



Evaluation of humidity, clouds and precipitation in hindcasts by CCLM and MM5

Anja Ludwig

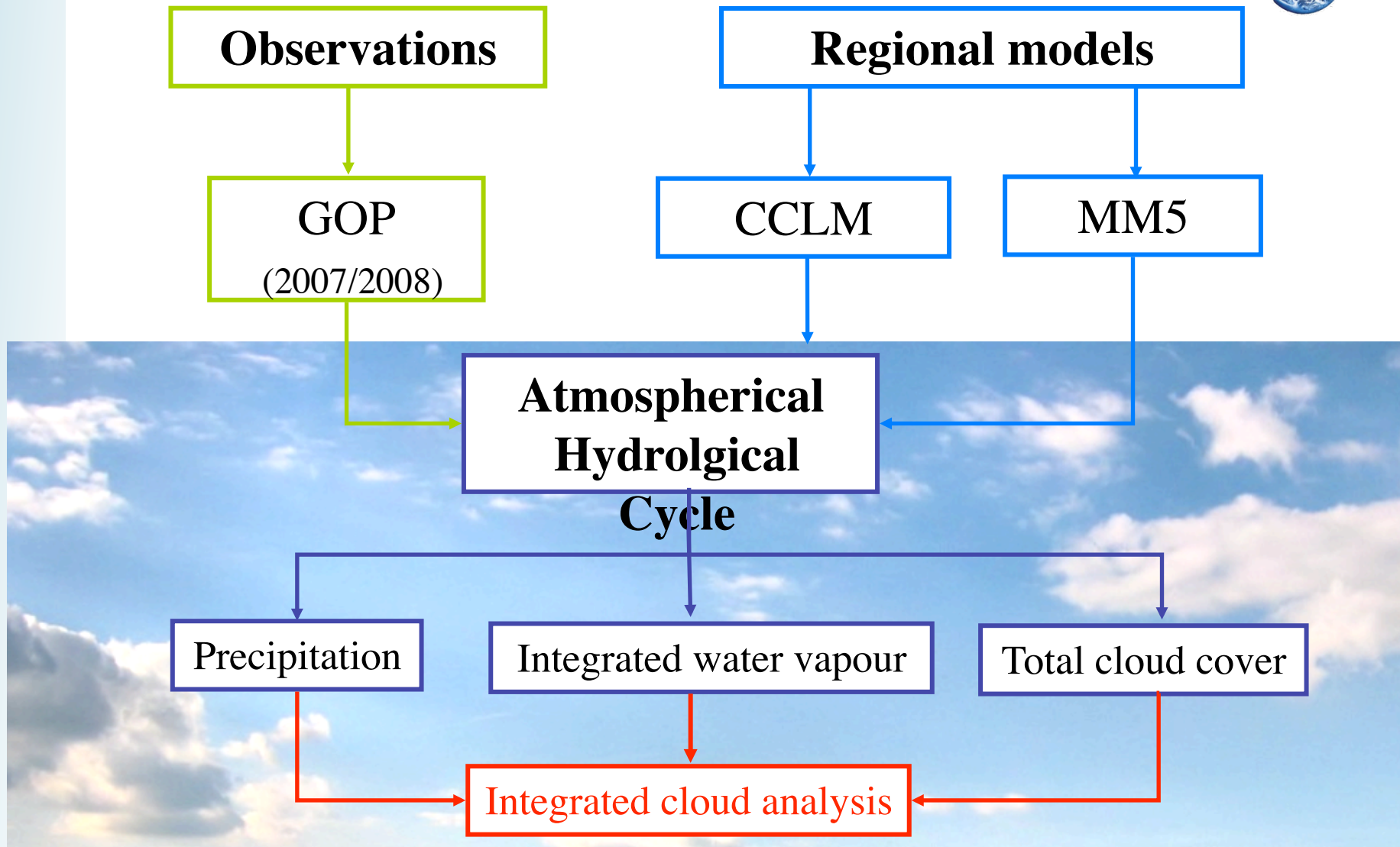
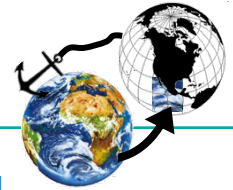
University of Hamburg/ GKSS Research Centre
„Synthesis of Observations and Models“ (F. Ament)
„Regional Atmospheric Modelling“ (B. Rockel)

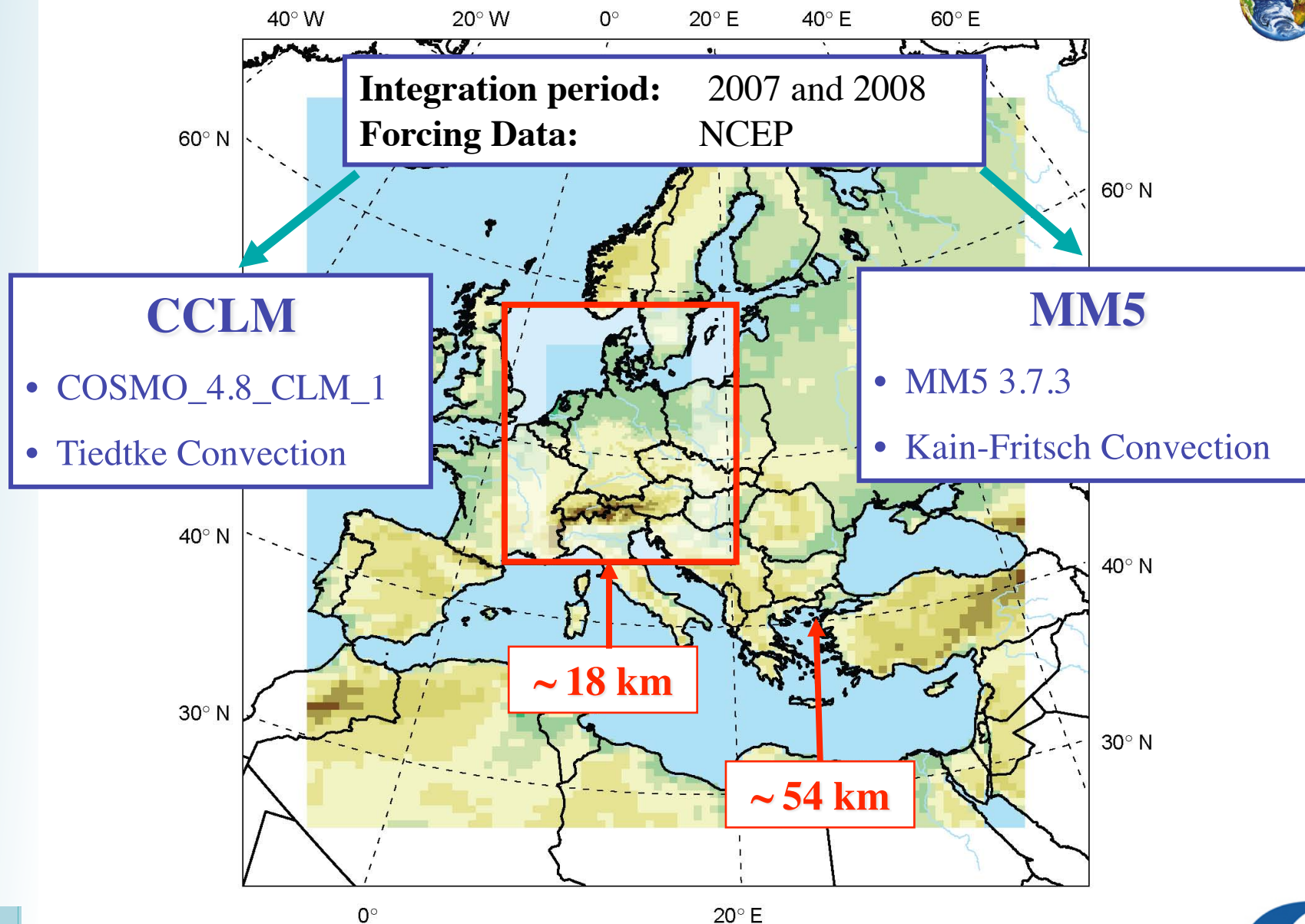
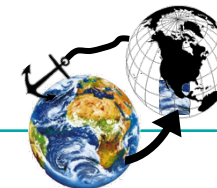


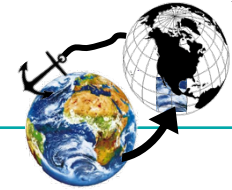


Key questions of my diploma thesis:

- Are regional climate models able to represent the hydrological cycle in central Europe?
- Are there typical error structures in the (atmospherical part of) the hydrological cycle?
- Is it even possible to evaluate climate models over short periods?





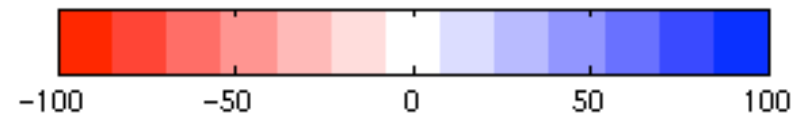
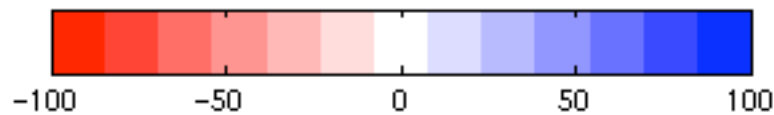
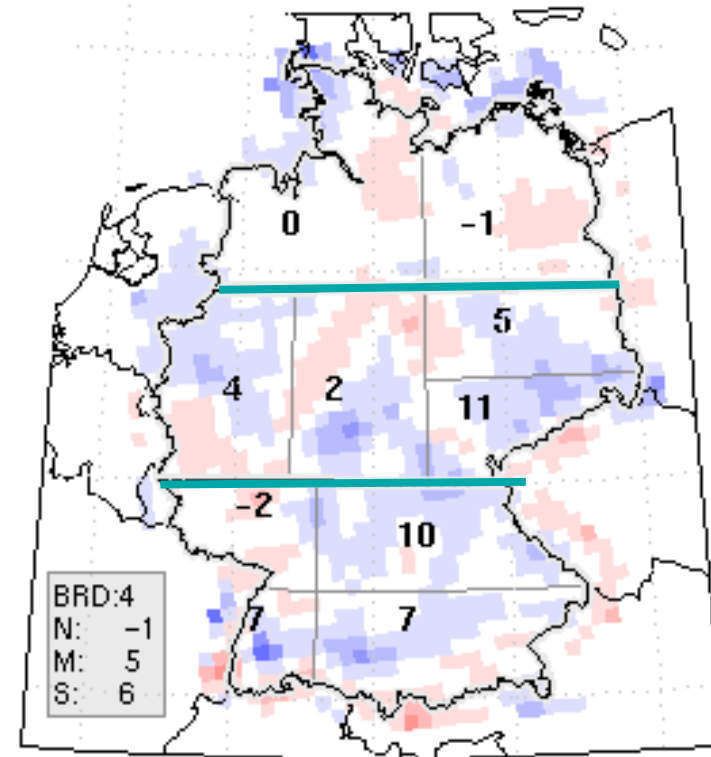
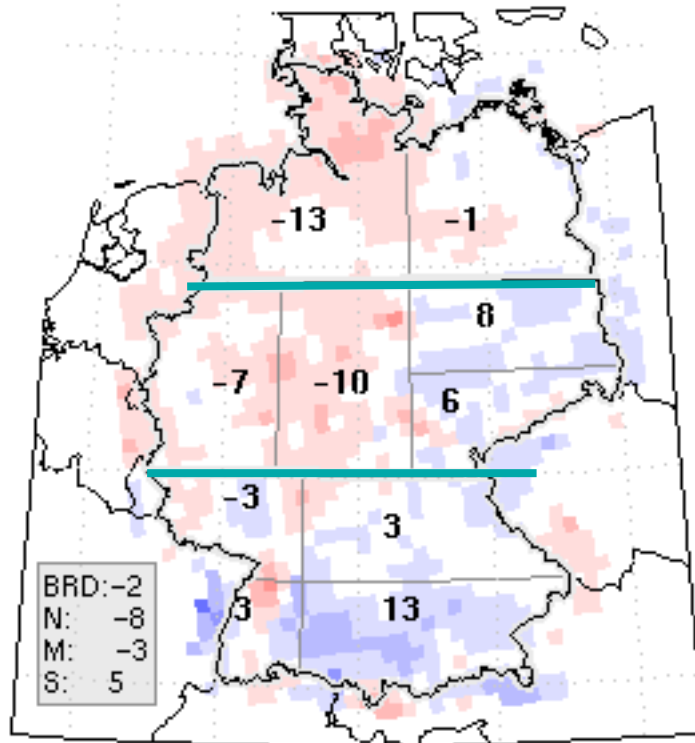


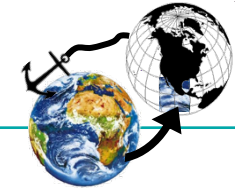
CCLM

MM5

Relativer BIAS: $(\text{CCLM} - \text{Ranie1}) / \text{Ranie1}$, 2007&2008 [%]

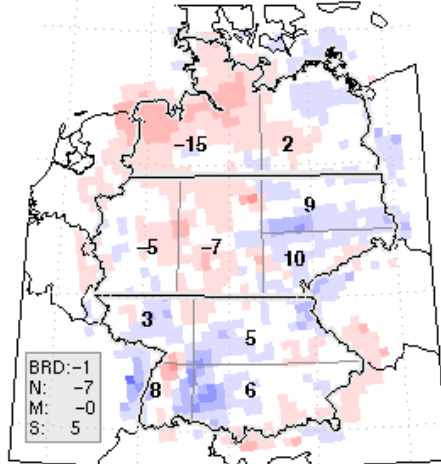
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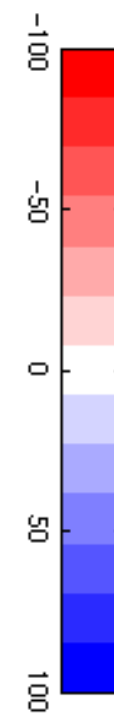
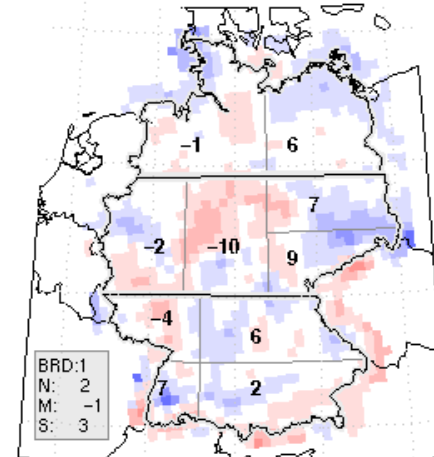


CCLM 2007 MM5

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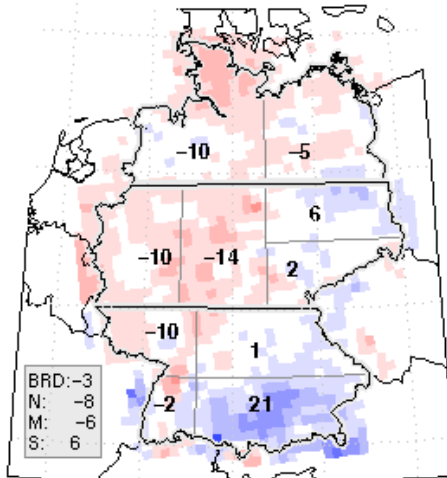


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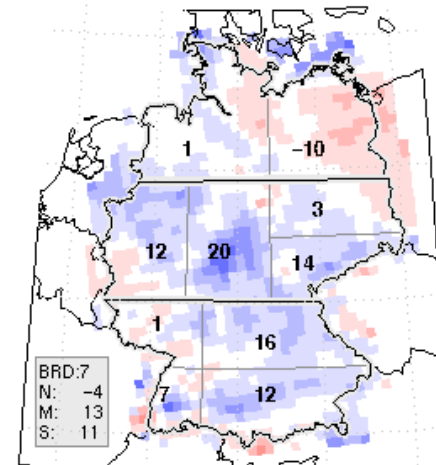


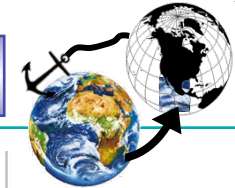
CCLM 2008 MM5

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Relativer BIAS: (MM5 - Ranie1) / Ranie1, 2008 [%]





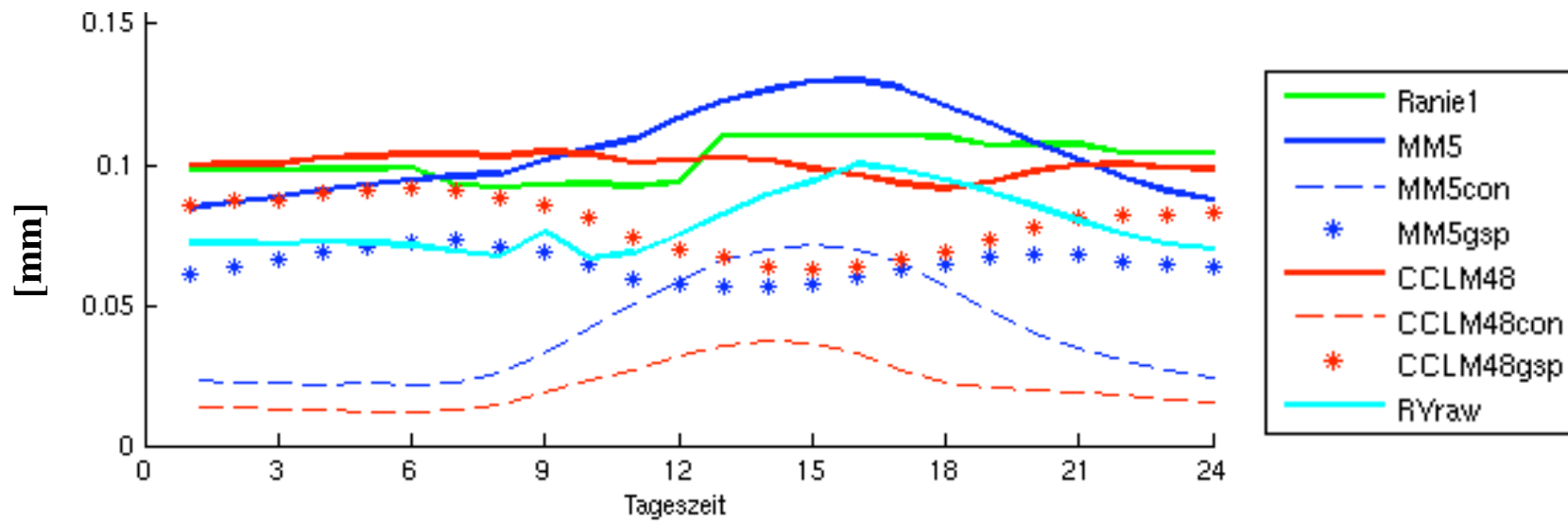
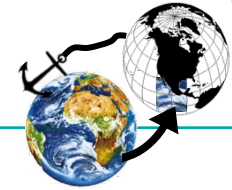
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NO	31	15	-18	284	-16	11	18	-33	-15	133	-10	38	37
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MW	4	21	4	-44	-23	15	25	-26	-37	6	-6	3	-5
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MSO	78	39	8	127	1	6	14	-40	2	13	6	53	26
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Mosel	52	-6	-25	-59	-30	24	-15	49	-25	12	35	13	2
NB	50	22	-11	-86	-16	4	7	-1	-14	6	18	37	1
SW	68	8	3	-86	-7	-13	-25	65	13	63	14	23	11
SB	96	21	45	-76	-9	15	-15	-2	-15	27	19	30	11
Gesamt	37	19	1	42	-15	10	0	-12	-21	39	-1	20	10

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mittel
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NO	13	37	-6	694	4	44	-1	-27	-14	4	-10	17	63
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MSO	61	35	-13	348	-4	1	24	34	-18	16	-9	14	41
Sued	52	15	2	62	-7	5	-9	27	-18	60	14	19	19
Mosel	33	-19	-21	306	2	-6	-19	9	-33	84	21	6	30
NB	45	20	-7	-36	-8	2	4	62	-21	53	-11	31	11
SW	54	14	-6	140	3	-8	-1	-12	15	95	29	24	29
SB	68	27	25	4	-13	17	-18	13	-17	46	31	13	16
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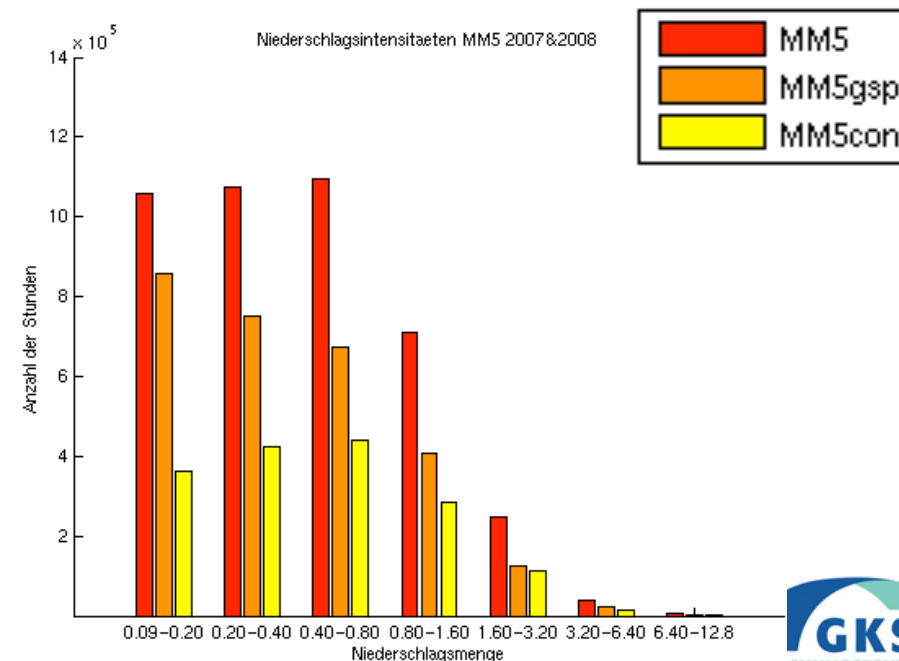
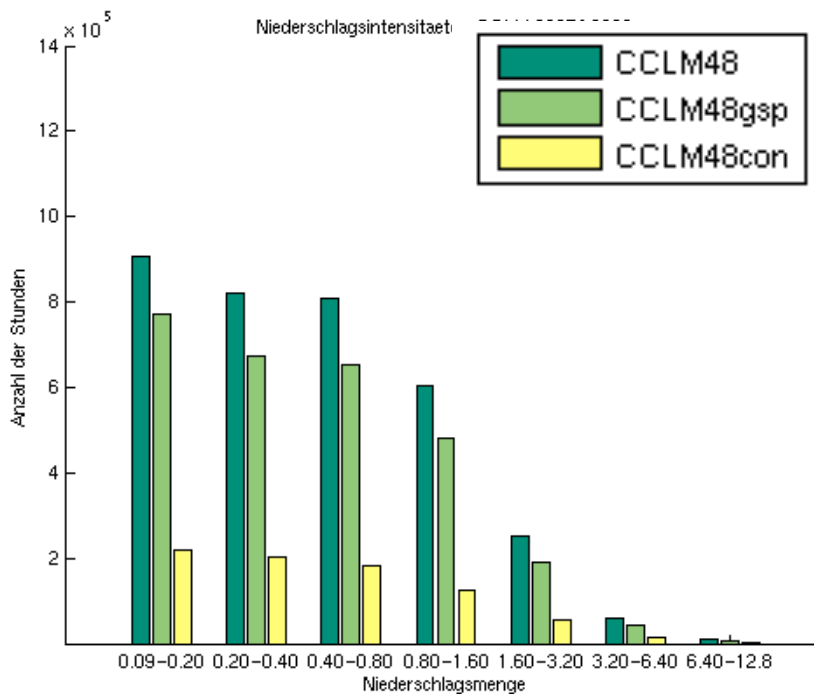
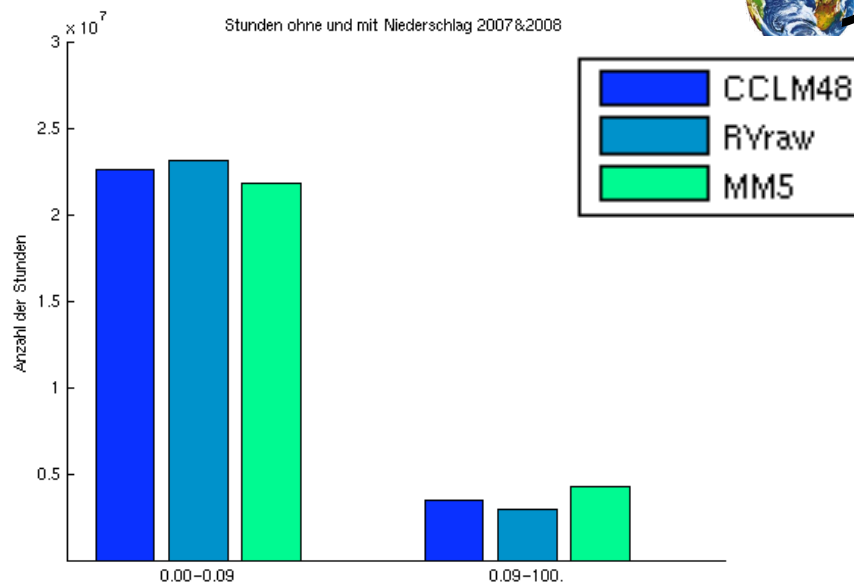
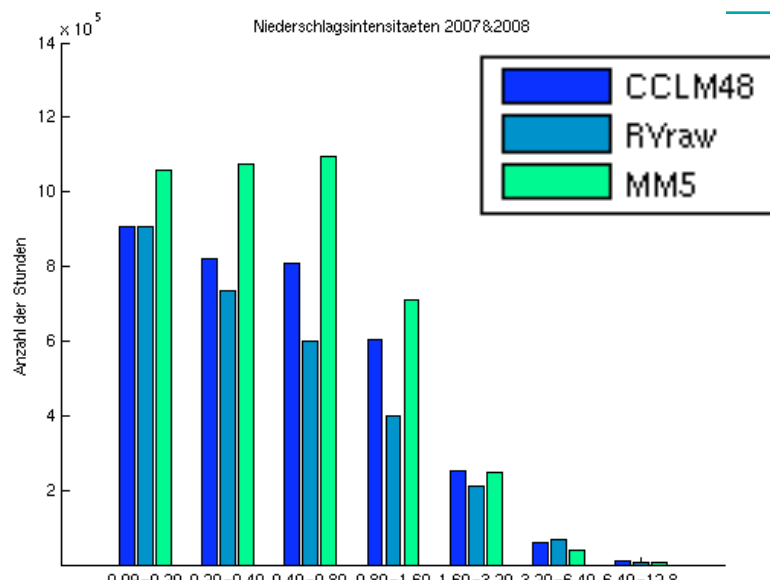
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Mosel	36	-28	-4	24	-12	-43	-22	-74	-13	28	61	1	-4
NB	63	5	-9	12	-68	-46	14	-30	-31	74	49	21	5
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SB	93	52	64	24	12	8	5	-16	-2	59	44	61	34
Gesamt	40	48	9	8	-21	-40	-9	-30	-37	16	40	36	5

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mittel
Nord	-11	42	-18	15	40	39	7	-28	-40	-14	48	22	9
NW	-8	21	-14	43	53	71	16	-31	-42	-15	39	41	15
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NB	79	3	-8	-6	146	64	33	17	-18	37	22	15	32
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SB	14	37	29	-19	-3	70	14	-1	-15	44	11	58	20
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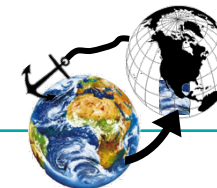




Distribution of Precip. Amounts



Total Cloud Cover: 2007 & 2008

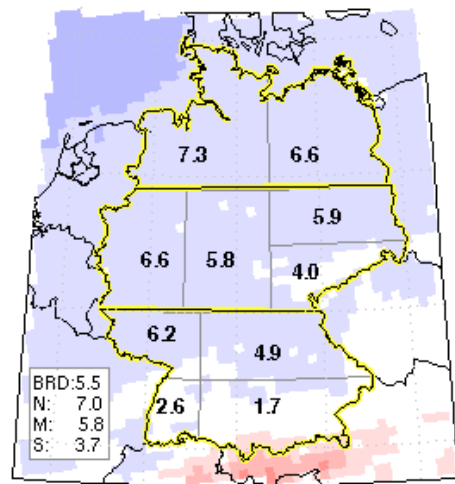


Relative Bias

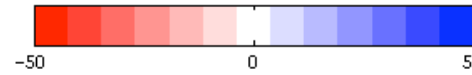
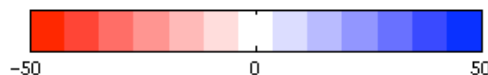
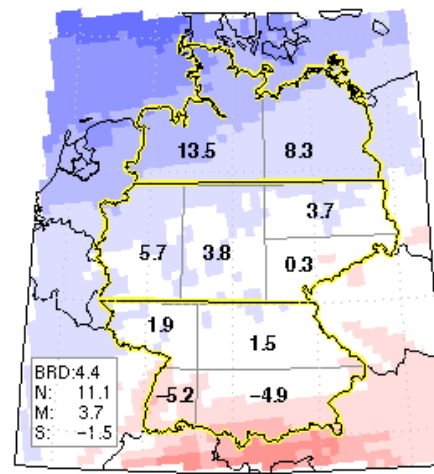
CCLM

MM5

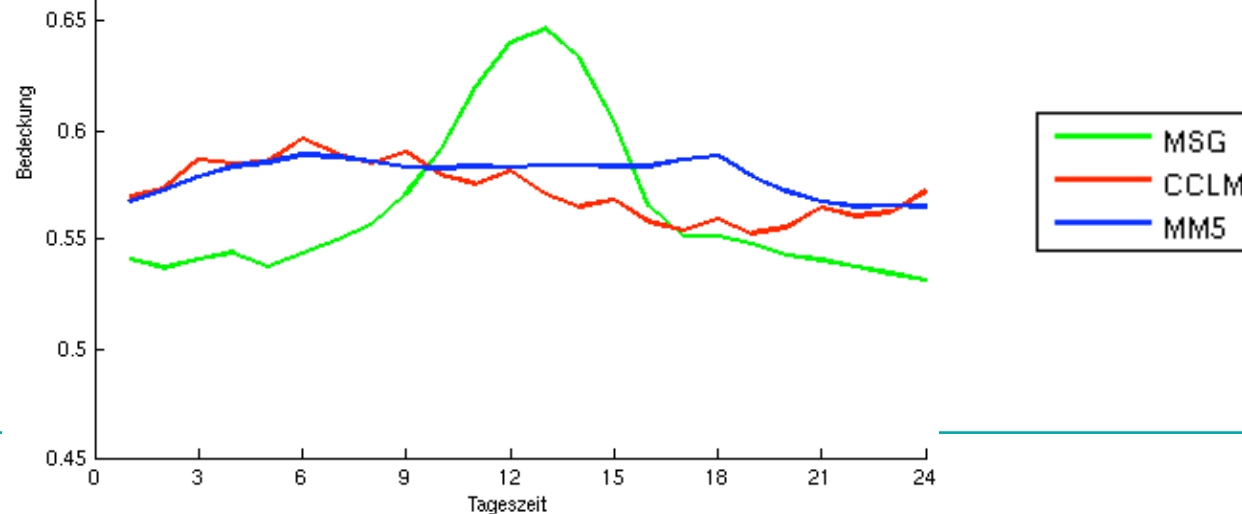
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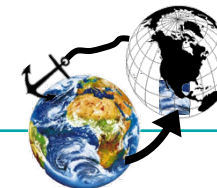


Relativer BIAS: (MM5 - MSG) / MSG, 2007&2008 [%]



Diurnal Cycle

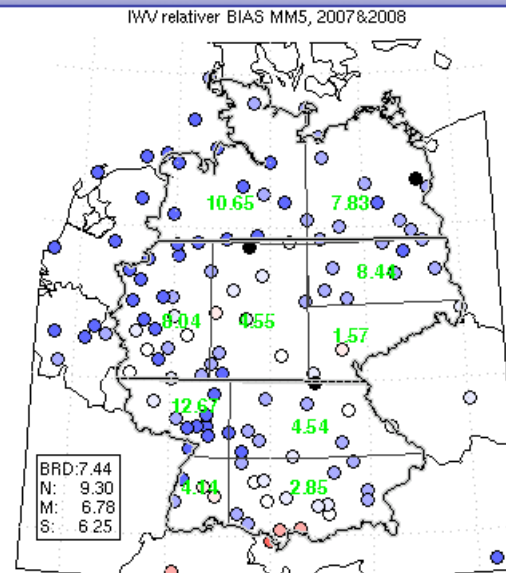
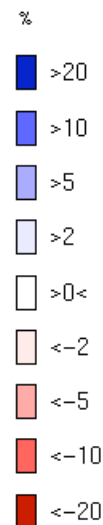
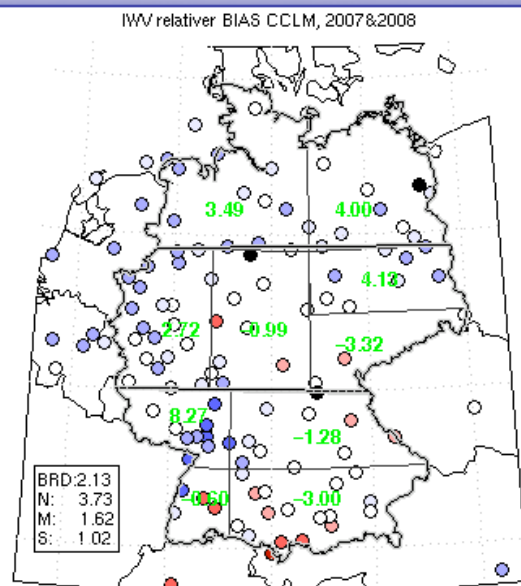




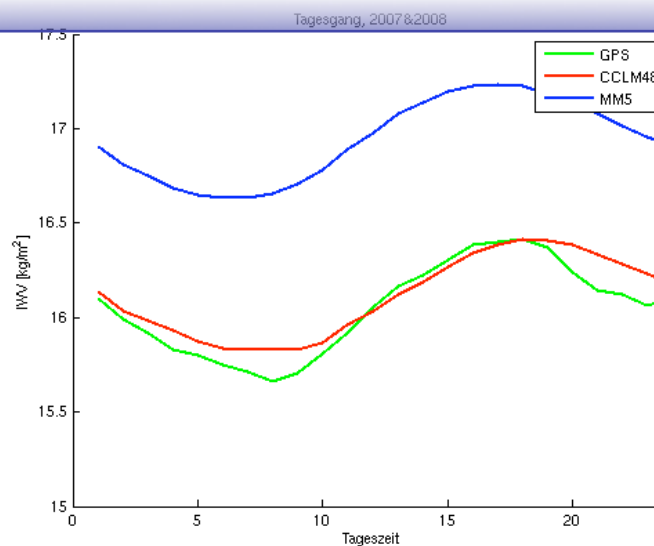
Relative Bias

CCLM

MM5



Diurnal Cycle





Are regional climate models able to represent the hydrological cycle in central Europe?

- ⇒ Both models are able to represent integrated water vapour and total cloud cover quite well.
- ⇒ Precipitation depends on the season.

Are there typical error structures in the (atmospherical part of) the hydrological cycle?

- ⇒ Yes, there are. E.g. total cloud cover in MM5: North-South-gradient in its Bias. Diurnal cycles,...

Is it even possible to evaluate climate models over short periods?

- ⇒ Yes, it is. But it depends: you have to be careful to eg monthly outliers.



Next Steps



- Analyse all plots which I have produced
- Look for correlations
- Integrated cloud analysis
- Summarise all findings in my thesis until 1st December





Thank you for your attention!

