Application and verification of ECMWF products 2016

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1. Summary of major highlights

The ECMWF products are extensively used in operational work of LEGMC in fields of meteorology and hydrology. ECMWF model output data are integrated in forecasters' workstation SmarMet, where analysis and editing of information is done followed by generation of products for customers. For hydrological purposes data are used in hydrological model HBV and hydrological simulation and forecasting system WSFS. Data are assembled and visualized in the internal web portal as well. For general analysis and quick overview and some specific products ECMWF website and ecCharts are used. Some results of verification of ECMWF product are added.

2. Use and application of products

2.1 Post-processing of ECMWF model output

2.1.1 Statistical adaptation

In the beginning of winter ECMWF data (mainly air temperature and precipitation) are used to predict the formation of ice cover in rivers, while in spring forecasts are used to predict ice break-up, spring floods maximum levels and discharges and the performance of the time of accession.

2.1.2 Physical adaptation

ECMWF HRES and EPS data (daily average air temperature and sum of the precipitation) are used into the hydrological model to simulate river runoff for the next 10 days, twice a week – for the next 4 weeks

2.1.3 Derived fields

Ensemble mean and probabilities of defined thresholds for wide range of parameters are calculated: air temperature, maximum wind gusts, total precipitation, snow fall and snow depth, total cloud cover and cloud base height, etc. Information is available in forecasters work station for data editing and generation of products for customers.

2.2 Use of ECMWF products

The ECMWF products are the base of LEGMC medium-range forecasts up to 14 days, and the only data for long range forecasts up to 6 months ahead.

For operational purposes ECMWF model data outputs form HRES, EPS and HRES-WAM routinely are provided to forecasters work station SmartMet, where they are analysed together with observations (ground observations, radio soundings, satellite pictures and radar data), climate data and other available models (for instance GFS) and edited for the period up to 7 days ahead. Maps, time series and vertical cross sections are used for wide range of hydrometeorological parameters. Not only single level (ground level) data are provided to workstation SmartMet, but pressure level and model level data also; stability indexes, wind shear and other parameters are calculated.

Together with HIRLAM and HARMONIE data (from FMI) ECMWF data are extensively used for short-range forecasts and warnings (not only meteorological phenomena, but hydrological as well). ENS are the only source of probabilities for our products. ECMWF Extreme forecast index and ENS clustering and plumes products are used from ECMWF web page and partly are available in our internal web portal as well.

For long-term forecasts air temperature and precipitation ensemble means, anomalies and terciles summaries are provided to forecasters together with climate data from LEGMC observation stations in form of maps, graphs and tables.

3. Verification of products

3.1 Objective verification

3.1.1 Direct ECMWF model output (both HRES and ENS)

In Annex there are some verification results for ECMWF HRES both model runs (00 un 12 UTC) for 2015. Verification is performed by quarters for time period 0-200 h for three aggregated parameters - temperature, max_gust and precipitation. Parameters are aggregated in 12 hour (night 18-6 UTC and day 6-18UTC), i.e., for temperature it is minimum at night, maximum by day, for max_gust it is simply max wind gust in 12h period, for precipitation it is total precipitation amount in 12h period.

Some explanations

In figures:

Lead_time is 0-200 h

prog_time5.0 is 12.00 UTC model run

prog_time13.0 is 00.00 UTC model run

3.1.2 ECMWF model output compared to other NWP models

3.1.3 Post-processed products

3.1.4 End products delivered to users

3.2 Subjective verification

3.2.1 Subjective scores (including evaluation of confidence indices when available)

3.2.2 Case studies

4. Feedback on ECMWF “forecast user” initiatives

5. References to relevant publications

Quarter 1st (01.01-31.03.2015)

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<tr><td rowspan="2">PARAMETR</td><td colspan="2">MEAN ERROR (me), ROOT MEAN SQUARE ERROR (rmse), MEAN ABSOLUTE ERROR (mae)</td></tr>
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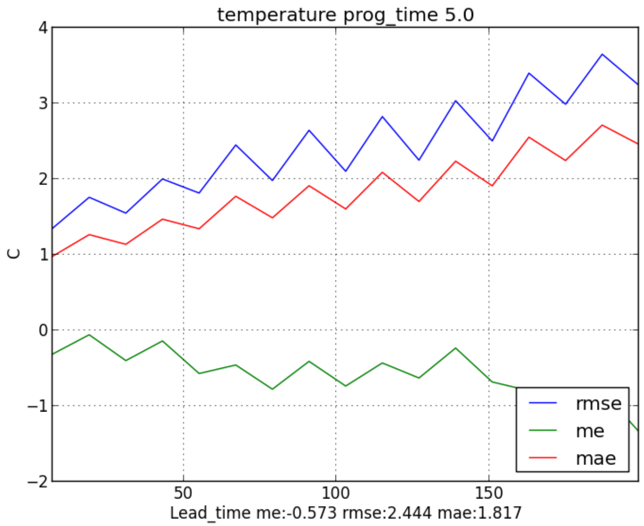
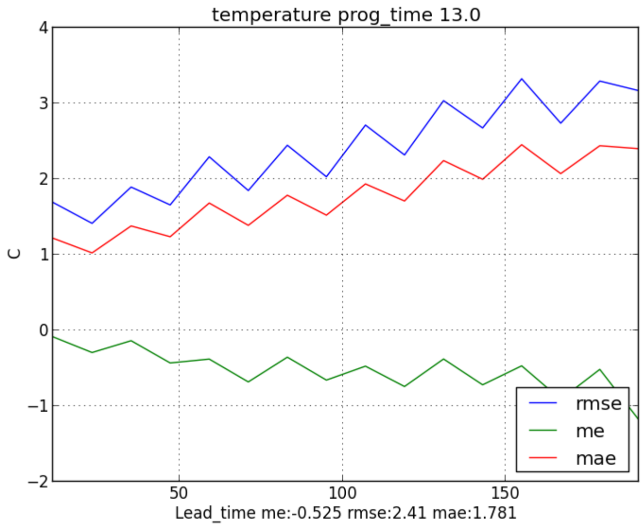
<tr><td>TEMPERATURE</td><td>
</td><td>
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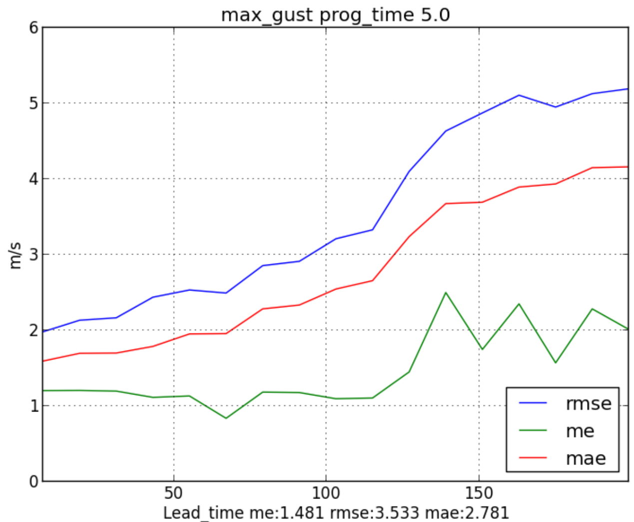
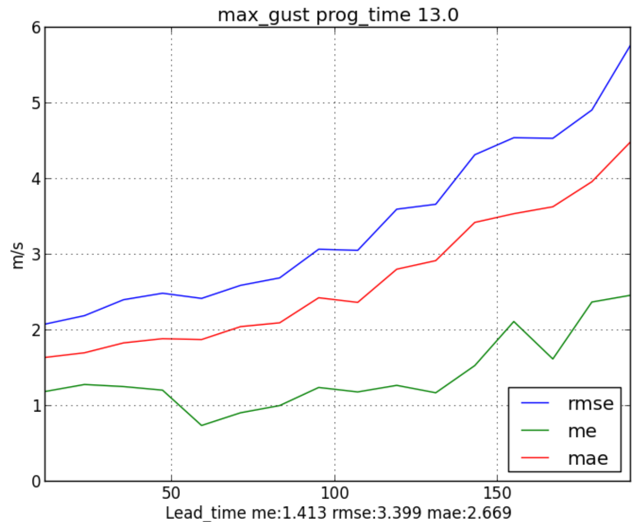
<tr><td>MAX GUSTS</td><td>
</td><td>
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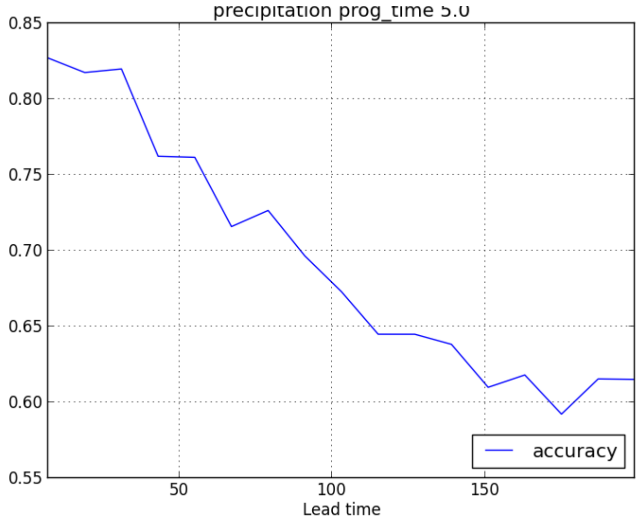
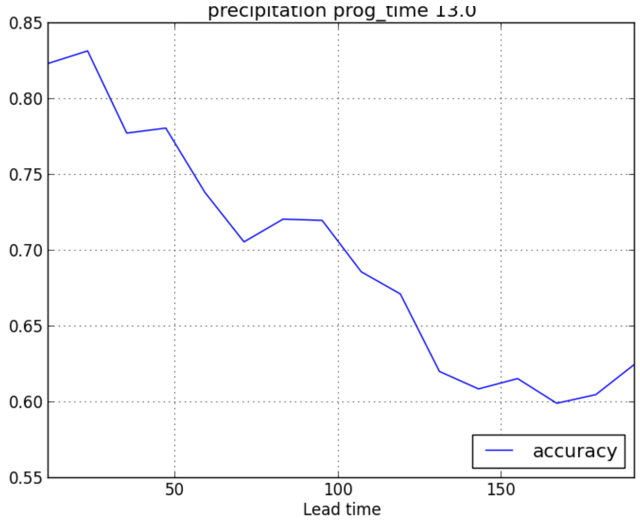
PRECIPITATION ACCUARCY		

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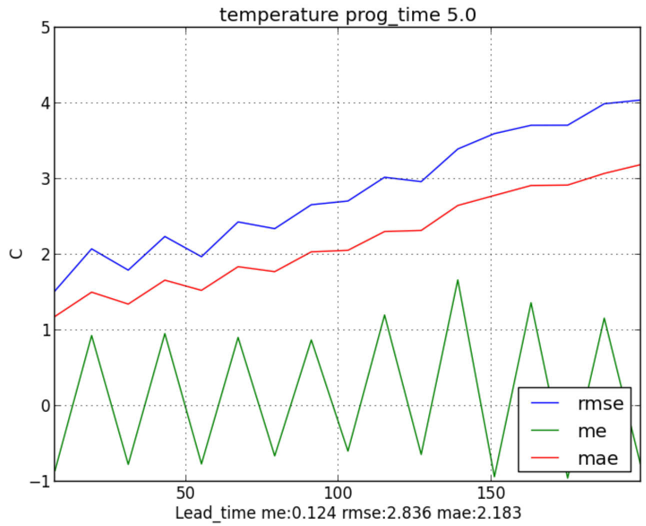
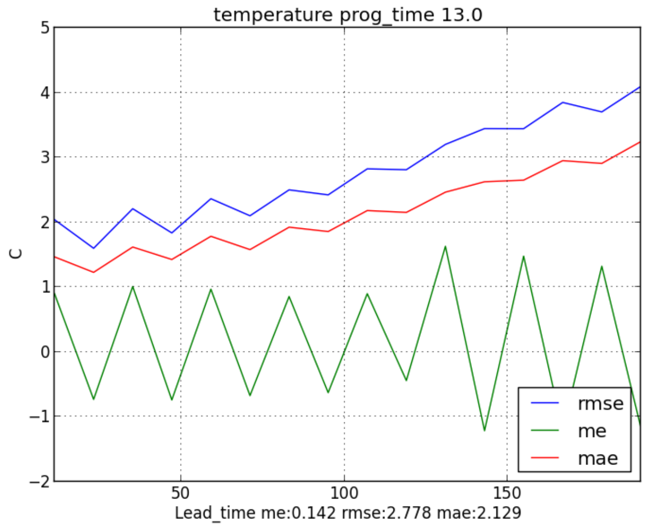
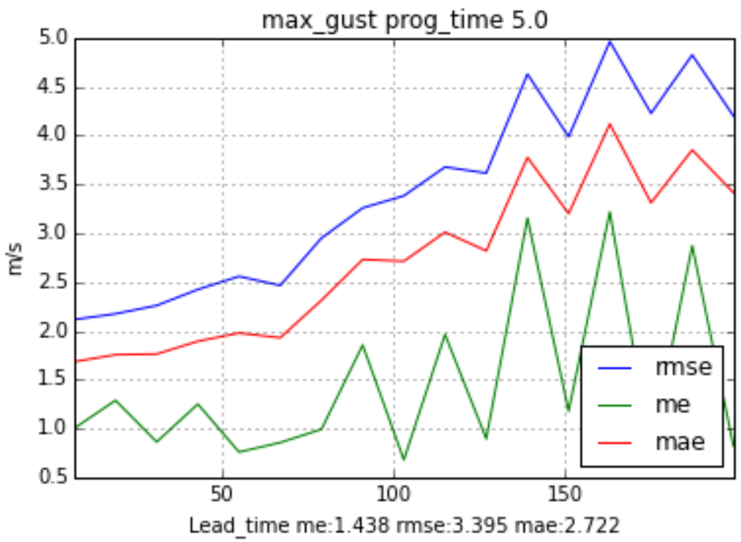
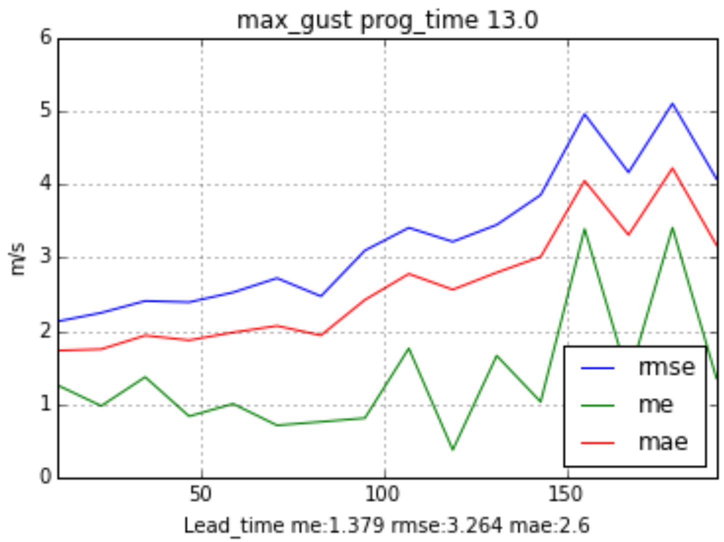
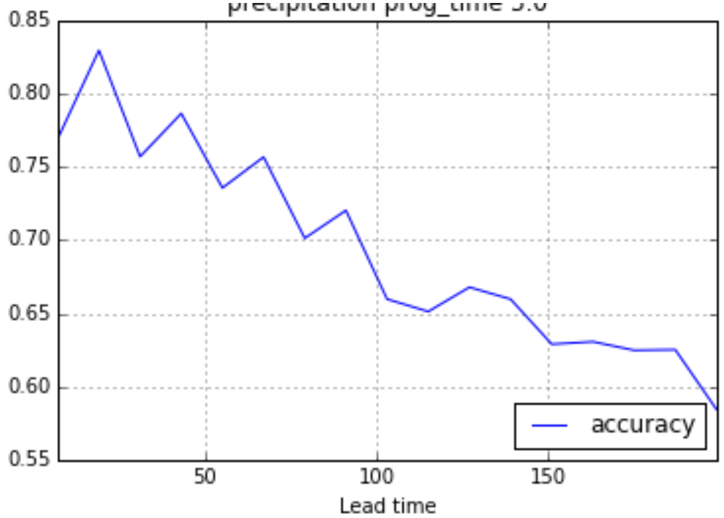
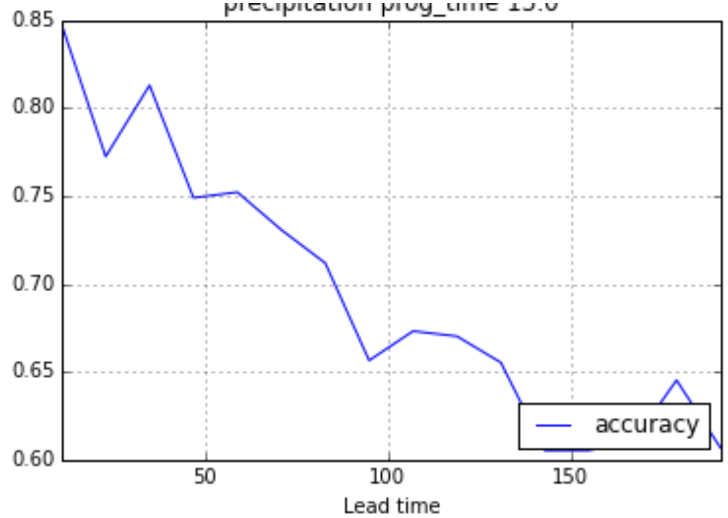
TEMPERATURE		
MAX GUSTS		

PRECIPITATION		

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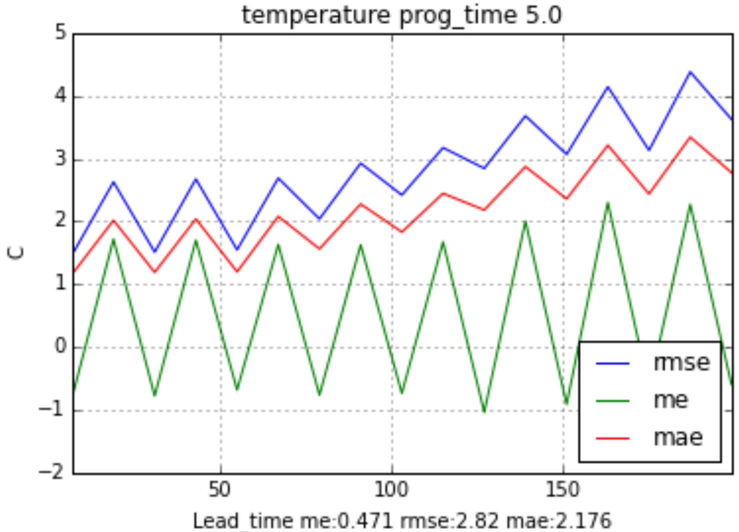
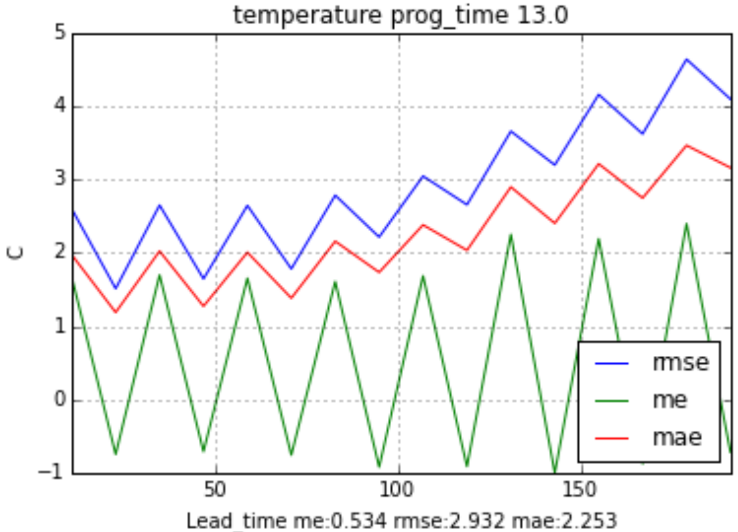
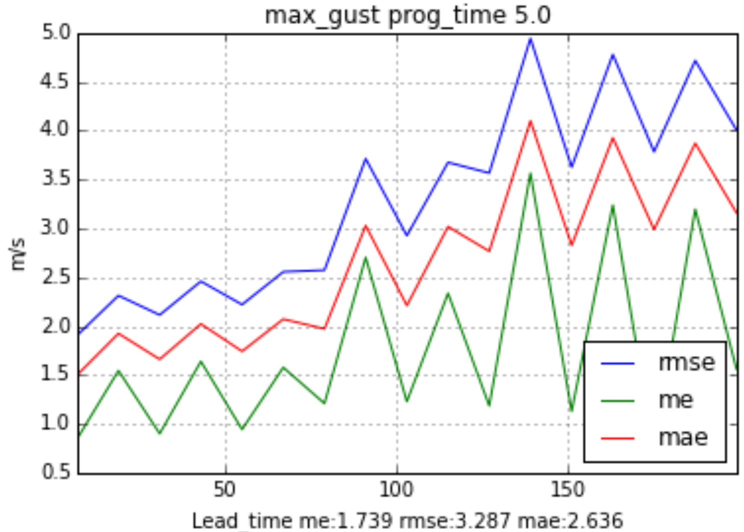
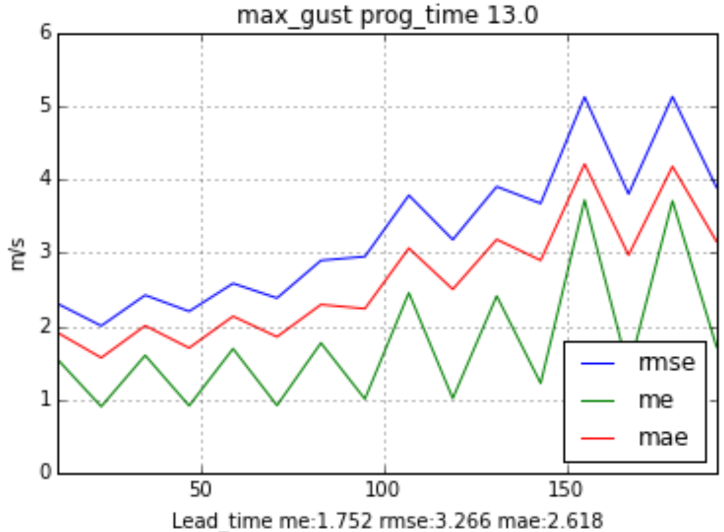
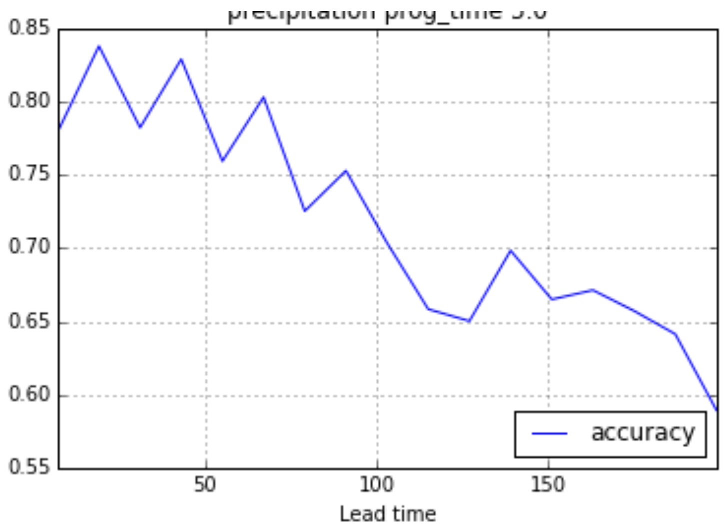
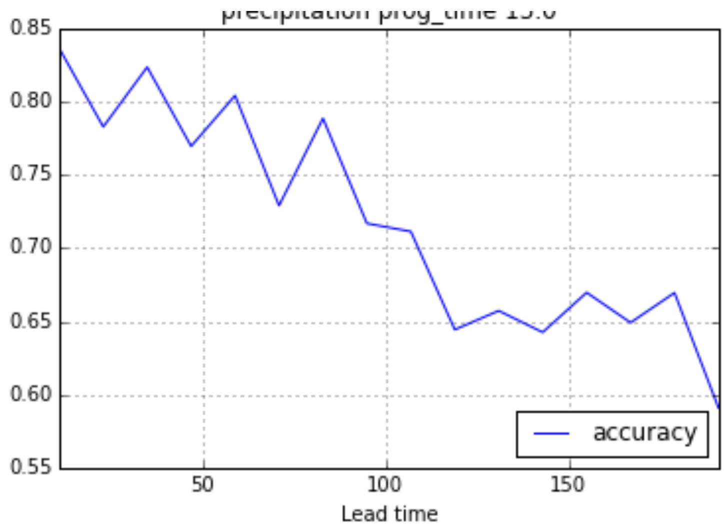
TEMPERATURE		
MAX GUSTS		

PRECIPITATION		

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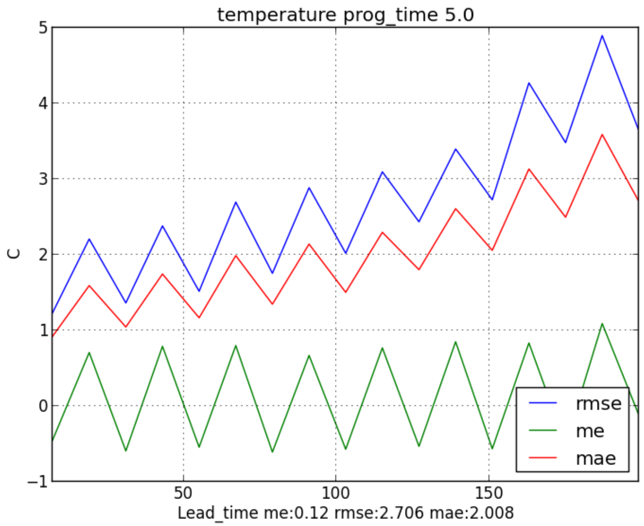
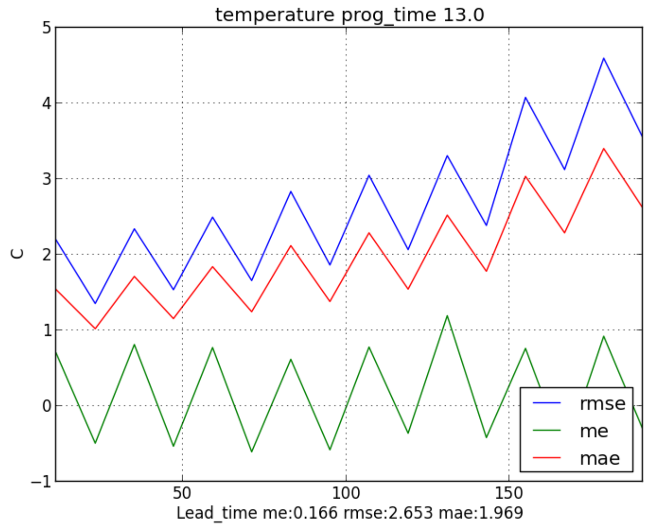
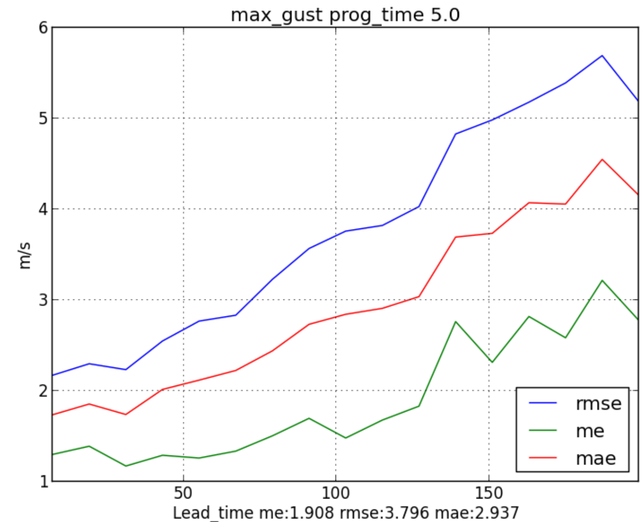
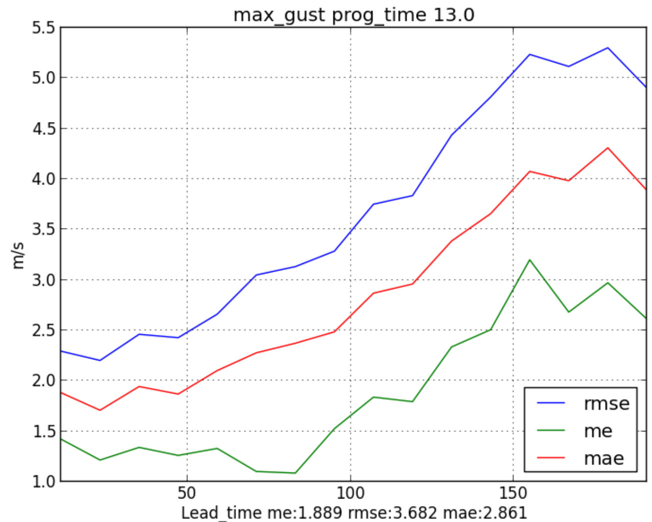
TEMPERATURE		
MAX GUSTS		

PRECIPITATION