CI Nowcasting at DLR – Snapshots of ongoing research

by Dennis Stich

2012 Convection Working Group meeting, 27-30 March 2012, Prague

Knowledge for Tomorrow

DLR

Motivation

Aviation purposes

Cb-TRAM as basic tool

Adding non-satellite fields for further development

NOT(!) especially for forecasters

General idea

Basic Tool
(Cb-TRAM) ⟷ Verification

↓ Data Fusion

Cb-TRAM +
Additional data ⟷ Verification
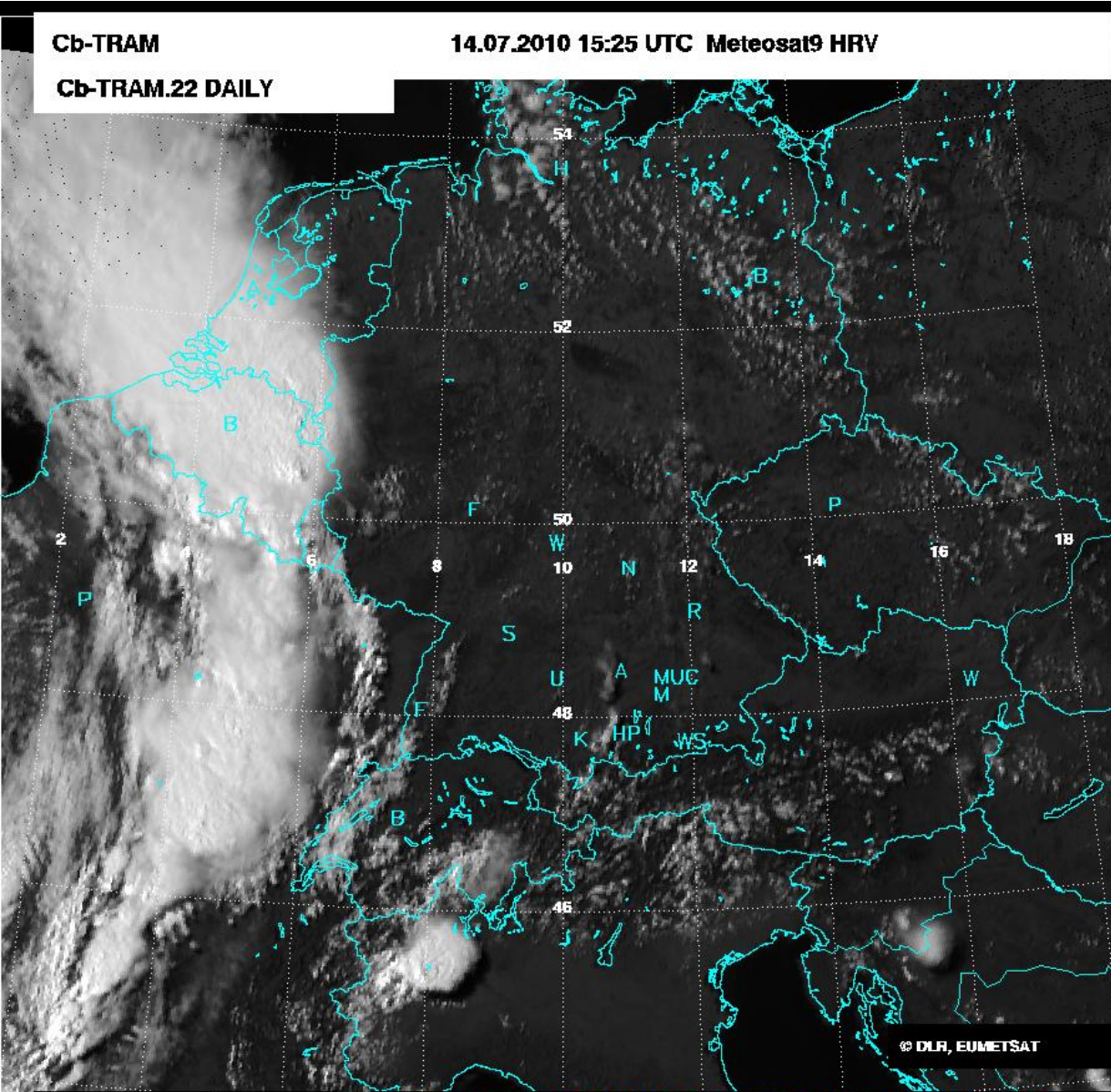
↓

CI-NOW – a CI detection and nowcasting tool

Cb-TRAM - **C**umulonim**b**us **TR**acking **A**nd **M**onitoring

Cb-TRAM - **C**umulonim**b**us **TR**acking **A**nd **M**onitoring

Cb-TRAM

Cb-TRAM.22 DAILY

14.07.2010 15:25 UTC Meteosat9 HRV

© DLR, EUMETSAT

parallax corrected
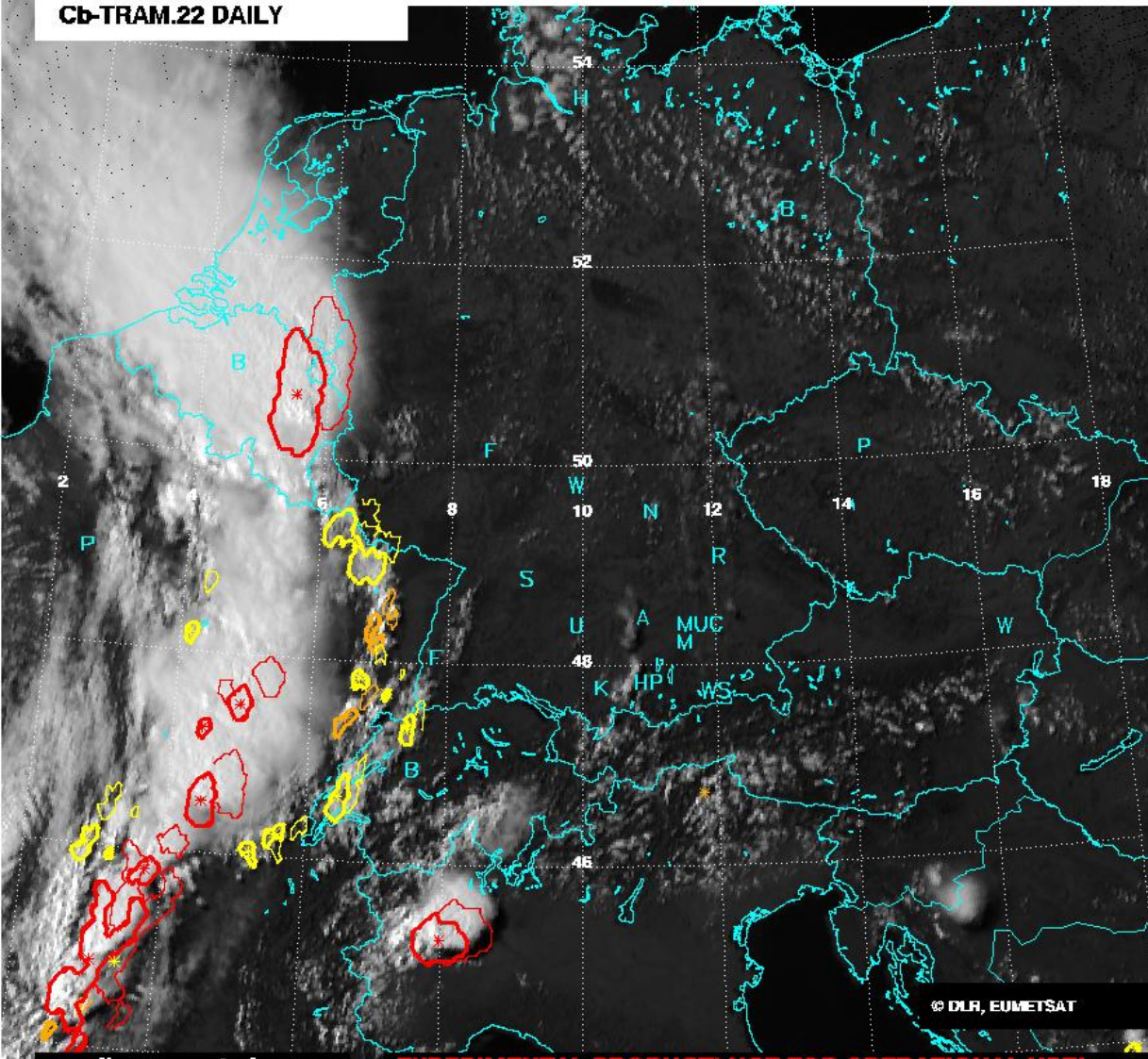
EXPERIMENTAL PRODUCT! NOT FOR OPERATIONAL USE!

Used MSG (rapidscan) data:

WV 6.2	IR 10.8
IR 12.0	HRV

Detection stages:

1: Convection Initiation (CI)
 development in HRV
 IR 10.8 cooling

2: Rapid development
 WV 6.2 rapid cooling
 (> 1K/15min)

3: Mature storms
 T 6.2 - T 10.8
 HRV texture

Extrapolation up to 60 min
(here 30 minute nowcast plotted)
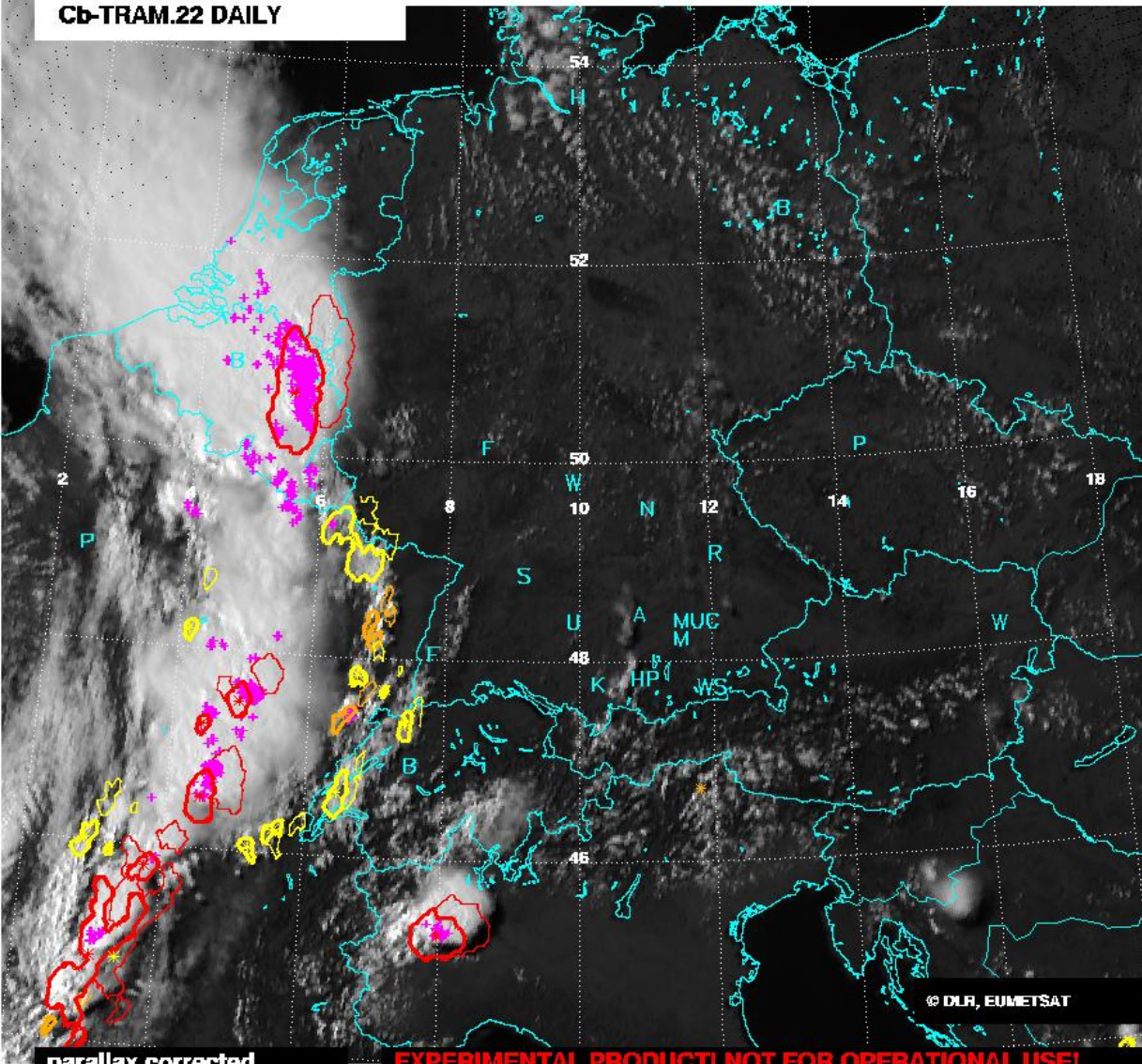
Description: Zinner et al., 2008

Cb-TRAM - Cumulonimbus TRacking And Monitoring

Cb-TRAM
Cb-TRAM.22 DAILY

14.07.2010 15:25 UTC Meteosat9 HRV

parallax corrected

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Used MSG (rapidscan) data:

WV 6.2   IR 10.8

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Detection stages:

1: Convection Initiation (CI)
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IR 10.8 cooling

2: Rapid development
WV 6.2 rapid cooling
(> 1K/15min)

3: Mature storms
T 6.2 - T 10.8
HRV texture

Lightning (LINET)

Extrapolation up to 60 min
(here 30 minute nowcast plotted)

Description: Zinner et al., 2008

CI-Verification

Changed a bit,
Improved a bit,
and now skipped due to lack of time !!
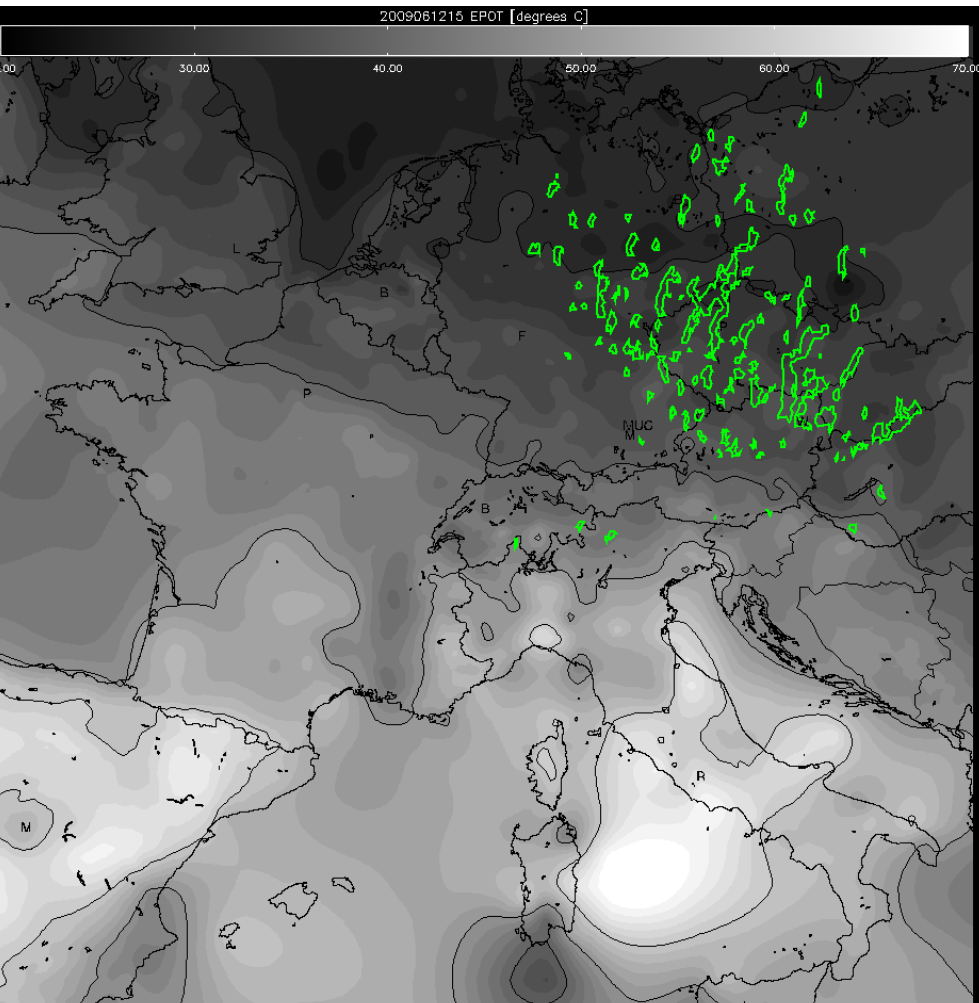
Additional data sources

Testing the additional information provided by:

- more satellite channels (SATCAST IFs)
- LINET data
- VERA data
  (e.g. MFC, equivalent potential temperature)
- COSMO-EU data
  (e.g. updraft, KO-Index)
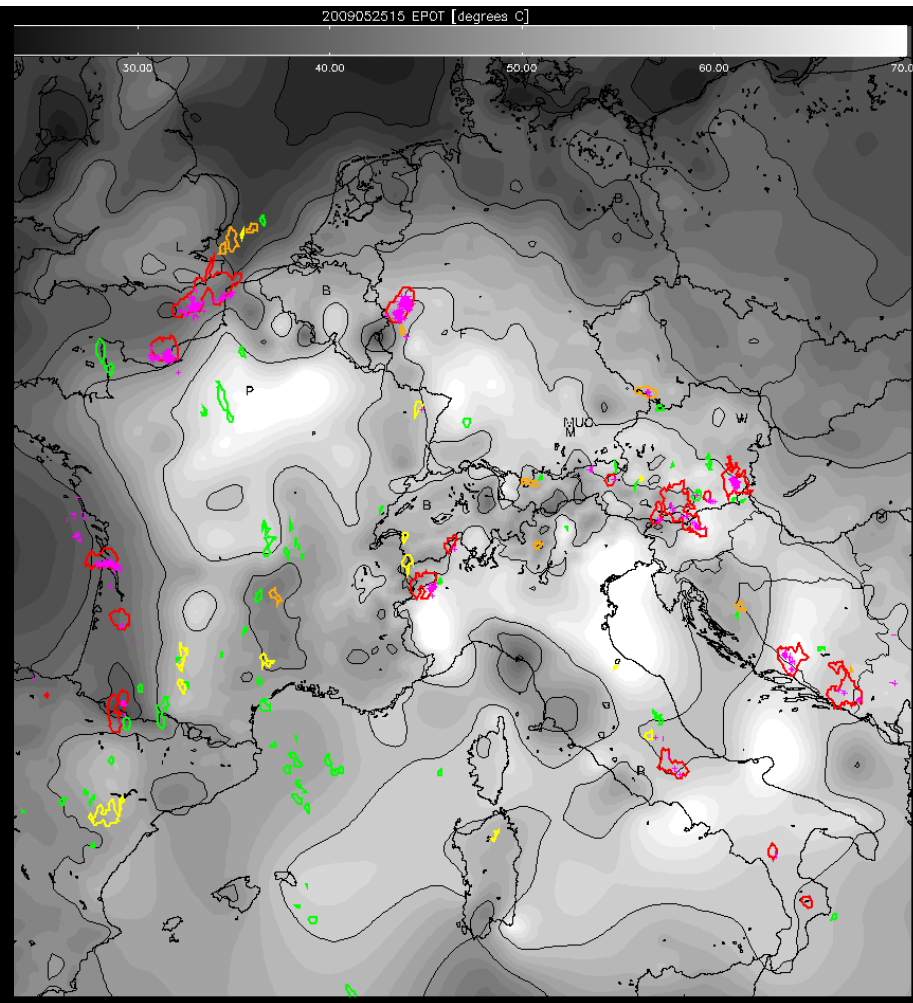- COSMO-DE data
  (e.g. thunderstorm probability)

More information and references:

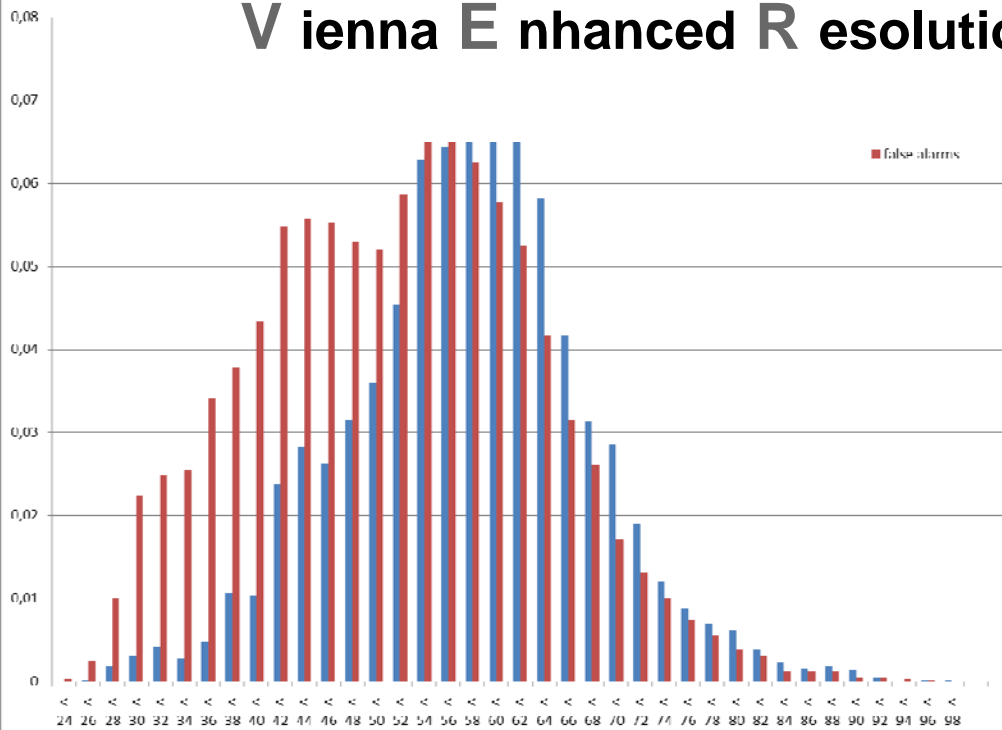www.univie.ac.at/amk/vera/

V ienna E nhanced R esolution A nalysis

θe June 12 2009 15 UTC

θe May 25 2009 15 UTC

V ienna **E** nhanced **R** esolution **A** nalysis

More information and references:

www.univie.ac.at/amk/vera/

Statistics calculated for
~ 35.000 CI cells over 87
days in summer 2009
(May 15 - 31 August)

θe < 36 °:
  1.7 % of all hits
 12.0 % of all false alarms
θe < 41 °:
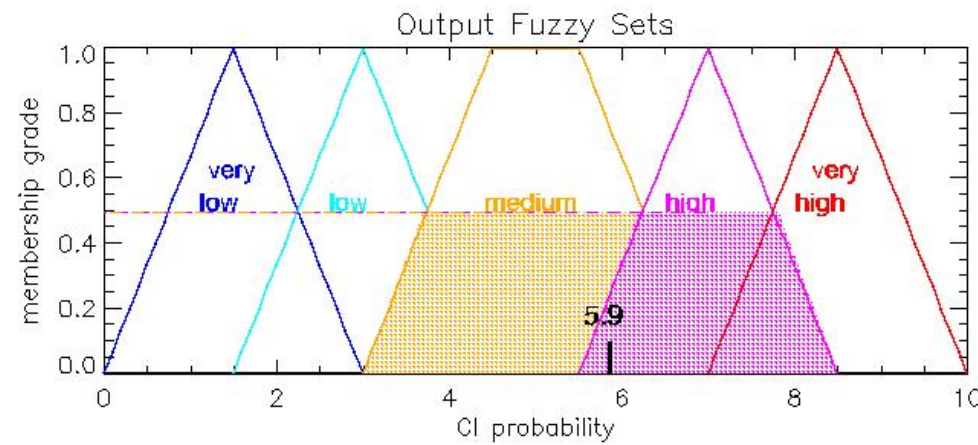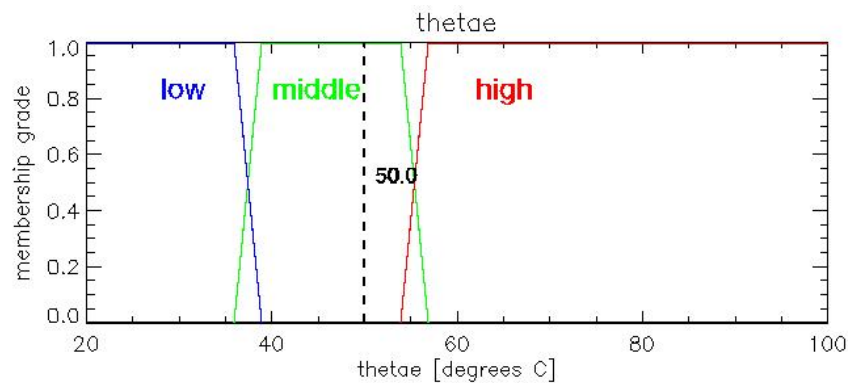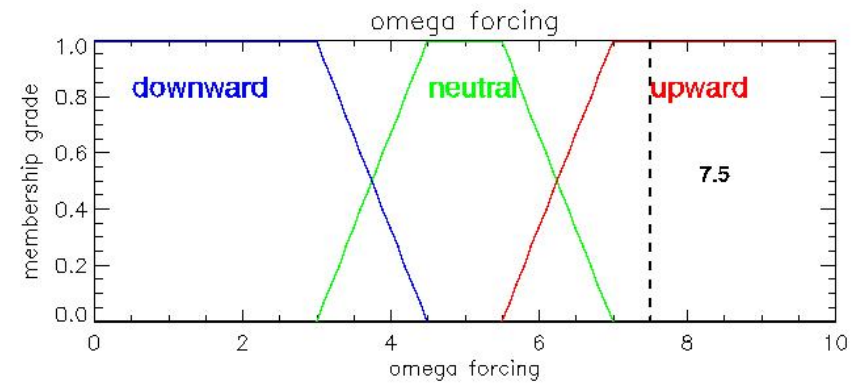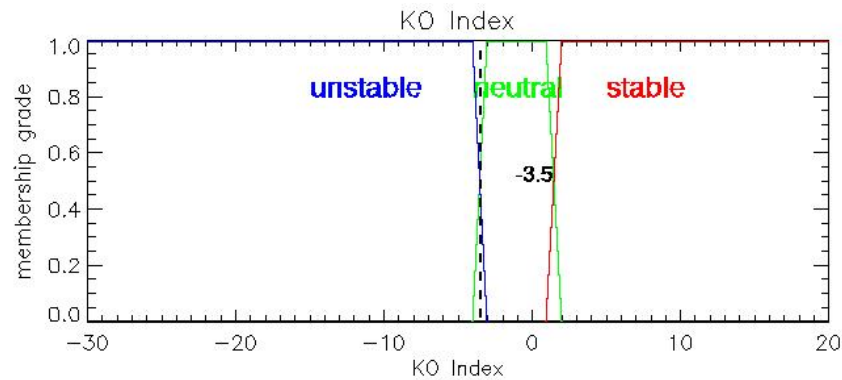 4.8 % of all hits
22.7 % of all false alarms

Fuzzy Logic

Aims

Reduce the amount of „false alarms" substantially

Losing as few „hits" as possible

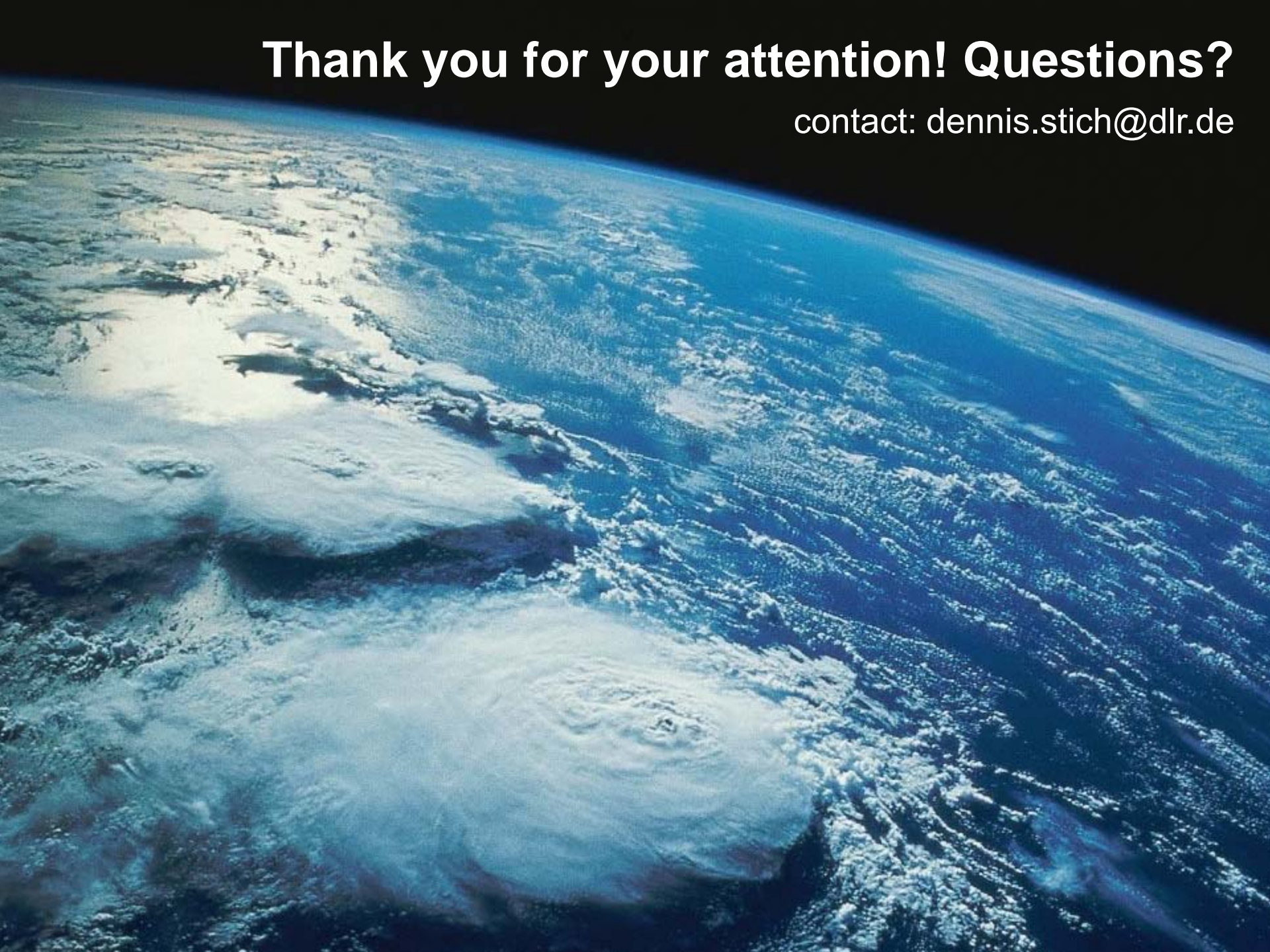Using just data where the gain is abundantly clear due to:

        save processing time
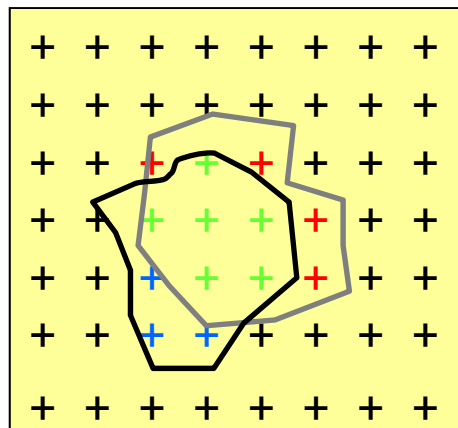
        stay easily traceable (selection of data)

Thank you for your attention! Questions?
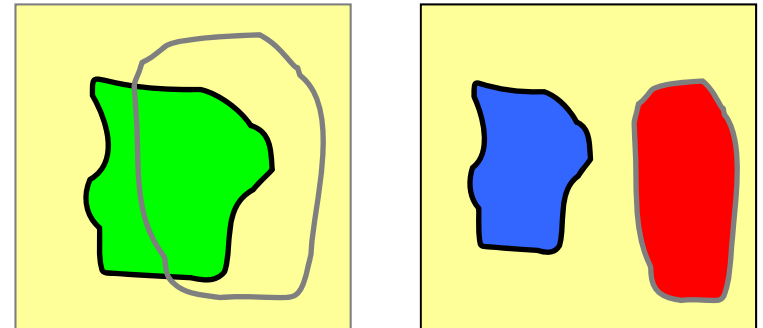
contact: dennis.stich@dlr.de

CI-Verification

Contingency table

		Observed	
		yes	no
Forecast	yes	hit	false alarm
	no	miss	correct negative

Object based

double penalty problem

Pixel based

Requires perfect matching!

Fuzzy + Object based

CI-Verification

Object based

Contingency table			
		Observed	
		yes	no
Forecast	yes	hit	false alarm
	no	miss	correct negative

Cb-TRAM analysis used for comparison with the 15, 30, 45, and 60 minutes CI-stage nowcasts and nowcasttracks

— detected cloud cell

— extrapolated/ first guess cell

→ analysed track

t+3

t+2

t+1

t+1

t

t