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Status and Plans of KENDA-1 at MeteoSwiss

Daniel Leuenberger, Livio Giacomini, and Marco Arpagaus

MeteoSwiss, Zurich, Switzerland



Status of and work on KENDA-1

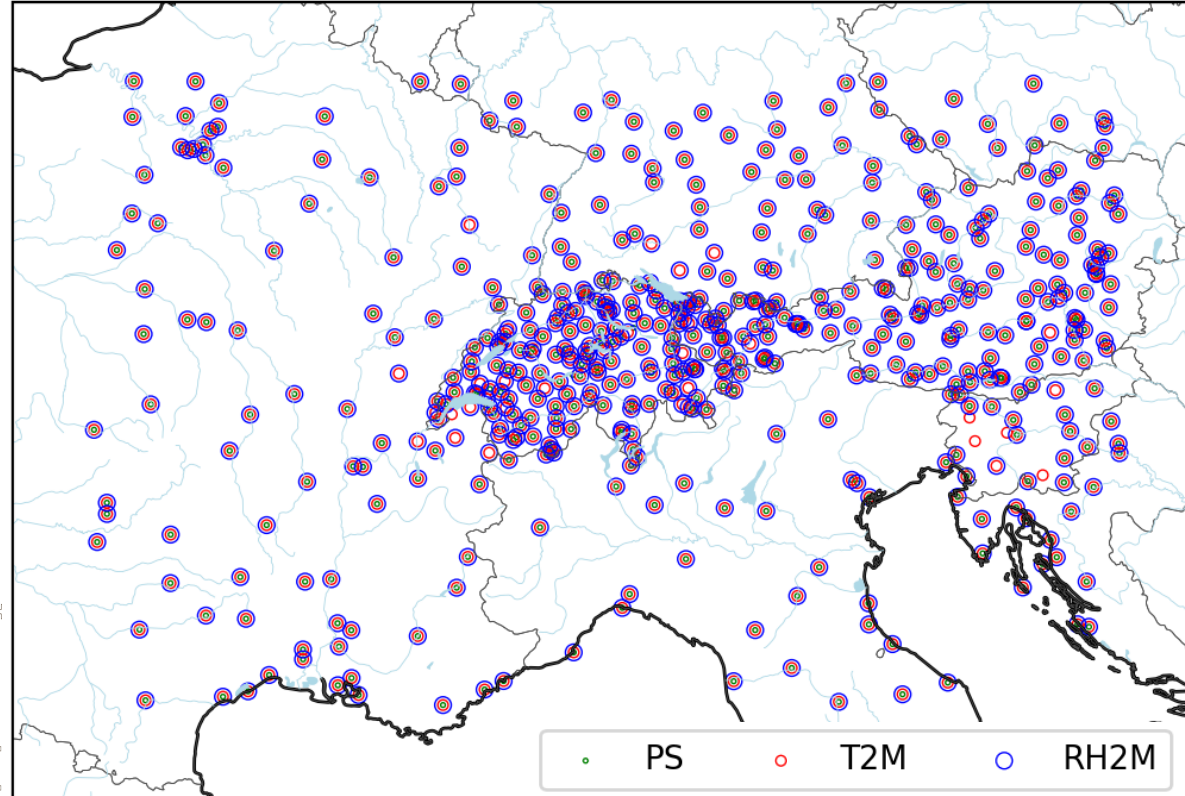
- Operational status
 - Introduction of T2m and RH2m on 27.9.2021
 - Introduction of Wind Lidar at 3 stations on 8.3.2022
- Ongoing developments
 - Microwave Radiometer brightness temperatures (see talk by Claire)
 - Raman Lidar mixing ratio and temperature profiles (see talk by Bas)
 - Additional wind radar and lidar station in Basel (see talk by Daniel)
 - MODE-S observation stream v2.2



Assimilation of T2m and RH2m

- Positive impact in all seasons, largest in fog period in Nov 2020
- Started diagnosis of O-B

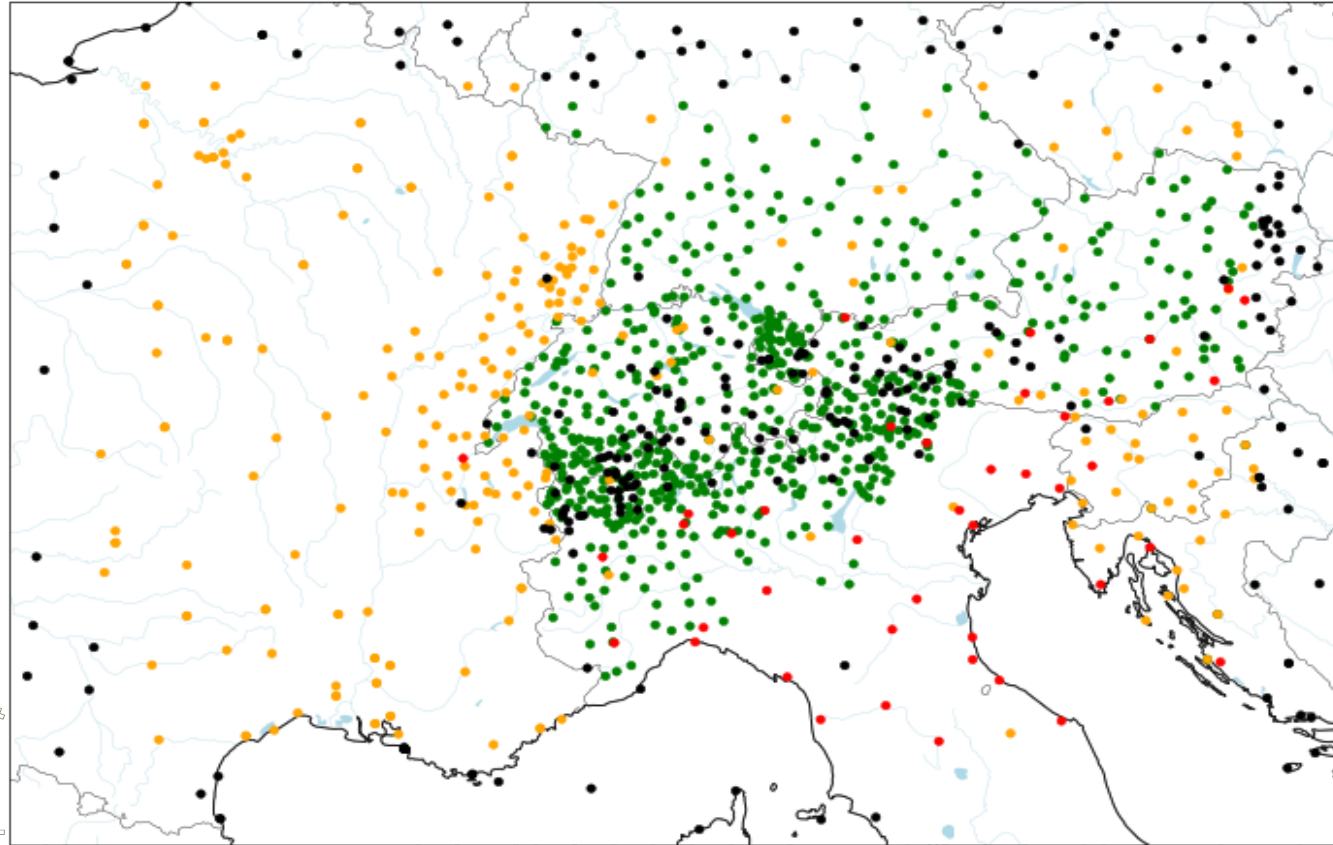
Locations of active observations



MeteoSwiss



Assimilation Frequency



- 30min (55%)
- 1h (21%)
- 3h (3%)
- REJ (20%)

• <1h (662 stations) • <2h (255 stations) • >=2h (41 stations) • inactive (245 stations)

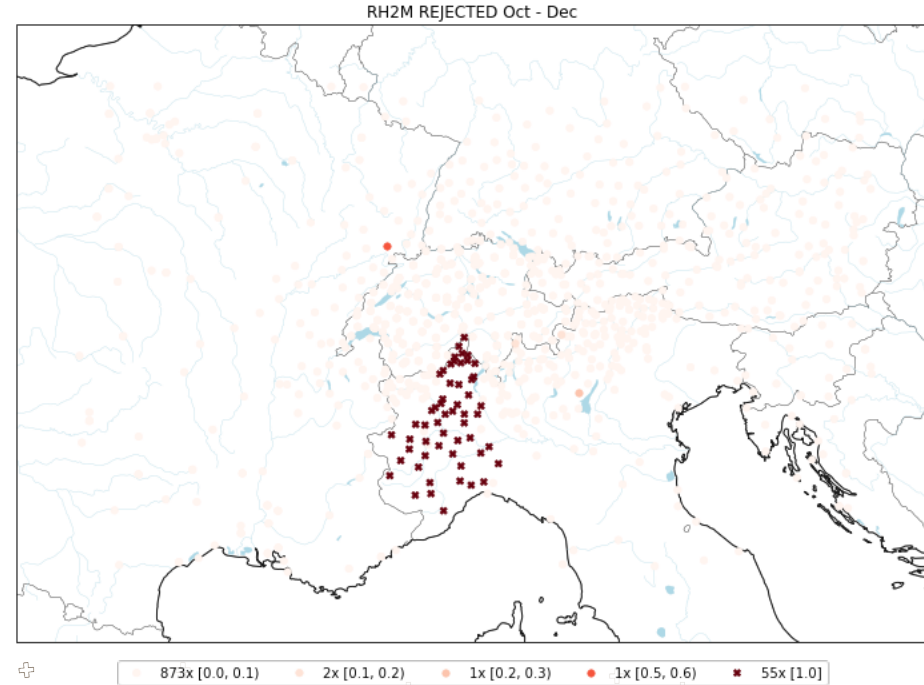
Leuenberger

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Look at Irregularities in Status Flags

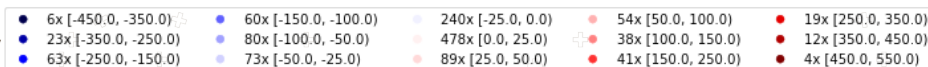
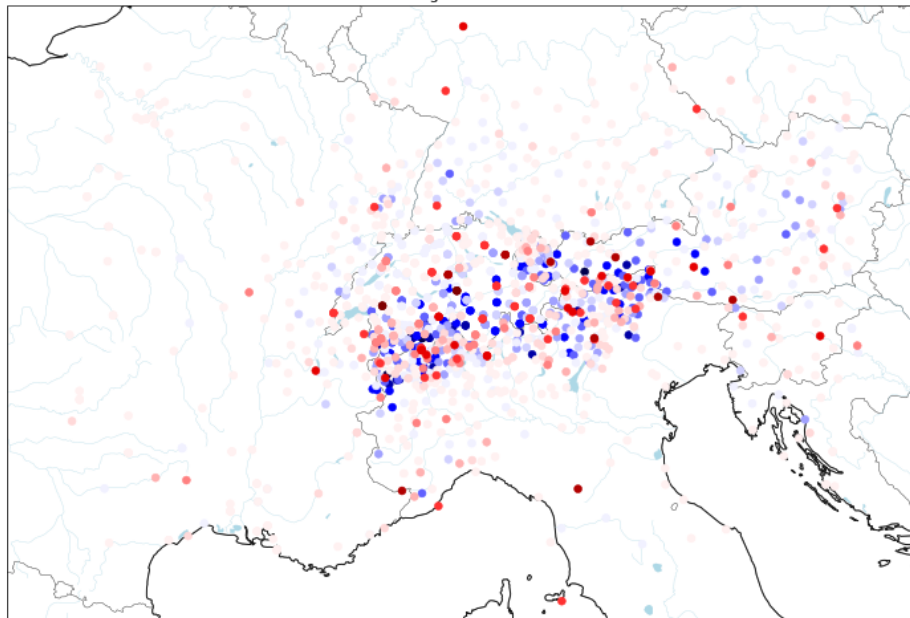
- Look at frequency of RH2m rejections
- Irregularities for stations in Piemonte region
- It turned out that our DWH only provides RH2m (and not Td2m) for these stations
- COSMO seems to require Td2m to assimilate RH2m, otherwise it is flagged as GROSS. Why?





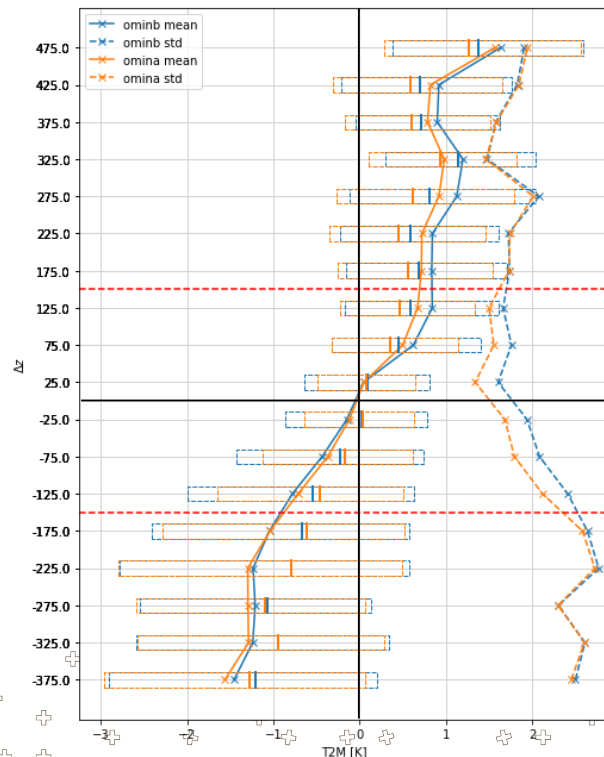
Δz as Station Selection Criterion?

Station Height Difference T2M



T2M
Time: 2021-09-30 23:10-2021-12-31 23:00

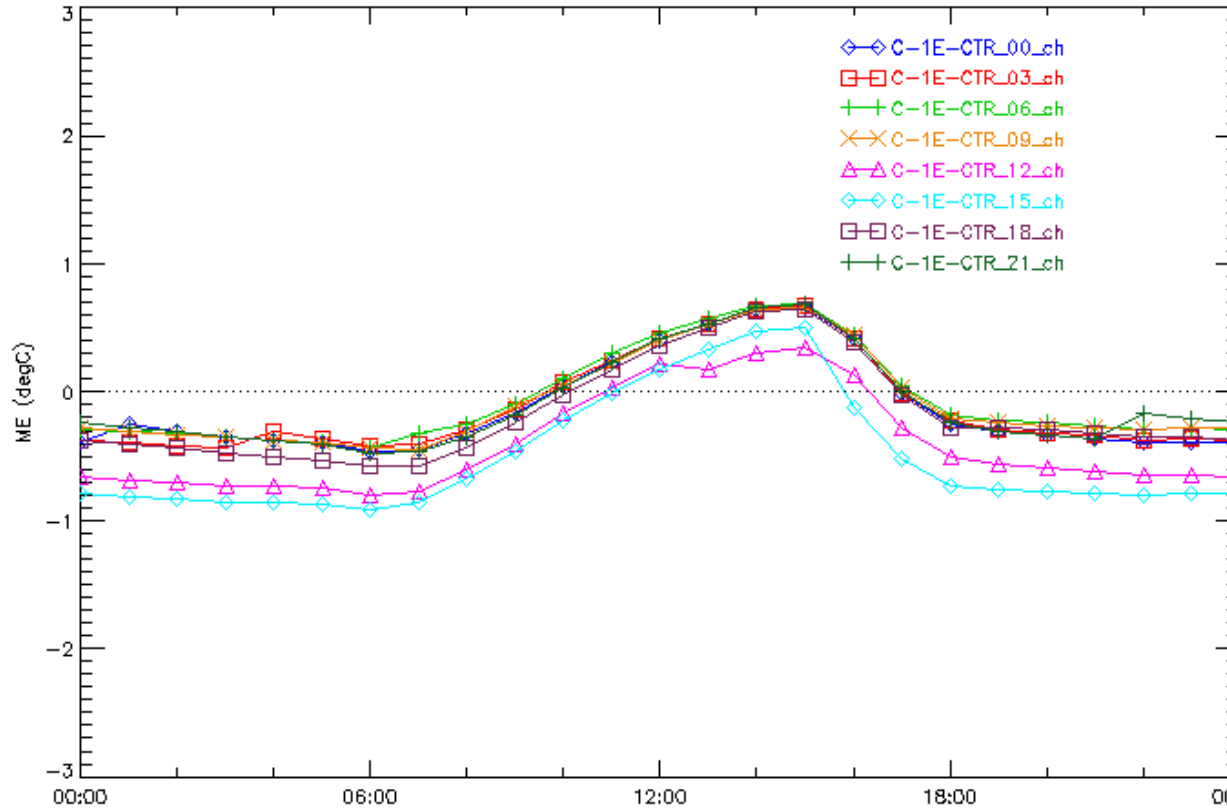
Δz vs O-B / O-A





Different Biases in Forecasts

Td2m Bias dependent on Forecast Initial Time (Autumn 2021)



- 12UTC and 15UTC forecasts systematically drier than other forecasts
- Due to diurnal cycle of model bias and corresponding DA increments



Assimilation of Wind Lidar Observations

- Add wind lidar observations collocated with the wind radar observations at Payerne, Grenchen, and Schaffhausen
- Few additional observations in lowest 100m and higher vertical resolution than wind radar observations
- Positive impact in wind at and near surface (small and very short-lived)
- Operational since 8.3.2022



MODE-S developments

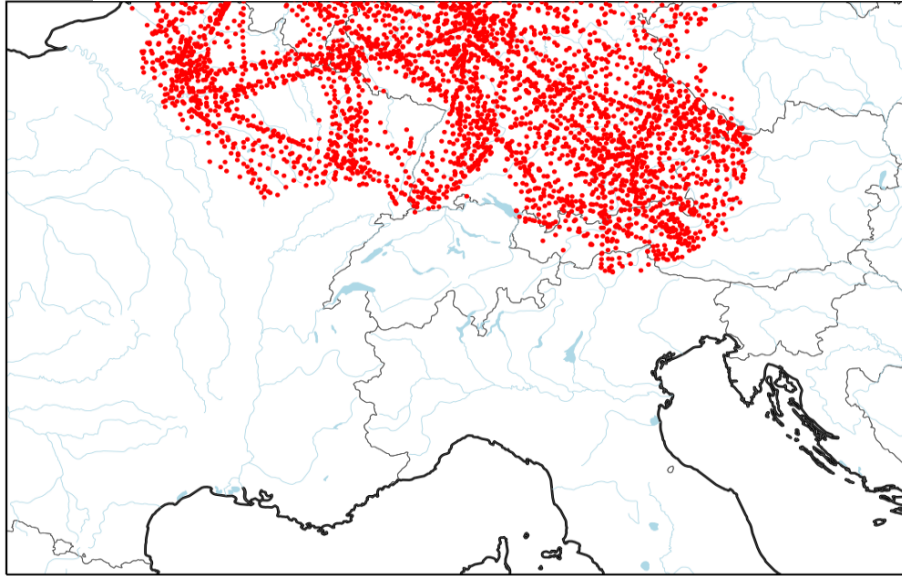
- Use of new observation stream EMADDC v 2.2
- Huge amount of additional data
- Consider only data below FL300 on our KENDA-1 domain
- Filter settings to further reduce data amount
 - wl_flag=0 (temperature AND wind whitelisted)
 - roll angle = 0
 - phase = 6 (only descent phase)
- Results in reduction factor of ~13 -> manageable data amount for our DWH
- Ongoing work with COSMO performance testing



Horizontal Coverage

Period from 11-16UTC on 2022-03-04

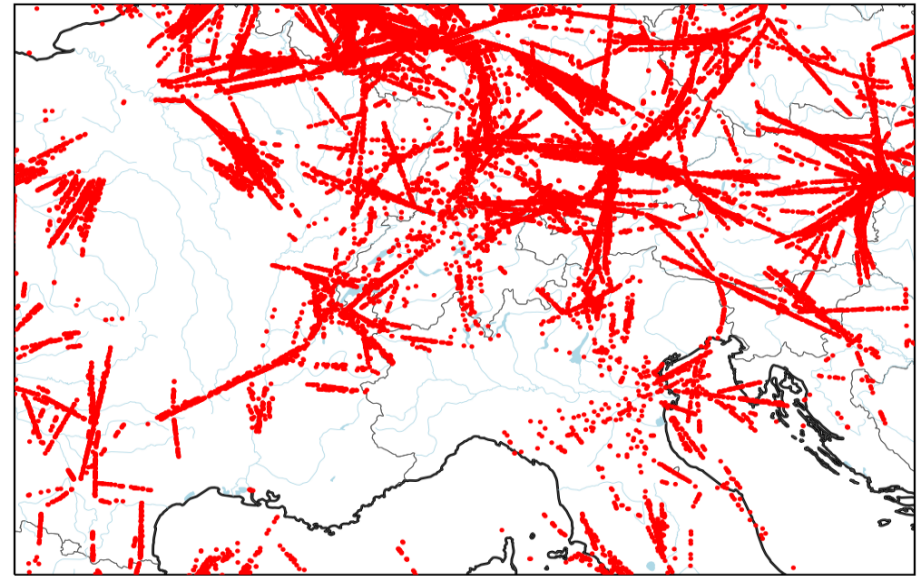
Operational coverage (MUAC only)



4'385 locations

MeteoSwiss

New coverage



63'376 locations

Daniel Leuenberger

© KENDA PP Meeting, 10.03.2022

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Outlook

Operational enhancement of KENDA-1

- Operational assimilation of MWR planned for Q2 2022
- Operational assimilation of Raman Lidar planned for Q? 2022
- Switch to new MODE-S data stream planned for Q2 2022

Development work

- Start work on assimilation of 3D volume radar data of 5 Swiss Stations (and neighboring stations)
- Look at Meteodrones observations from ongoing measurement campaign
 - 9 flights each night up to 2000m at Payerne
 - November 2021 – April 2022



Discussion Points and Questions

- Quality control of T2m/RH2m observations at DWD?
- Revisit the grid point assignment for Surface observations? Select gridpoint with a smaller vertical distance (allowing for larger horizontal distance) to station
- Why is Td2m required for RH2m assimilation? GROSS error flag else...
- Transition of MEC-light to MEC / ICON
- Correlated observation errors for profile observations
- Correlated observation errors for multiple microwave channels (MWR)
- Horizontal and vertical localization in densely populated observation areas (e.g. surface stations, wind profiler/wind lidar observations)
 - Globally or for selected observation types only (with RULES)?