

First results of forecast verification of Terminal Aerodrome Forecast TAF during the last 10 years

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■ Outline

- introduction
- method of verification
- verification result
- trend in results 10 years
- conclusions

Introduction

- TAF Terminal aerodrome forecast
 - Standard ICAO product
 - forecaster
 - validity 24h
 - every 6 hours (+amendment)
- Quality management system - ICAO Annex 3
 - proving the accuracy of forecasts for aviation
 - there is no standard method for verifying TAFs
- Verification - observed state METAR report
 - every 30min

```
TAF LDZA 250525Z 2506/2606 22005KT 9999 OVC045
                                     TX18/2513Z TN07/2604Z
      TEMPO 2510/2518 23010KT
      PROB30 2603/2606 0200 FG=
```

Introduction

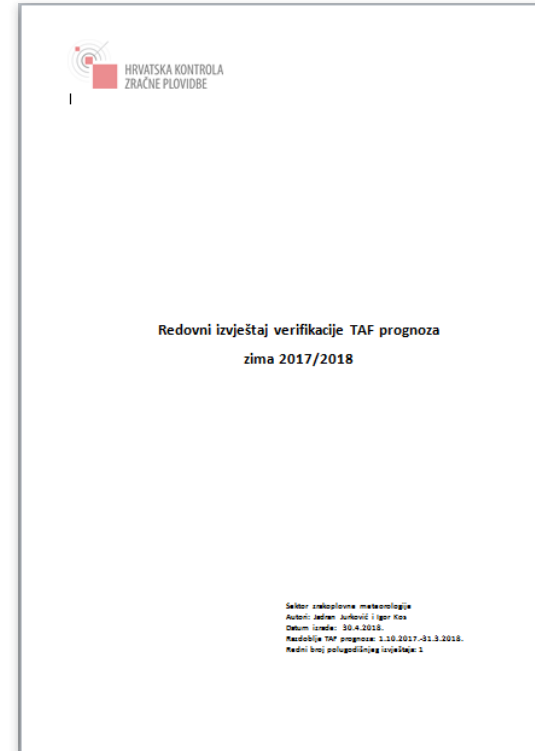
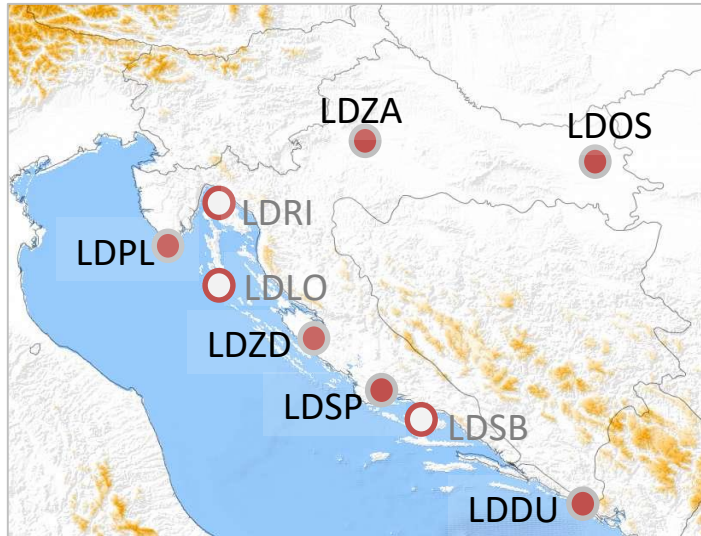
- Verification in document: *Monitoring procedure*
 - seasonal report; in real time; diagnostic verification
- Quality
 - verification report (within 2 months)
 - results and conclusion
 - meeting
 - possible corrective actions
 - mail to forecasters, detailed diagnostic verification, new education, proposals to forecasting or observing systems

Verification method

- Methodology similar to Met Alliance - Mahringer (2008)
 - based on criteria for group of changes
 - verifying for every hour
 - Best (FC and OBS) and worse (FC and OBS) conditions are verified
- 9 airports: ~35000 FCST hours/year
- Scores (KPI):
 - number of correct forecasts - wind speed
 - e.g. $|FC-OBS| < 10KT$
 - $(HSS+PSS)/2$ for continuous variables
 - visibility, ceiling, present weather, wind gusts

Verification report

- summer 4-9, winter 10-3
 - 1st report : winter 2017/2018
- All airports



■ Verification results - 10 years

- changes from 2009.
 - personnel
 - optimized organization of forecasting tasks
 - forecasting tools
 - additional effort in training (e.g. convection, wind and fog)
 - verification
- variation of results
- positive trends: thunderstorm, wind gusts, temperature
- negative trends: ceiling



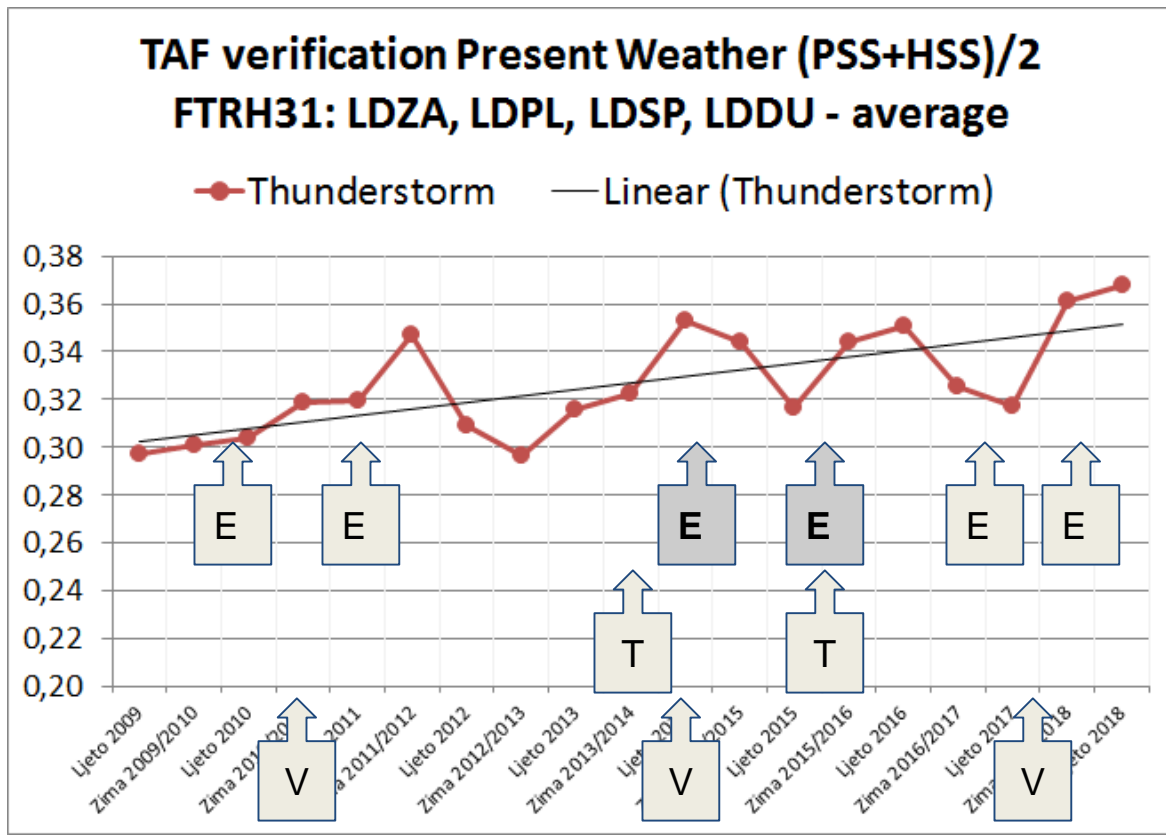
Result thunderstorm

LDDU 2009

PW_TS	OBS	
FC	yes	no
yes	93	1332
no	145	15830

2018

PW_TS	OBS	
FC	yes	no
yes	285	1729
no	168	15377



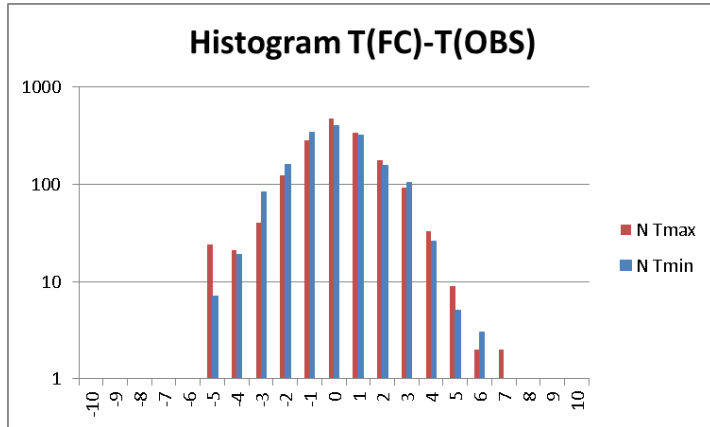
Education

Technology

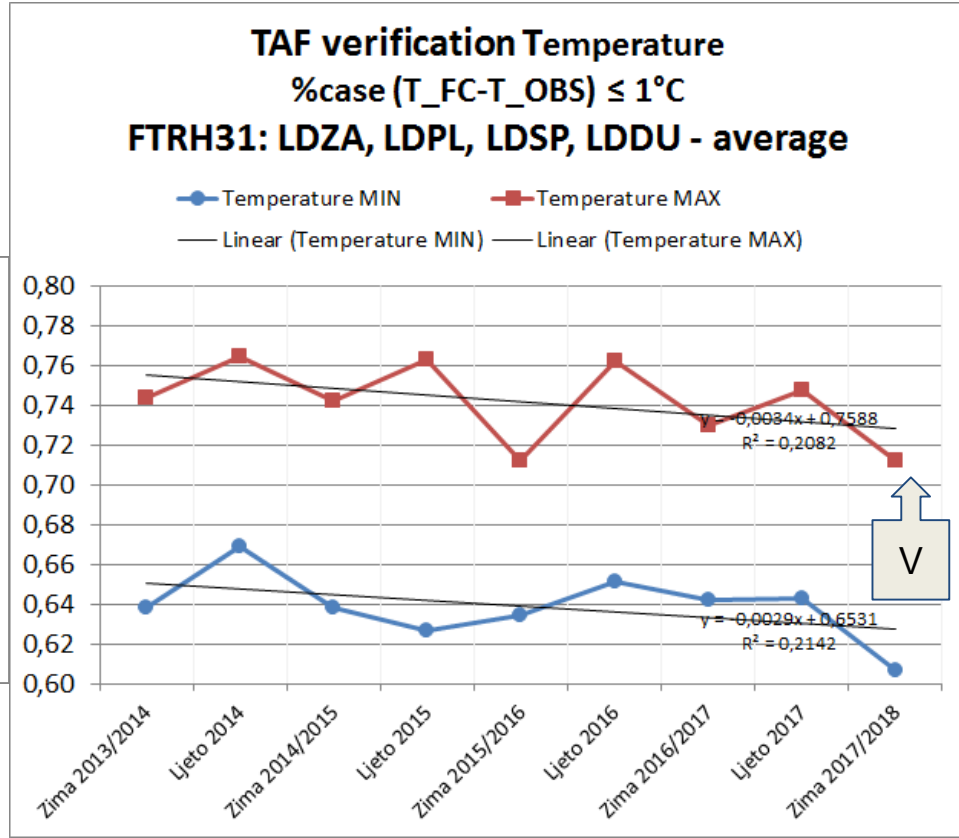
Verification

Results temperature

- FC 24h Tmax Tmin and timing (hour)
- from 2013.

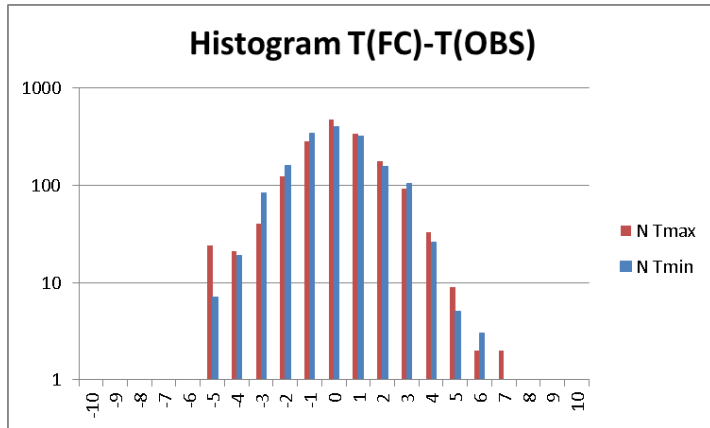


- $\pm 1^\circ\text{C}$ in 70% cases

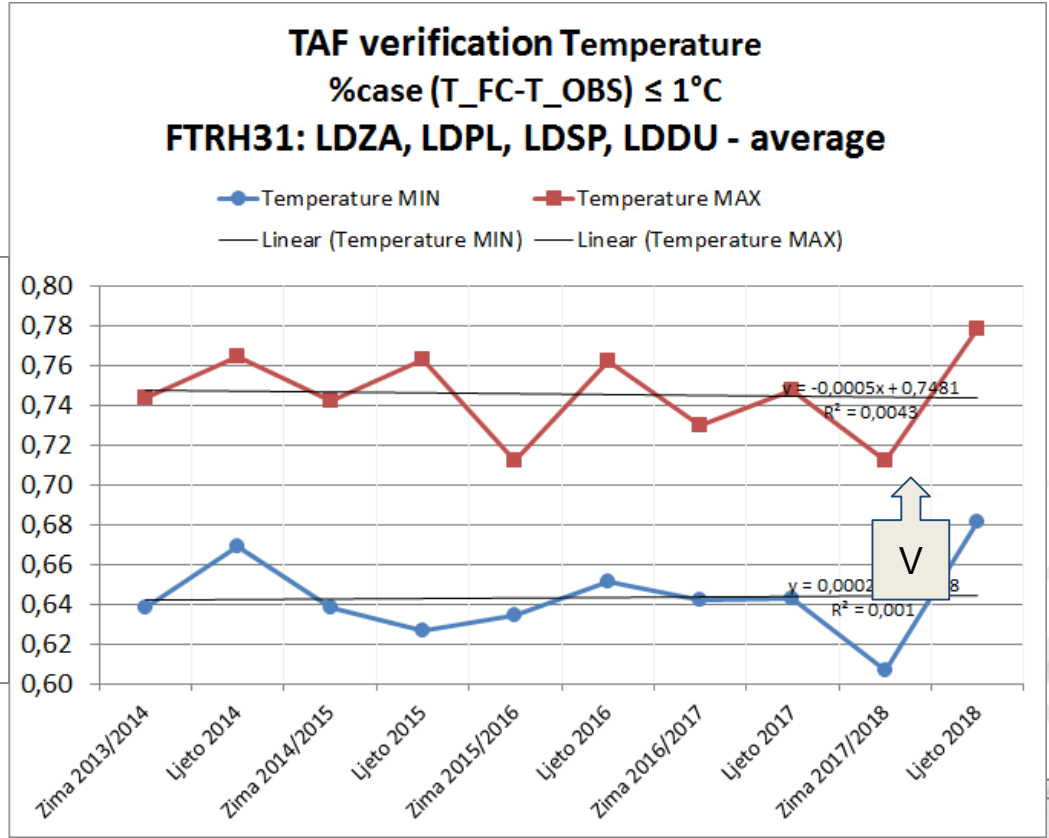


Results temperature

- FC 24h Tmax Tmin and timing (hour)
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- $\pm 1^\circ\text{C}$ in 70% cases



Conclusions

- Verification system has been established, and **regular reports** are produced
- **Positive trends** for thunderstorm and wind, temperature
- Permanent monitoring of the TAFs quality, together with corrective actions, gives **better forecasts**



■ Constraints and problems

- input data TAF and METAR
 - e.g. thunderstorm ~16km
- method
 - criteria thresholds
- results - scores
- rare events
 - forecast for a given point
 - the verification period is just one hour
 - aviation requirements usually refer to high impact weather
 - climatological difference