Use of Background Model in the GII Processing

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Background

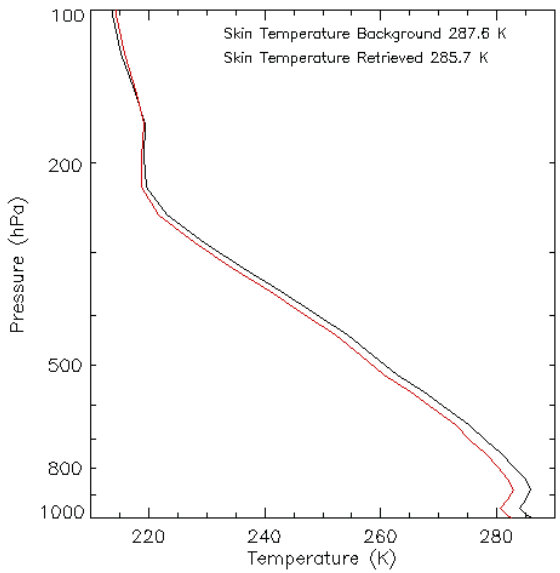
GII = Global instability Indices (TPW, K-Index, …)

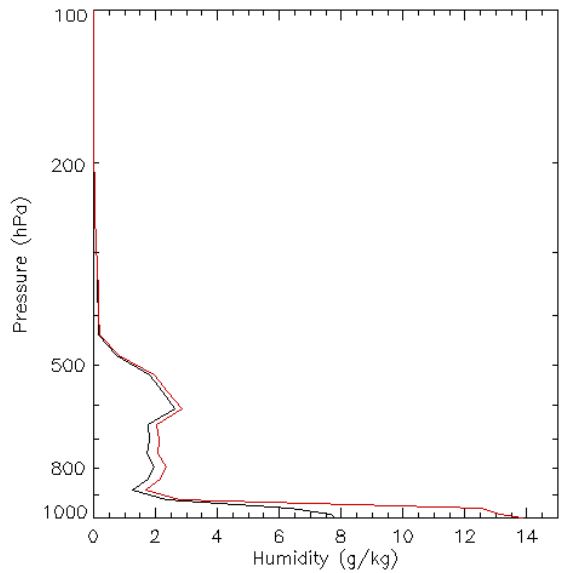
One of the MSG Meteorological Products generated at EUMETSAT

Generation through an optimal estimation scheme:

Background temperature and humidity profile is changed until the simulated brightness temperatures in 6 IR channels more or less agree with the measurements

Example





Background and retrieved temperature and humidity profile

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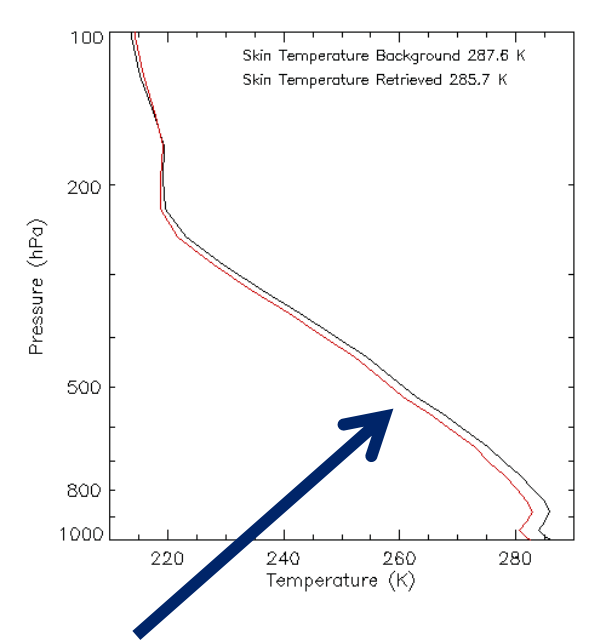
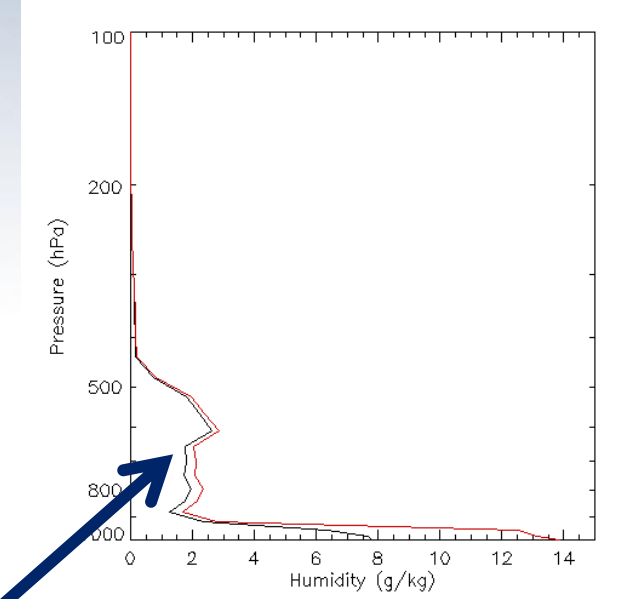
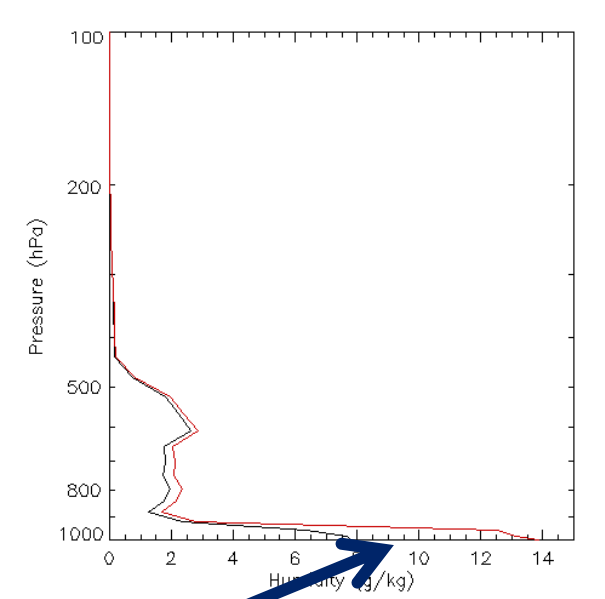
Example



Temperature changes e.g. through IR13.4 channel
Measurement here: 253.5 K
Simulated from forecast: 258.5 K – too warm!
Simulated from final profile: 254.5 K, profile colder throughout troposphere

Example - simplified





Humidity changes in midlevel:
Measurement IR7.3 here: 249.4 K
Simulated from forecast: 250.8 K (too moist)
Simulated from final profile: 249.5

Humidity changes in midlevel:
From split window BT difference
Measurement IR108.-IR12.0: 1.4 K
Simulated from forecast: 0.6 K – too dry
Simulated from final profile: 1.2 K

Question: Impact of Background Model?

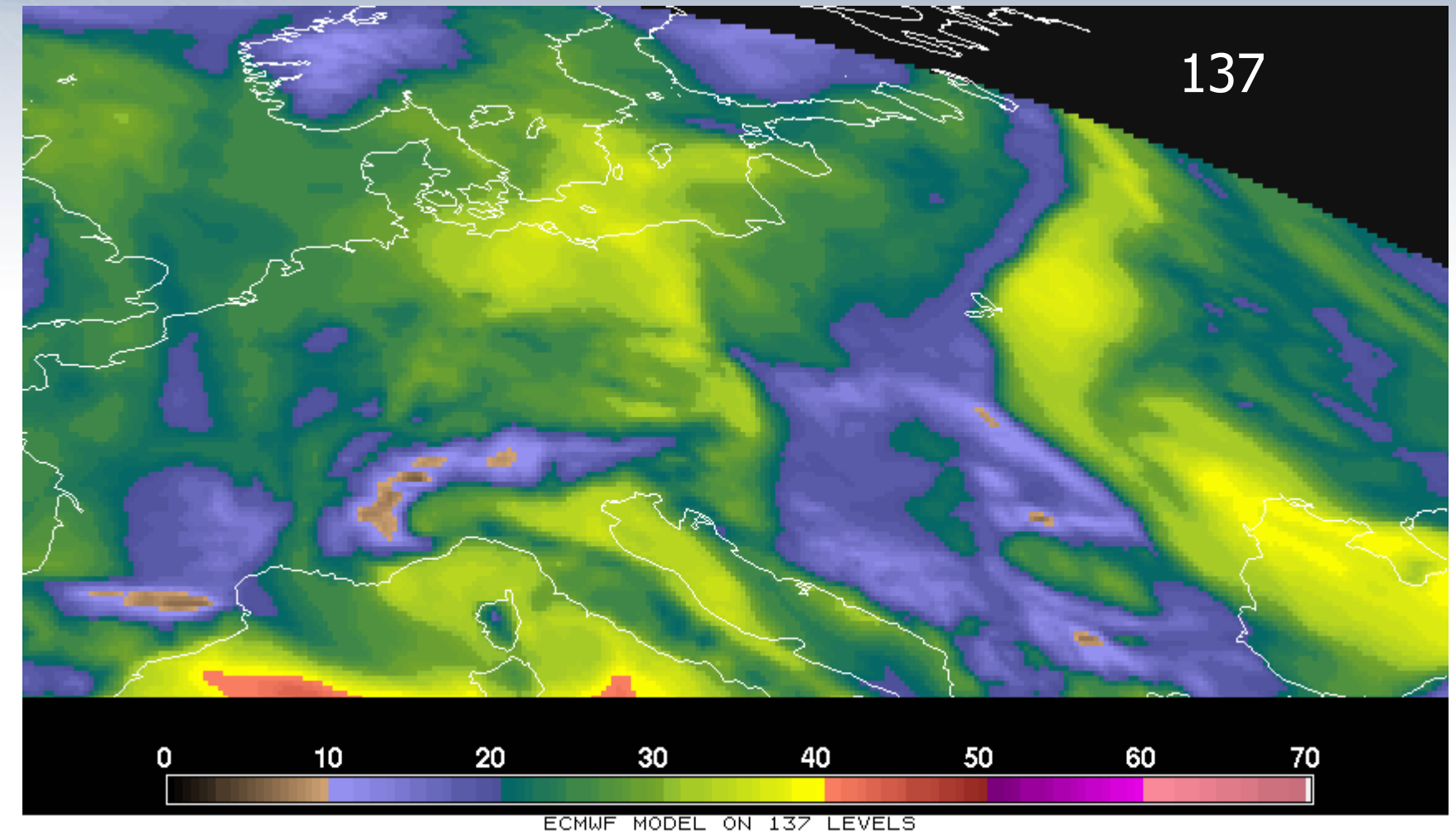
EUMETSAT processing uses 1 deg ECMWF forecasts on 30 levels as background

Note: Background data should be close to the truth, MSG-SEVIRI carries too little information, and the retrieval would not work

Tests were done with a different vertical resolution

Very preliminary test was done with another model (Aladin, kindly provided by Monika Pajek)

Impact of Vertical Resolution – TPW (1)



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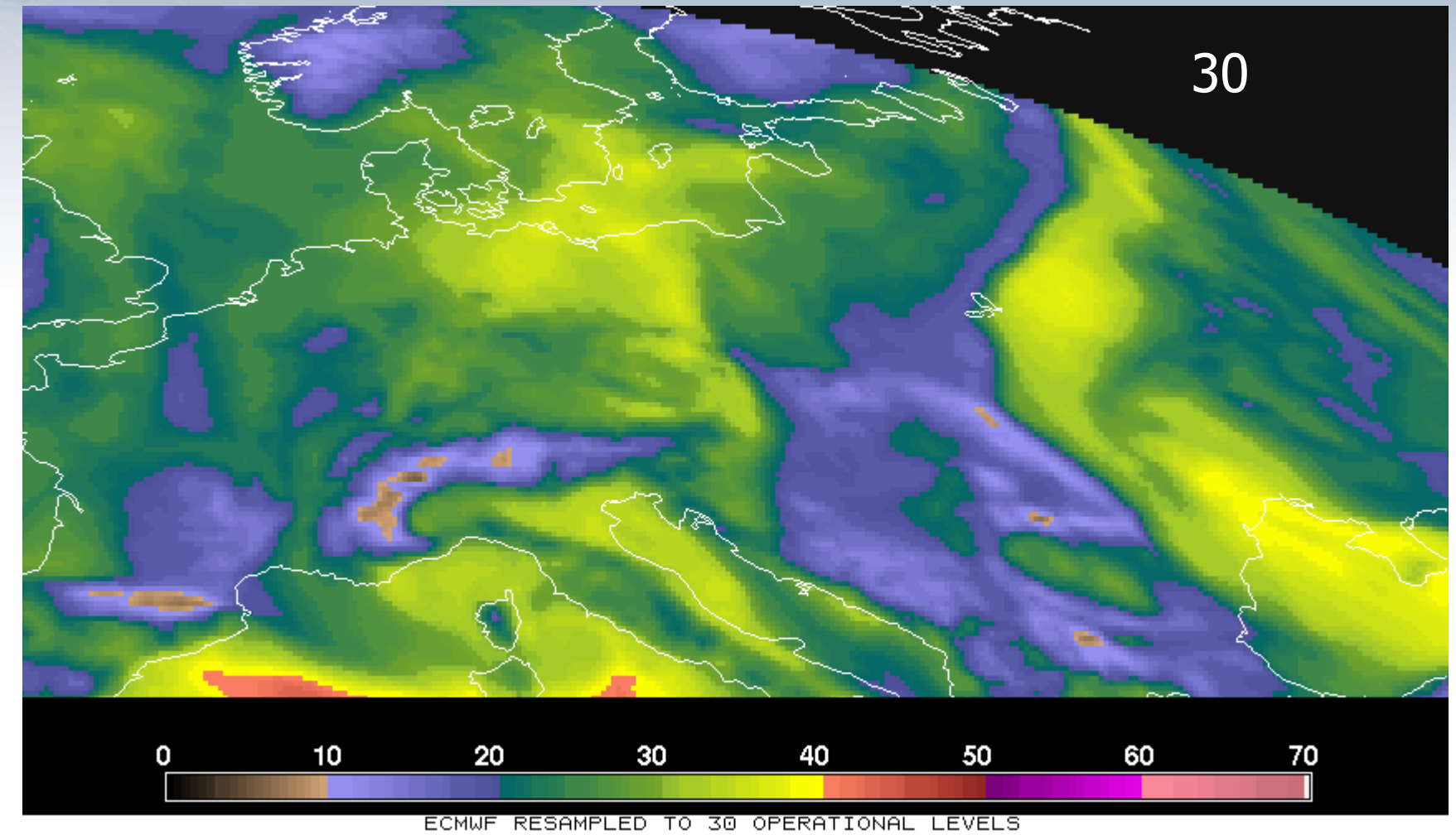
Impact of Vertical Resolution – TPW (2)



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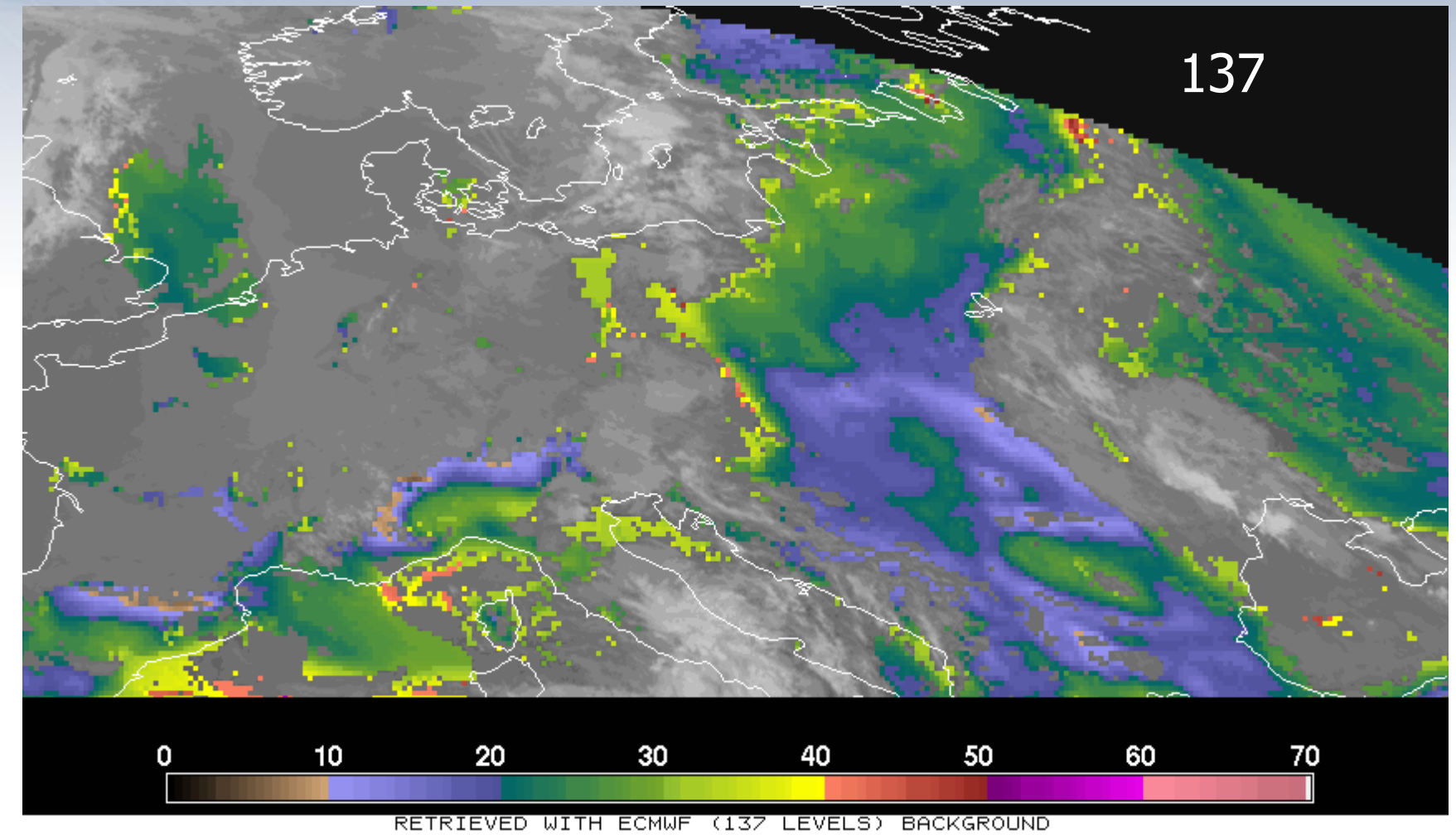
Impact of Vertical Resolution – TPW (3)



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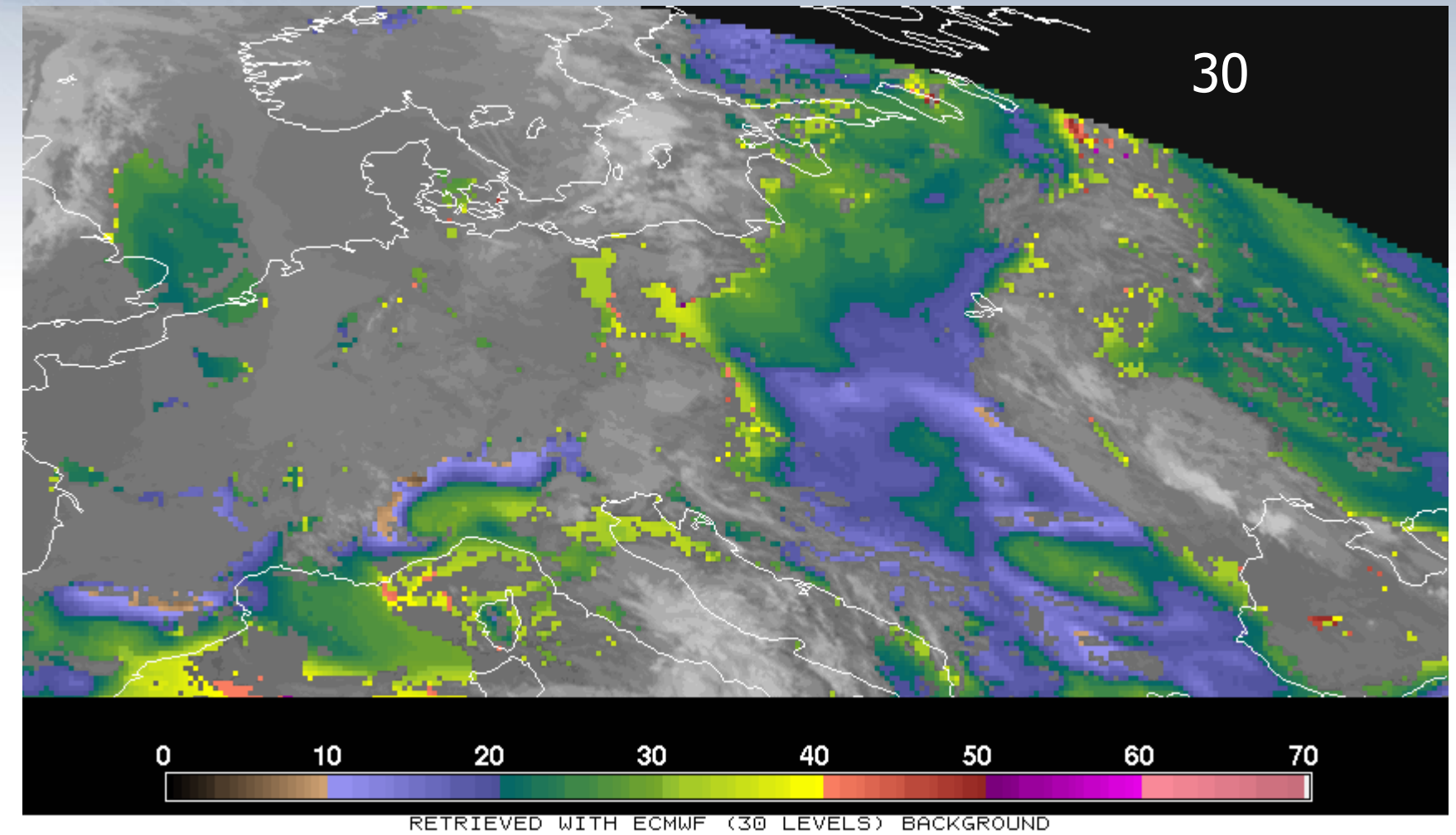
Impact of Vertical Resolution – TPW (4)



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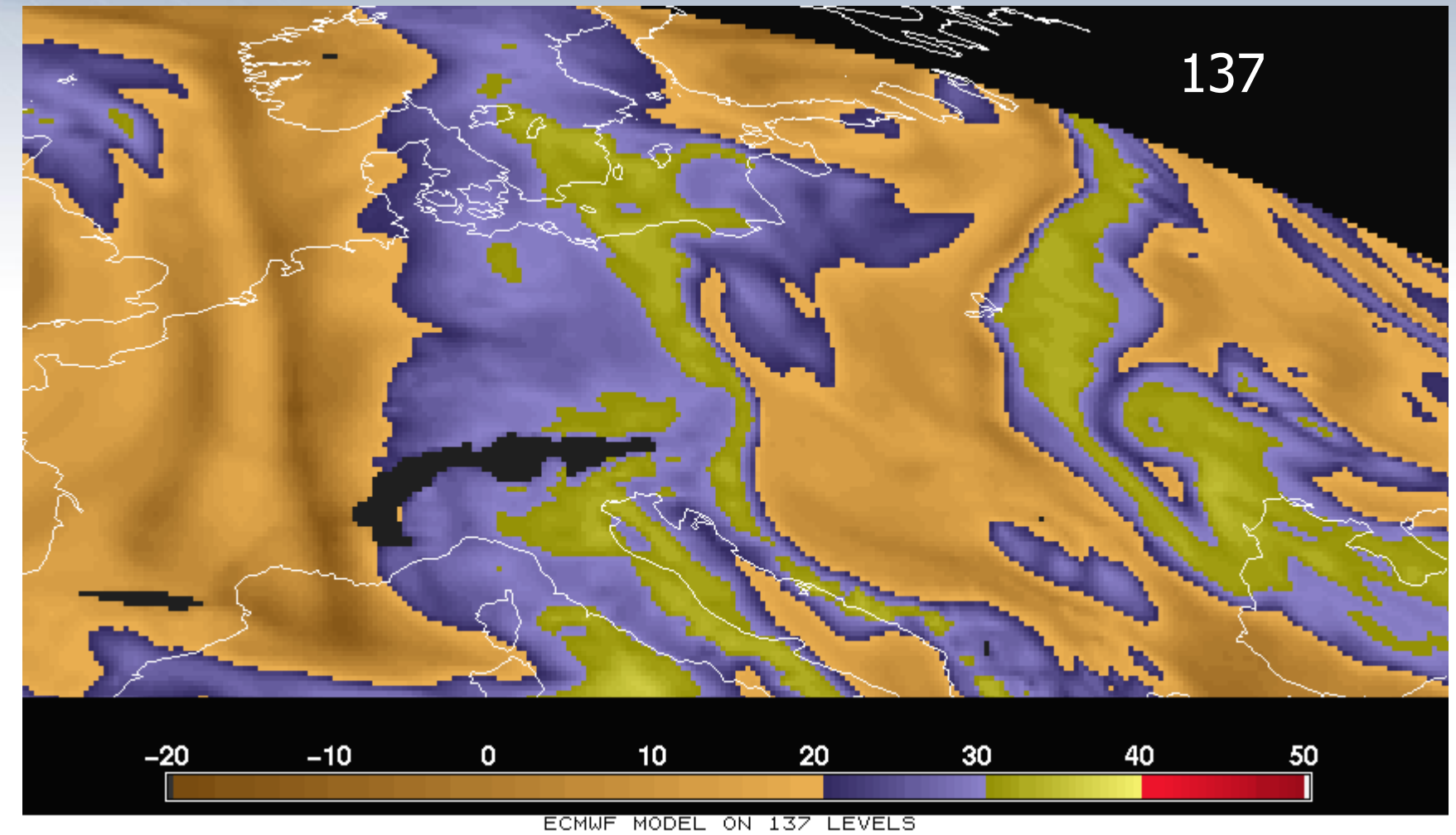
Impact of Vertical Resolution K-Index (1)



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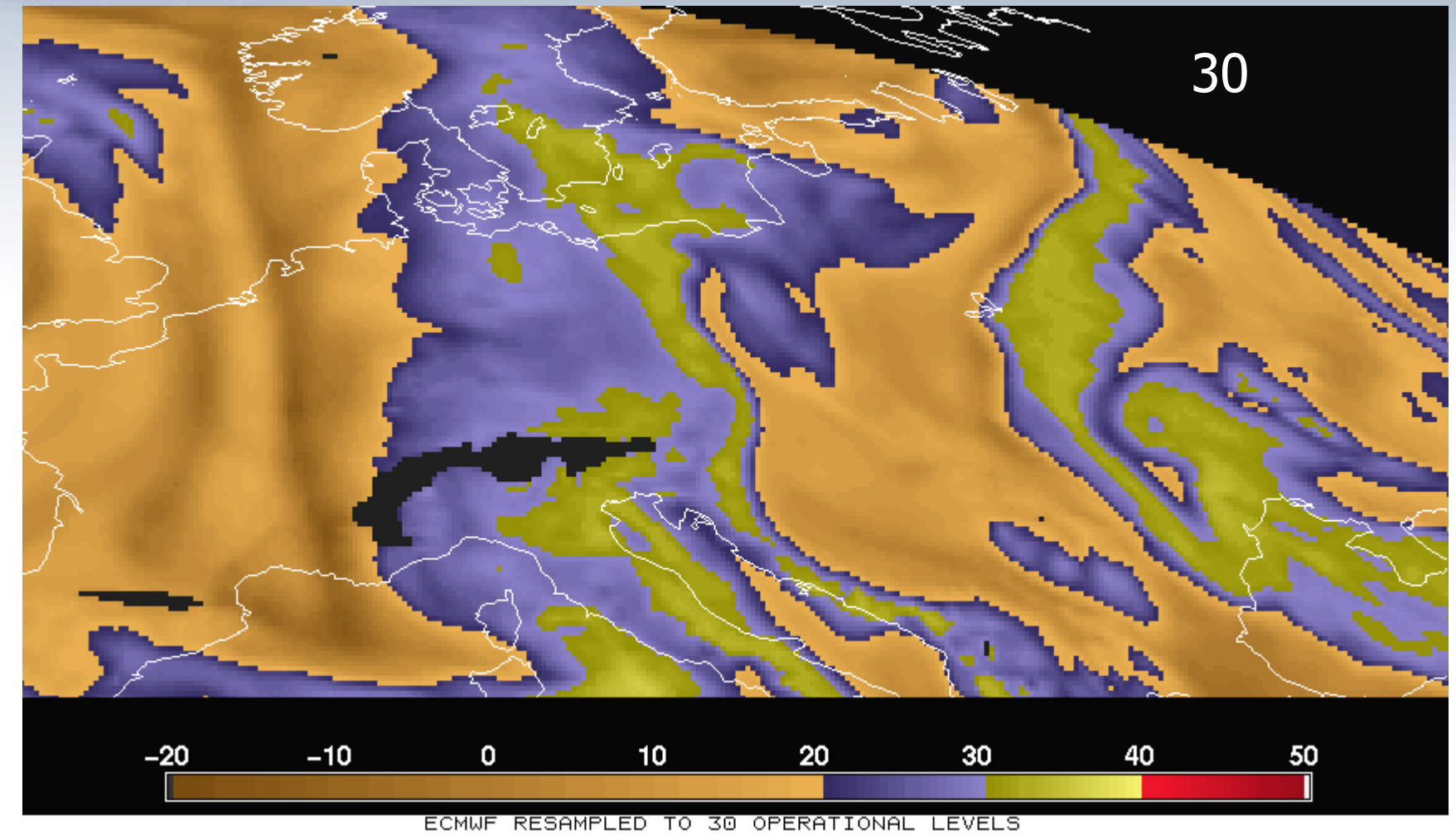
Impact of Vertical Resolution K-Index (2)



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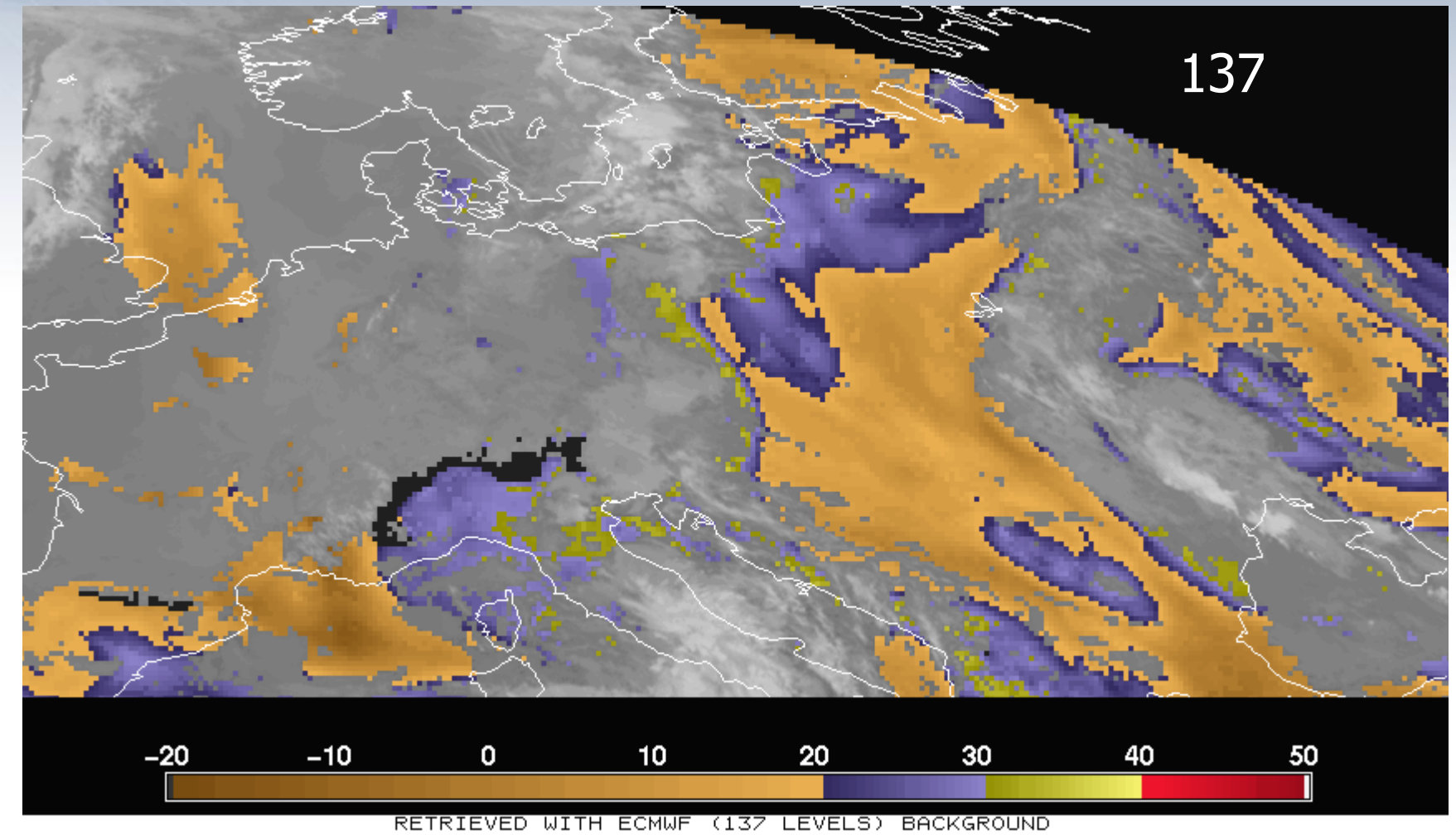
Impact of Vertical Resolution K-Index (3)



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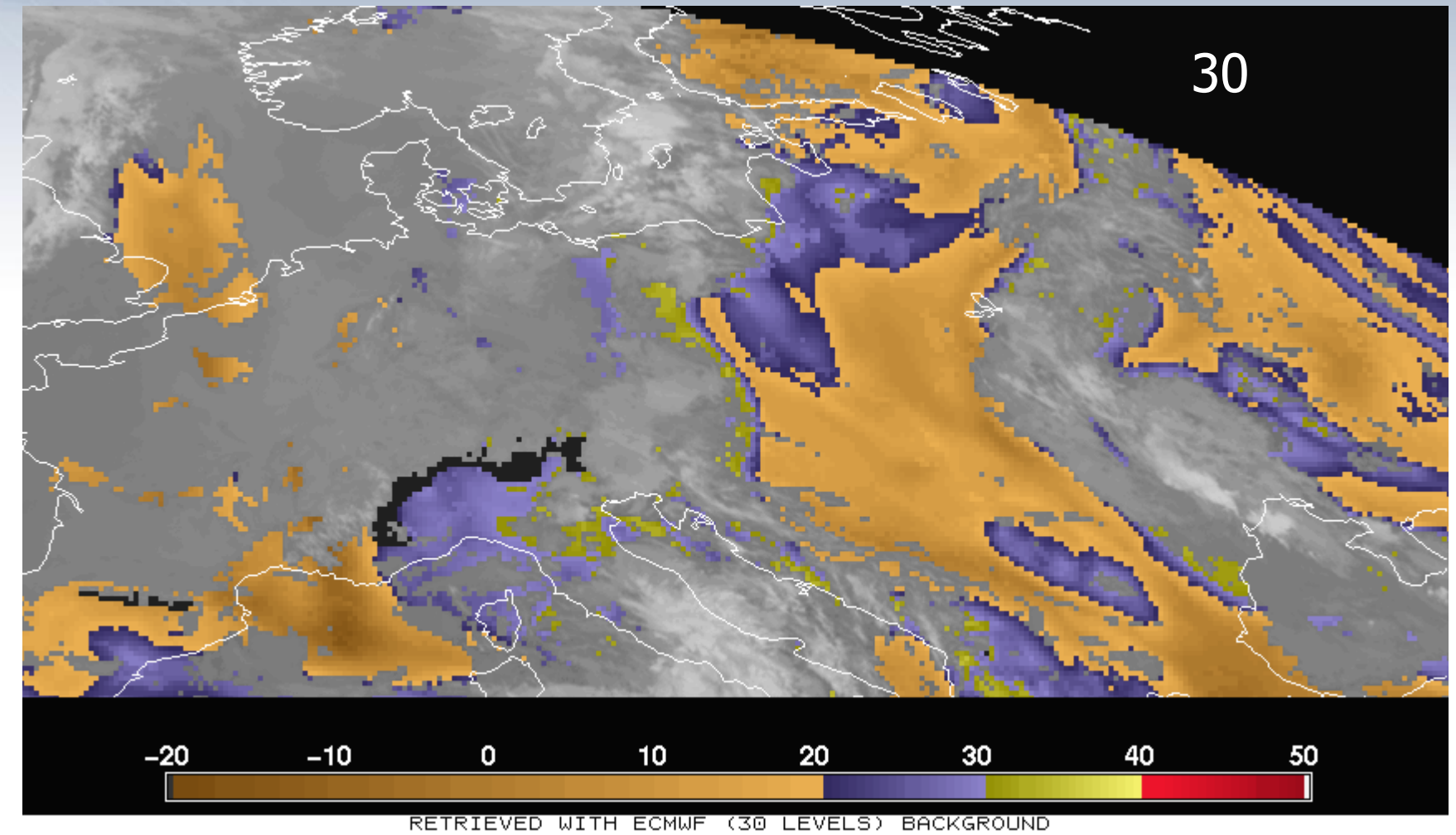
Impact of Vertical Resolution K-Index (4)



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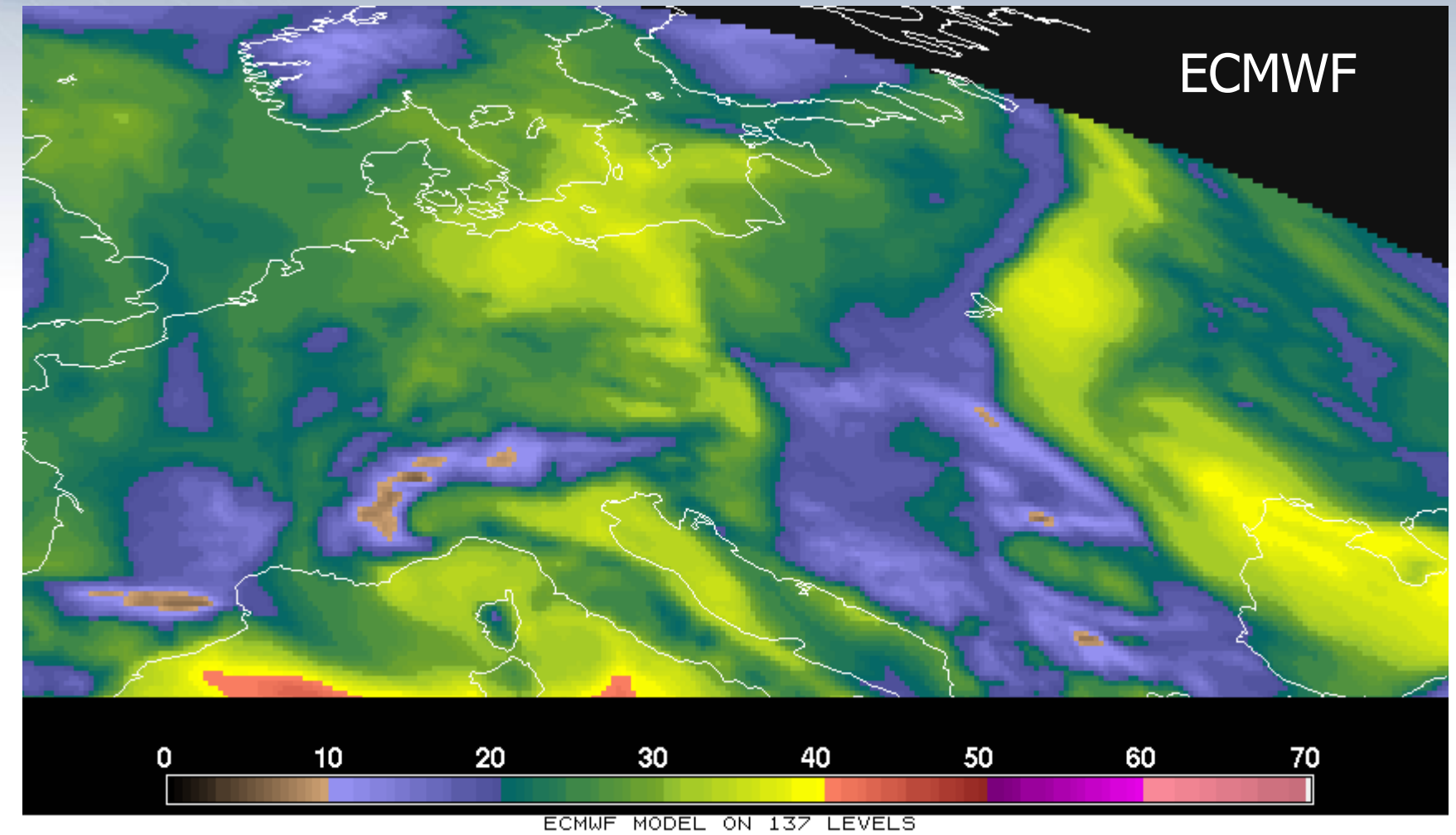
Comparison to Aladin Model – TPW (1)



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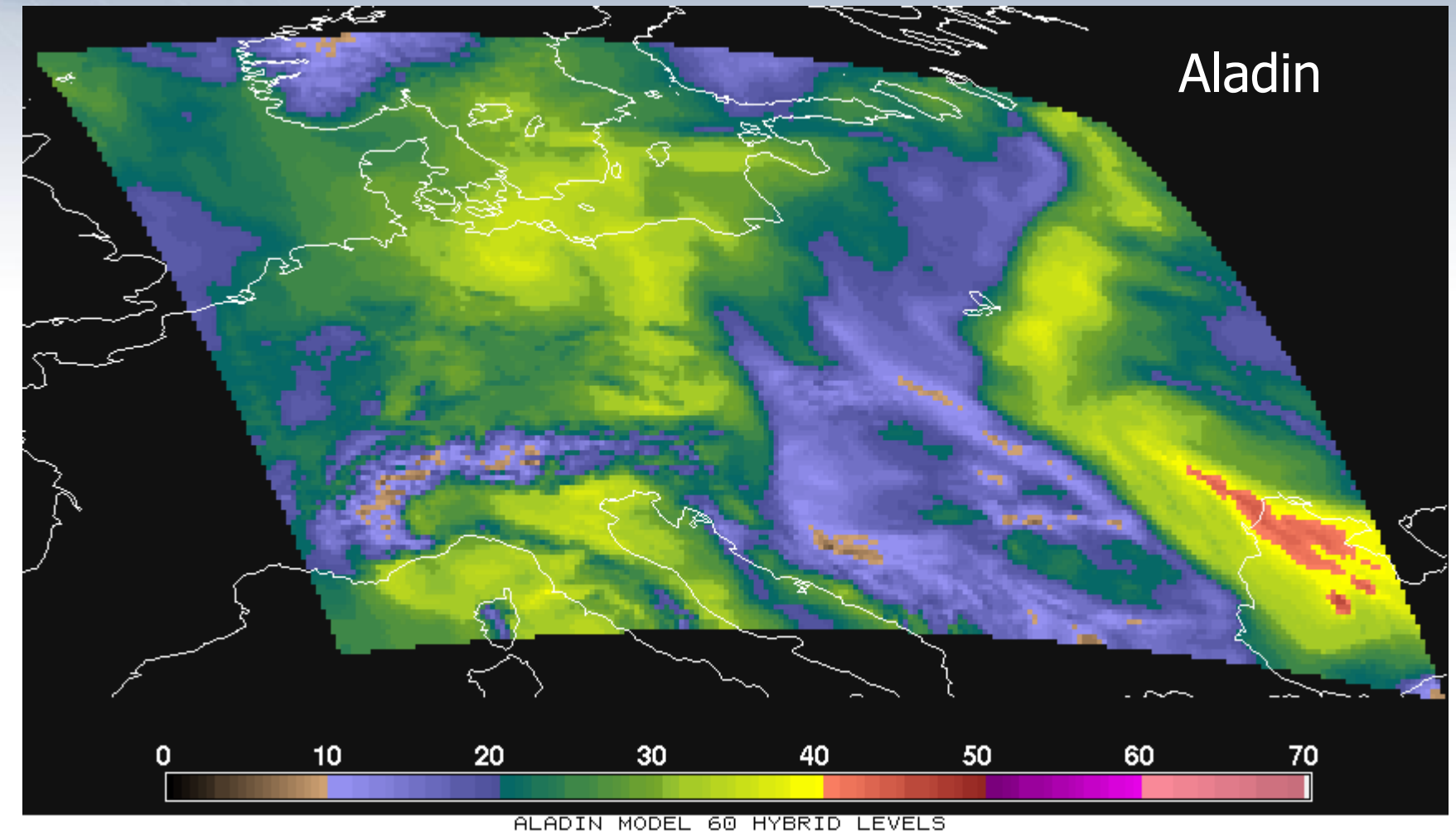
Comparison to Aladin Model – TPW (2)



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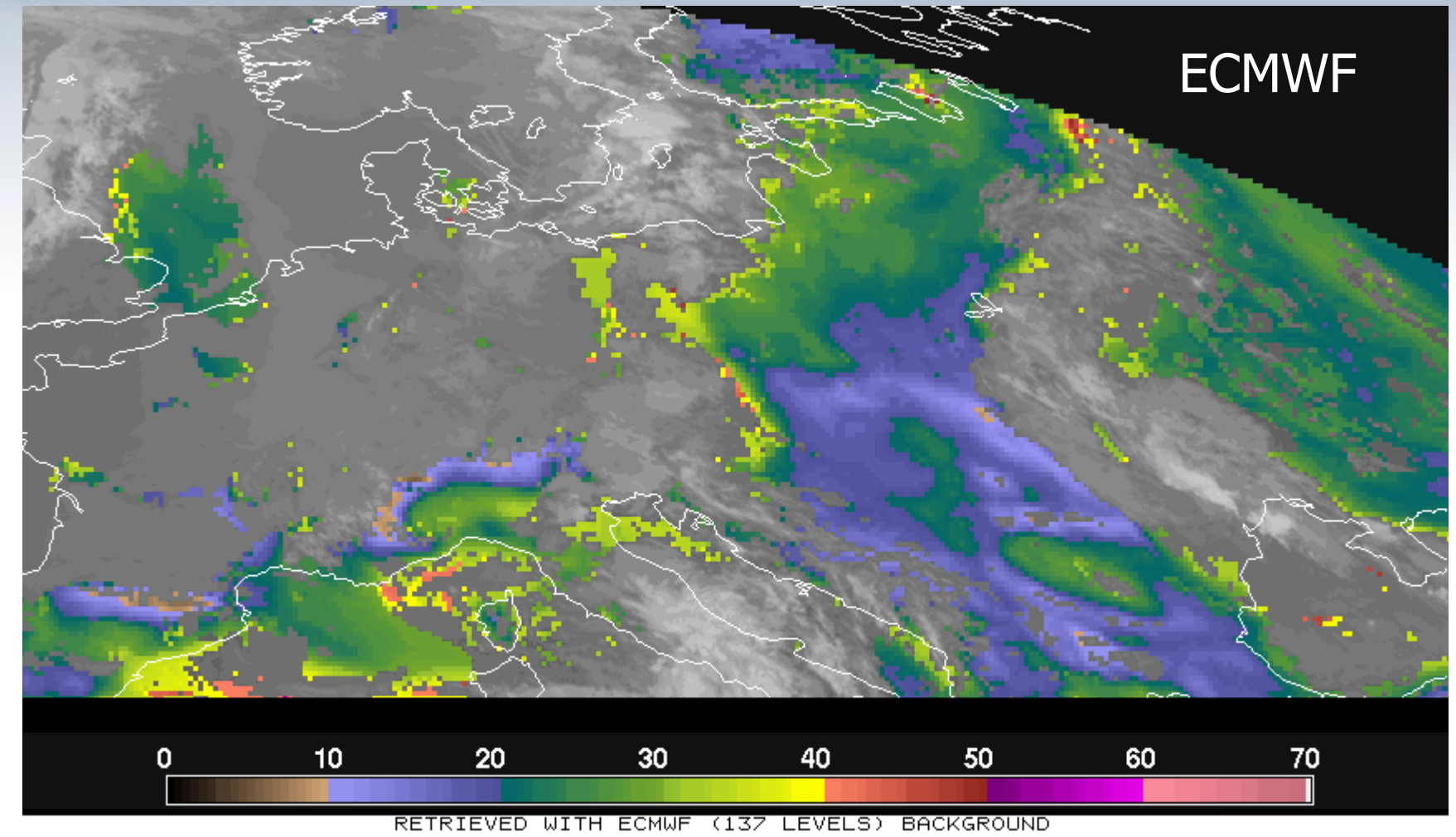
Comparison to Aladin Model - TPW (3)



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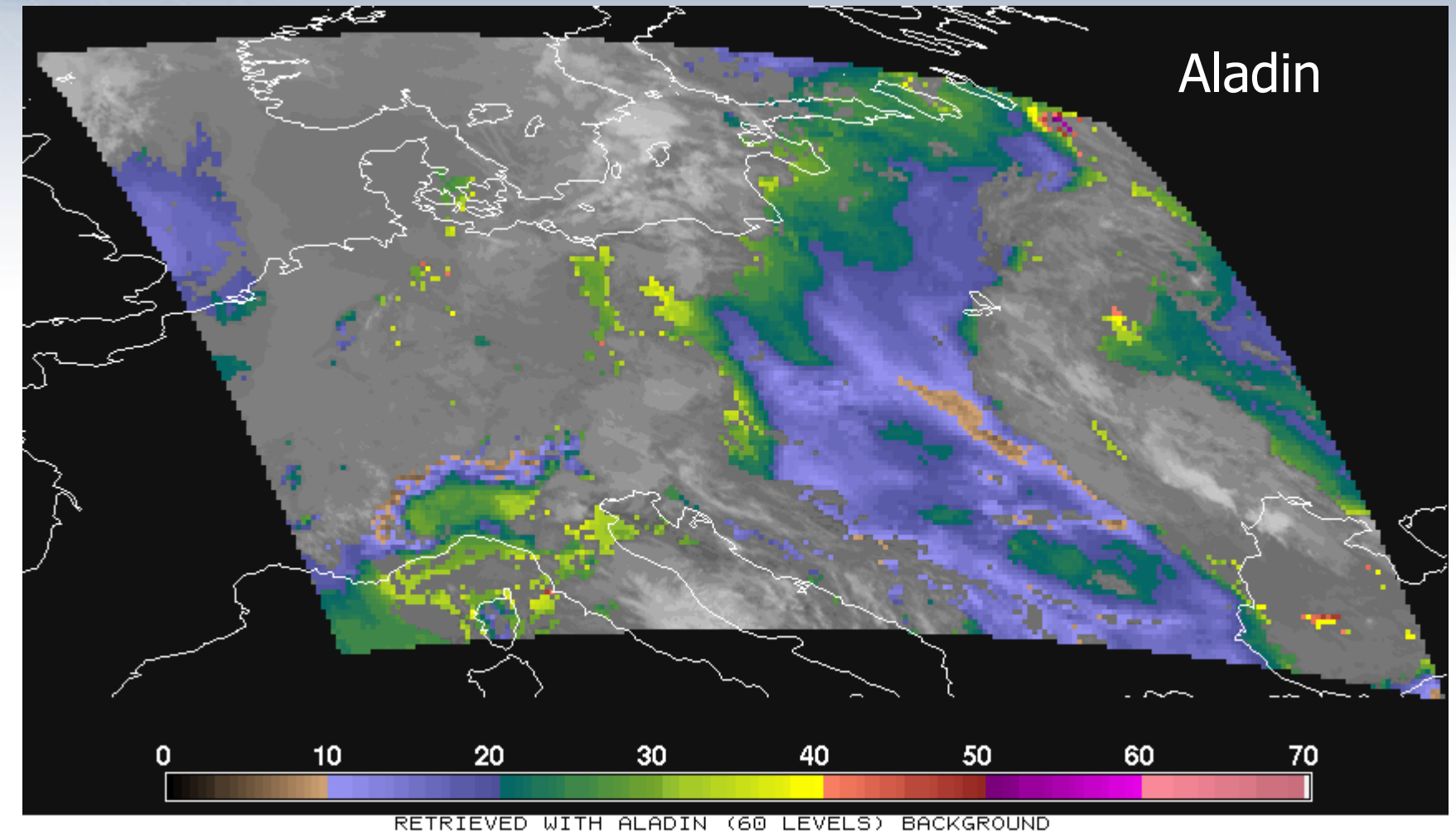
Comparison to Aladin Model – TPW (4)



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Summary and Outlook

Results not conclusive – mainly because models were rather similar

Way forward: Find cases where models really disagree (e.g. on position of air mass boundaries etc.)

We cannot do that at EUMETSAT, as no operational access to different models

Suggestion: Science Study to be commissioned by EUMETSAT, to be reported back at next CWG

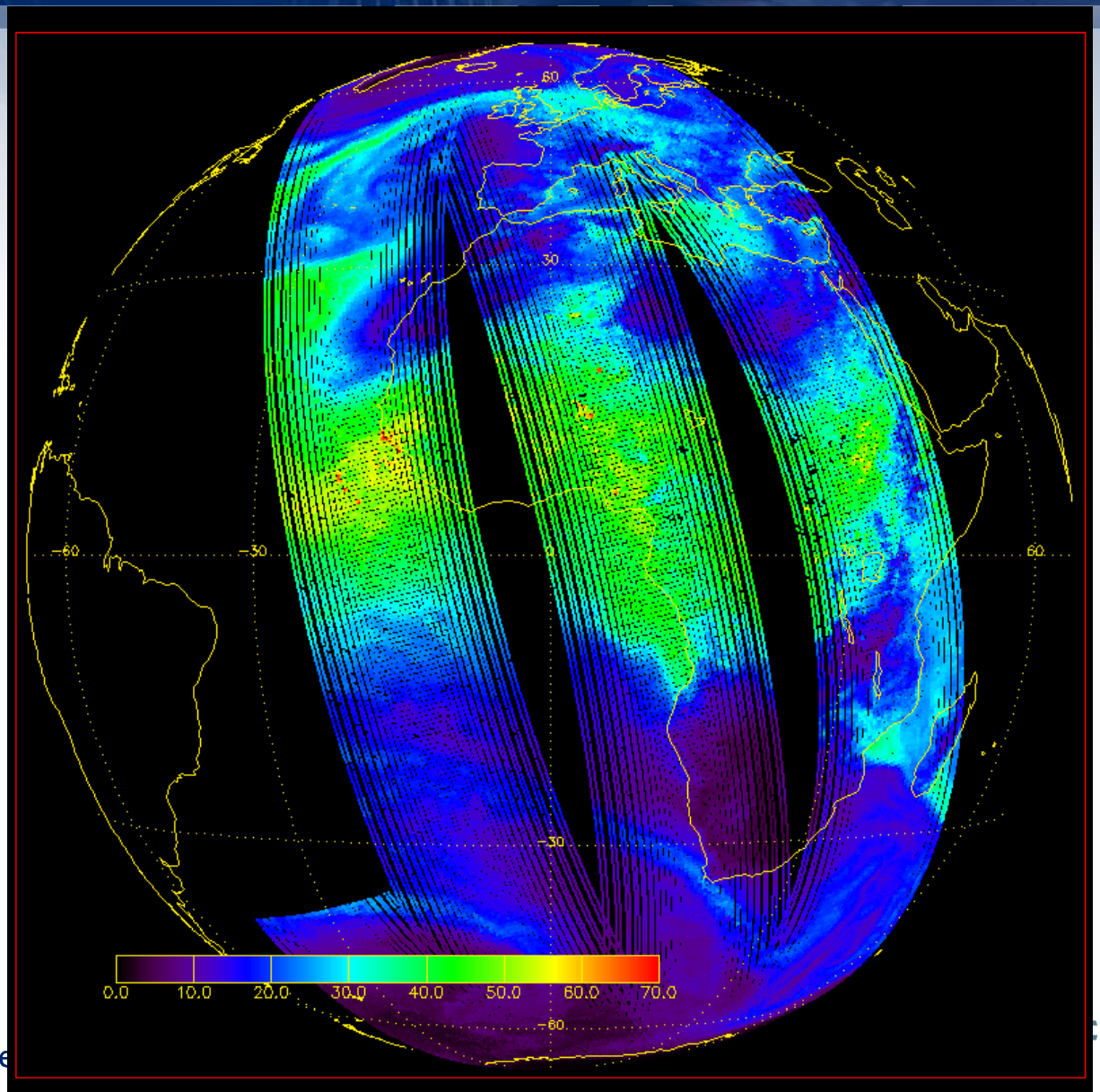
Hot off the Press

There is hope:

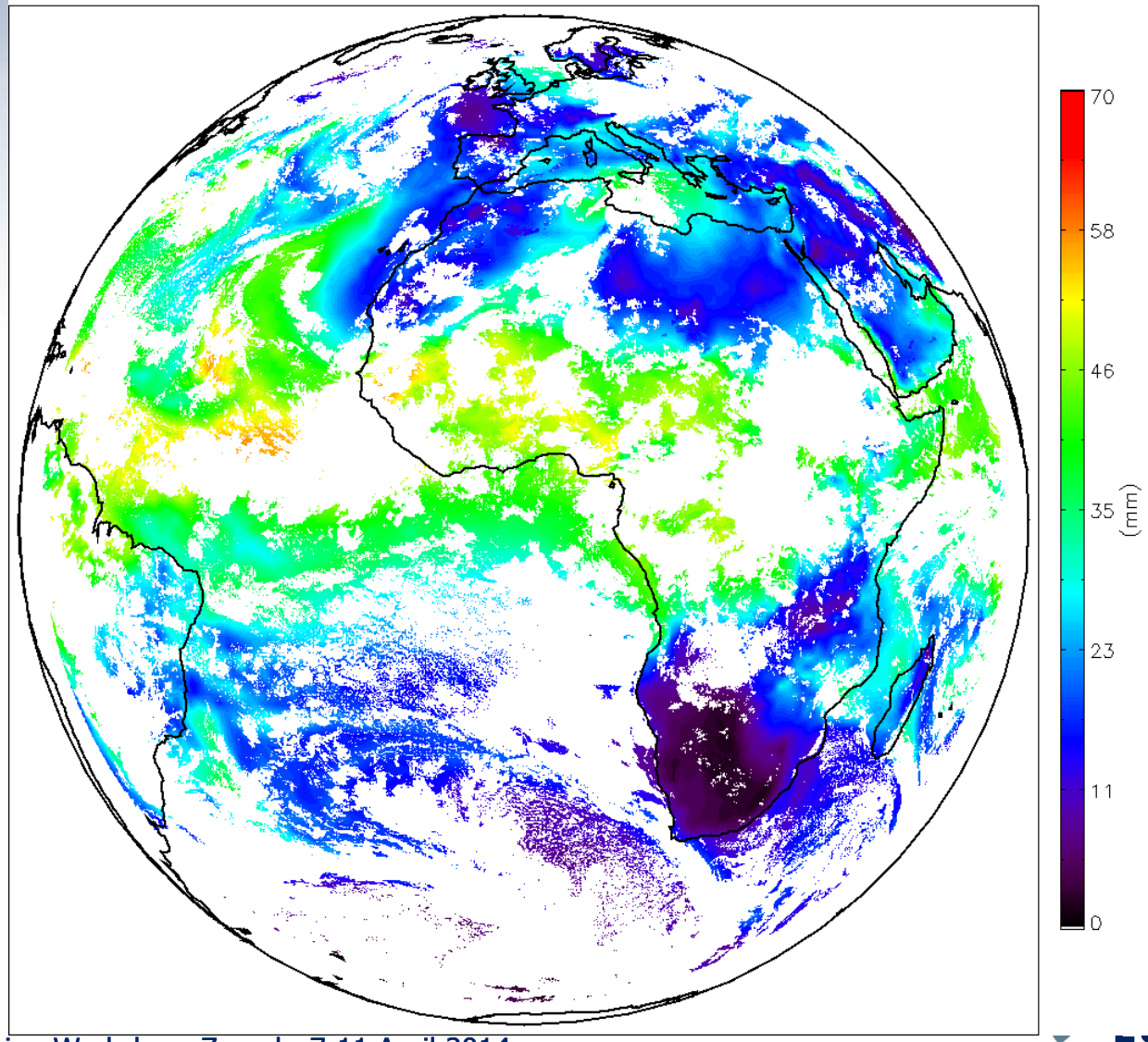
Latest update of the EUMETSAT combined IASI/MW profile retrievals show good agreement to GII product

Note that the IASI/MW retrievals do NOT use any forecast data as background

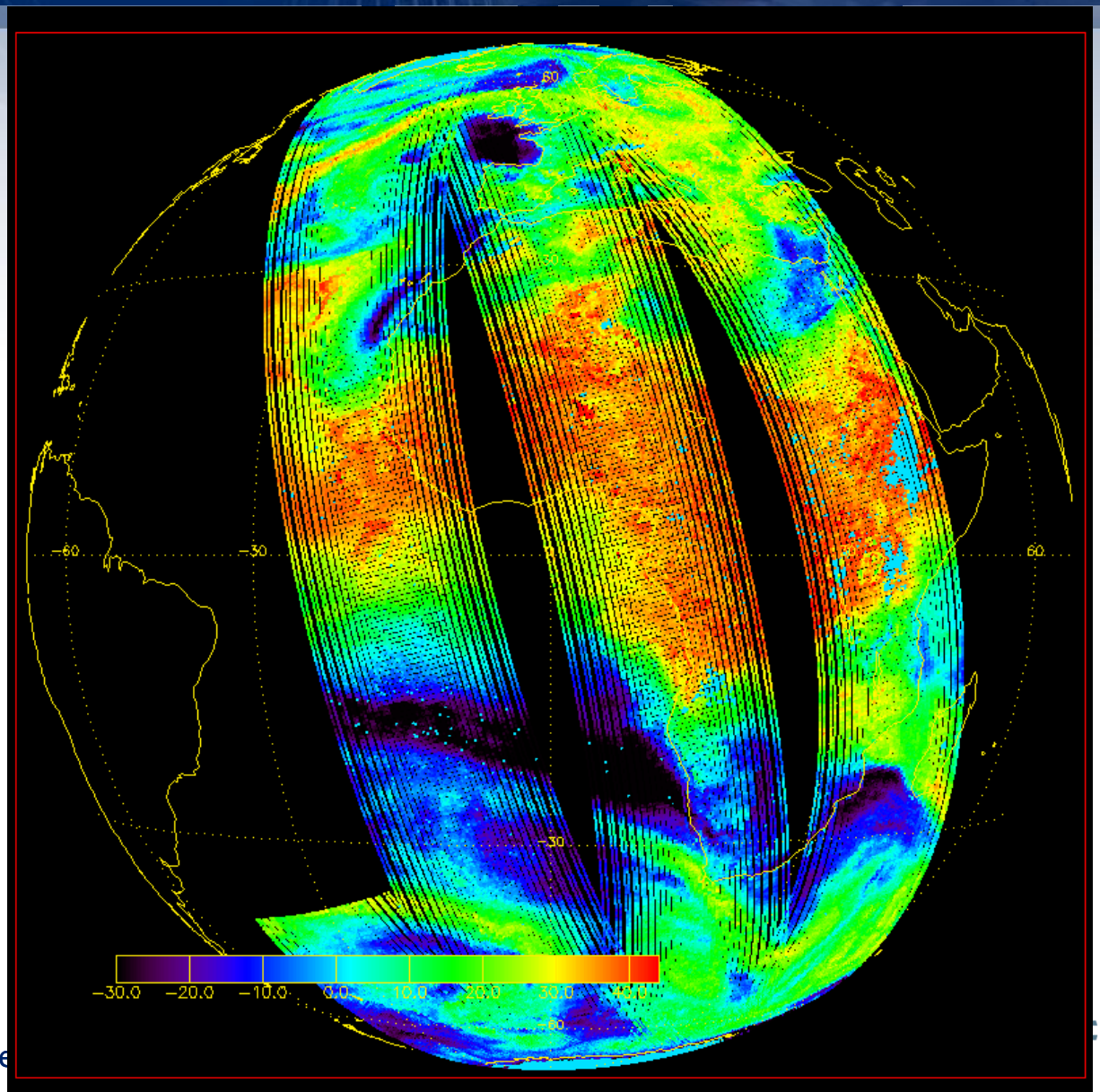
TPW – 3 Metop Orbits, 02 September 2013



Corresponding MSG Product (centre orbit time)



K-Index – 3 Metop Orbits, 02 September 2013



Corresponding MSG Product (centre orbit time)