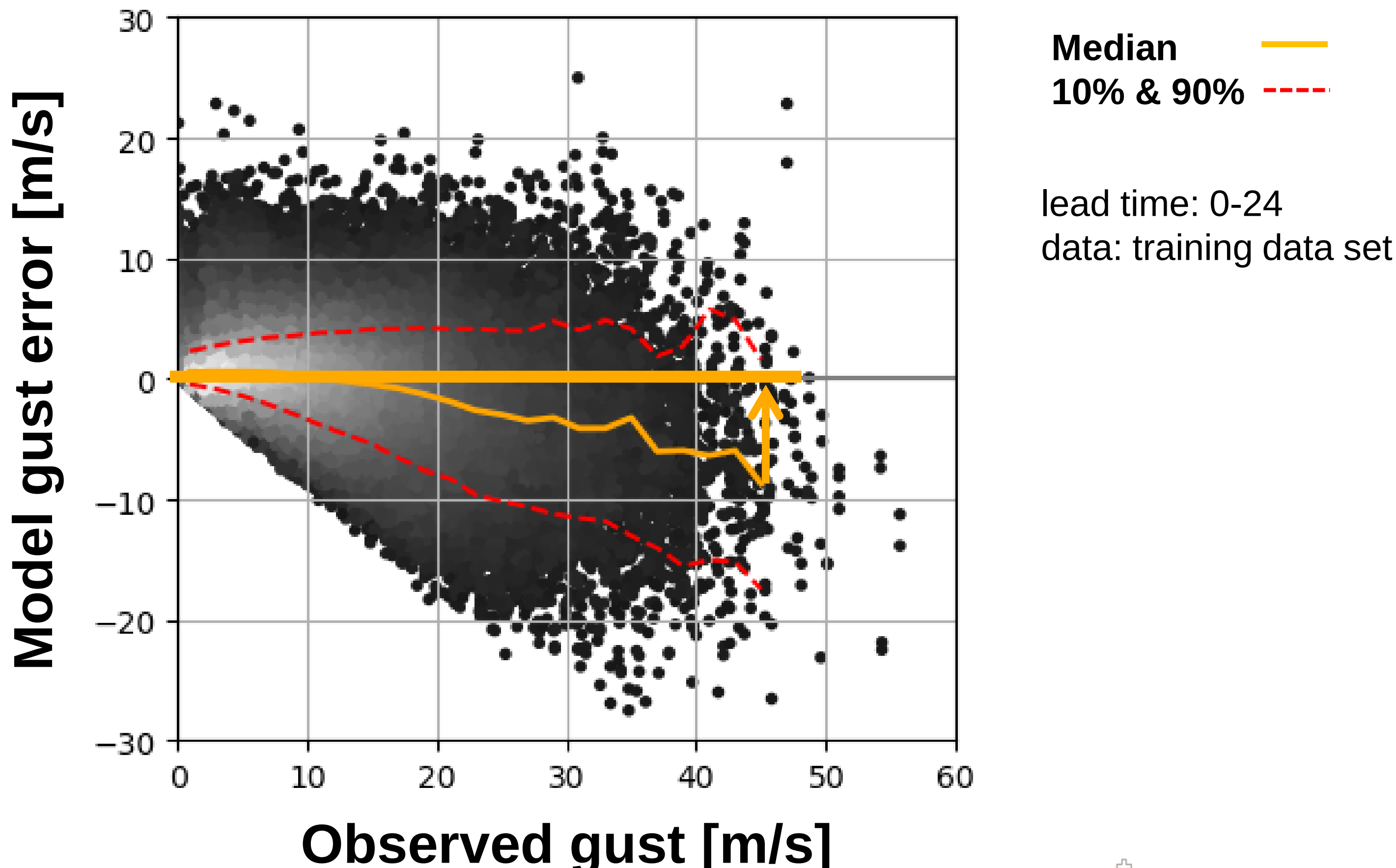
V5.05 against v5.06 (7 km, DP, hindcast)




Software
PPCARMA
NWP Test suite
Verification Applications
Spatial Methods/
High Impact Weather
Common Plots (CP)
WG5 activities

The Problem

COSMO-1 underestimates strong wind gusts.



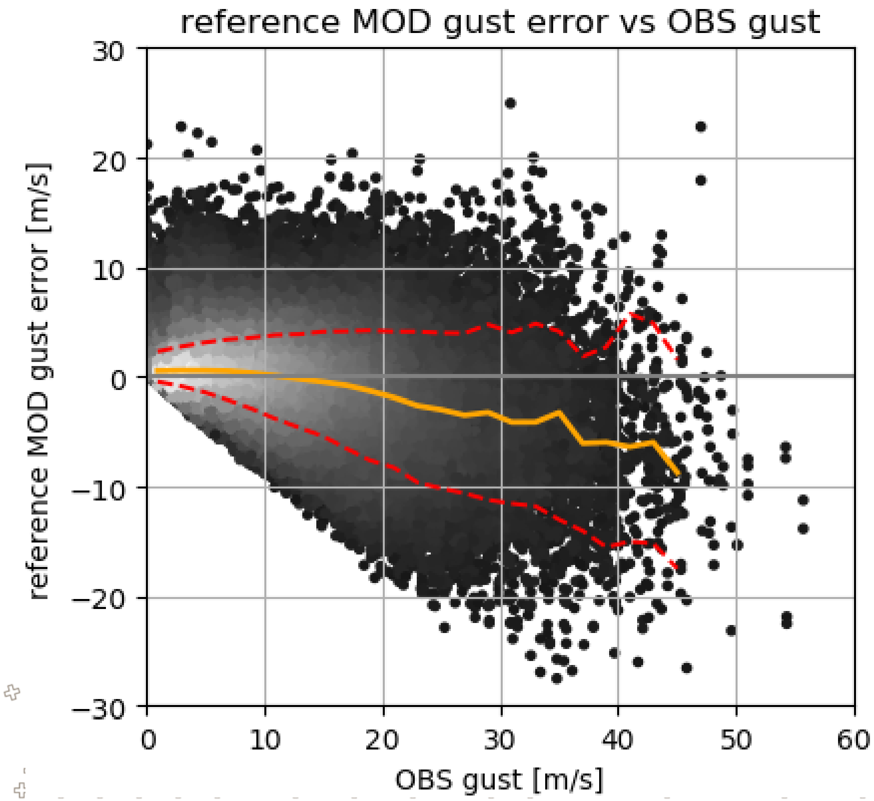
- ***Christoph Heim***
- ***Guy de Morsier, Oliver Fuhrer, André Walser, Pirmin Kaufmann, Marco Arpagaus***

Statistical Model (operational in COSMO-1)

itype_diag_gusts=1

- Simple linear model based on 2 predictors:
  - model mean wind at 10m (WIND)
  - transfer coefficient of momentum (TCM)

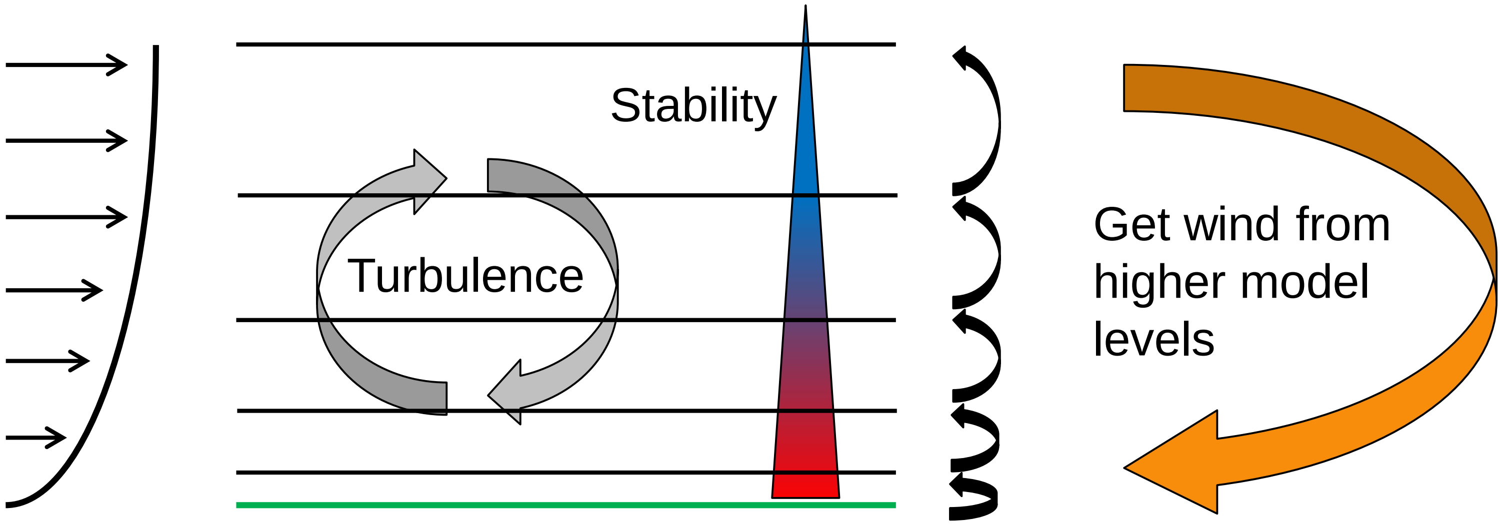
$$GUST = WIND + \alpha * \mathrm{sqrt}(TCM) * WIND$$



Median
10% & 90%

New Gust Parameterization

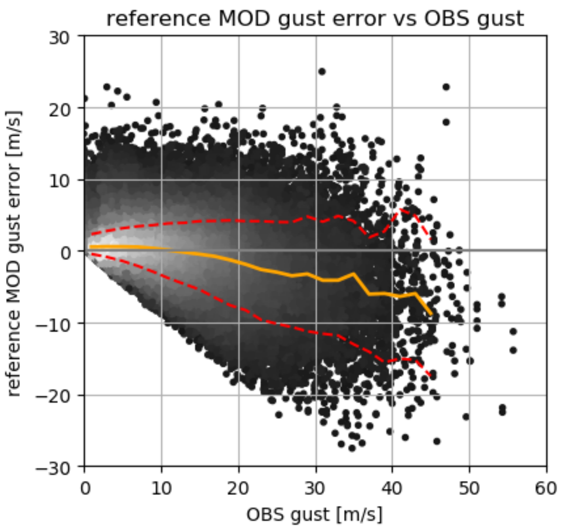
- Linear model based on a physical parameterization (**Brasseur**)
- Brasseur compares vertical profiles of stability and turbulence
- Linear model thus implicitly contains information from higher model levels!



GUST = WIND + α * sqrt(TCM) * WIND

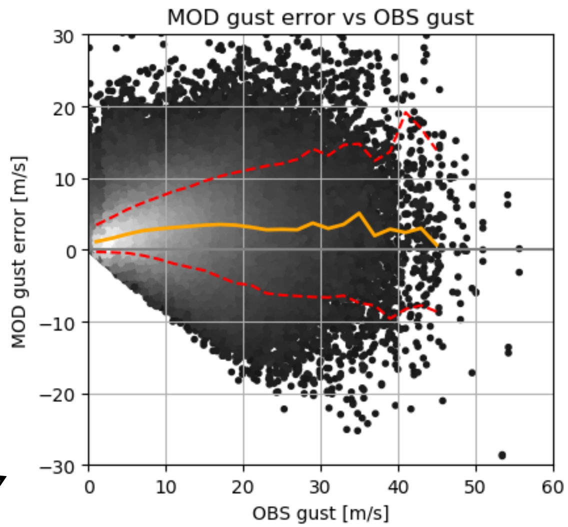
(operational)

α = 7.2



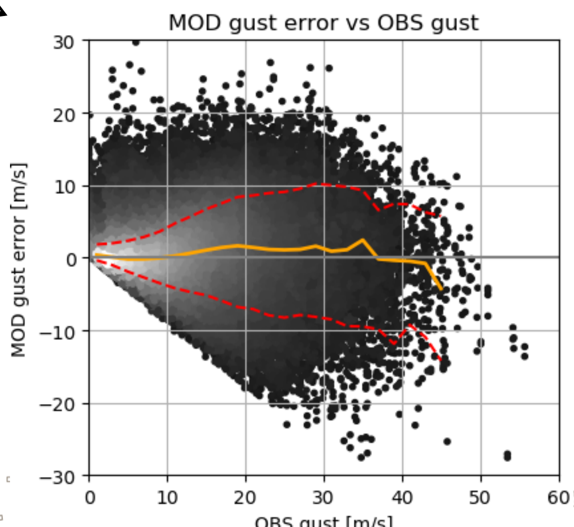
RMSE	2.9
ME	0.3

α = 10



RMSE	4.5
ME	2.6

new parameterization



RMSE	3.2
ME	0.4

Limitations of New Parameterization

- New gust parameterization is a statistical model. Can be expected to work only within the domain of data used for training of coefficients. Everything else is extrapolation.

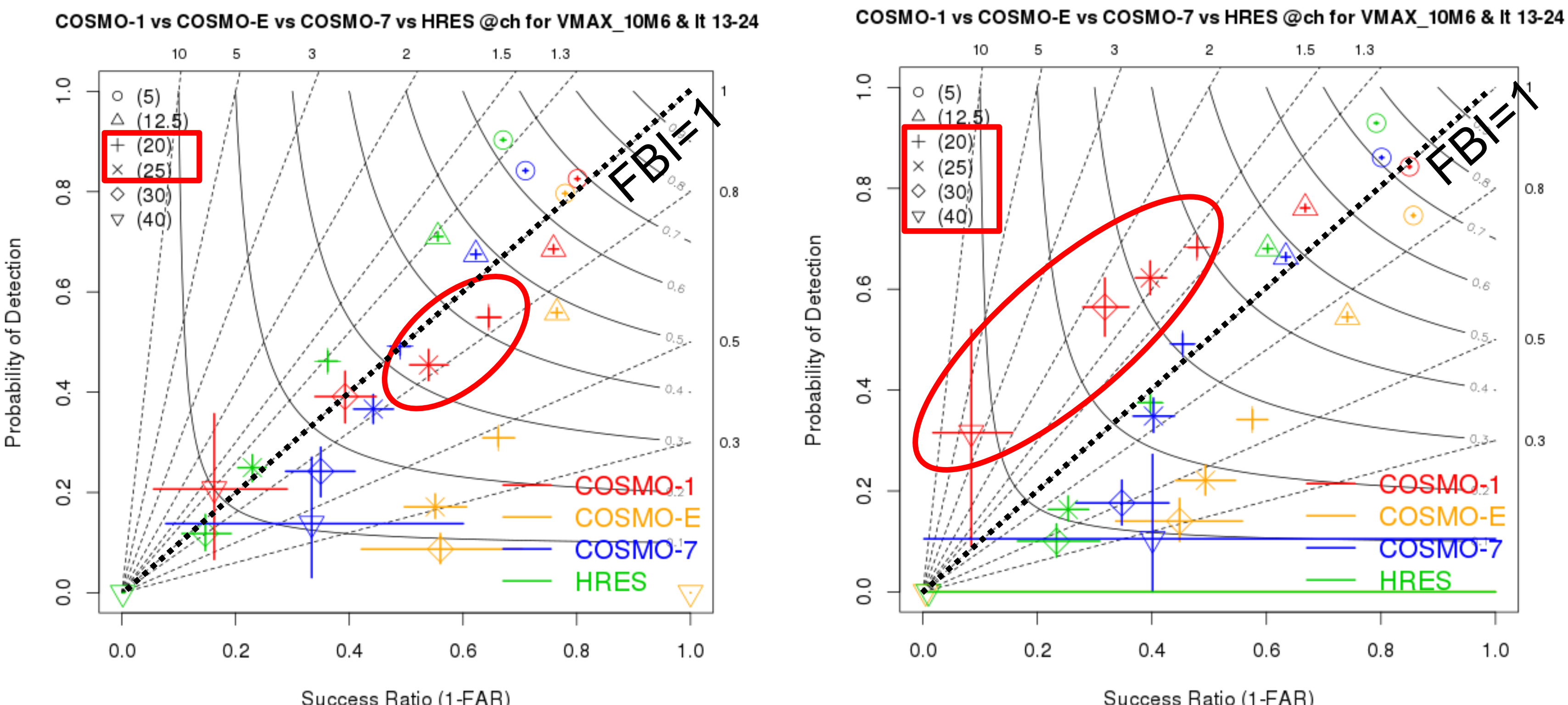
- Known cases of extrapolation
  - Lakes and Sea in winter
  - Very strong wind speeds
  - Different model resolutions
  - Different areas?

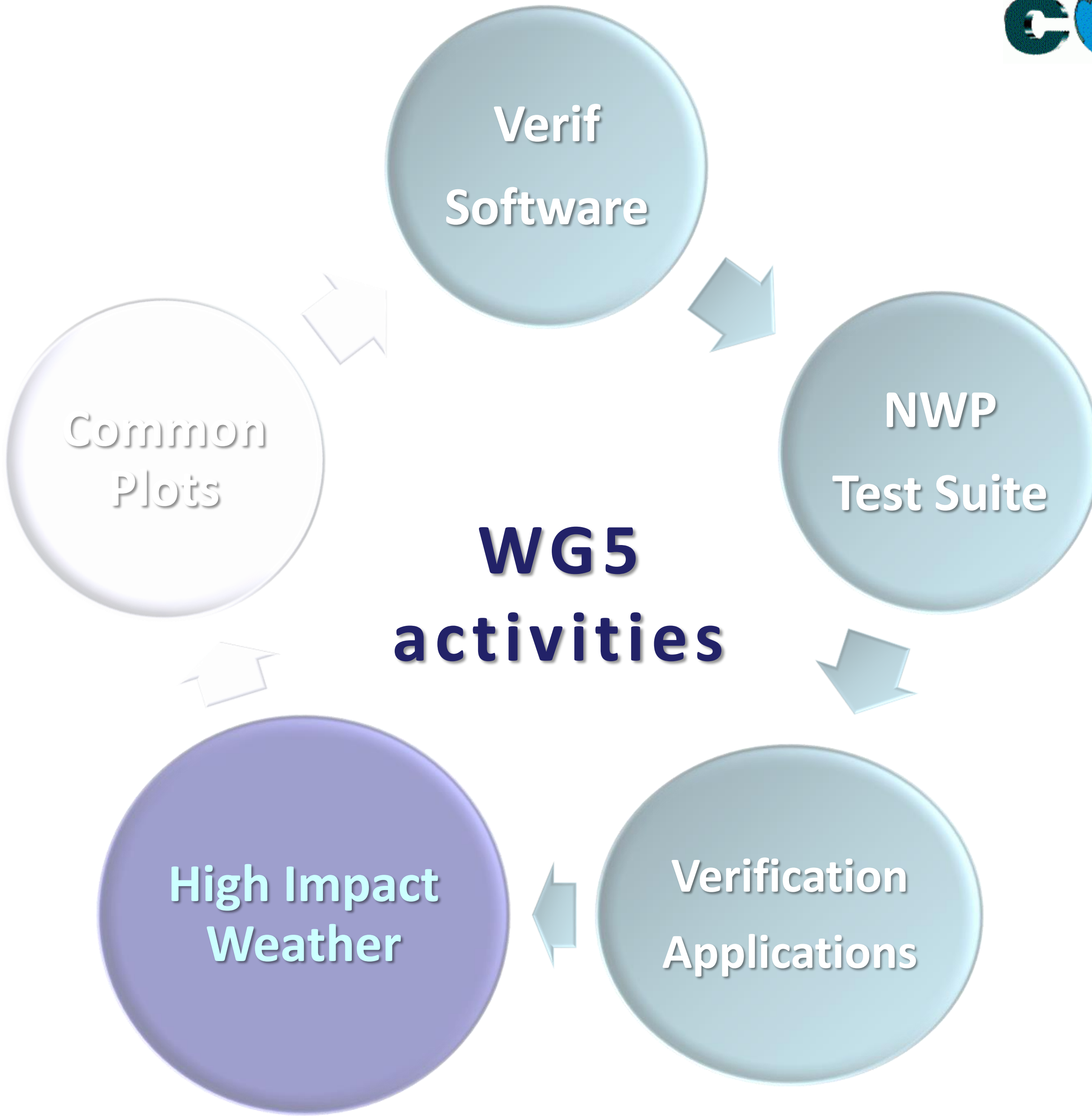
- Other problems:
  - Overestimated gusts in convective situations (?)
    - Frequency bias for strong gusts in summer (likely from convective situations) is already very high in itype_diag_gusts=1 but even higher in itype_diag_gusts=5. Probably due to a small amount of observation data for convective cells used in tuning.

First operational verification results

Comparison with previous season

Old parametrization (DJF18/19) New parametrization (MAM19)





21TH COSMO General Meeting , 9-12 Sept 2019, Roma, WG5 Overview

CONSORTIUM FOR SMALL SCALE MODELING

PP-AWARE proposal: Appraisal of "Challenging WeAther" FoREcasts

Joint Project Proposal: ***WG5 &WG4 (collaboration with WG7)***

The goal of the PP is to provide COSMO Community with an overview of forecast methods and forecast evaluation approaches that are linked to high impact weather (not necessarily considered extreme to all users).

Key forecast quality and verification aspects to consider in this project include:

- How well high-impact weather is represented in the observations, including biases and random errors, and their sensitivity to observation density.
- How well high-impact weather is represented in models, including systematic and stochastic errors, and their sensitivity to model resolution.
- How well high-impact weather is represented in postprocessing.
- The predictability, current predictive skill, and the user's interpretation of forecast value in high-impact weather situations (observed and/or forecast).

Approval decision is expected by the STC this afternoon

Proposed Tasks

Task 1. Challenges in observing CW/HIW (WG5 and WG4 related)

Question: How well high-impact weather is represented in the observations, including biases and random errors, and their sensitivity to observation density?

HIW phenomena studied: visibility range (fog), thunderstorms (w. lightning), intense precipitation, extreme temperatures and winds.

Task 2: Overview of appropriate verification measures for HIW (WG5 related)

Question: How well high-impact weather forecast quality is represented with commonly used verification measures? What is the most appropriate verification approach?

HIW phenomena studied: intense precipitation, thunderstorm (lightning activity, visibility range (fog).

Task 3: Verification applications (with a focus on spatial methods) to HIW (WG5 and WG7 related). This task will make use of the findings of Task 2 and is connected with and continued from PP-INSPECT and MesoVICT projectsFeature-based analysis of intense precipitation patterns. Spatial methods on a probabilistic approach

Question: Can spatial verification methods contribute to the proper evaluation of HIW phenomena and in what way?

HIW phenomena studied: intense precipitation, thunderstorm (lightning activity LPI, visibility range (fog).

Task 4. Overview of forecast methods, representation and user-oriented products linked to HIW (WG4 related)

Question: How well is HIW is represented in postprocessing? What are the pros/cons of DMO vs. PostPro with respect to HIW phenomena predictions? What is the current predictive skill, and the user's interpretation of forecast value in high-impact weather situations (observed and/or forecast)?

HIW phenomena studied: fog/visibility, convection related CW (thunderstorms, lightning, hail, squalls, showers, flash floods)

QPF operational verification over catchment area

Maria Stefania Tesini

The estimation of QPF on river basins for purposes related to the issue of Civil Prot... alerts for hydro-geological or h... is one of the main ... operati... ...o-Climate Service ...agna.

Presentation during High Impact Weather Session this afternoon

- Development of tools to help forecasters and hydrologists to evaluate mean, max, or percentiles of the precipitation field on the warning areas used by the National Civil Protection Department using data from different NWP models (e.g. IFS-ECMWF, COSMO-5M or COSMO-2I)
- Exceeding predefined thresholds can give useful indications for situations of intense precipitation possibly leading to floods

- Development of a system to verify the products used to estimate the QPF over catchment areas:
  - It should allow to carried out verification operationally on a seasonal basis using the available observational data
  - Verification results should be used directly to interpret how to use the forecast system and to decide in which situations one system is better than another

AWARE TASK 4: Overview of forecast methods, representation and user-oriented products linked to HIW
Sub Task 4.6: QPF evaluation approaches

AWARE TASK 3: Verification applications to HIW (with focus on spatial methods)
Sub Task 3.4: DIST methodology tuned on high thresholds events

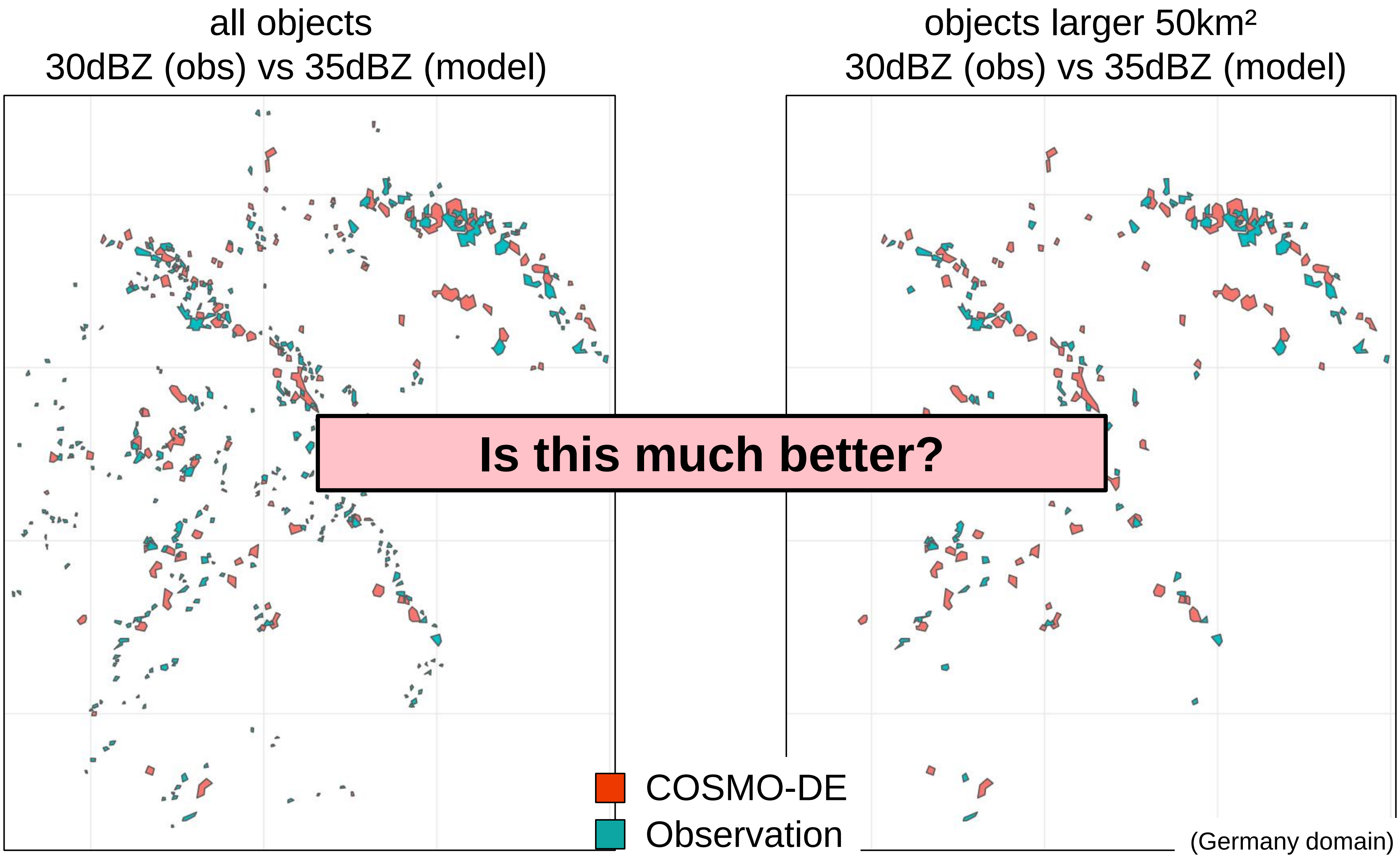
Object-based verification of radar reflectivities on the convective scale

COSMO General Meeting
09.09.2019 – 12.09.2019

Michael Hoff
E-Mail: michael.hoff@dwd.de

A qualitative comparison

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



SINFONY

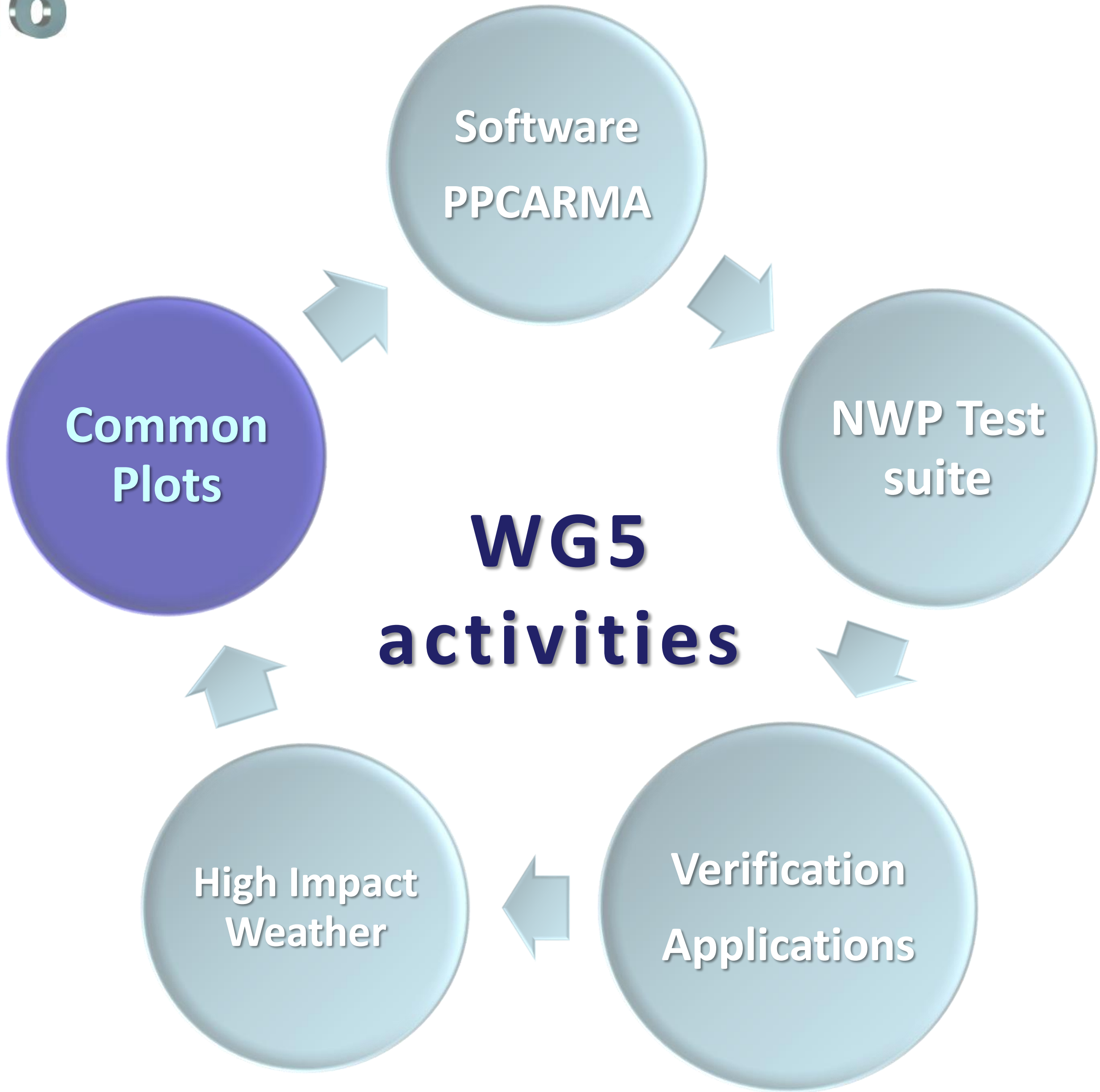
Total Interest & Median of Maximum Interest

The Method for Object-based Diagnostic Evaluation (MODE) Applied to Numerical Forecasts from the 2005 NSSL/SPC Spring Program

C.A. Davis, B.G. Brown, R. Bullock & J. …

Presentation during High Impact Weather Session this afternoon

- a **Fuzzy L…** …ompares several attributes of forecast and …jects (or features)
- a **total interest** describes how similar both objects are
- the **median of maximum** interest as a metric for overall forecast quality
- <u>However:</u> stratification on distinct attributes possible
- <u>Idea:</u> should better **mimic** the decision process of a forecaster


Software
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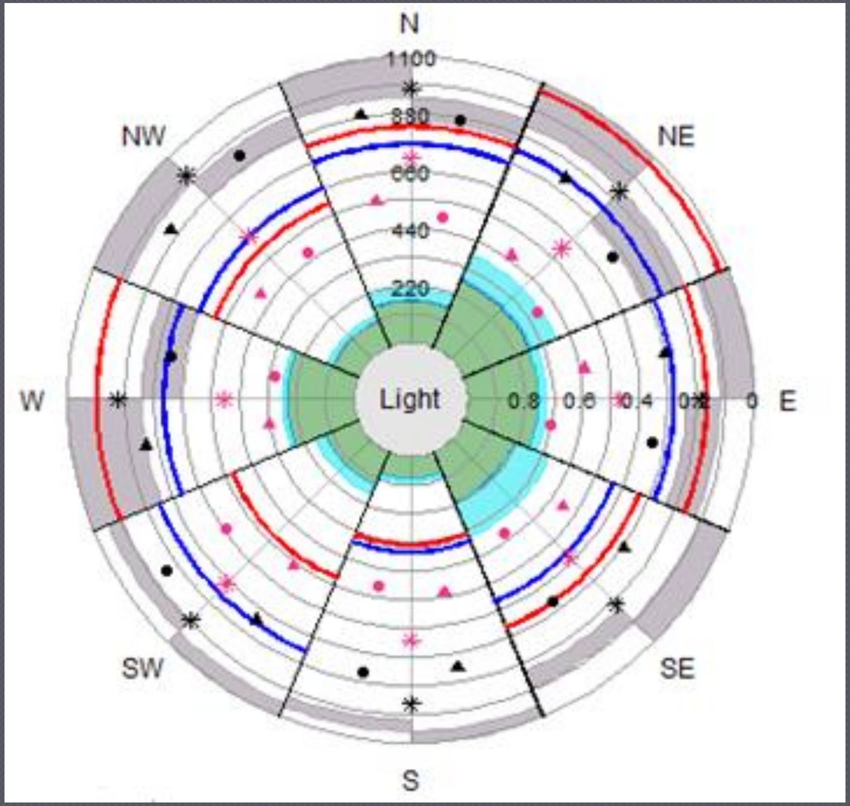
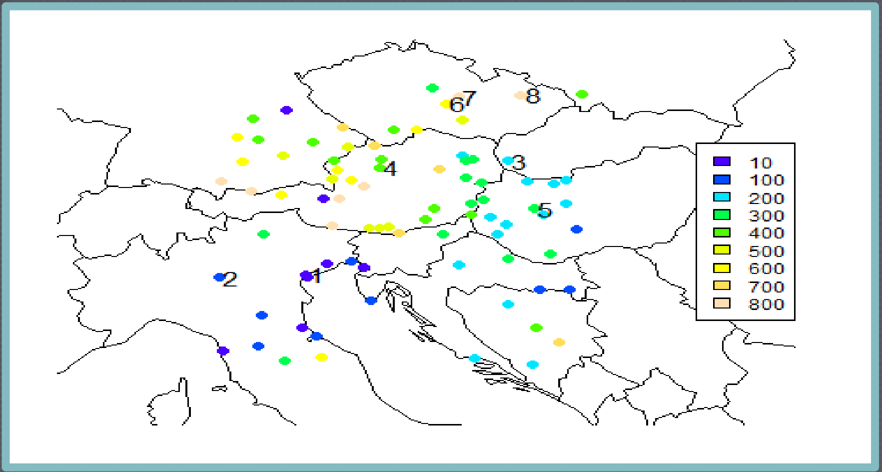
The "performance-rose"

- It is a diagram in which are summarized according to directions:
  - scores derived from contingency table (plotted as symbols)
  - type of errors of wind forecast , e.g. over/under estimation of wind speed (plotted as colored sectors)





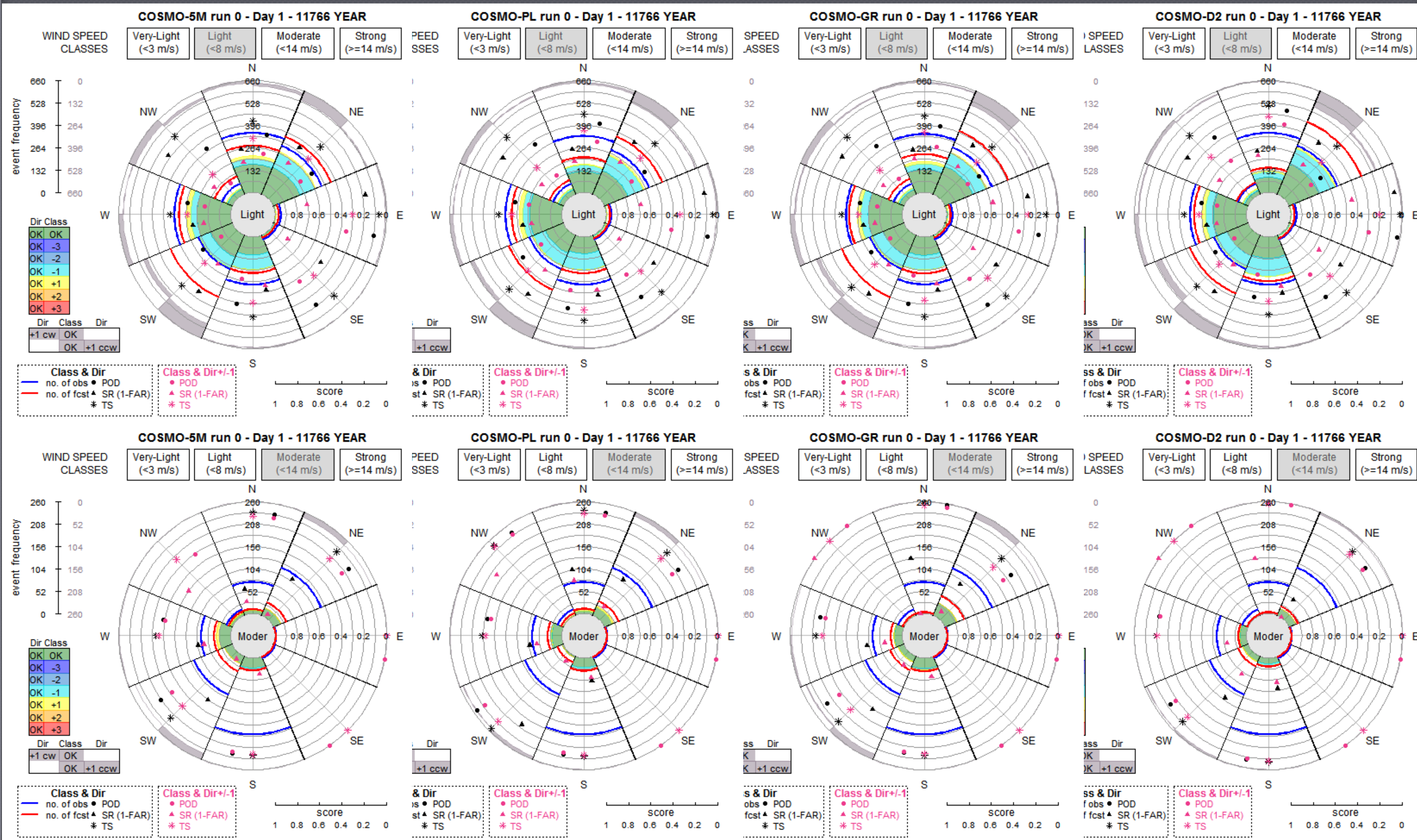
	code	name	height
1	16105	VENEZIA TESSERA	6
2	16088	BRESCIA/GHEDI	97
3	11816	BRATISLAVA-LETISKO	134
4	11012	KREMSMUENSTER	390
5	12830	VESZPREM/SZENTKIRALYSZABADJA	281
6	11659	PRIBYSLAV	536
7	11683	SVRATOUCH	740
8	11766	CERVENA U LIBAVE	753

station code	COSMO-5M	COSMO-PL	COSMO-GR	COSMO-RU	COSMO-D2	ICON-EU	ICON
16105	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1	DAY 1 DAY 2	DAY 1 DAY 2
16088	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1	DAY 1 DAY 2	DAY 1 DAY 2
11816	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1	DAY 1 DAY 2	DAY 1 DAY 2
11012	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1	DAY 1 DAY 2	DAY 1 DAY 2
12830	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1	DAY 1 DAY 2	DAY 1 DAY 2
11659	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1	DAY 1 DAY 2	DAY 1 DAY 2
11766	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1 DAY 2	DAY 1	DAY 1 DAY 2	DAY 1 DAY 2

- 3 hourly data from 8 selected stations
- 7 model data (00 UTC run - step 3h)
- Period: June 2018 – May 2019

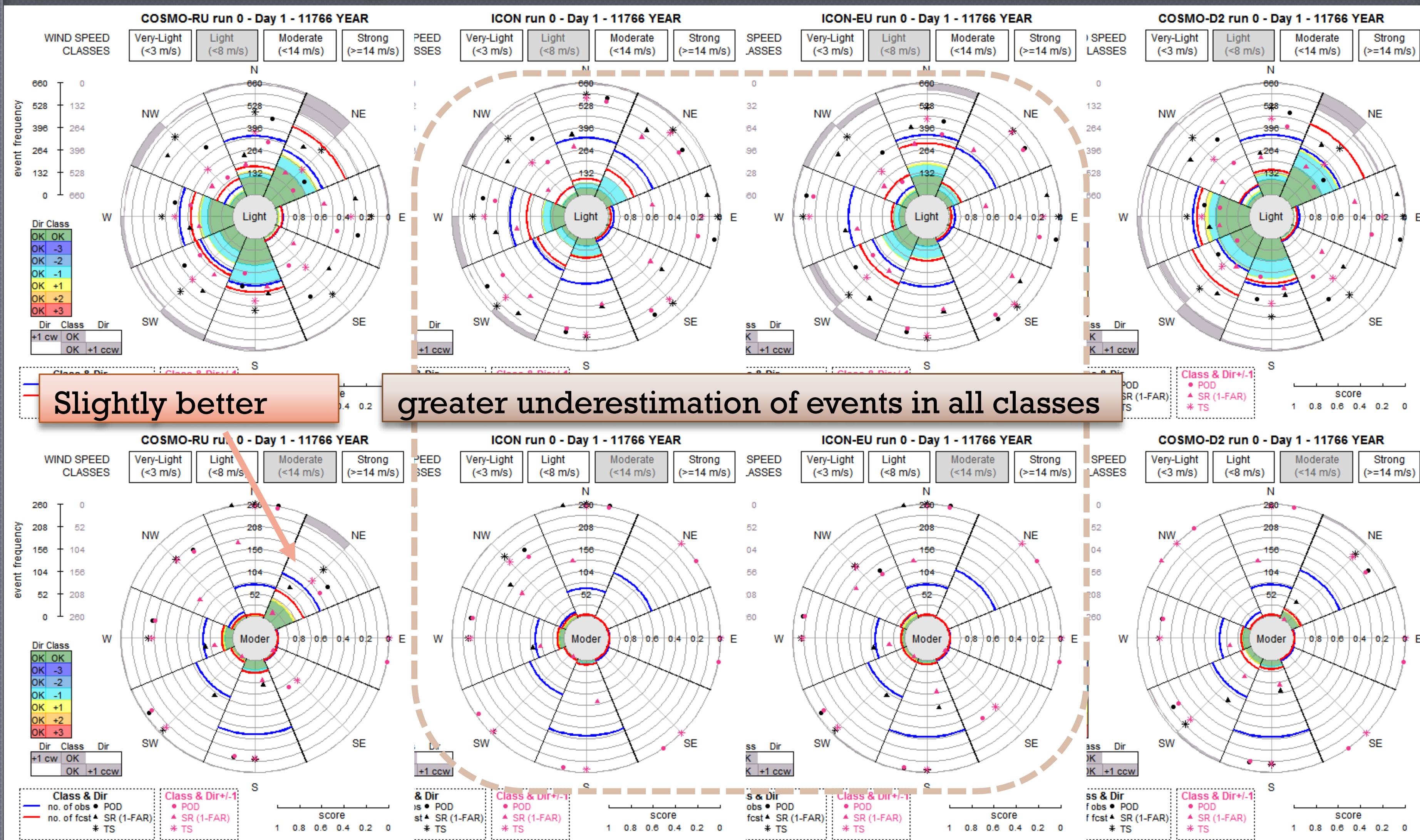
All Year – station 11766

COSMO-5M	COSMO-PL	COSMO-GR4	COSMO-D2



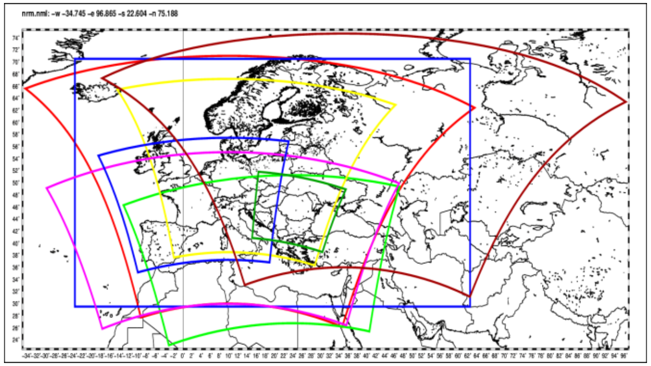
All Year – station 11766

COSMO-RU7	ICON	ICON-EU	COSMO-D2



Fuzzy verification on Common Area 2 October and November 2018

MODEL	LON MIN	LON MAX	LAT MIN	LAT MAX	RESOLUTION	N° of POINTS
COSMO I5	10.925	17.30	46.525	49.60	0.045°	9447
COSMO GR	10.925	17.30	46.525	49.60	0.045°	9447
COSMO 2I	10.925	17.275	46.525	48.275	0.025°	18105
COSMO IT	10.925	17.275	46.525	48.275	0.025°	18105
COSMO D2	10.925	17.275	46.525	48.275	0.025°	18105
COSMO PL	10.95	17.30	47.622	48.30	0.025°	6858
COSMO 1	10.925	16.937	46.586	48.30	0.025°	16320

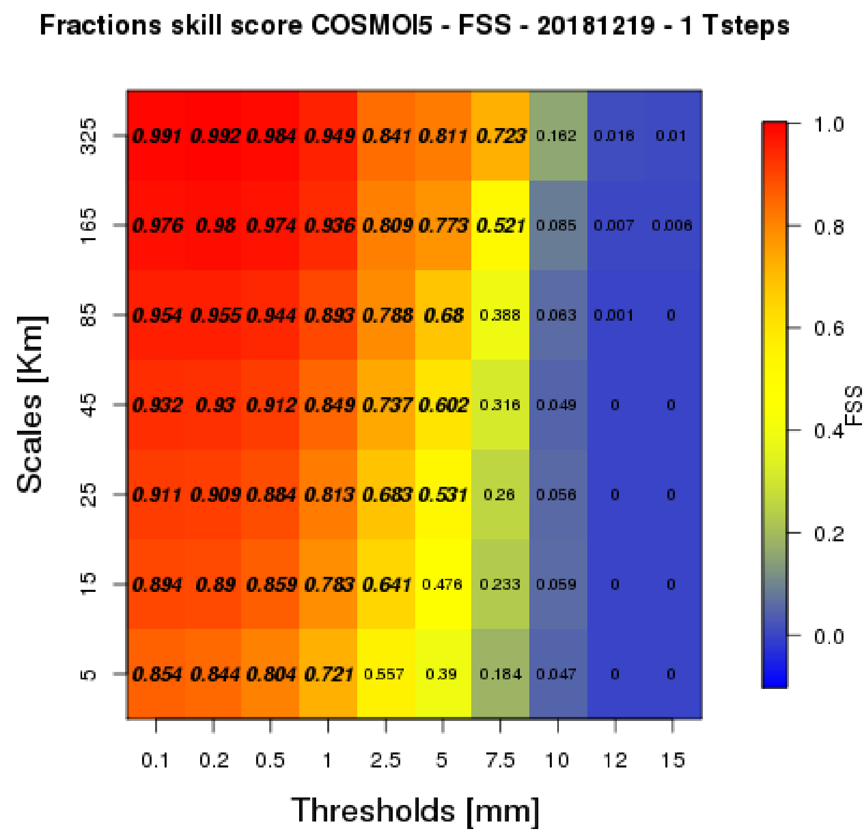


- **10 PRECIPITATION THRESHOLDS**:
  0.1, 0.2, 0.5, 1.0, 2.5, 5.0, 7.5, 12, 15
- **7 SPATIAL SCALES** (except COSMO PL, which has 5)
  Scale=(minimum resolution)$*$(2^n+1) n=0,...,(scales-1)

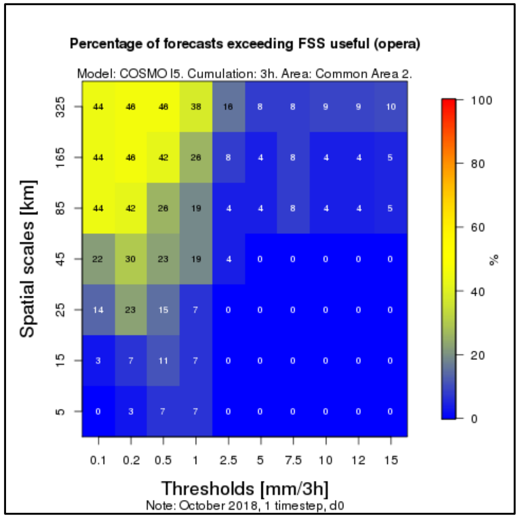
Observations: OPERA radar database composite (HDF-5) 3h accumulated precipitation

* What is FSS_{useful} ? (quick remind)

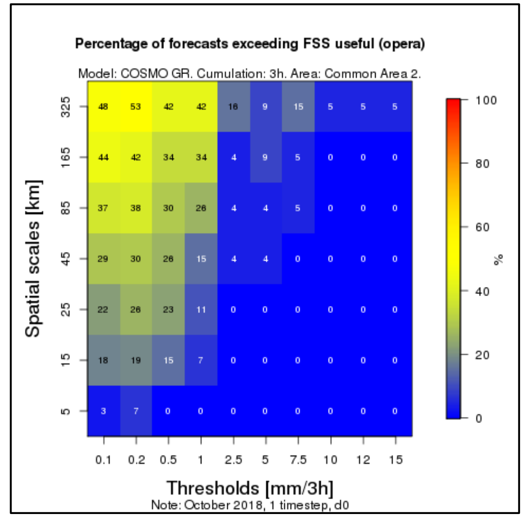
- FSS is called “useful” when the verification certifies an actual added value of the forecast superior to the random data
- FSS_{useful} threshold depends on the precipitation pattern:
    - Precipitation everywhere -> easier forecast -> higher threshold
    - Many precipitation blobs -> more difficult forecast -> lower threshold
- FSS can never be considered useful if it does not reach the value of 0.5



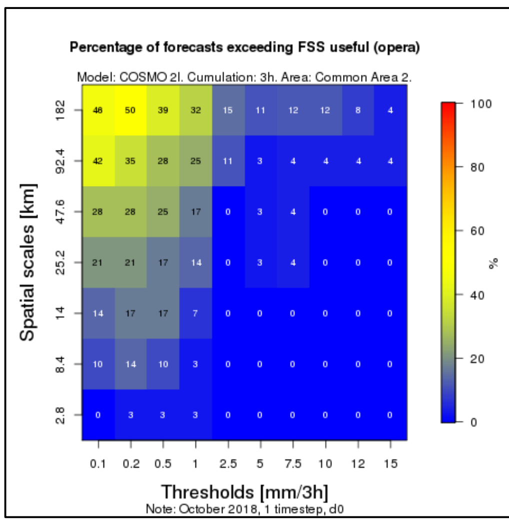
Results FSSuseful - October – D0



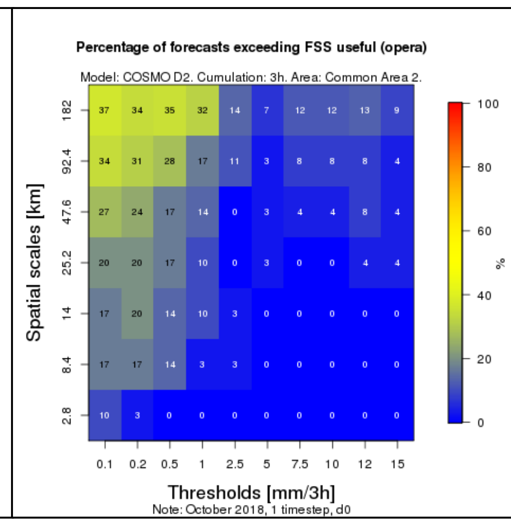
COSMO-I5



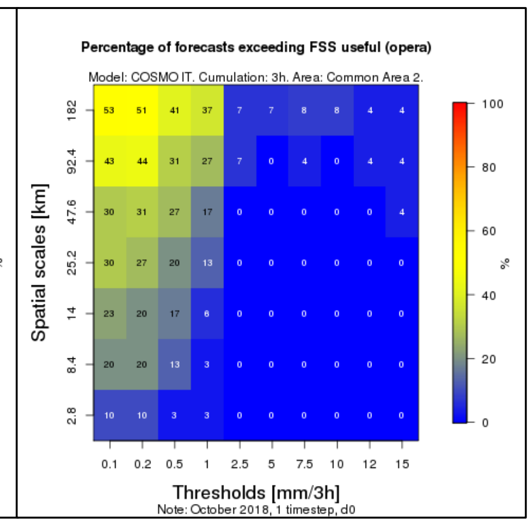
COSMO-GR4



COSMO-2I



COSMO-D2

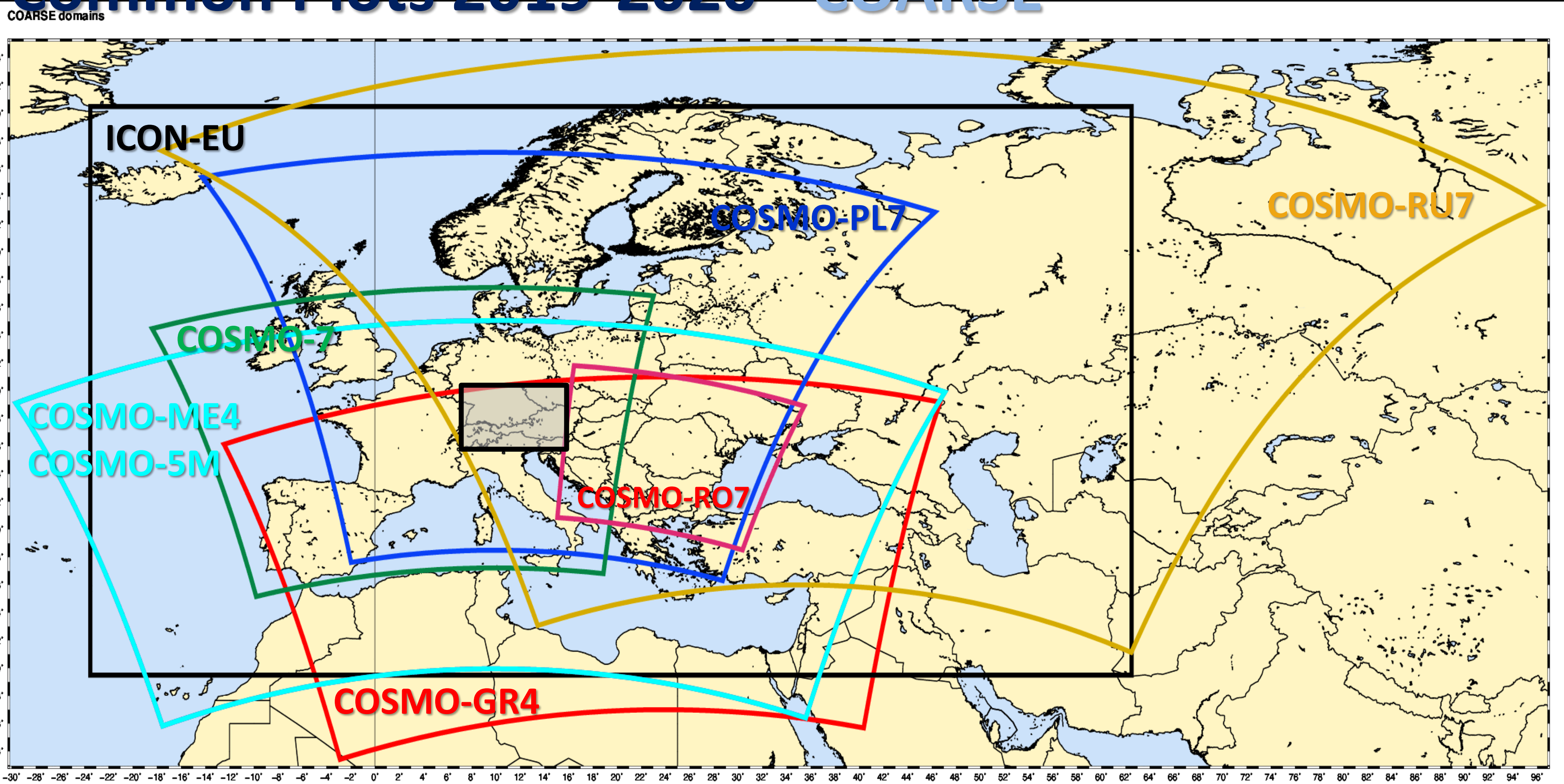


COSMO-IT

Verif Feedback: Models implementation for 2019-2020

model	type	dlon,dlat	A (startlat)	B (startlon)	C (endlat)	D (endlon)	ie_tot	je_tot	ke_tot	ie_tot X dlon	je_tot X dlat	polelat	polelon	IC/BC	DA	cycles	fct range	Mbs	Plans for 2019-2020
ICON-EU	det	0.0625	29.5	-23.5	70.5	17.5	1377	657	60	86	41	-90	0 (geo/cal)	VAE-EnKF/ICON	ICON-EDA	00UTC /3h	120/30h		confirmed
ICON-D2	det	0.025										40	-170			00UTC /3h			operational in 2020
COSMO-DE	det	0.02	-6.3	352.5	8	366.8	651	716	65	13	14.3	40	-170	ICON-EU	KENDA,LHN	00UTC /3h	27h		cease in 2020
COSMO-D2-EPS	eps	0.02	-6.3	352.5	8	366.8	651	716	65	13	14.3	40	-170	ICON-EU	KENDA,LHN	00UTC /3h	27h	20	
COSMO-1	det	0.01	-4.4	-6.8	3.33	0.93	1158	774	80	11.57	7.73	43	-170	COSMO-1 Analysis Cycle/IFS-HRES	Nudging + LHN	00UTC /3h	33		Switch to KENDA data assimilation and 11 member ensemble in 2020 (COSMO-1E)
COSMO-E	eps	0.02	-4.42	-6.82	3.36	0.96	582	390	60	11.62	7.78	43	-170	KENDA Analysis Cycle /IFS-ENS	KENDA + LHN	00-12UTC	120	21	
COSMO-7	det	0.06	-9.78	-16.32	10.44	3.9	393	338	60	23.52	20.22	43	-170	COSMO-7 Analysis Cycle /IFS-HR	Nudging + LHN	00,06,12UTC	72		Phase-out, shutdown autumn
ICON																			no plans for current year
COSMO-ME	det	0.045	-13.05	-25.29	12.06	-0.18	1083	559	40	48.69	25.11	47	-170	LETKF/IFS	LETKF	00,06,12,18UTC	72		confirmed
COSMO-IT	det	0.02	-8.5	-3.8	5.5	10.2	576	701	65	11.5	14	47	-170	KENDA/LETKF	KENDA/LETKF	00,06,12,18UTC	30-48		confirmed
COSMO-ME-EPS	eps	0.0625	-13	-25.25	12	-0.25	779	401	40	48.625	25	47	-170	LETKF/IFSENS	LETKF	00,12UTC	72	40+1	confirmed
COSMOIT-EPS	eps	0.02	-8.5	-3.8	3	7.7	701	576	45	14	11.5	47	-170	IFS	KENDA	00,12UTC	48	20	confirmed
ICON-IT	det	0.02	-8.5	-3.8	5.5	10.2	576	701	65	11.5	14	47	-170	KENDA/LETKF	KENDA/LETKF	00,06,12,18UTC	30-48		confirmed
ICON-ME	det	0.045	-13.05	-25.29	12.06	-0.18	1083	559	40	48.69	25.11	47	-170	IFS	KENDA	00,12UTC	48	20	confirmed
COSMO-PL7	det	0.0625	-19	-10	9.6875	18.6875	415	460	40	25.875	28.6875	32.5	-170	DAC/ICON	Nudging	00,06,12,18UTC	78		confirmed
COSMO-PL2.8	det	0.025	-2.4	0.65	7.7	10.75	380	405	50	9.475	10.1	40	-170	COSMO-PL7	Nudging	00,06,12,18UTC	36		confirmed
COSMO-PL2.8-TL	eps	0.025	-2.4	0.65	7.7	10.75	380	405	50	9.475	10.1	40	-170	COSMO-PL7	No	00,06,12,18UTC	36	20	confirmed
ICON-PL	det	2.5km / R2B10												ICON	No	00UTC	48		upgrade to ICT 2019
COSMO-RU7	det	0.0625	-19	-19	19.6875	19.6875	700	620	40	43.6875	38.6875	35	-145	ICON	Nudging	00,06,12,18UTC	78		confirmed
COSMO-RU13	det	0.12	-30	-60	29.88	-0.12	1000	500	40	119.88	59.88	25	-90	ICON	No	00,06,12,18UTC	99/78		confirmed
COSMO-RU2cfo	det	0.02	-4.5	-3	4.88	6.38	420	470	50	8.38	9.38	35	-145	COSMO-Ru7	Nudging	00,06,12,18UTC	42		confirmed
COSMO-RU2sfo	det	0.02	-16	-1	-6.62	8.38	420	470	50	8.38	9.38	35	-145	COSMO	Nudging	00,06,12,18UTC	42		confirmed
COSMO-RU2vfo	det	0.02	-8	-26	0.98	-17.02	470	450	50	9.38	8.98	25	-90	COSMO	Nudging	00,06,12,18UTC	42		confirmed
COSMO-RU	det	0.01	-8.4	-34.7	-6.51	-32.81	190	190	50	1.89	1.89	25	-90	COSMO	Nudging	00,06,12,18UTC	36		confirmed
ICON-RU																			
ICON-IL	det	0.025	26	25	36	39	561	401	65	14	10	90	-180	ICON	none	00h	78		testing phase
COSMO-IL	det	0.025	26	25	36	35	561	401	60	14	10	90	-180	IFS	LBC: IFS, IC: IFS at atmosphere, ICON at soil	00,06,12,18UTC	90		confirmed
COSMO-RO7	det	0.0625	-16.5	4	-5.5	15	201	177	40	12.5	11	32.5	-170	ICON	Nudging		78		
ICON-RO7	det																		test phase
COSMO-RO3	det	0.025	-6.5	6	0.75	13.25	361	291	50	9	7.25	40	-170	COSMO-RO7	Nudging		30		
COSMO-GR4	det	0.04	-11	-25	13	15	1001	601	80	40	24	52	-156	IFS	NO	00-12UTC	72		yes
COSMO-GR1	det	0.01	-4	-5	4	5	1001	801	80	10	8	52	-156	COSMO-GR7	NO	00-12UTC	48		yes
ICON-GR2	det	0.025												IFS	NO	00UTC	48		yes
COSMO-5M	det	0.045	-13.05	-25.29	12.06	-0.18	1083	559	40	48.69	25.11	47	-170	LETKF –COMET /IFS-ECMWF	NO	00UTC/12h	72		yes
COSMO-2I	det	0.02	-8.5	-5	3.56	7.06	542	604	65	10.82	12.06	47	-170	COSMO-5M	KENDA	00UTC/12h	48		yes
COSMO-2I-RUC	det	0.02	-8.5	-5	3.56	7.06	542	604	65	10.82	12.06	47	-170	COSMO-5M	KENDA,LHN	00UTC/3h	18		yes
COSMO-2I-EPS	eps	0.02	-8.5	-5	3.56	7.06	542	604	65	10.82	12.06	47	-170	COSMO-5M	KENDA	21UTC/24h	51	20	yes
		COARSE				FINE													

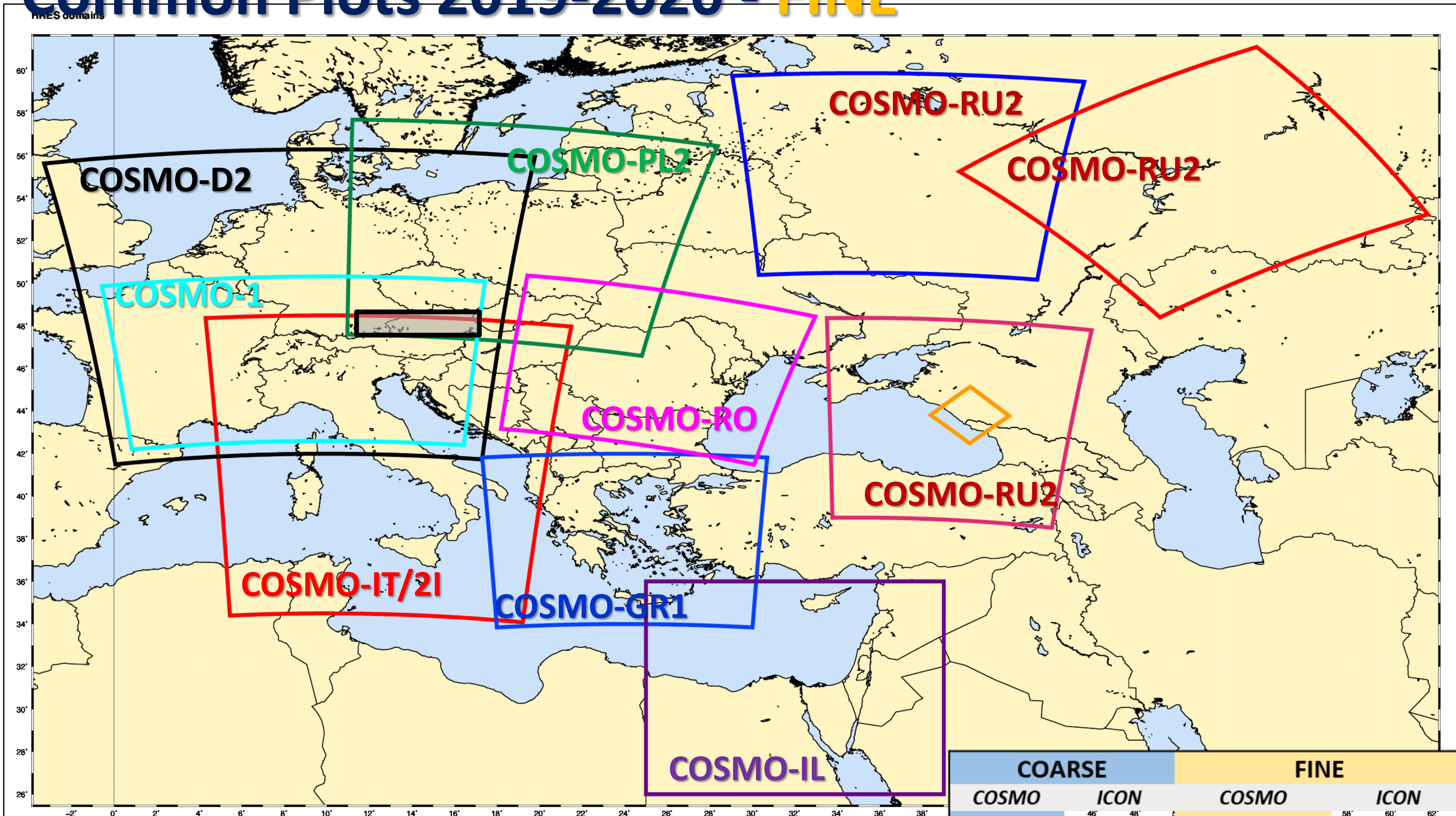
Common Plots 2019-2020 - COARSE



More stations can be added

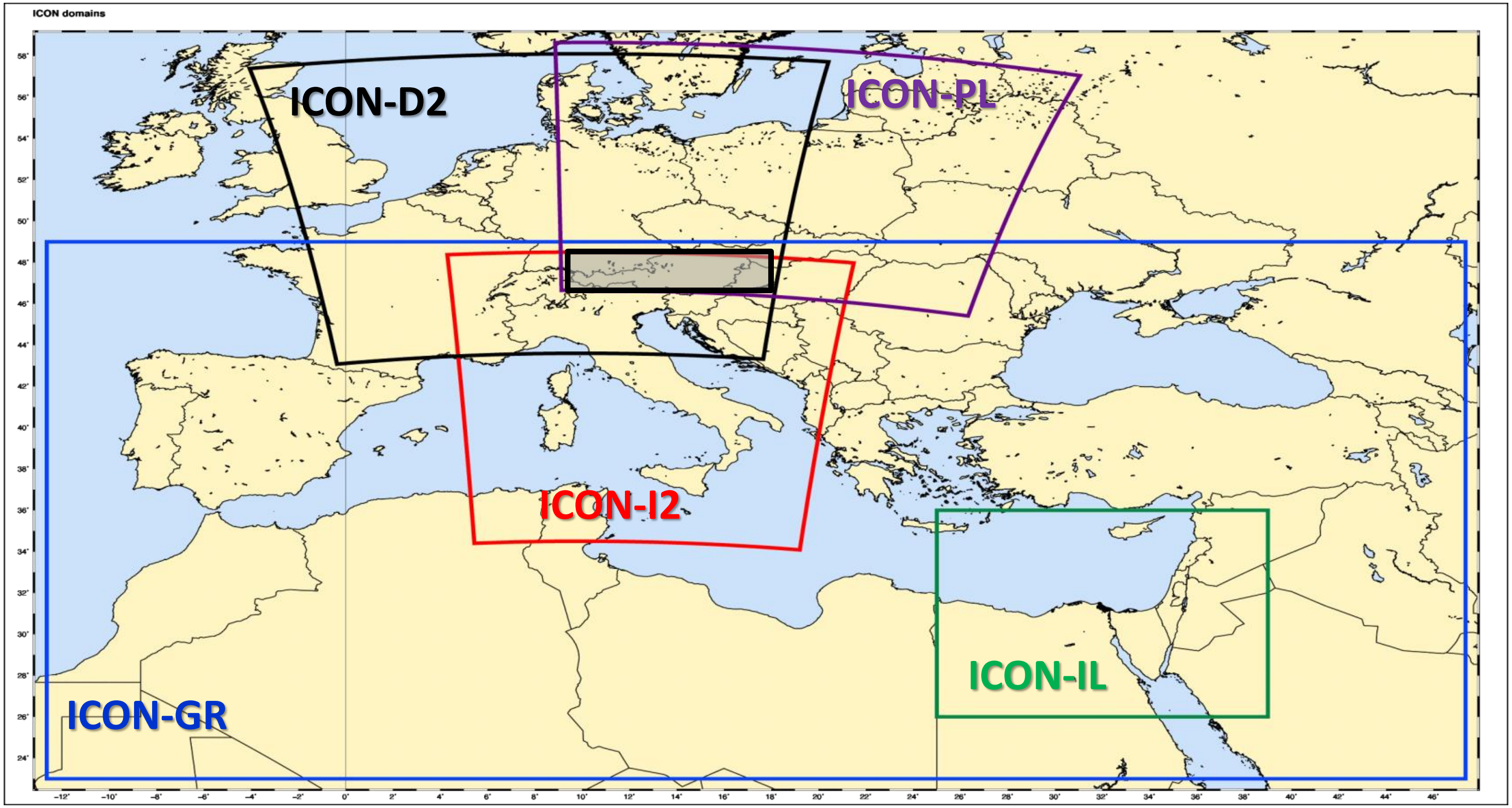
COARSE		FINE	
COSMO	***ICON***	***COSMO***	***ICON***
COSMO-5M		COSMO-2I/2IRUC	
COSMO-GR4		COSMO-GR1	ICON-GR2 or 1
		COSMO-IL	ICON-IL
COSMO-RU7	ICON-RU	COSMO-RU++	
	ICON-EU	COSMO-DE	ICON-D2
COSMO-PL7		COSMO-PL2.8	ICON-PL2.5
COSMO-7		COSMO-1	
COSMO-ME	ICON-ME	COSMO-IT	ICON-IT
COSMO-RO7		COSMO-RO1	

Common Plots 2019-2020 - FINE



COARSE		FINE	
COSMO	*ICON*	*COSMO*	*ICON*
COSMO-5M		COSMO-2I/2IRUC	
COSMO-GR4		COSMO-GR1	ICON-GR2 or 1
		COSMO-IL	ICON-IL
COSMO-RU7	ICON-RU	COSMO-RU++	
	ICON-EU	COSMO-DE	ICON-D2
COSMO-PL7		COSMO-PL2.8	ICON-PL2.5
COSMO-7		COSMO-1	
COSMO-ME	ICON-ME	COSMO-IT	ICON-IT
COSMO-RO7		COSMO-RO1	

Operational (?) ICON-LAM



ICON-LAM		
ICON-EU	0.0625	√
ICON-D2	0.02	2020
ICON-GR	0.025	√
ICON-PL	0.025	2019
ICON-IL	0.025	?
ICON-IT	0.02	√
ICON-ME	0.045	√

Common Plot Activity 2019-2020

A. Participating models - COSMO/ICON
- COSMO models
- Comparison of ICON-LAM/COSMO desirable

B. Choice of comparable resolution(s)
- As in plots

C. Choice of common domain(s)
- Common area 1 / Common area 2

D. Choice of (Common) Verification Software
- VERSUS or else (provide only txt numerical results)
- With end of PPCARMA (03/2020) desirable to provide statistical analysis with MEC/Rfdbk

E. Decision on guidelines
- Basic surface parameters, 00UTC run
- No Extreme Dependency scores
- Wind Performance Rose? (Maria Stefania)
- FSS on common Area2 (Naima)
- Upper air when MEC/Rfdbk is adopted

Visit: http://www.cosmo-model.org/content/tasks/verification.priv/common/plots/default.htm

PP- C2I: Task 6.5 - Verification

Flora Gofa

Introduction

The purpose of the document is to provide verification guidelines that can be followed by the partners for priority project C2I purposes. The overall goal of the PP-C2I is to ensure a smooth transition from the COSMO model to ICON-LAM. At the end of the PP C2I, each participating institution is free to choose when ICON-LAM replaces the COSMO model in their operational forecasting system and a major role in this will play the relative performance between the two systems.

Proposed Verification Software

Proposed Evaluation Approach

http://www.cosmo-model.org/content/tasks/priorityProjects/c2i/PP-C2I-verification.pdf

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