

ALARO-0 Experience in TURKISH STATE METEOROLOGICAL SERVICE

Alper GÜSER



ALARO-1 Working Days
12-14 May 2014, ZAMG, Vienna



Content

- Operational Use of ALARO at TSMS
- Comparison of ALARO Experiments
- Comparison of ALARO with Other Models
- Conclusion



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Operational Use of ALARO-0 at TSMS

Operational Model (cy38t1bf3)

- Resoluton: 4.5 km/60L (655x355)
- Runs: 00/06/12 (72hrs), 18(60hrs)
- Time Step: 180 sec
- Coupling : ARPEGE
- Orography: Envelope
- Grid : Quadratic
- No Assimilation



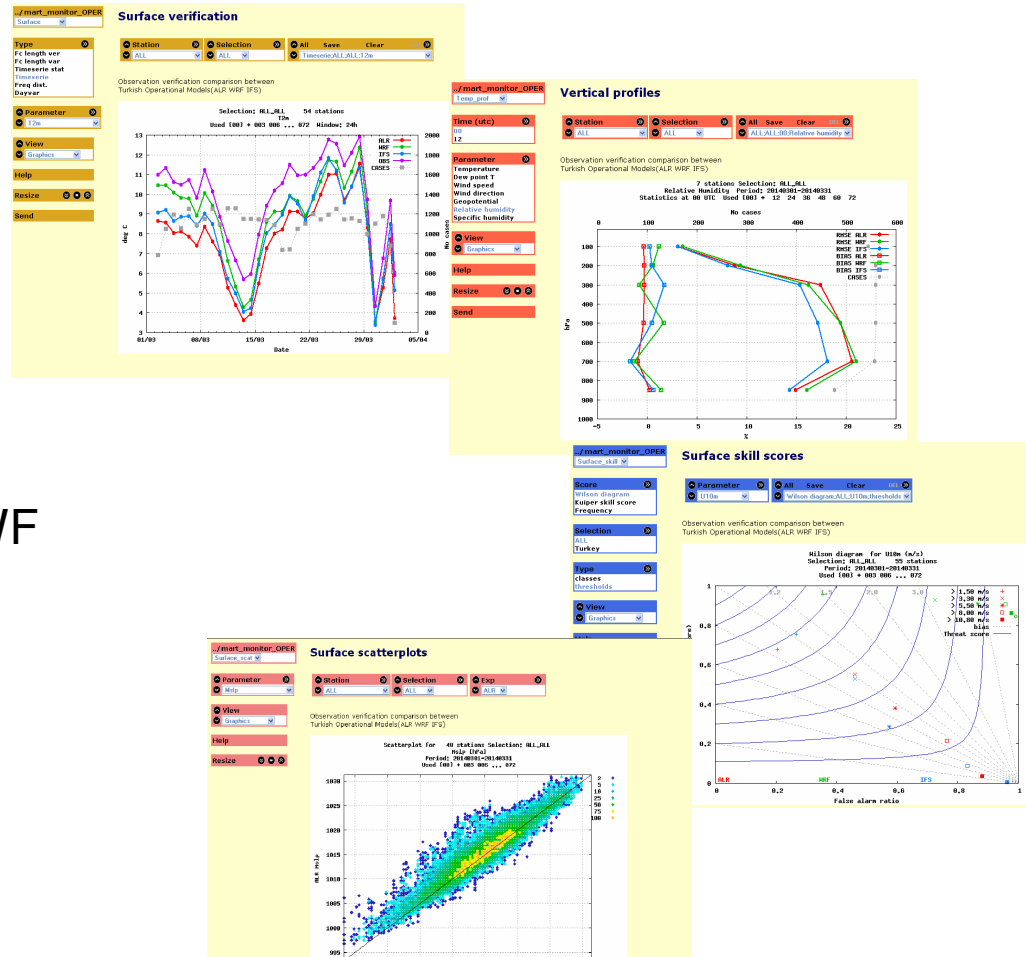
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Comparison of ALARO Experiments

Harmony Verification Tool

- Can read FA files and ECMWF grib/bufr files directly
- WRF outputs added locally



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Comparison of ALARO Experiments

STATIONS



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Comparison of ALARO Experiments

Experiments

- **ALARO 36t1** (Hydrostatic) —→ (*Previous Operational*)
- **ALARO 38t1 bf3** (Non-Hyd.)
- **ALARO 38t1 bf3** (Hyd + VFE) —→ (*Operational*)
- **ALARO 38t1 bf3** (Hyd + VFE + IFS data)

Test Period : 1-31 May 2013

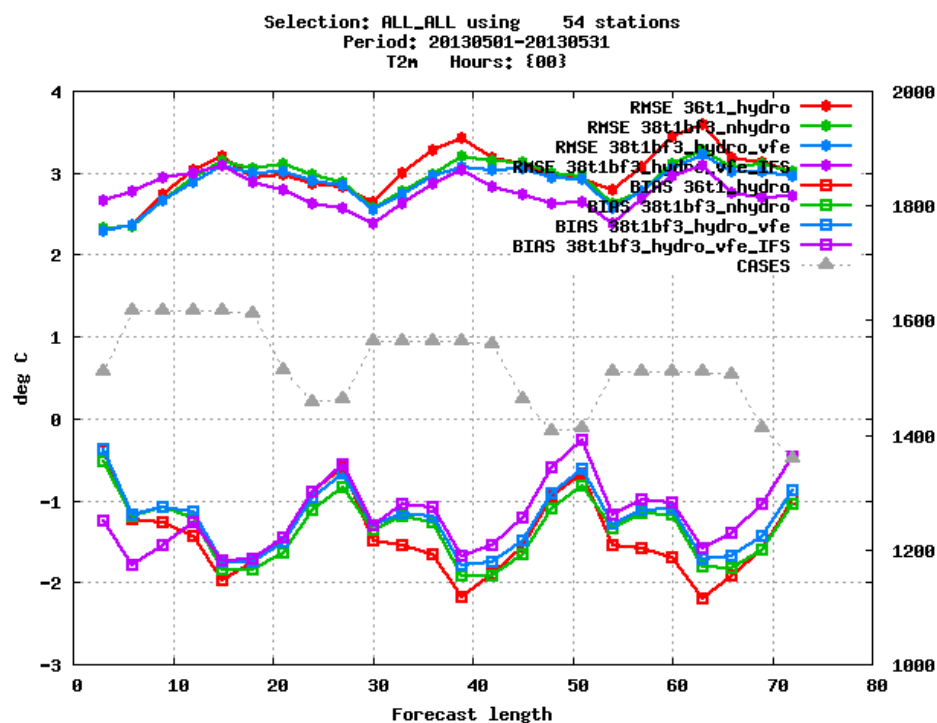


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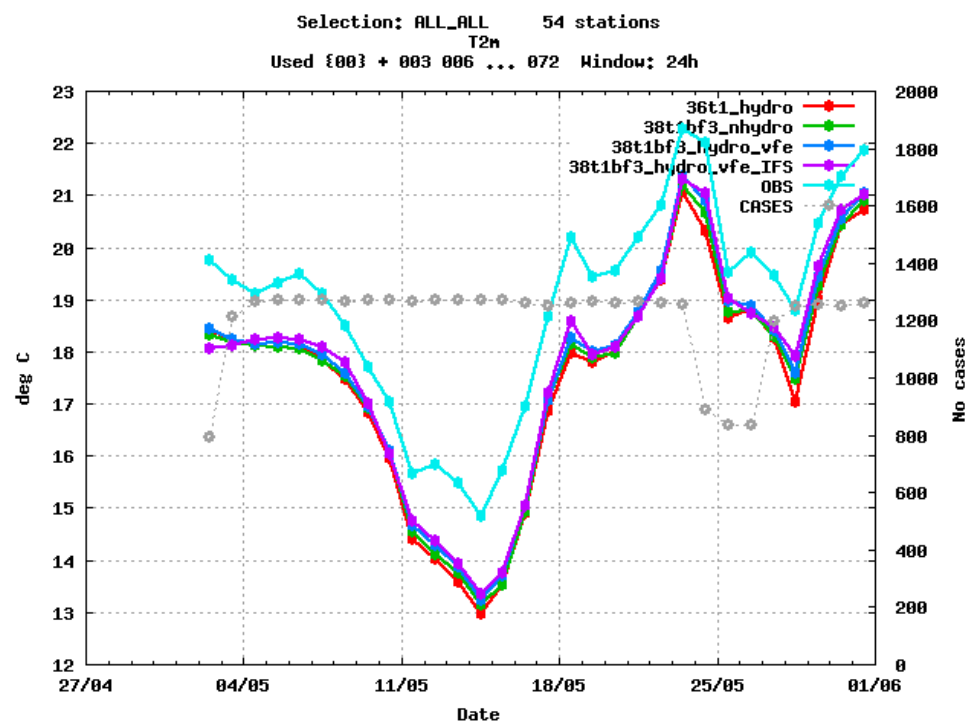


Comparison of ALARO Experiments

2m Temp RMSE and BIAS Average



2m Temperature Time Series

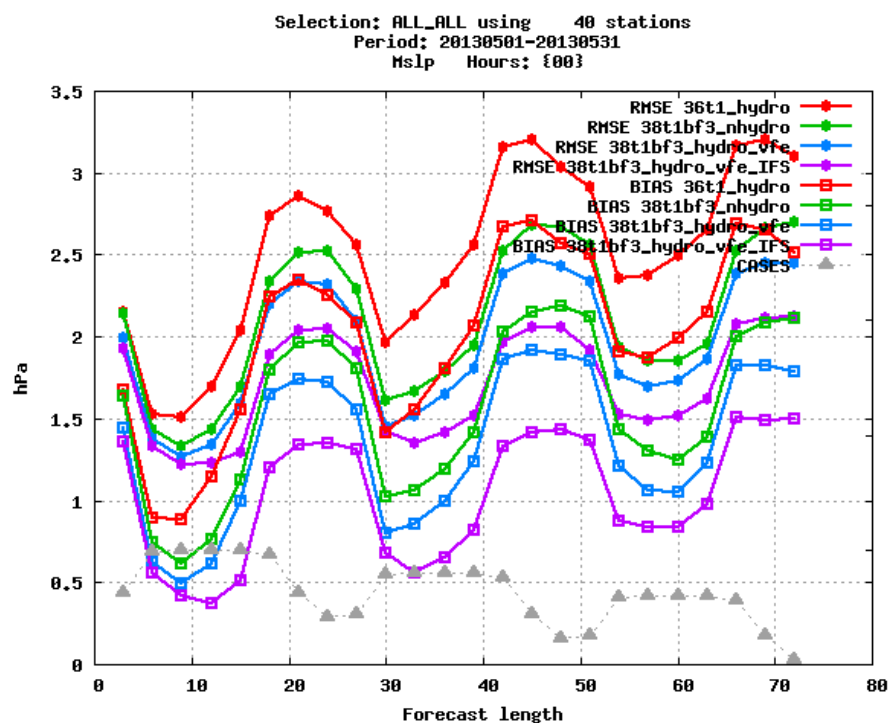


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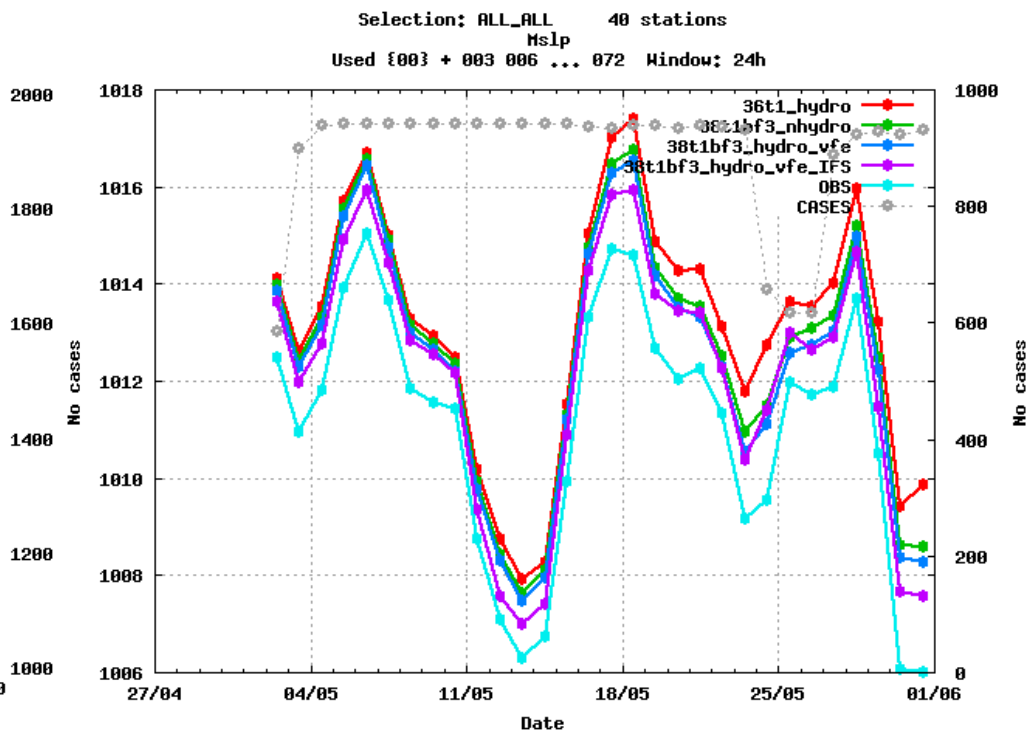


Comparison of ALARO Experiments

MSLP RMSE and BIAS Average



MSL Pressure Time Series

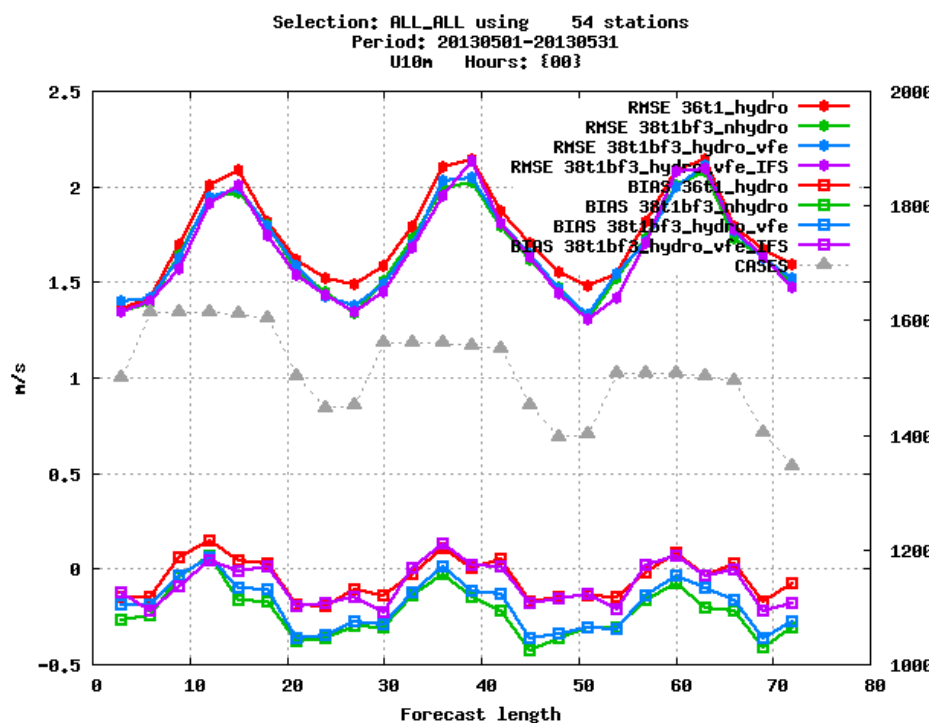


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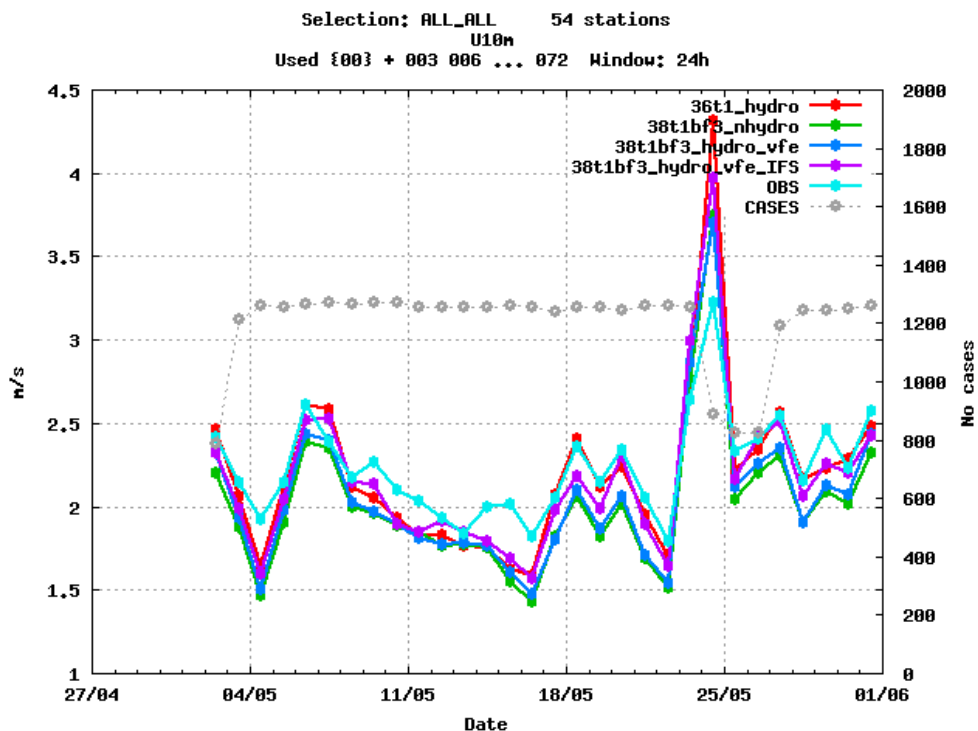


Comparison of ALARO Experiments

10m Wind Speed RMSE and BIAS Average



10m Wind Speed Time Series



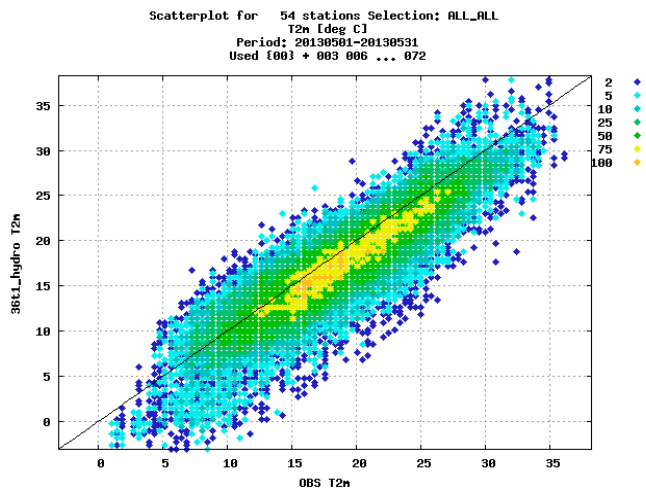
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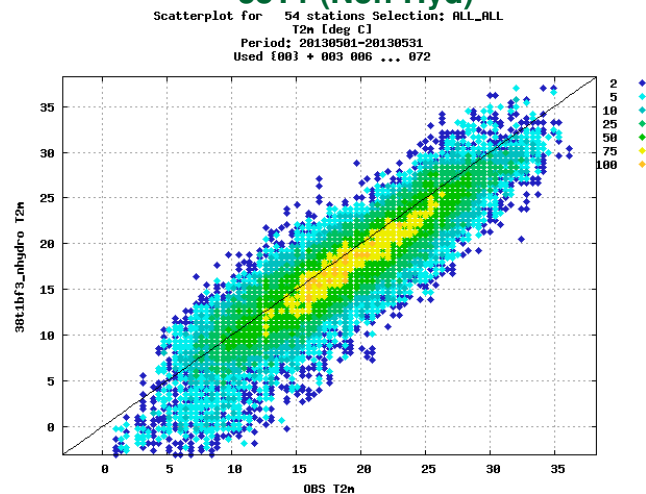
Comparison of ALARO Experiments

Scatter Plots Of 2m Temperature

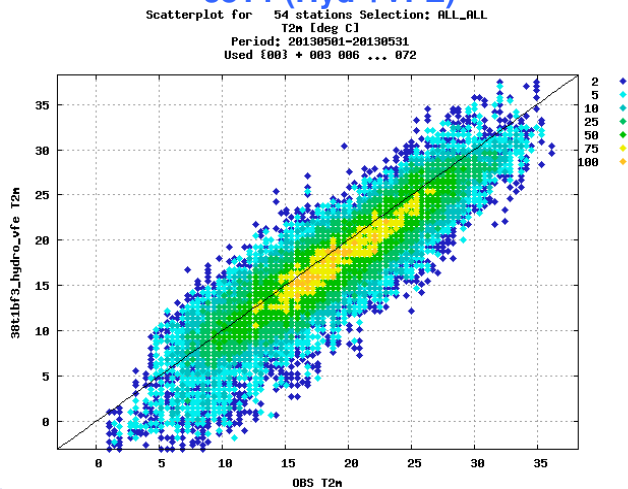
36T1 (Hyd)



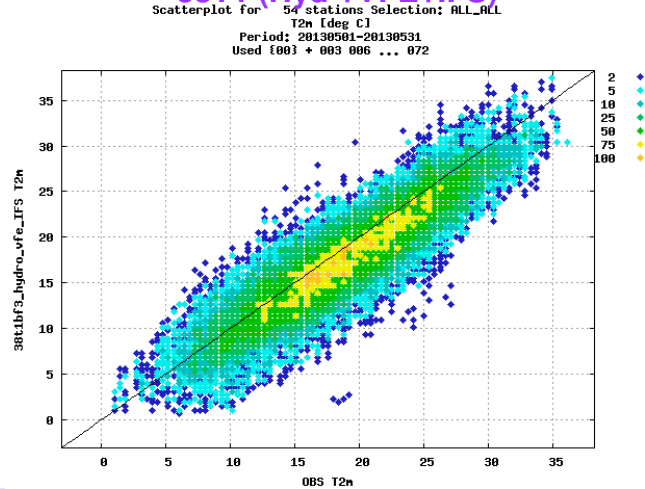
38T1 (Non-Hyd)



38T1 (Hyd +VFE)



38T1 (Hyd +VFE+IFS)



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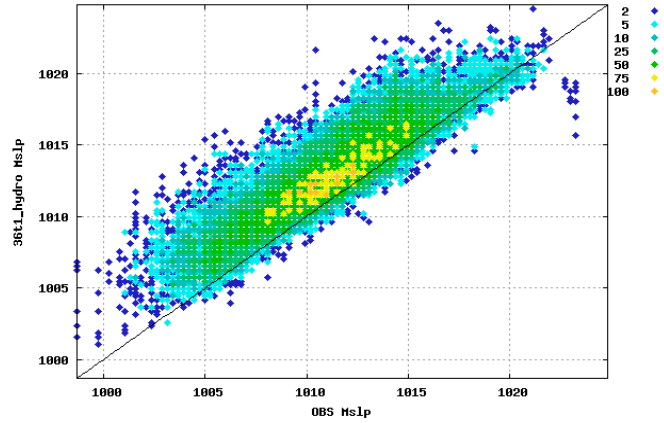


Comparison of ALARO Experiments

Scatter Plots of MSLP

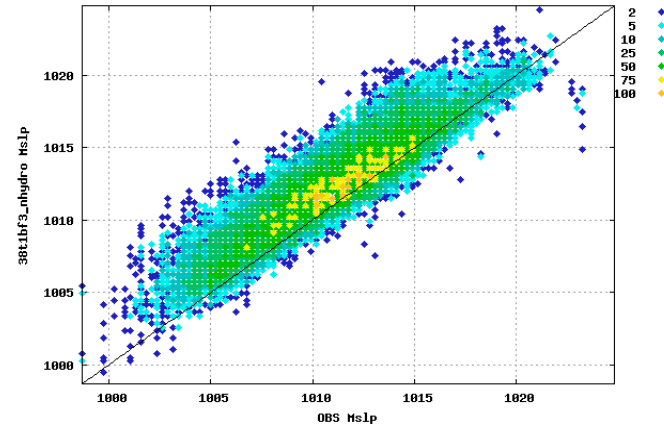
36T1 (Hyd)

Scatterplot for 40 stations Selection: ALL_ALL
Mslp [hPa]
Period: 20130501-20130531
Used {00} + 003 006 ... 072



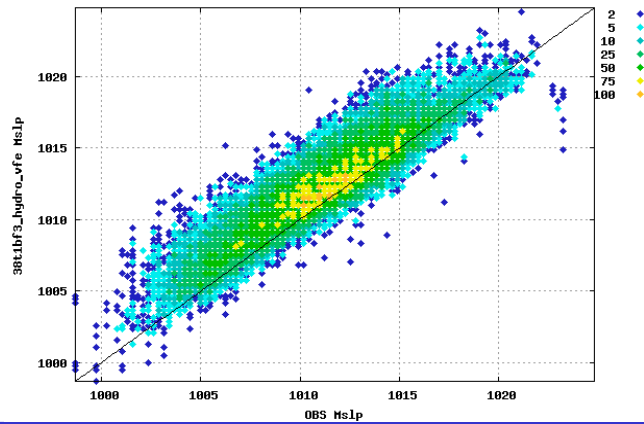
38T1 (Non-Hyd)

Scatterplot for 40 stations Selection: ALL_ALL
Mslp [hPa]
Period: 20130501-20130531
Used {00} + 003 006 ... 072



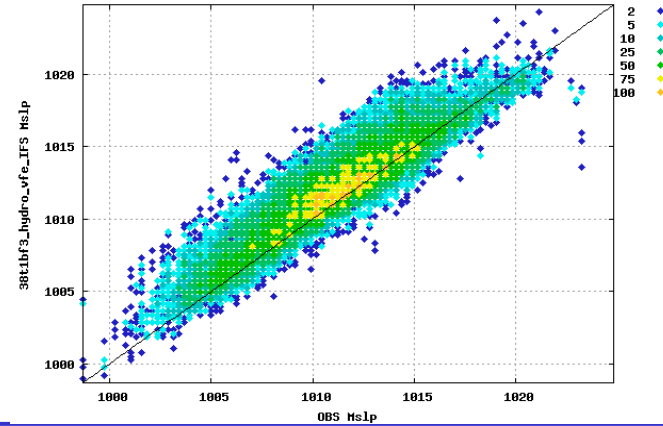
38T1 (Hyd +VFE)

Scatterplot for 40 stations Selection: ALL_ALL
Mslp [hPa]
Period: 20130501-20130531
Used {00} + 003 006 ... 072



38T1 (Hyd +VFE+IFS)

Scatterplot for 40 stations Selection: ALL_ALL
Mslp [hPa]
Period: 20130501-20130531
Used {00} + 003 006 ... 072



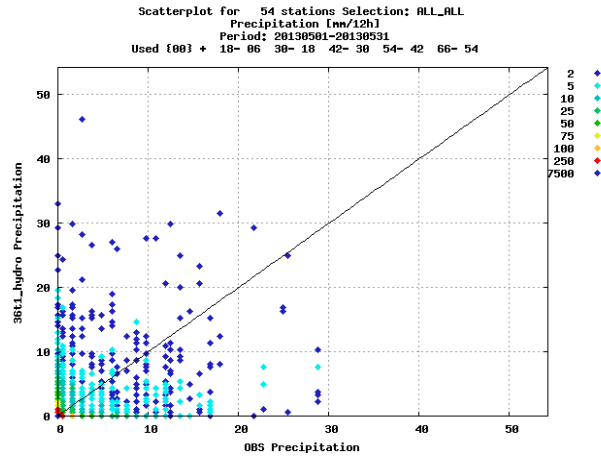
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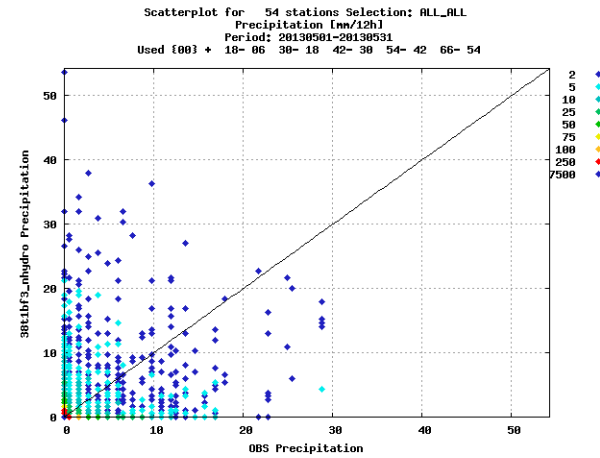
Comparison of ALARO Experiments

Scatter Plots Of 12 Hr. Precipitation

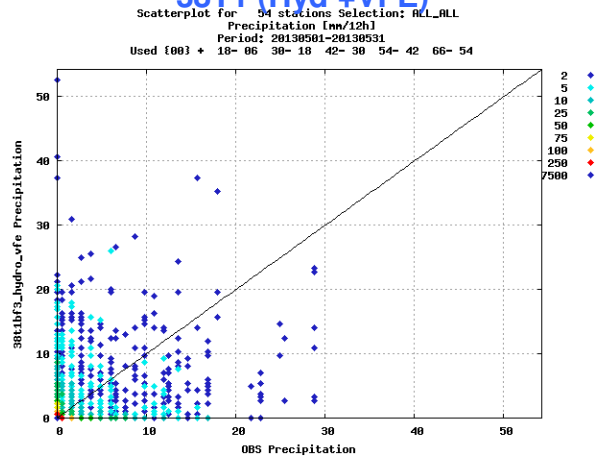
36T1 (Hyd)



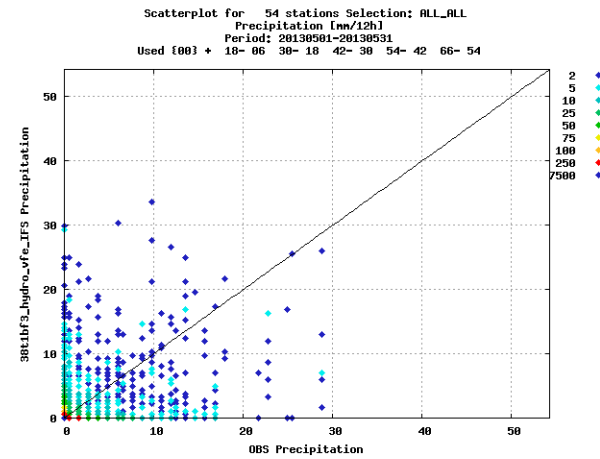
38T1 (Non-Hyd)



38T1 (Hyd +VFE)



38T1 (Hyd +VFE+IFS)



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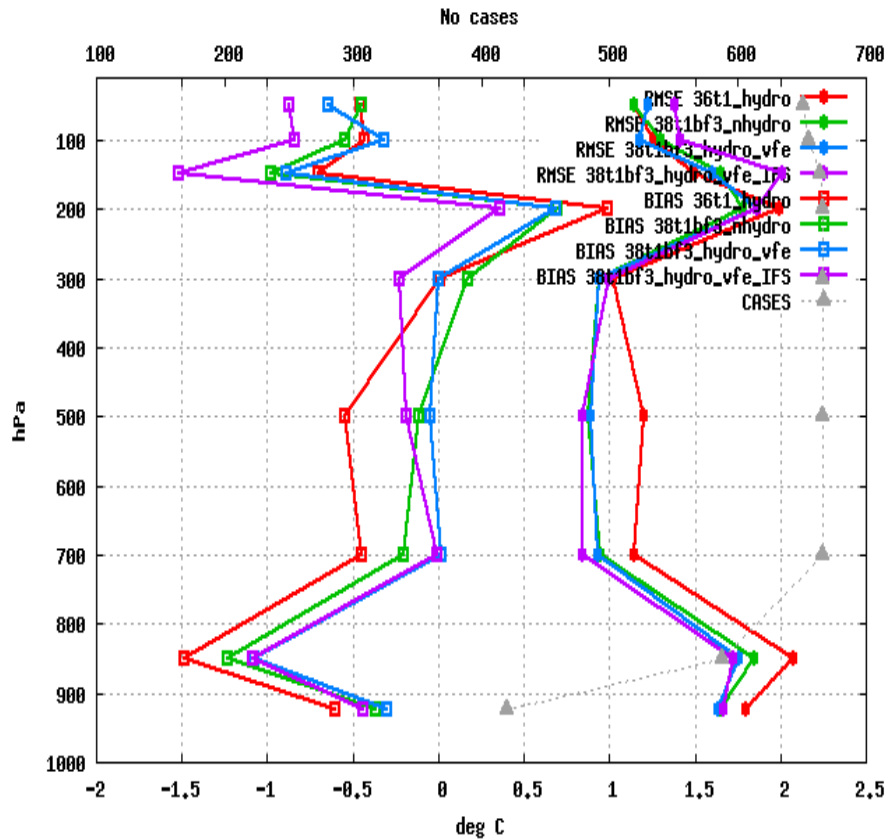


Comparison of ALARO Experiments

RMSE and BIAS Profiles

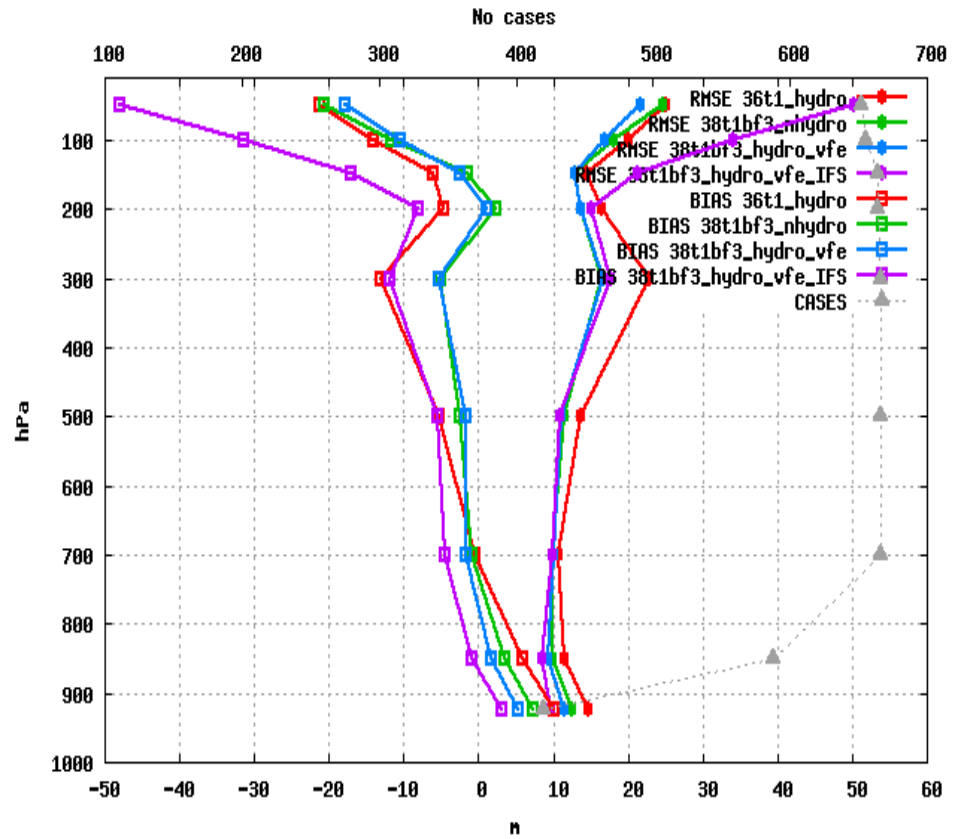
Temperature

8 stations Selection; ALL_ALL
 Temperature Period; 20130501-20130531
 Statistics at 00 UTC Used {00} + 12 24 36 48 60 72



Geopotential

8 stations Selection; ALL_ALL
 Height Period; 20130501-20130531
 Statistics at 00 UTC Used {00} + 12 24 36 48 60 72



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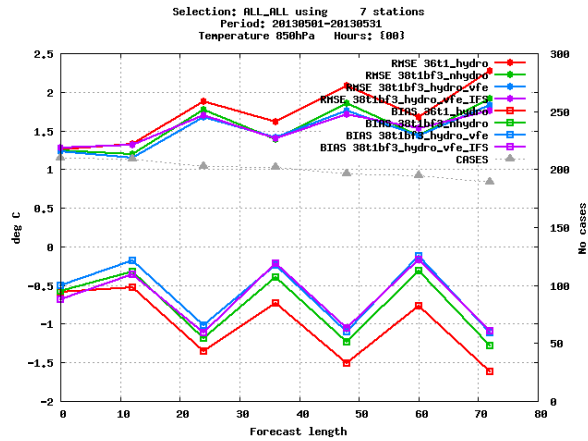


Comparison of ALARO Experiments

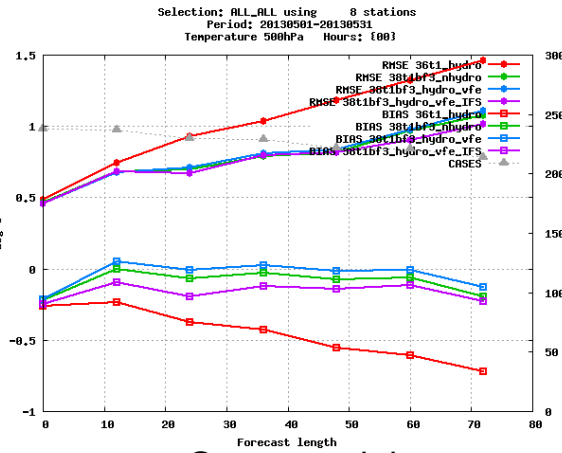
Upper Level RMSE and BIAS Scores

Temperature

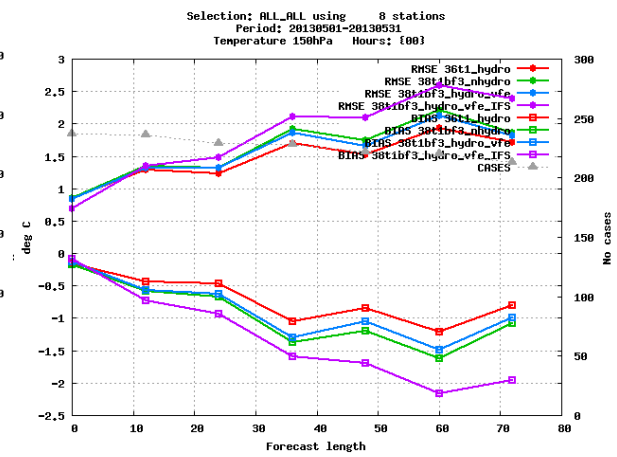
850 hPa



500hPa

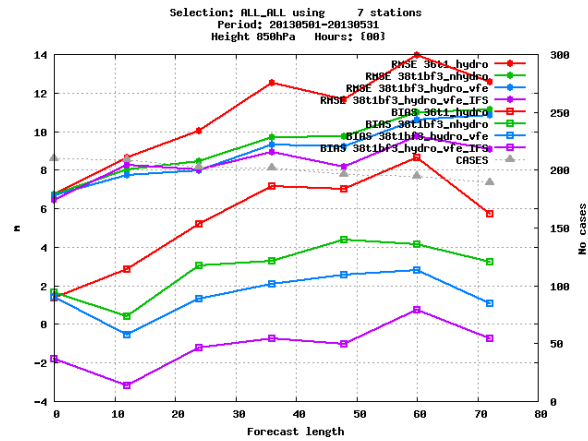


150 hPa

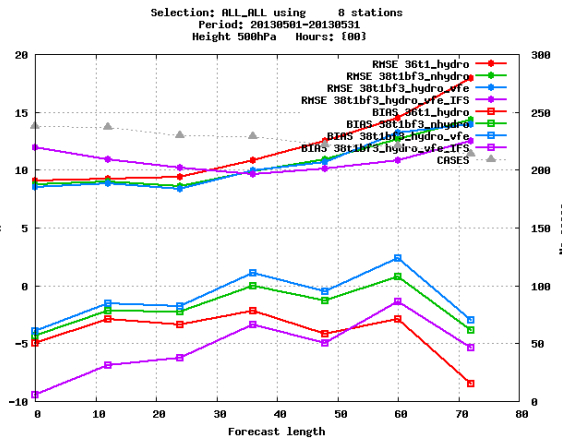


Geopotential

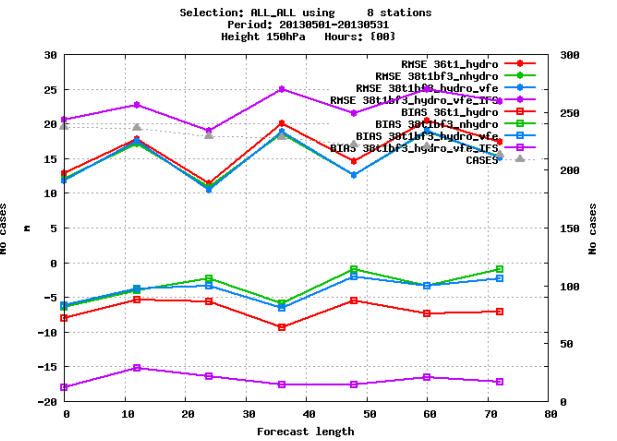
850 hPa



500 hPa



150 hPa



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Comparison of ALARO with Other Models

Models

- **ALARO 38t1 bf3** (Hyd + VFE / 4.5 km / 60 L)
- **WRF** (Non-Hyd. / 4.5 km / 46 L (Surf-100 hPa))
- **ECMWF (IFS)**

Verification Period: 1 January – 30 April 2014



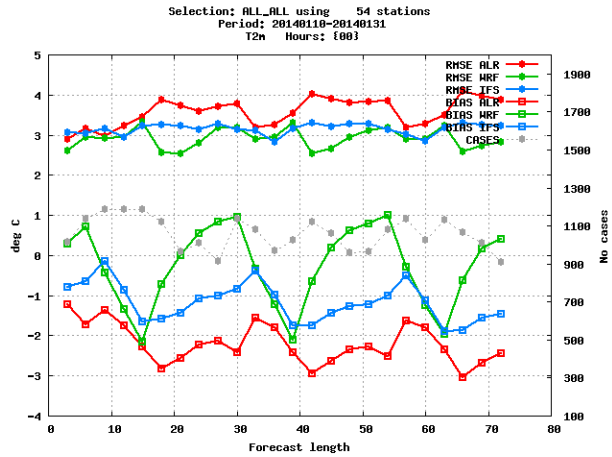
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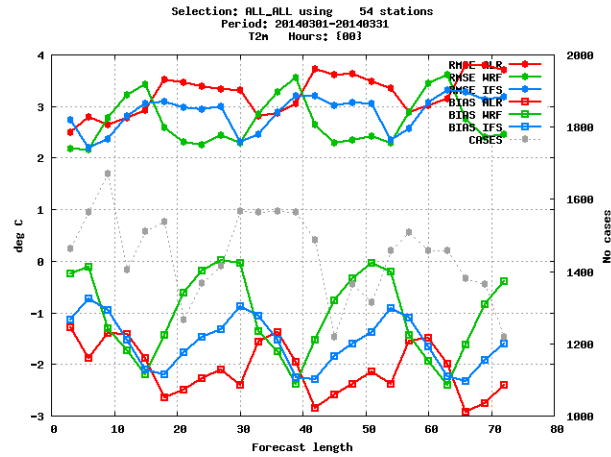
Comparison of ALARO with Other Models

2m Temp RMSE and BIAS Average for all Stations

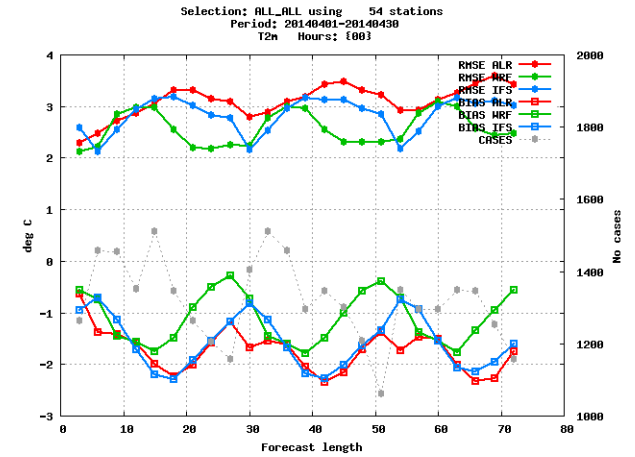
JANUARY



MARCH

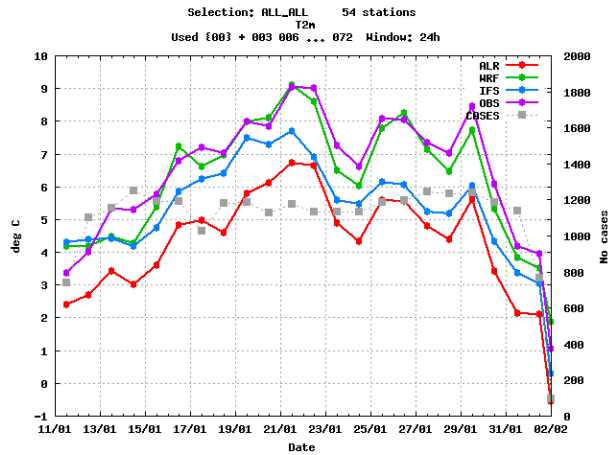


APRIL

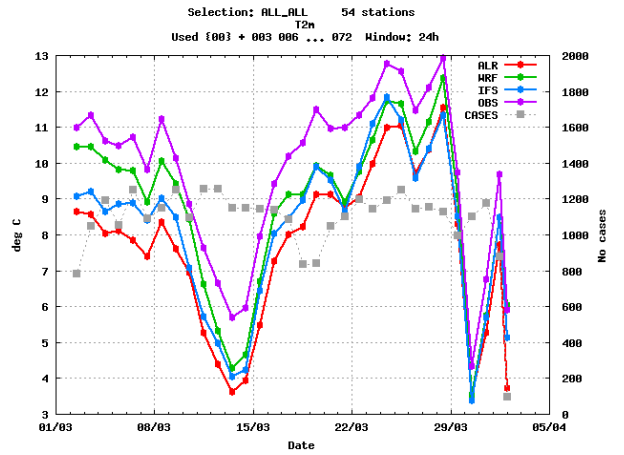


2m Temp. Time Series

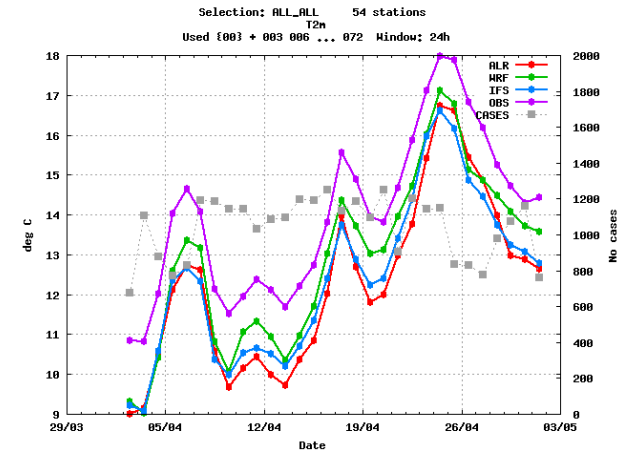
JANUARY



MARCH



APRIL

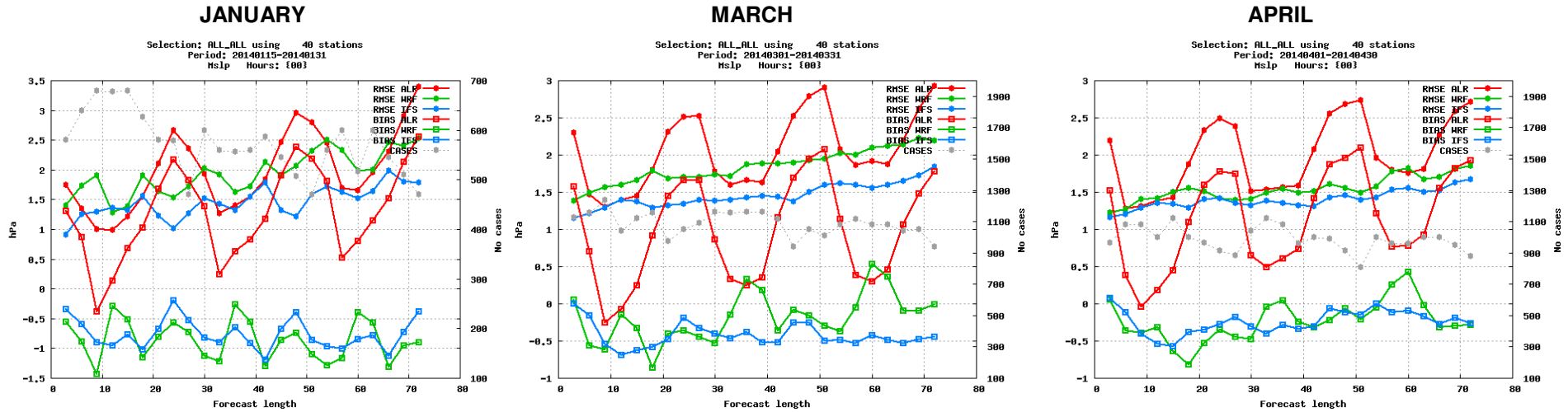


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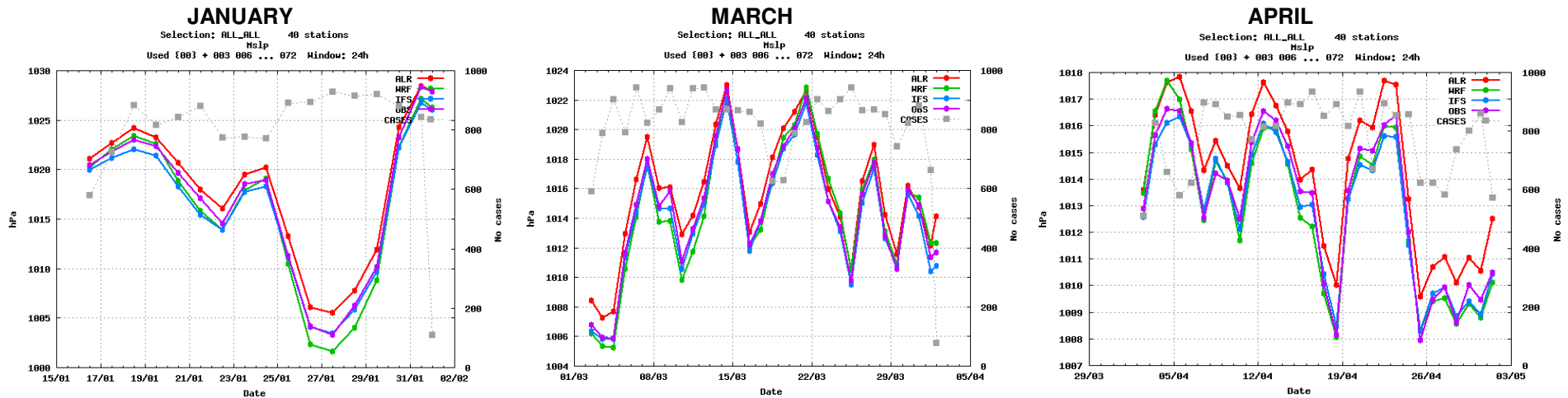


Comparison of ALARO with Other Models

MSLP RMSE and BIAS Average for all Stations



MSLP Time Series



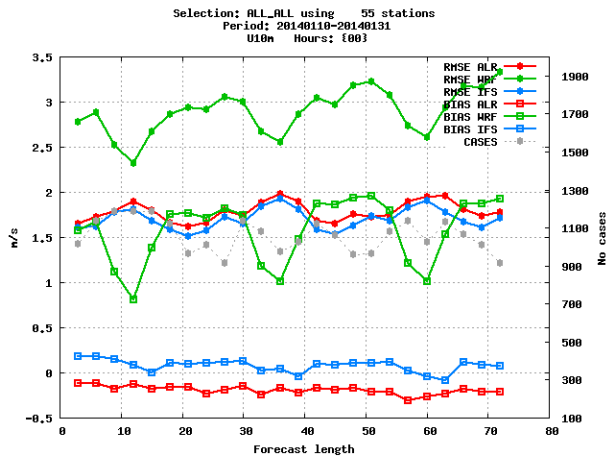
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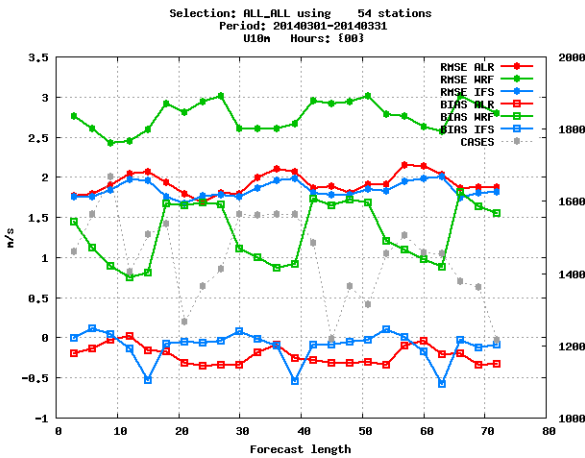
Comparison of ALARO with Other Models

10 m Wind Speed RMSE and BIAS Average for all Stations

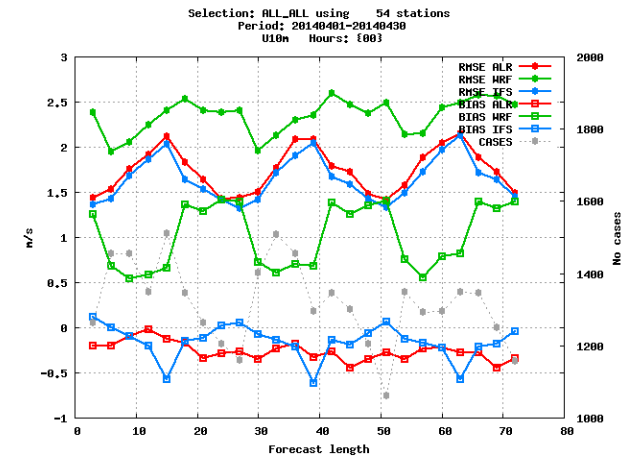
JANUARY



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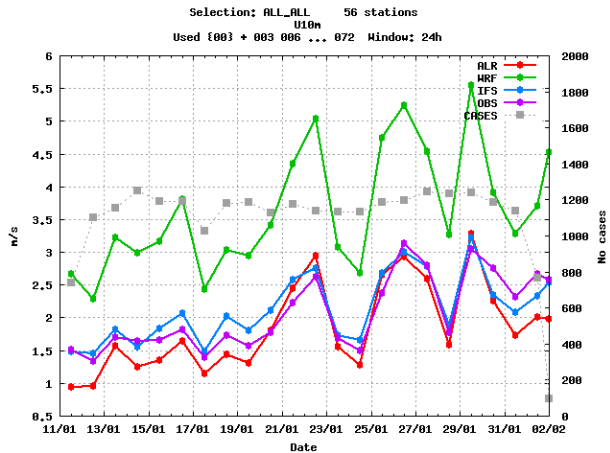


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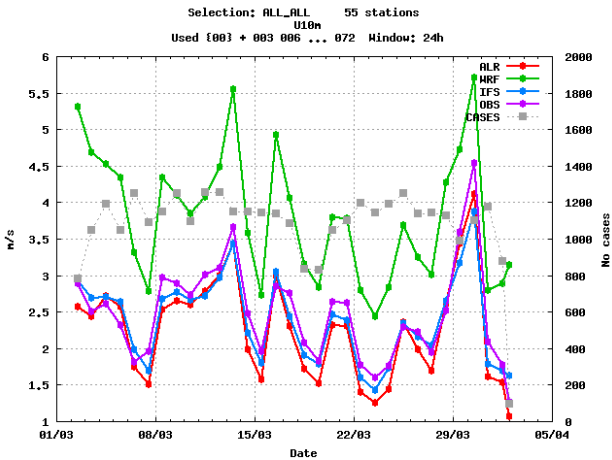


10m Wind Speed Time Series

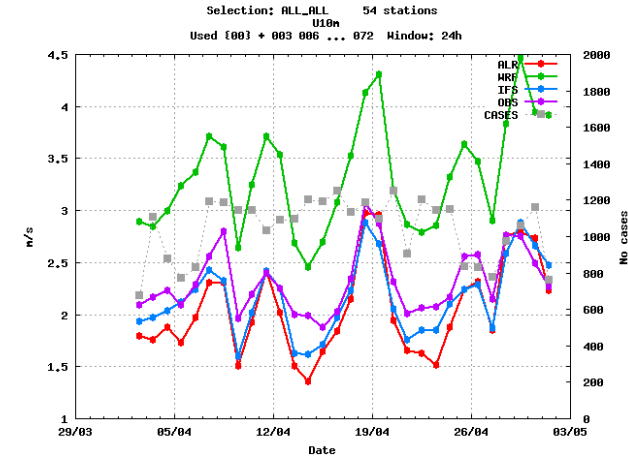
JANUARY



MARCH



APRIL



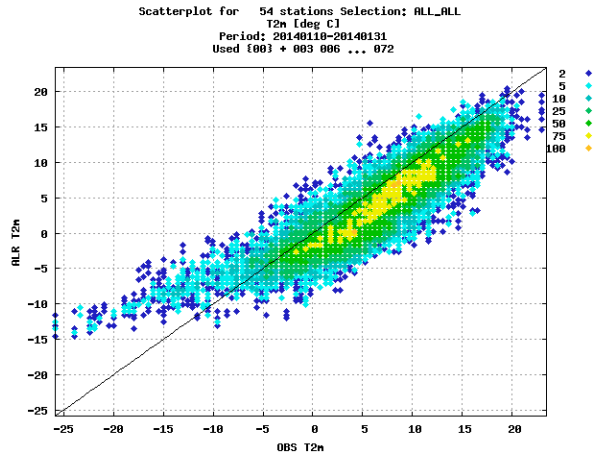
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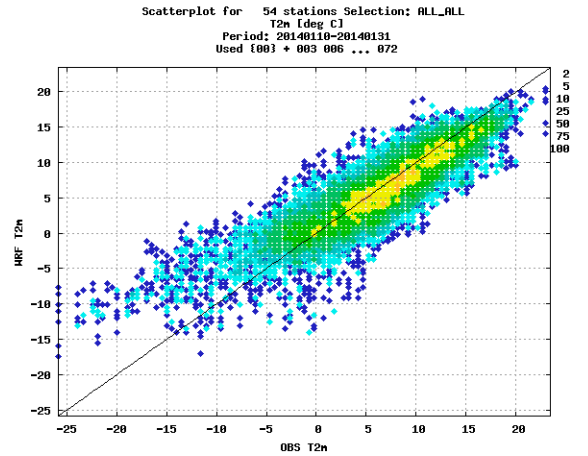
Comparison of ALARO with Other Models

Scatter Plots Of 2m Temperature (January)

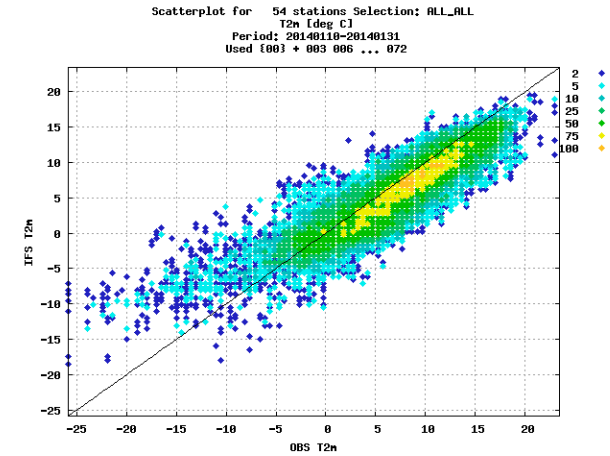
ALARO



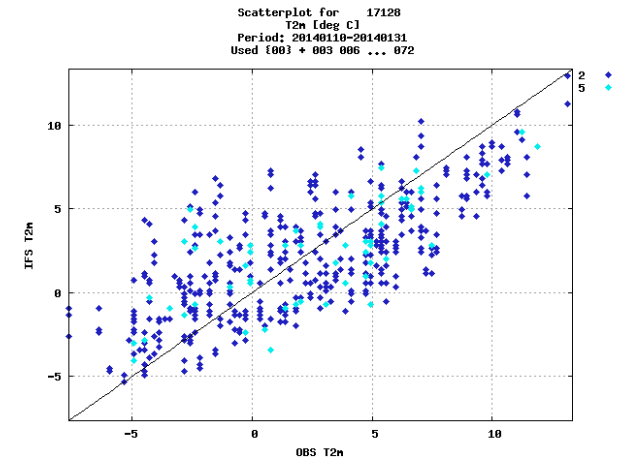
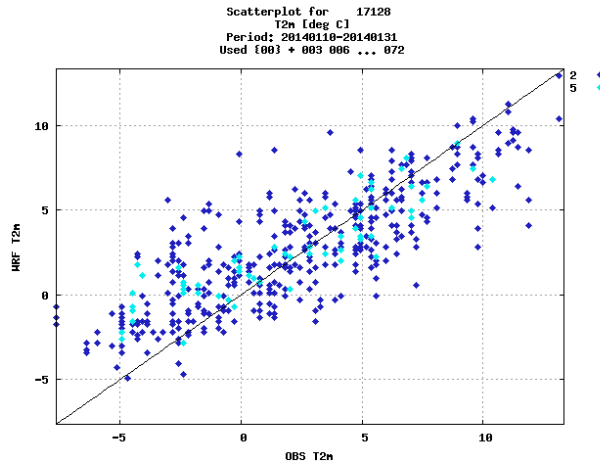
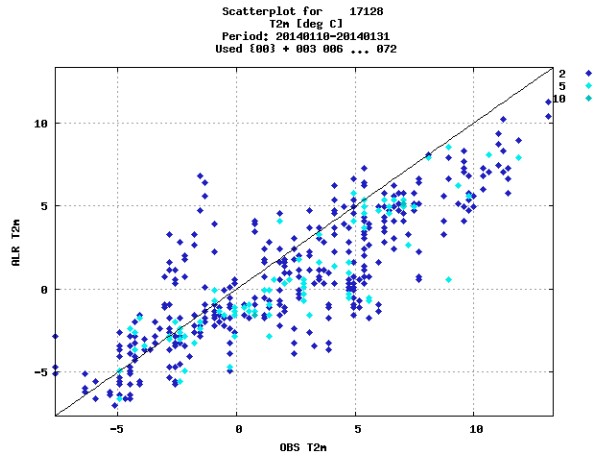
WRF



ECMWF-IFS



2m Temp. Scatter Plots For ANKARA



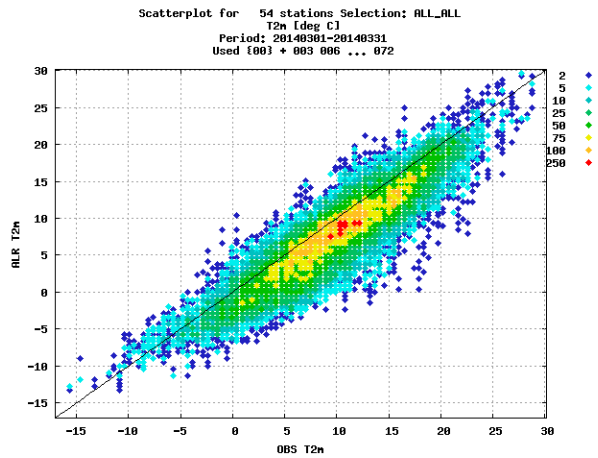
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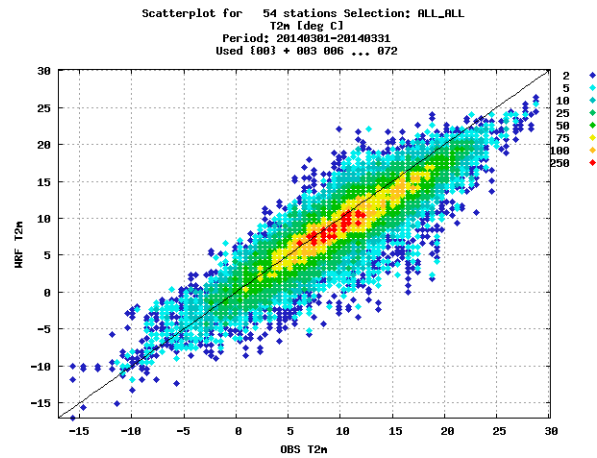
Comparison of ALARO with Other Models

Scatter Plots Of 2m Temperature (March)

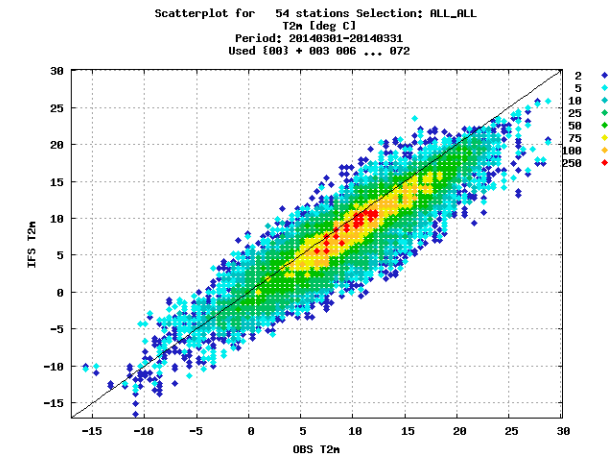
ALARO



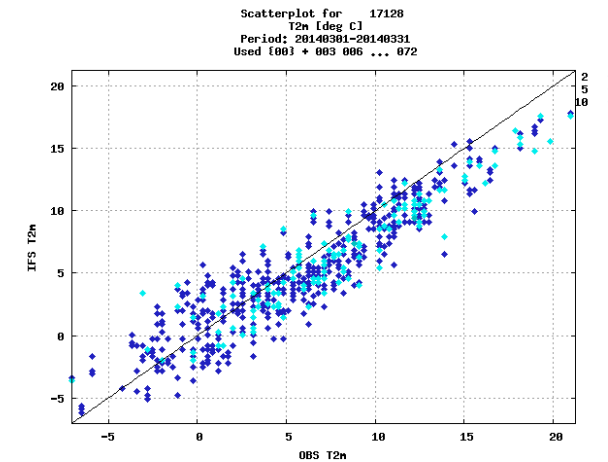
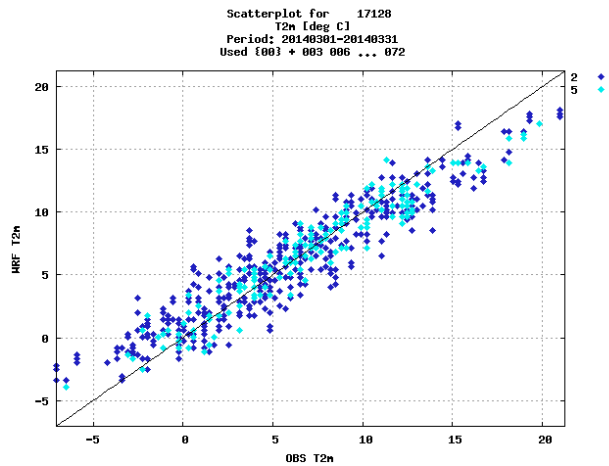
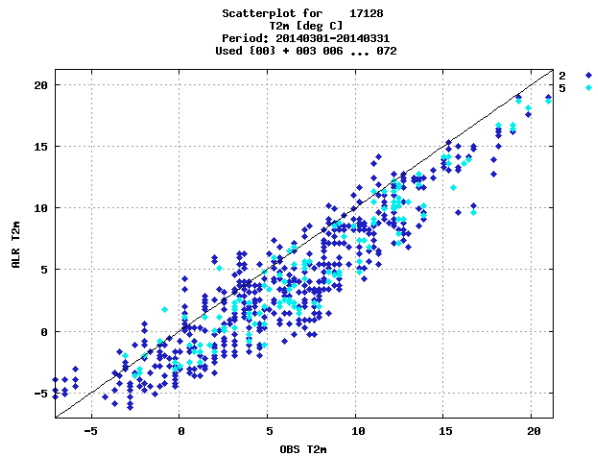
WRF



ECMWF-IFS



2m Temp. Scatter Plots For ANKARA



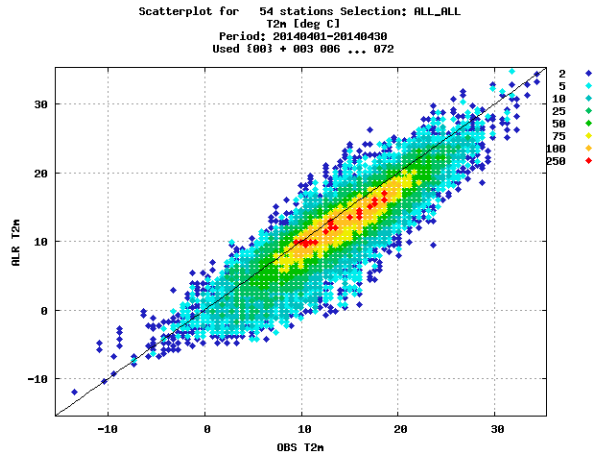
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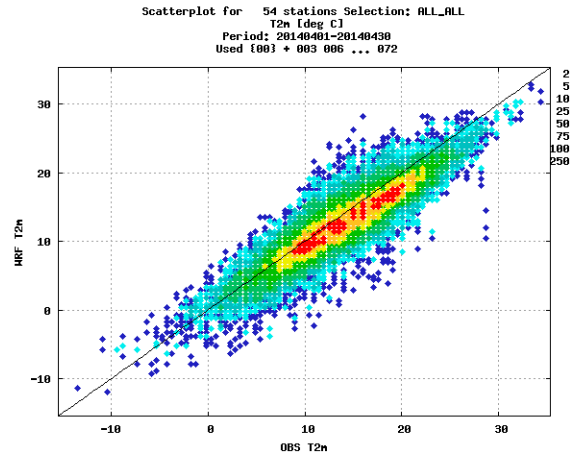
Comparison of ALARO with Other Models

Scatter Plots Of 2m Temperature (April)

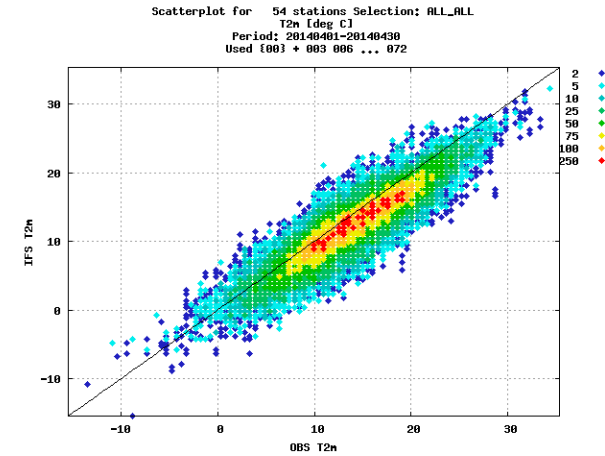
ALARO



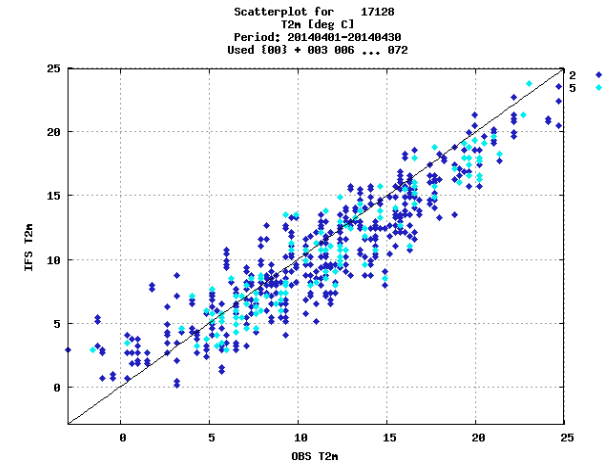
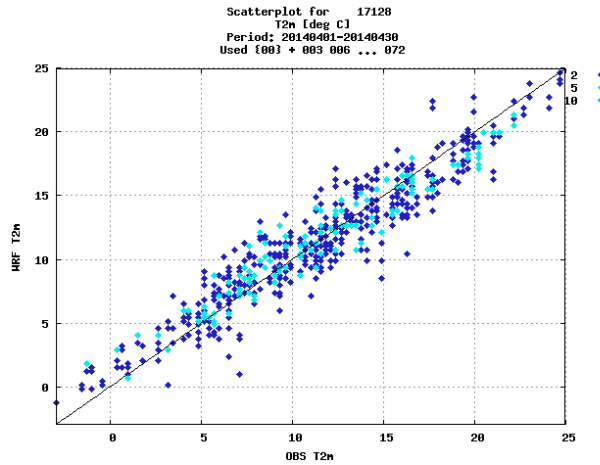
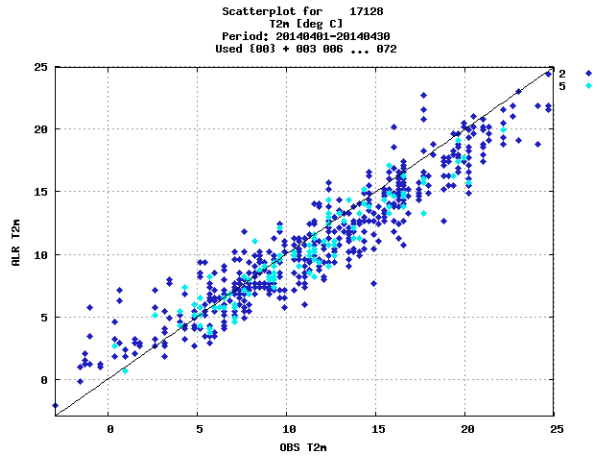
WRF



ECMWF-IFS



2m Temp. Scatter Plots For ANKARA



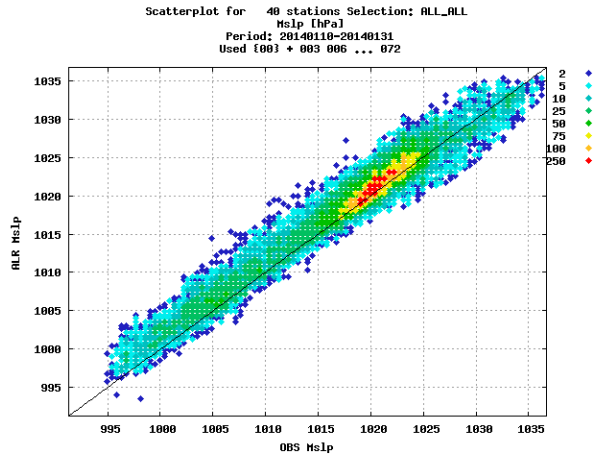
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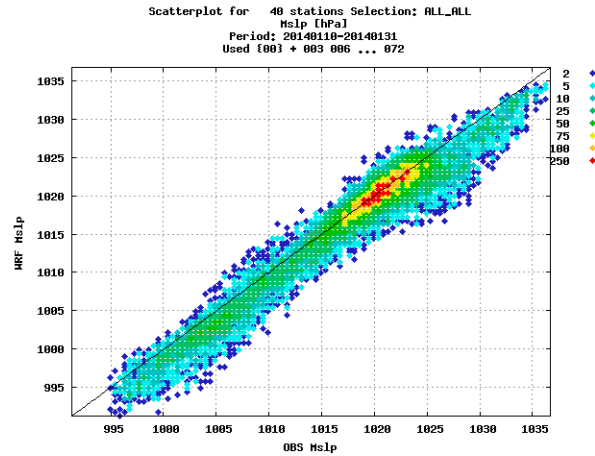
Comparison of ALARO with Other Models

Scatter Plots Of MSLP (January)

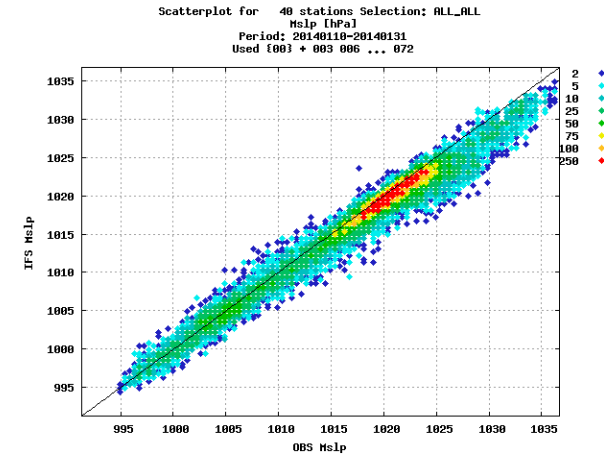
ALARO



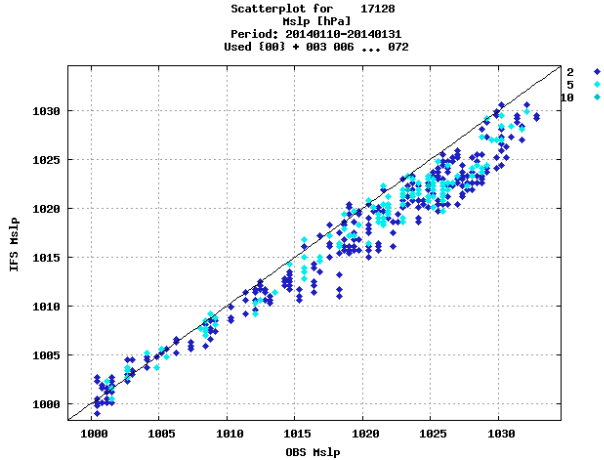
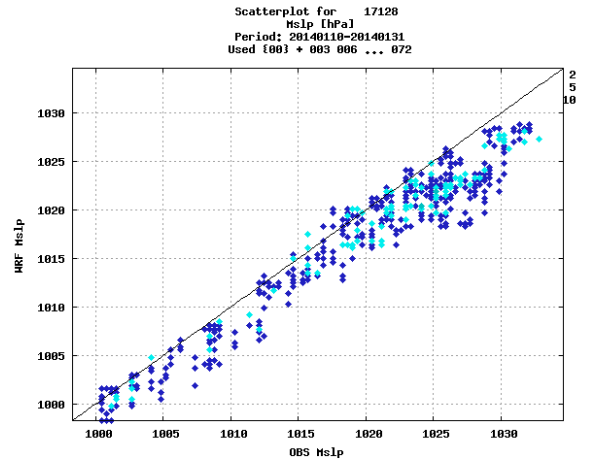
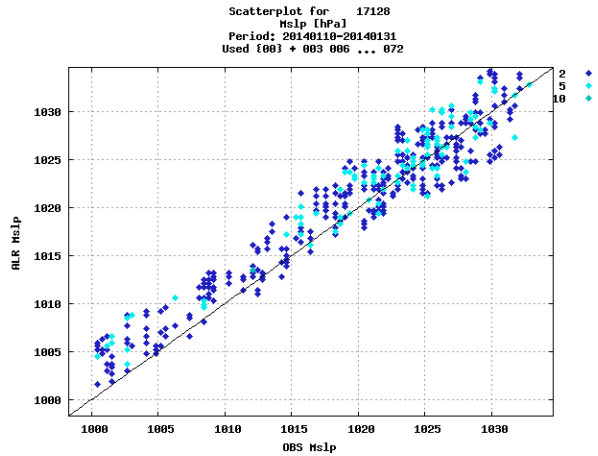
WRF



ECMWF-IFS



MSLP Scatter Plots For ANKARA



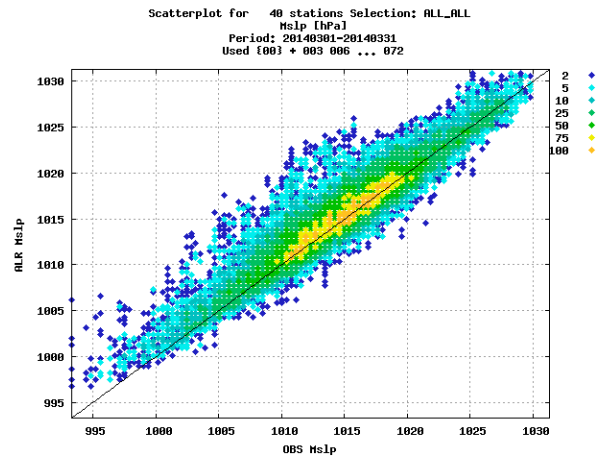
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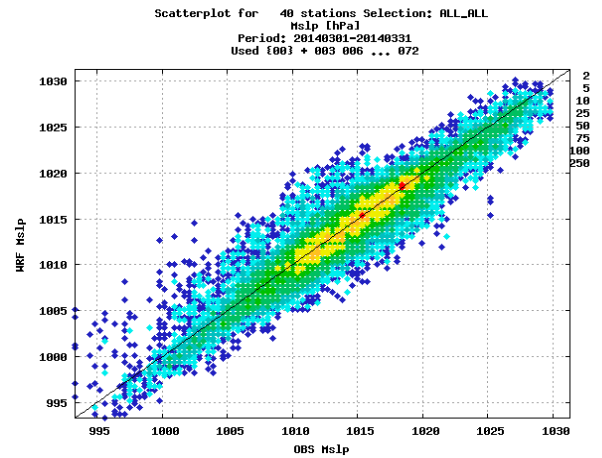
Comparison of ALARO with Other Models

Scatter Plots Of MSLP (March)

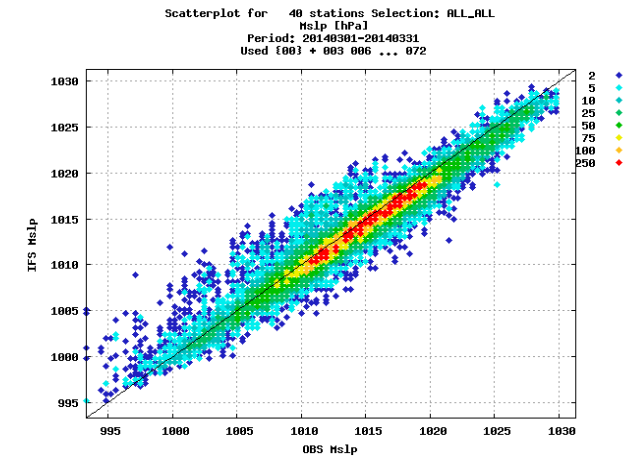
ALARO



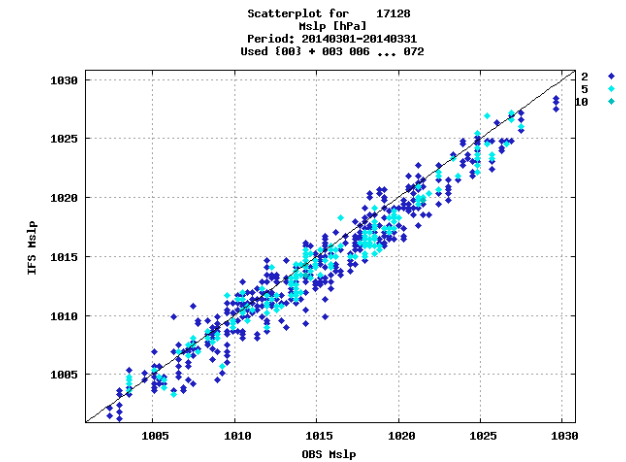
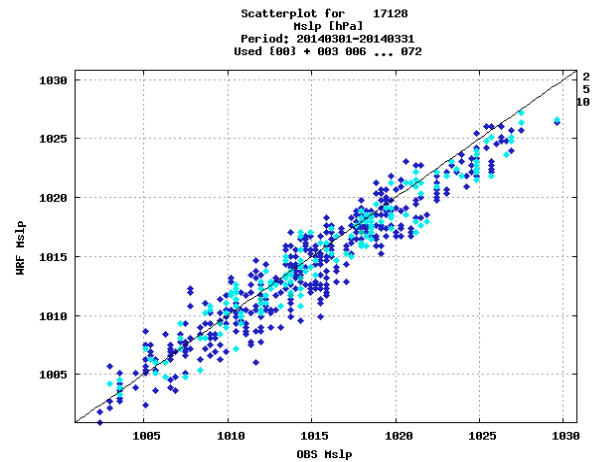
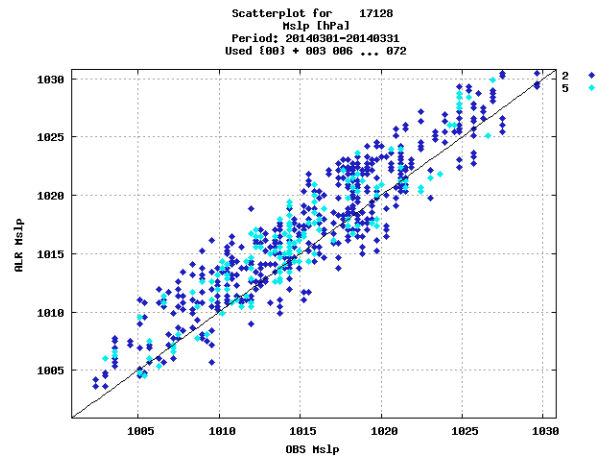
WRF



ECMWF-IFS



MSLP Scatter Plots For ANKARA



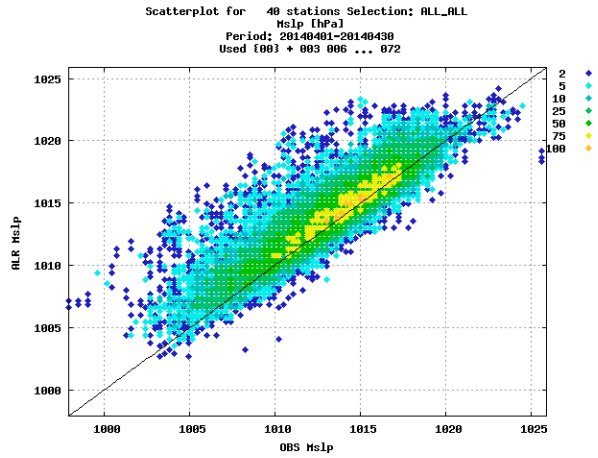
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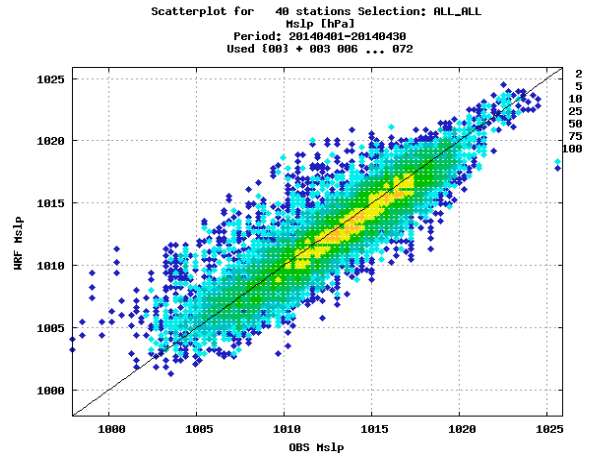
Comparison of ALARO with Other Models

Scatter Plots Of MSLP (April)

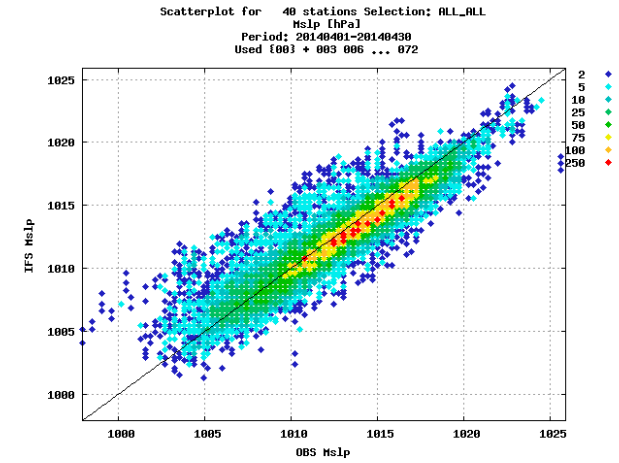
ALARO



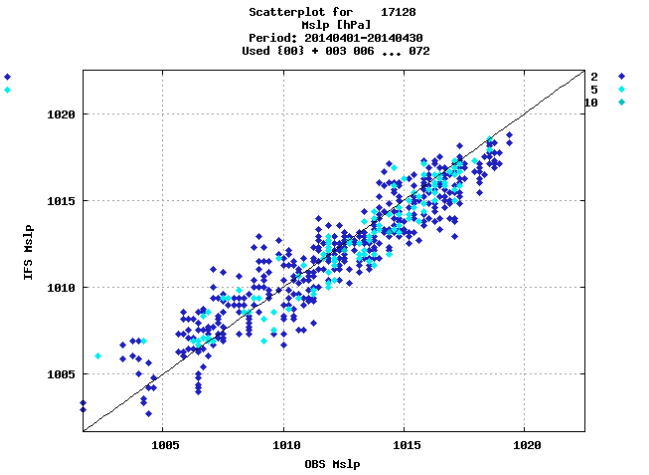
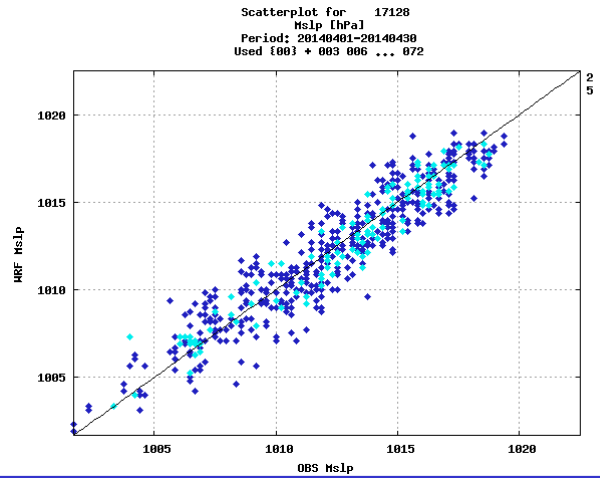
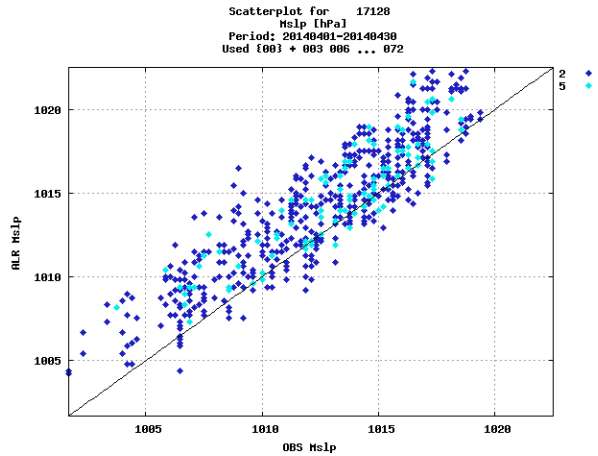
WRF



ECMWF-IFS



MSLP Scatter Plots For ANKARA



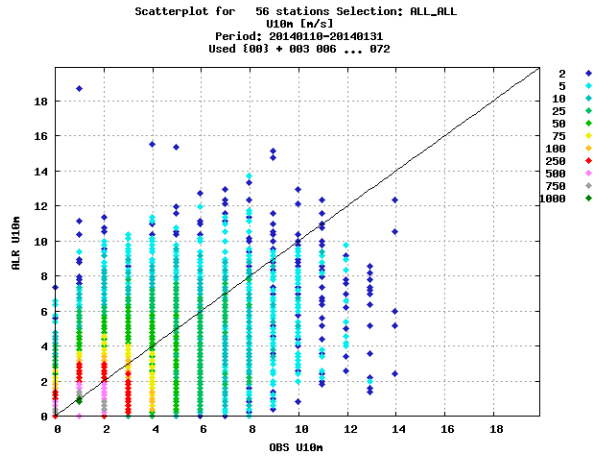
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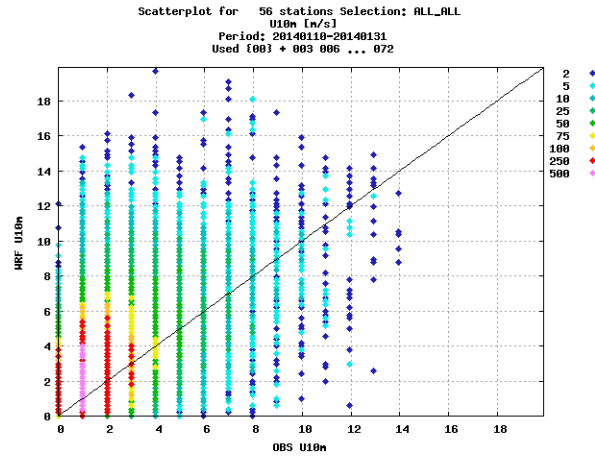
Comparison of ALARO with Other Models

Scatter Plots Of 10m. Wind Speed (January)

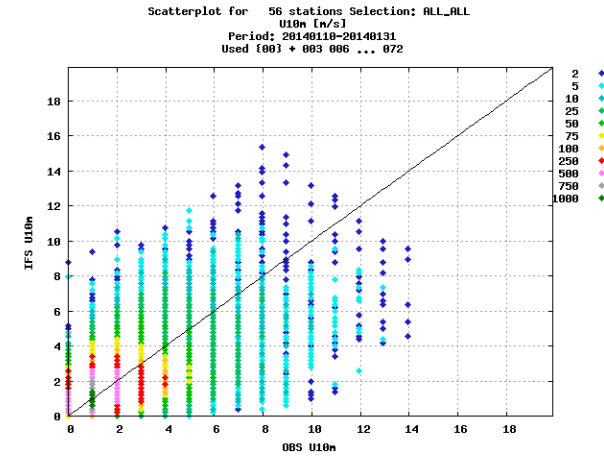
ALARO



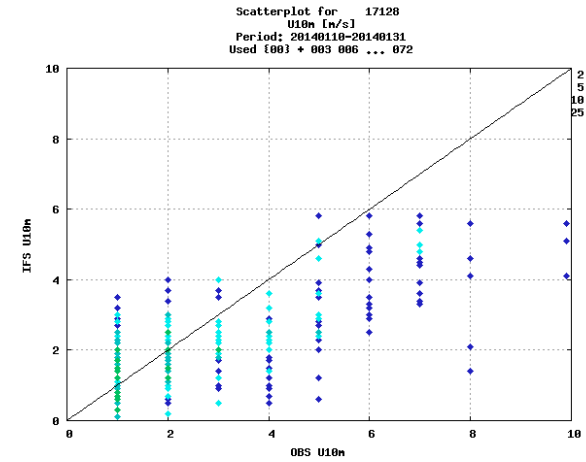
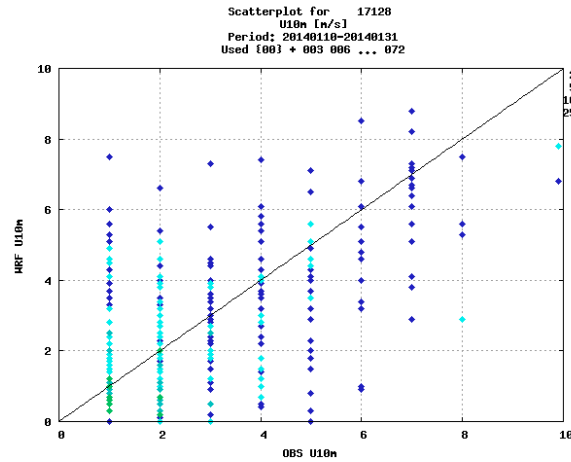
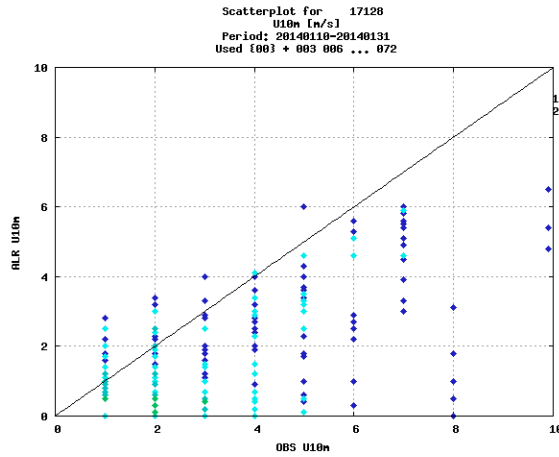
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10m Wind Speed Scatter Plots For ANKARA



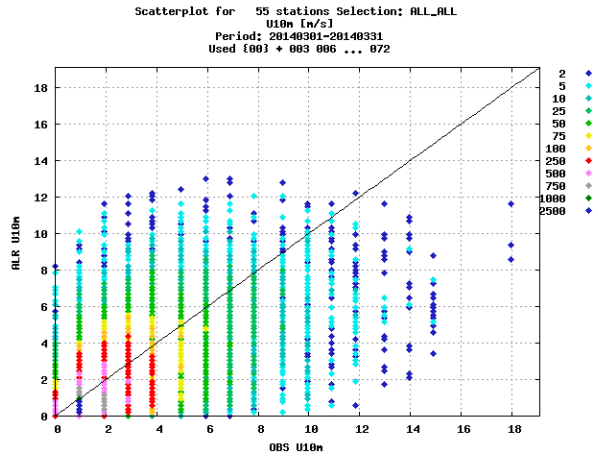
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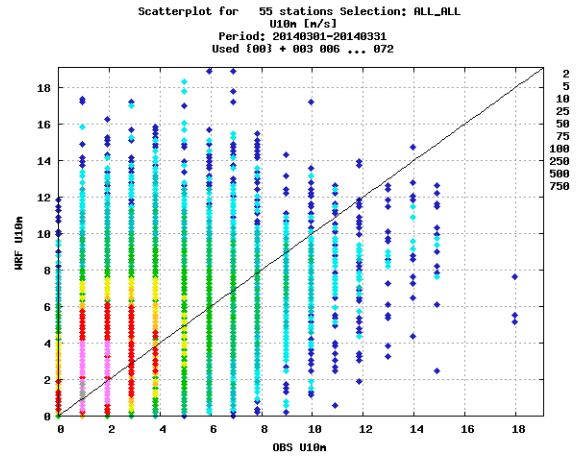
Comparison of ALARO with Other Models

Scatter Plots Of 10m. Wind Speed (March)

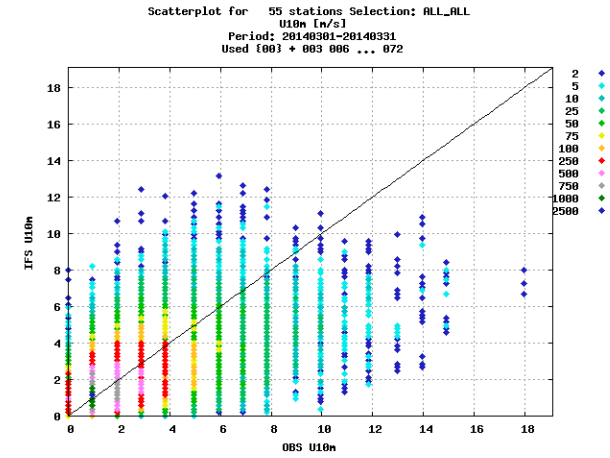
ALARO



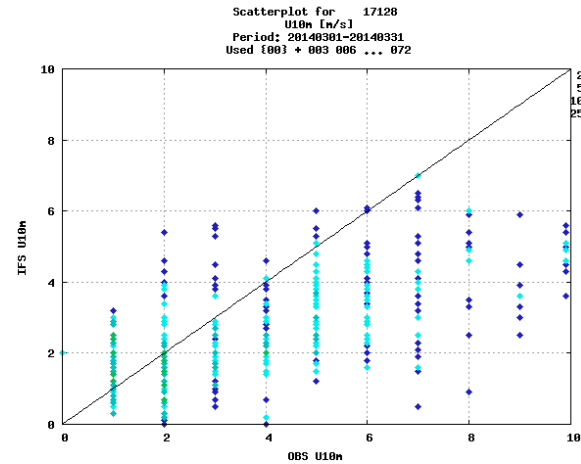
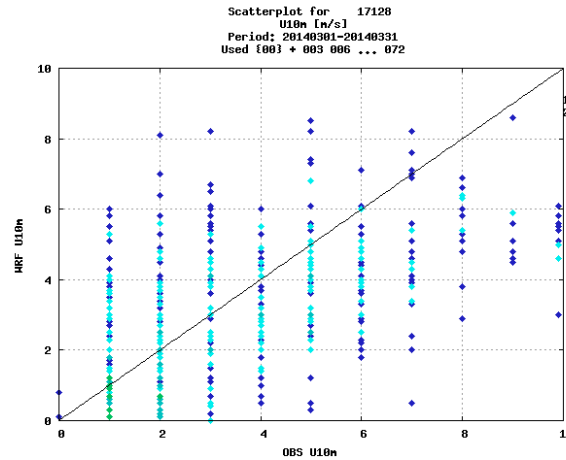
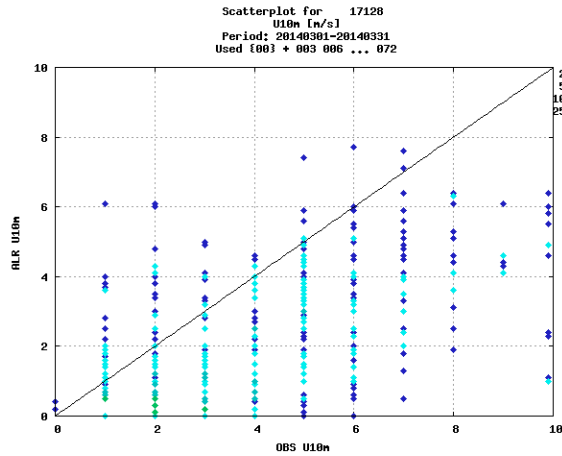
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10m Wind Speed Scatter Plots For ANKARA



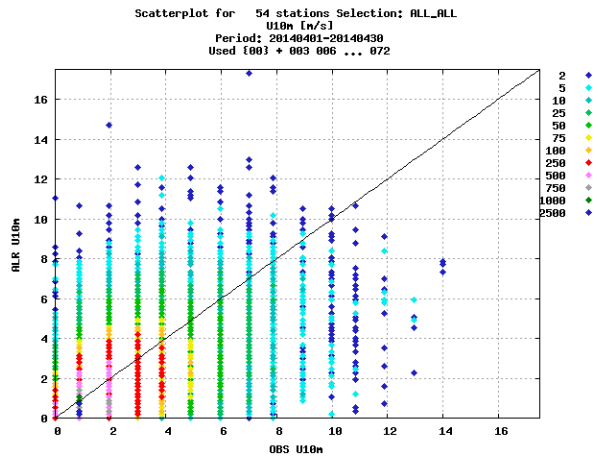
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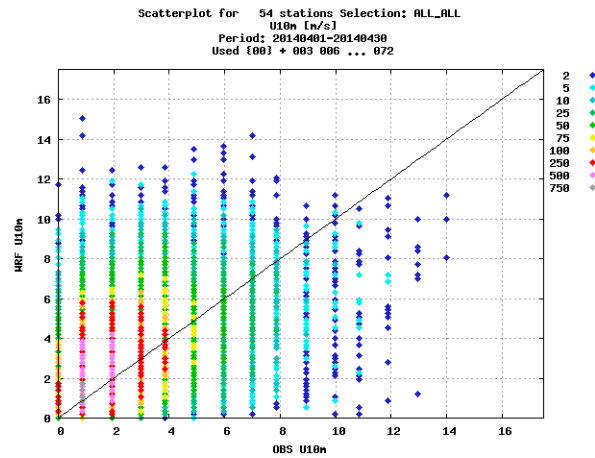
Comparison of ALARO with Other Models

Scatter Plots Of 10m. Wind Speed (April)

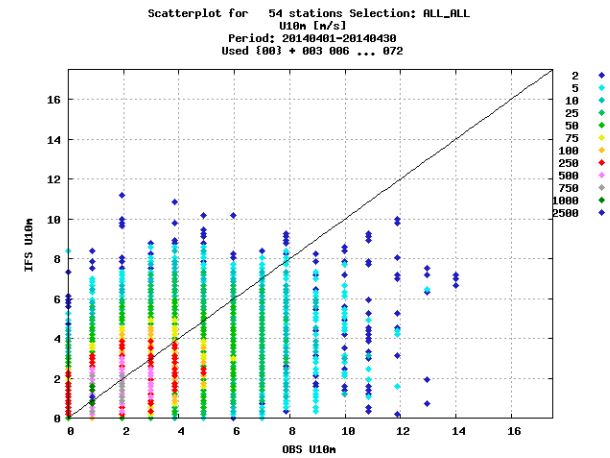
ALARO



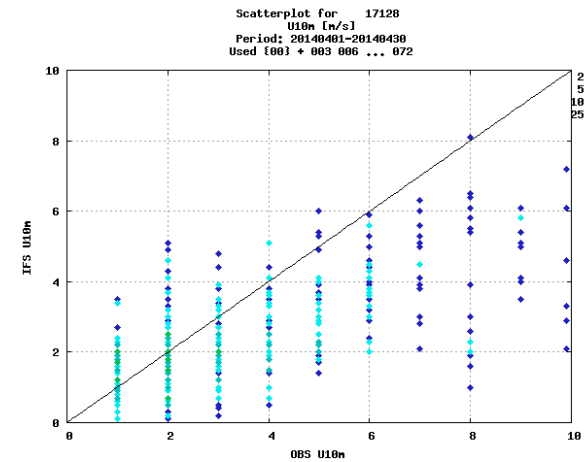
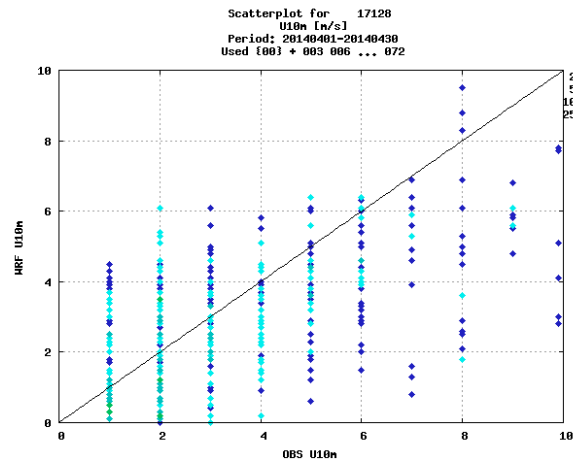
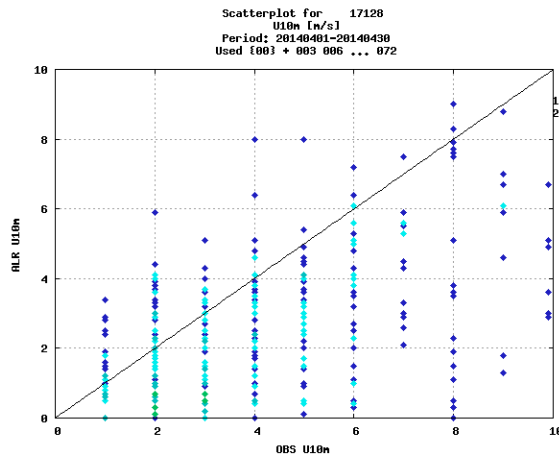
WRF



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10m Wind Speed Scatter Plots For ANKARA



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Comparison of ALARO with Other Models

RMSE and BIAS Profiles

JANUARY

MARCH

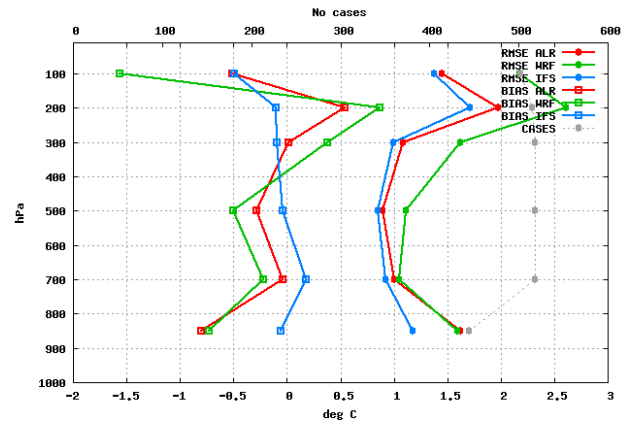
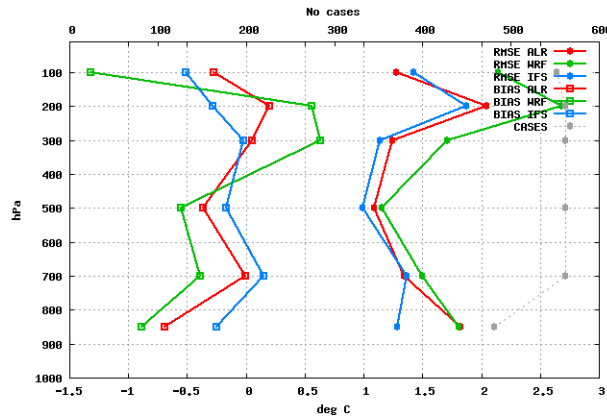
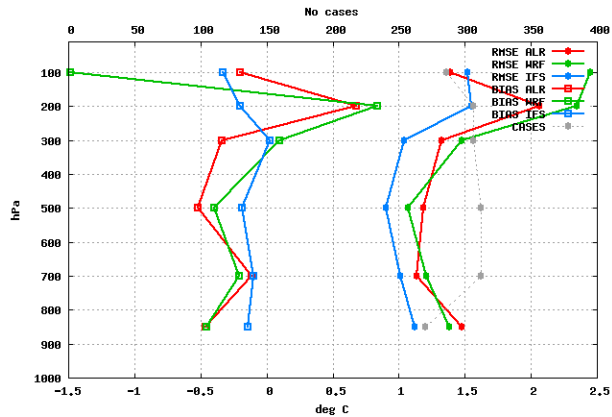
APRIL

TEMPERATURE

7 stations Selection: ALL_ALL
Temperature Period: 20140115-20140131
Statistics at 00 UTC Used {00} + 12 24 36 48 60 72

7 stations Selection: ALL_ALL
Temperature Period: 20140301-20140331
Statistics at 00 UTC Used {00} + 12 24 36 48 60 72

7 stations Selection: ALL_ALL
Temperature Period: 20140401-20140430
Statistics at 00 UTC Used {00} + 12 24 36 48 60 72

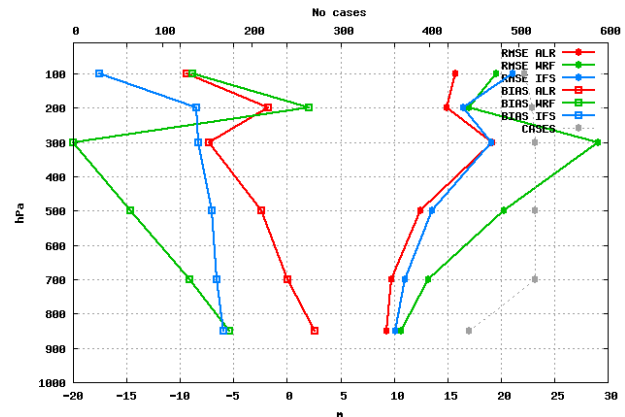
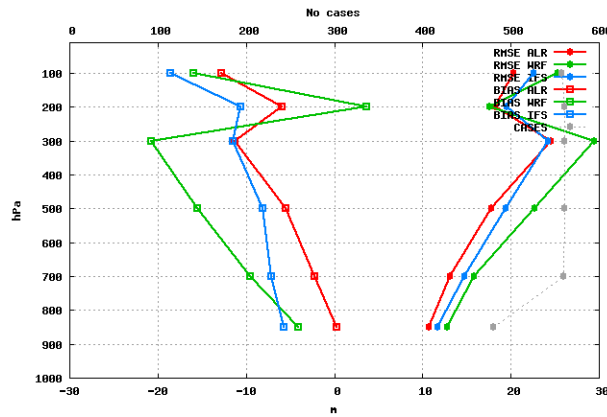
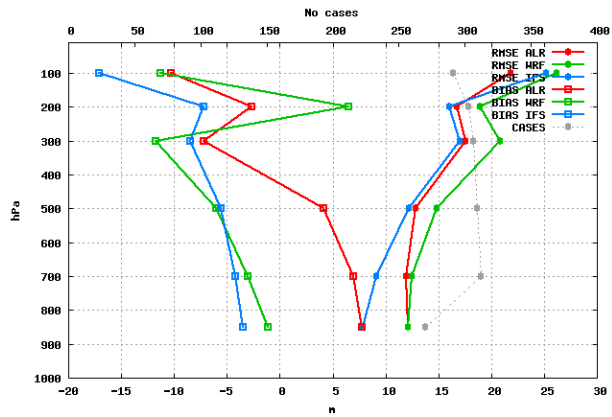


GEOPOTENTIEL

7 stations Selection: ALL_ALL
Height Period: 20140115-20140131
Statistics at 00 UTC Used {00} + 12 24 36 48 60 72

7 stations Selection: ALL_ALL
Height Period: 20140301-20140331
Statistics at 00 UTC Used {00} + 12 24 36 48 60 72

7 stations Selection: ALL_ALL
Height Period: 20140401-20140430
Statistics at 00 UTC Used {00} + 12 24 36 48 60 72



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Conclusion

2m Temperature

- Negative Bias
- but over estimated especially temperature below -5 degrees,

MSL

- Better than cy36t1
- Overestimated

10 meter wind speed



Upper level

- Better than cy36t1
- High RMSE of Humidity at Low Levels

• <http://212.175.180.126/verif>

