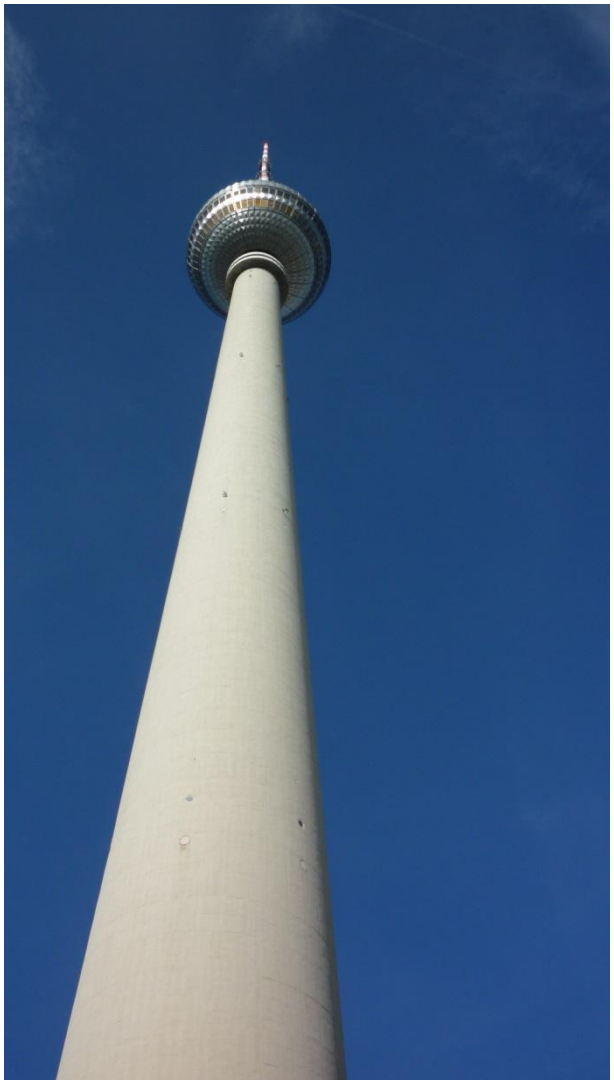
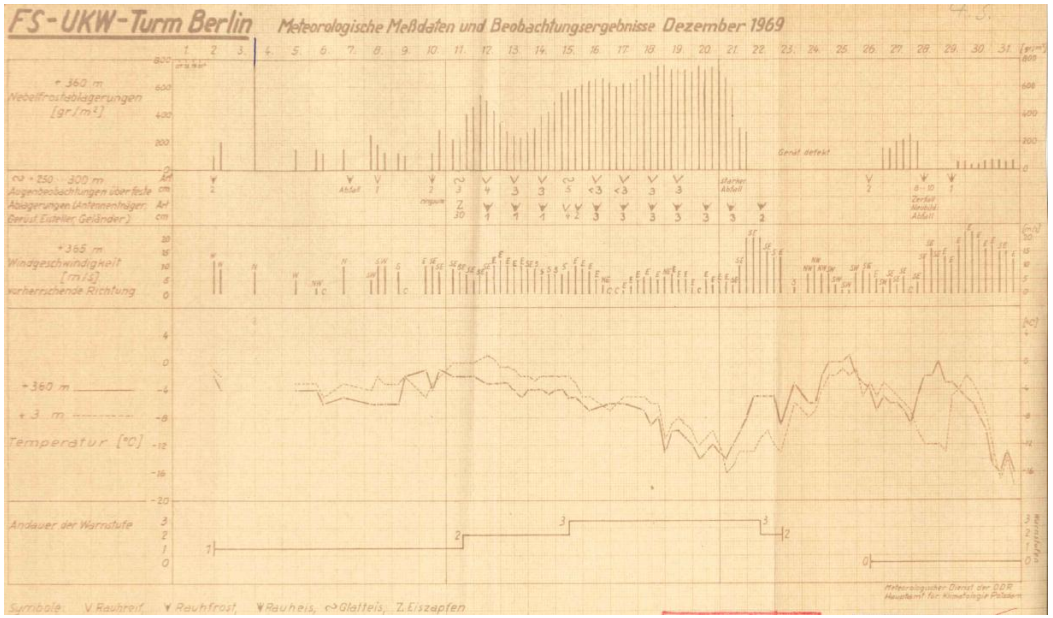




Icing Measurements at Berlin TV Tower

A case study on ice fall on 23rd December 2012

Bodo Wichura, German Meteorological Service

December 23rd, 2012: Chunks of ice fall from Berlin TV Tower

- The surrounding area of the Berlin TV Tower in the city center of Berlin was shut by the authorities due to ice fall.
- Similar situations occurred from time to time in the past, too.
- Observations and measurements of ice accretion are (in principle) available for Berlin TV Tower since winter 1969/70.
- New situation in 2012: Additional measurements of ice accretion as well as of supplementary meteorological parameters are available from a 100 m tall tower near Falkenberg (Meteorological Observatory Lindenberg, German Meteorological Service, DWD).

Datum: 24.12.2012
Quelle: http://www.tagesspiegel.de/berlin/tauwetter-an-heiligabend-alexanderplatz-nach-eis-gefahr-wieder-frei/7559250.html

Tauwetter an Heiligabend

Alexanderplatz nach Eis-Gefahr wieder frei

von Stefan Jacobs

Vom Kuppeldach des Fernsehturms drohen wegen des Tauwetters Eisplatten herabzurutschen. - FOTO: DPA

UPDATE Viel Schnee und eine dicke Eisdecke brachten am Sonntag sogar die sonst so wetterfeste BVG aus dem Takt. Das Tauwetter bringt neue Probleme: Wegen der Gefahr herabstürzender Eisbrocken musste das Gelände rund um den Fernsehturm gesperrt werden.

Empfehlen · Twittern · +1

Das Gelände rund um den Fernsehturm am Berliner Alexanderplatz ist nach der Sperrung wegen herabstürzender Eisbrocken wieder frei. Das Areal sei seit Sonntagabend wieder für Fußgänger begehbar, sagte ein Polizeisprecher am Montag. Wegen des Tauwetters mit Eisregen waren von der rund 200 Meter hohen Restaurant-Kugel größere Eisbrocken abgerutscht und auf den Platz gestürzt. Um die Passanten zu schützen, hatte die Polizei den Bereich Sonntag gesperrt. „Verletzt wurde niemand, Schäden gab es auch nicht“, sagte der Polizeisprecher. Am verkaufsoffenen Sonntag waren viele Menschen rund um den - samt Antenne - 368 Meter hohen Fernsehturm unterwegs gewesen.

Outline

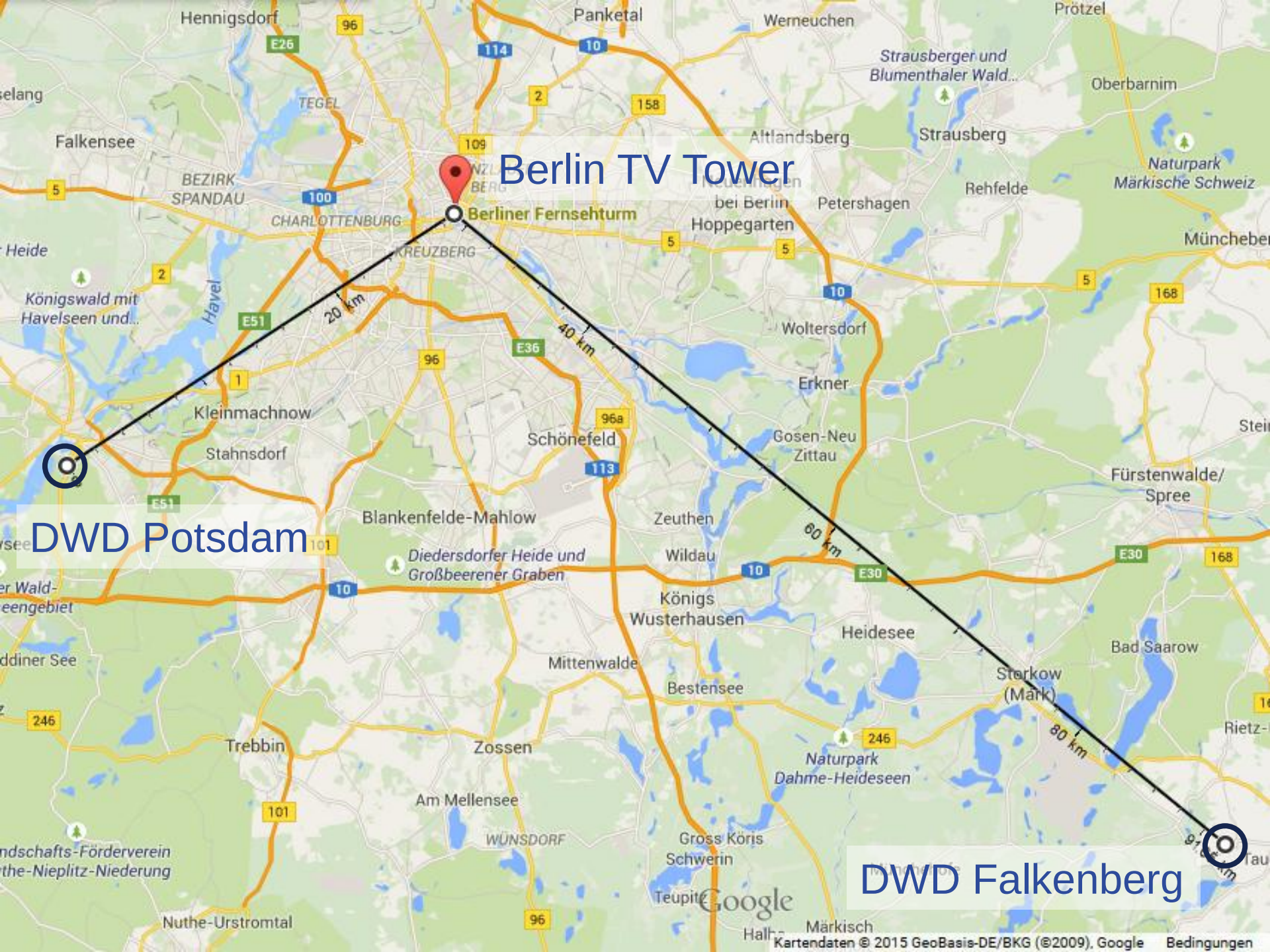
- Berlin TV Tower (general remarks, location)
- Meteorological observations and measurements at Berlin TV Tower
- Results of ice accretion measurements on December 23rd, 2012
- Analysis of the meteorological (pre-)conditions for the ice fall event
- Synopsis of measurement results at Berlin TV Tower and at station Falkenberg for December 23rd, 2012
- Analysis of height dependence of ice accretion during the event
- Summary

Berlin TV Tower: General Remarks

- In the early 50's the GDR in Berlin was planning to build a new facility that would serve mainly as a transmitter for the GDR television signals.
- The television tower was put into operation on 3rd of October 1969.
- Total height of 368 m. Sphere at a height of 207 m.

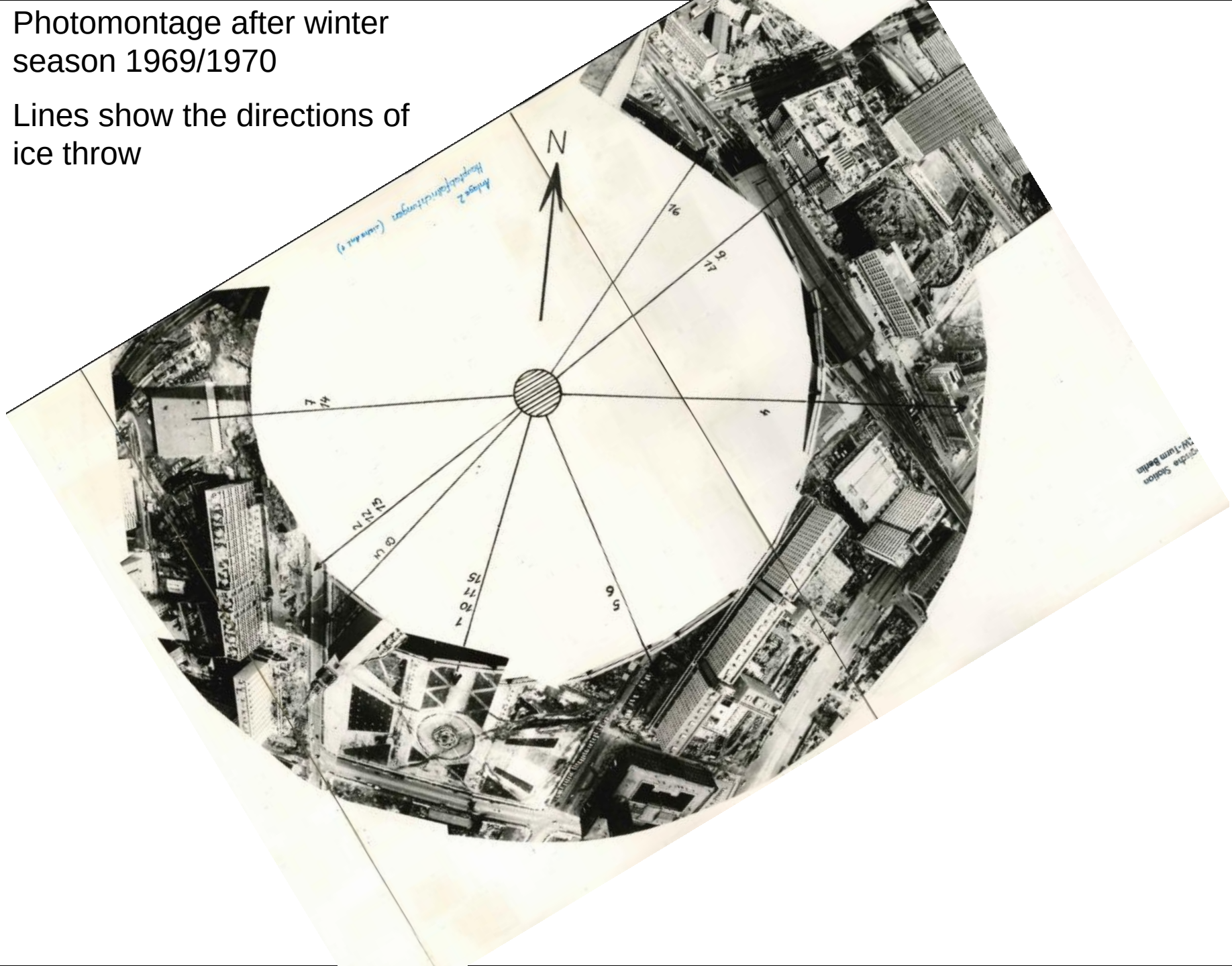
- Architecture: The enthusiasm for technology and space in late 60's are noticeable. In cross-section, the TV tower resembles a space rocket. The sphere of the TV tower should remind of the Soviet Sputnik satellite.

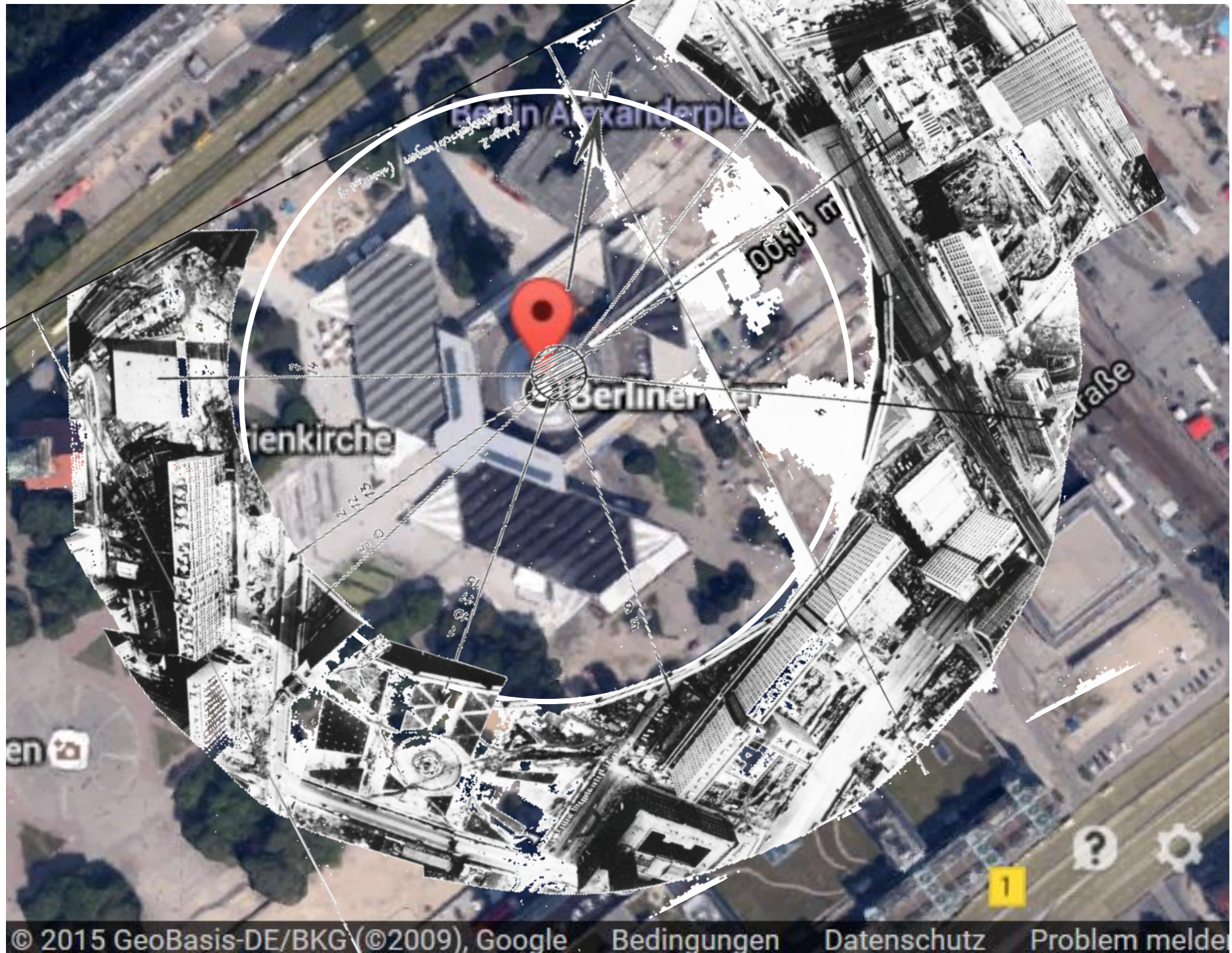
https://www.tv-turm.de/en


Berlin TV Tower
Berliner Fernsehturm
DWD Potsdam
DWD Falkenberg
20 km
40 km
60 km
80 km
Hennigsdorf
Panketal
Werneuchen
Prötzel
Falkensee
TEGEL
Altlandsberg
Strausberg
Oberbarnim
Naturpark Märkische Schweiz
BEZIRK SPANDAU
CHARLOTTENBURG
KREUZBERG
Hoppegarten
Petershagen
Rehfelde
Müncheber
Königswald mit Havelseen und...
Havel
Kleinmachnow
Stahnsdorf
Schönefeld
Woltersdorf
Erkner
Gosen-Neu Zittau
Fürstenwalde/ Spree
Blankenfelde-Mahlow
Zeuthen
Diedersdorfer Heide und Großbeerener Graben
Wildau
Königs Wusterhausen
Heidesee
Bad Saarow
Mittenwalde
Bestensee
Storkow (Mark)
Trebbin
Zossen
Naturpark Dahme-Heideseen
Am Mellensee
WÜNSDORF
Gross Köris
Schwerin
Nuthe-Urstromtal
Märkisch
Google
Kartendaten © 2015 GeoBasis-DE/BKG (©2009), Google
Bedingungen


Berlin Alexanderplatz (S)
S+U Alexanderplatz (Berlin) [U8]
100,14 m
Berliner Fernsehturm
St. Marienkirche
Rathausstraße
Rathausstraße
Google
© 2015 GeoBasis-DE/BKG (©2009), Google
Bedingungen
Datenschutz
Problem melden

- Photomontage after winter season 1969/1970
- Lines show the directions of ice throw




Berlin Alexanderpla
Berliner
ienkirche
straße
© 2015 GeoBasis-DE/BKG (©2009), Google
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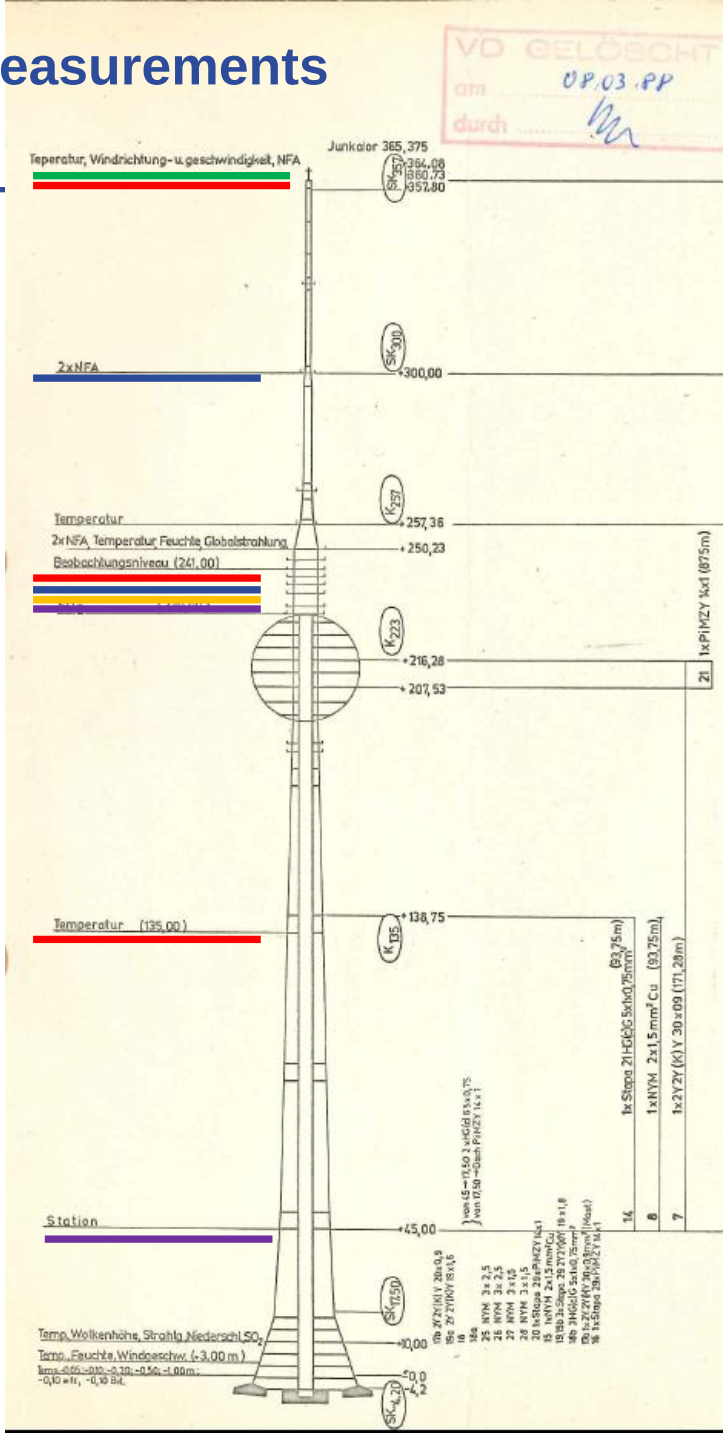
Problem melde

Meteorological observations and measurements at Berlin TV Tower

- Meteorological observations were projected and carried out from the very beginning in 1969.

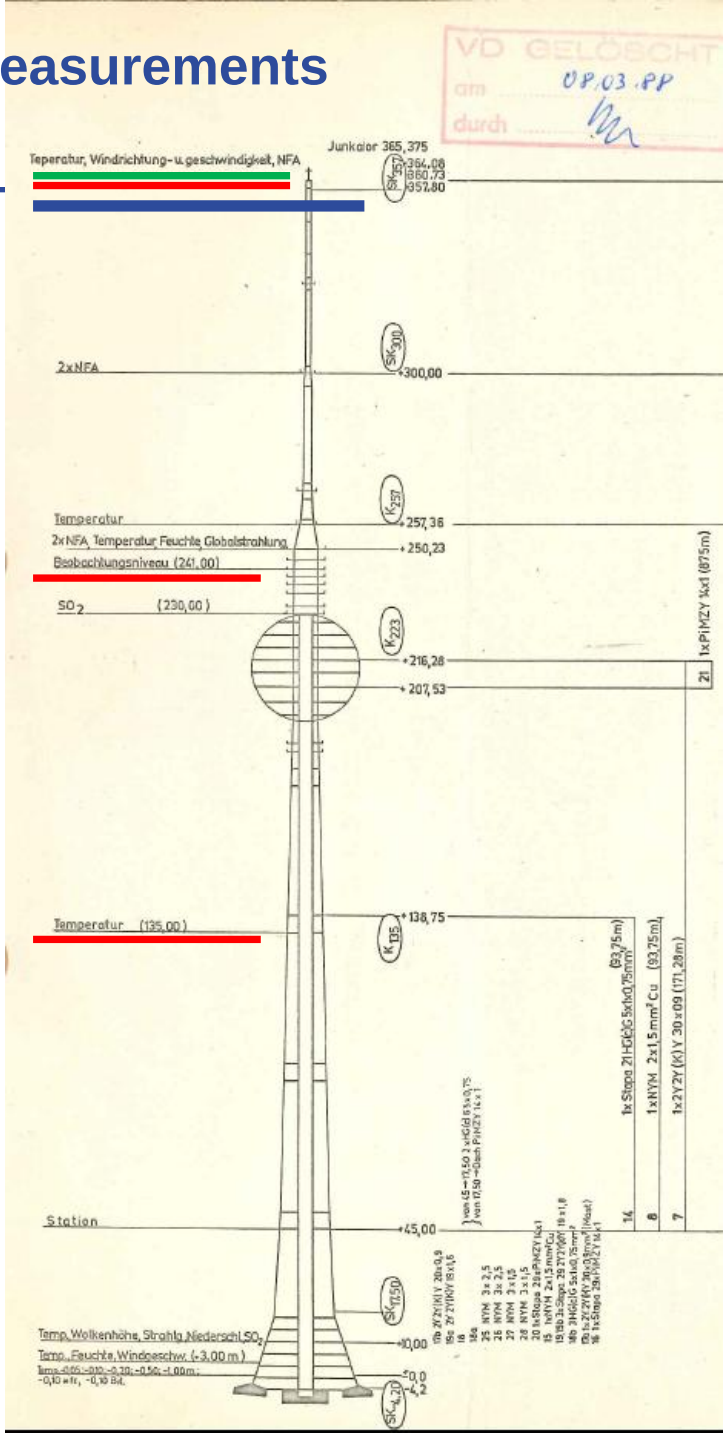
- Wind velocity and wind direction
- Temperature
- Ice load
- Humidity, solar radiation
- Observation



https://www.tv-turm.de/en

Meteorological observations and measurements at Berlin TV Tower

- (manned) meteorological station at TV tower was closed in early 1990s, unfortunately
  - Wind velocity and wind direction
  - Temperature
  - Ice load
- Number of “missing data” periods (for ice accretion measurements in particular) increased remarkably afterwards (installation on top of the tower, lightning!).

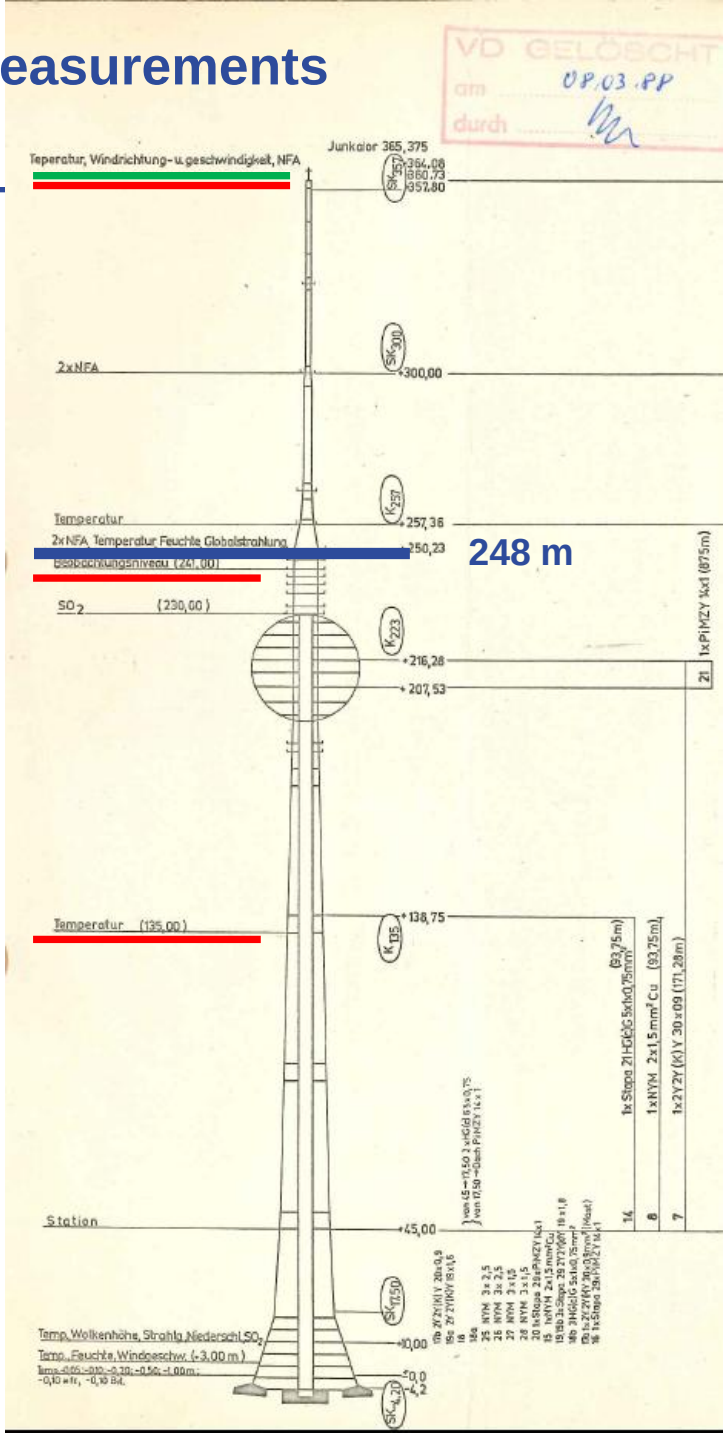


https://www.tv-turm.de/en

Meteorological observations and measurements at Berlin TV Tower

- a changeover of the instrument for ice accretion measurements has been carried out in 2011

- Wind velocity and wind direction
- Temperature
- Ice load



https://www.tv-turm.de/en


Berlin Alexanderplatz (S)
S+U Alexanderplatz (Berlin) [U8]
100,14 m
Ice load sensor NE
Berliner Fernsehturm
St. Marienkirche
Ice load sensor SW
Rathausstraße
Rathausstraße
Google
© 2015 GeoBasis-DE/BKG (©2009), Google
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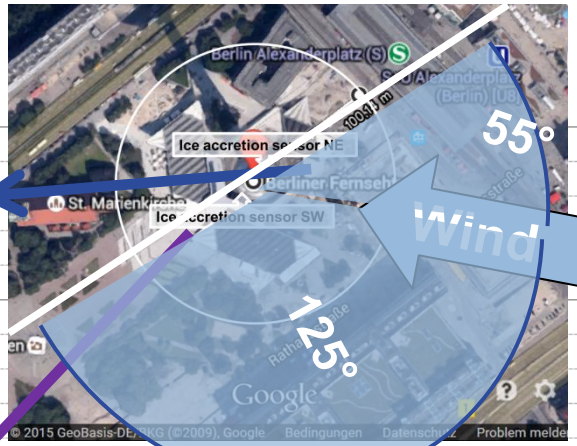
Problem melden


Ice load sensor (EAG) NE


Ice load sensor (EAG) SW

Results: December 23rd, 2012

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



0,2-0,4 K

Ice Mass EAG [g/0,5m]

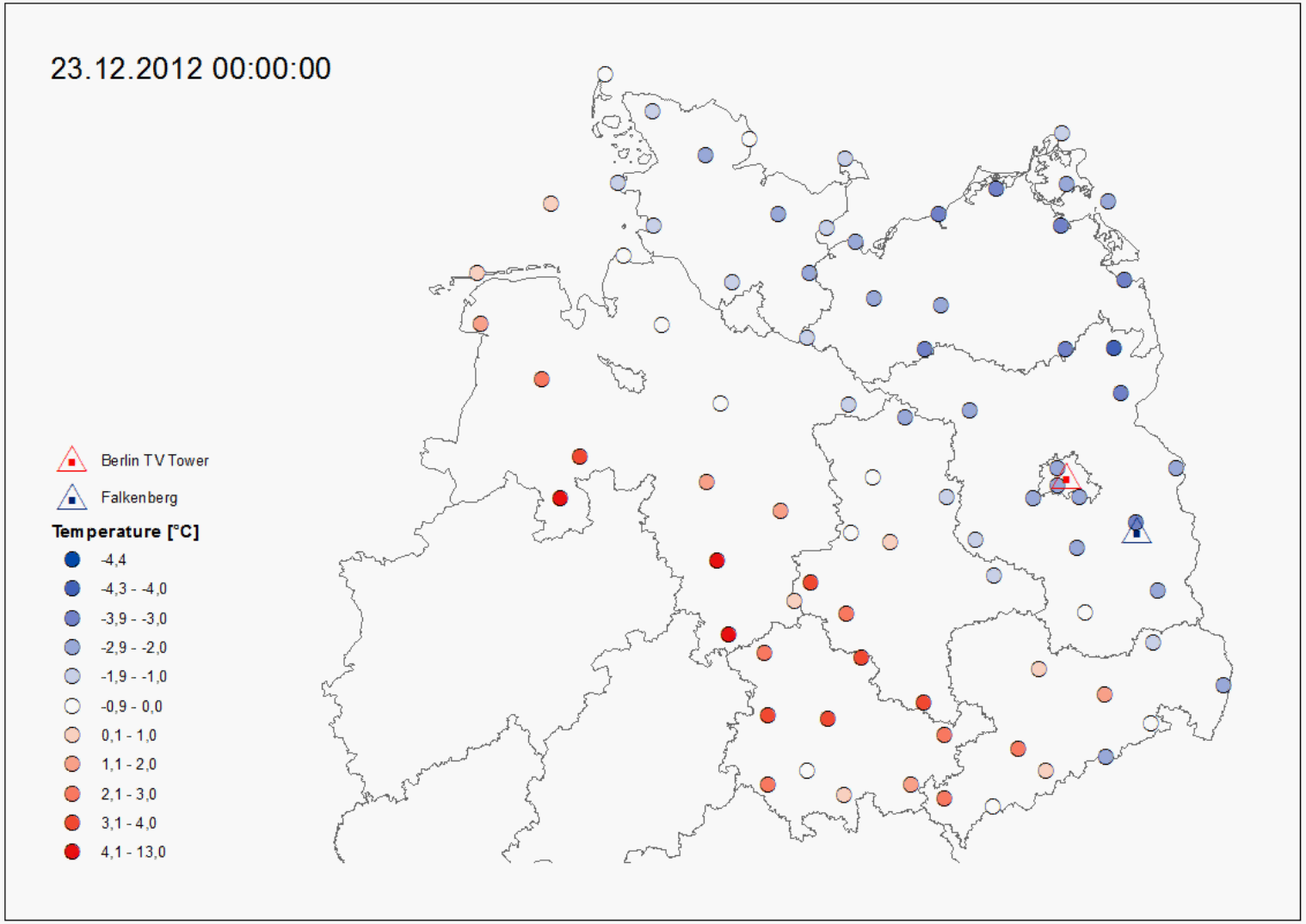
Temperature T [°C]

Time [UTC]

TV-Tower: EAG NE (248 m) — TV-Tower: EAG SW (248 m) — TV-Tower: T (135 m)

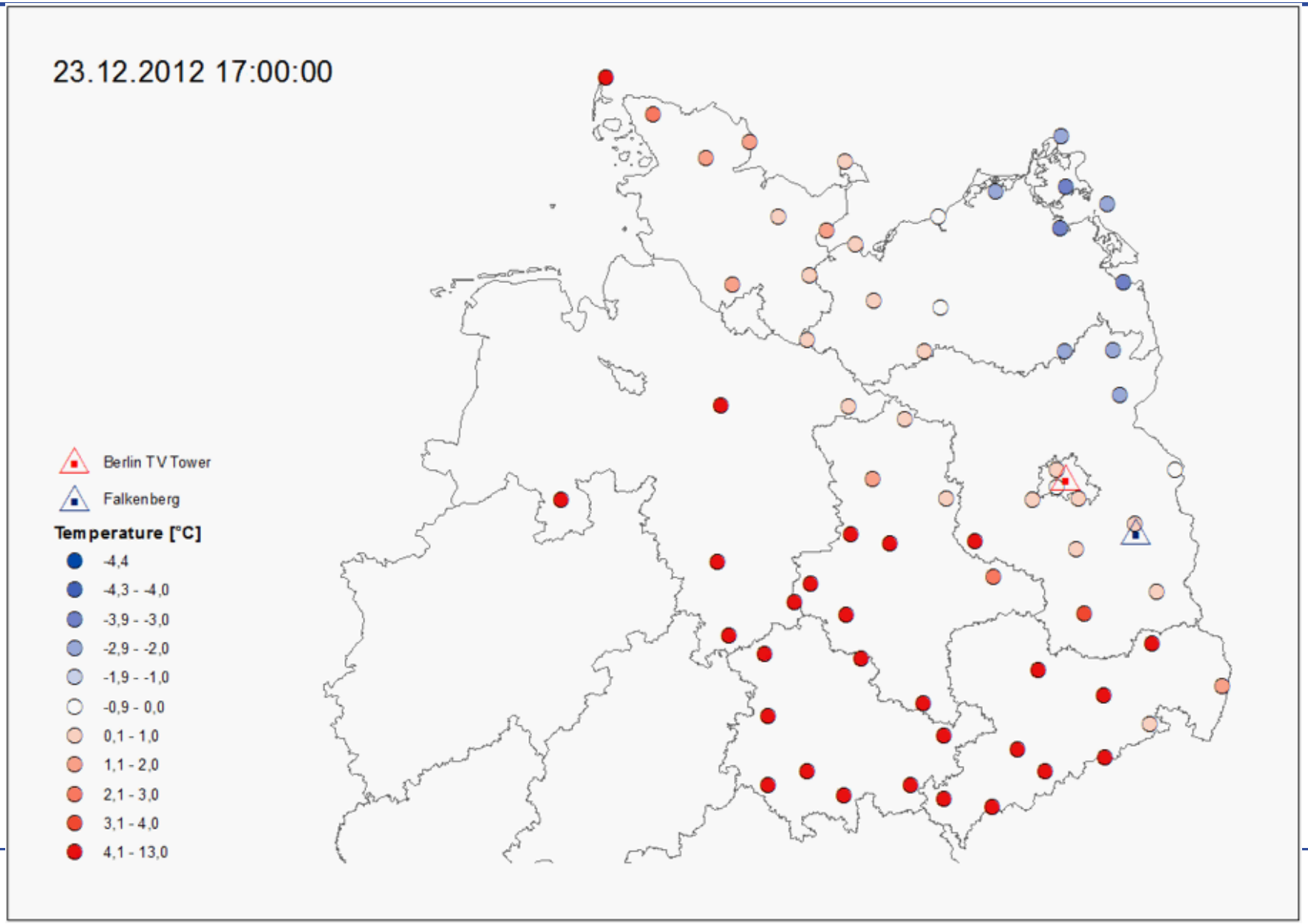
Meteorology: December 23rd, 2012

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



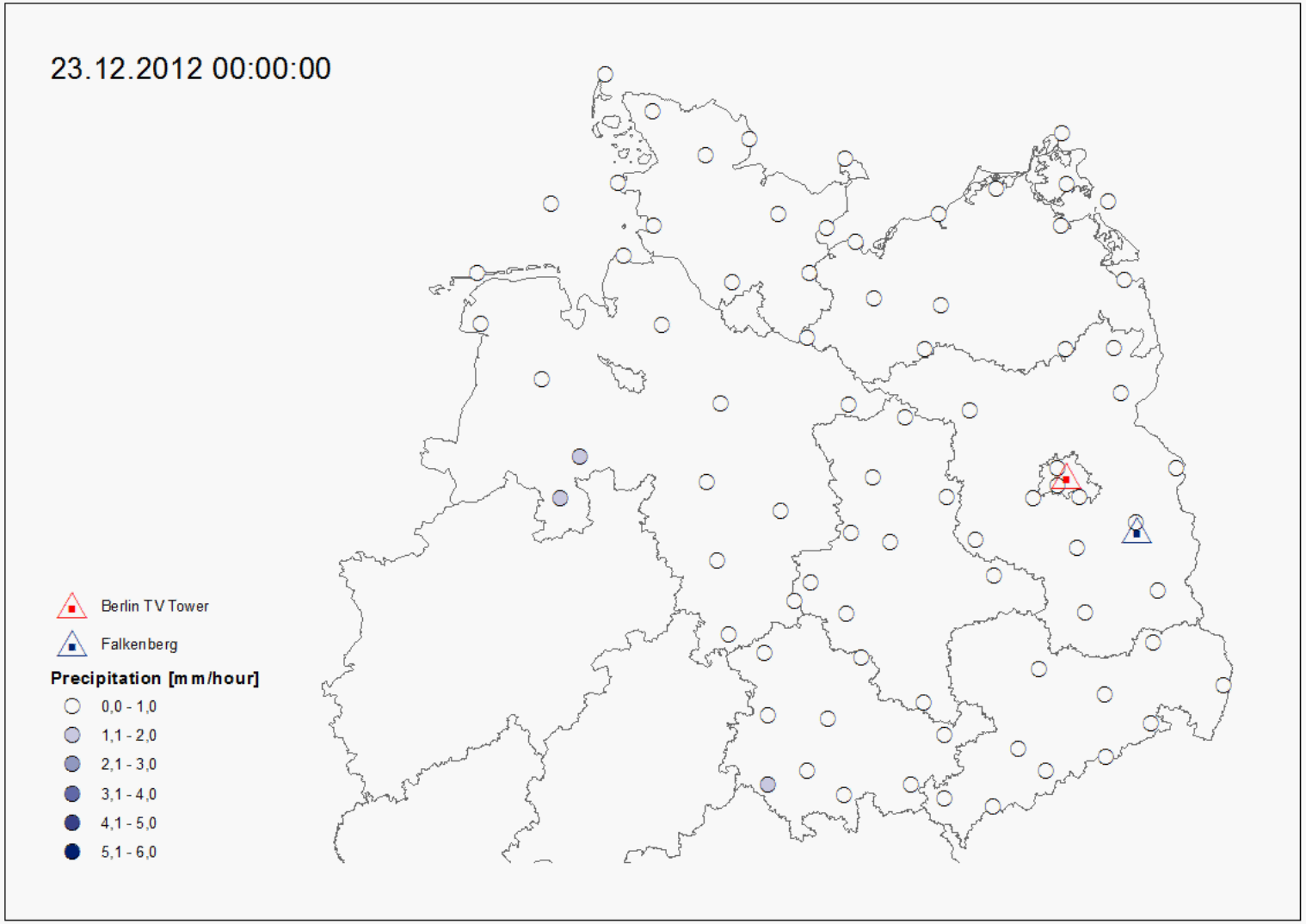
Meteorology: December 23rd, 2012

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



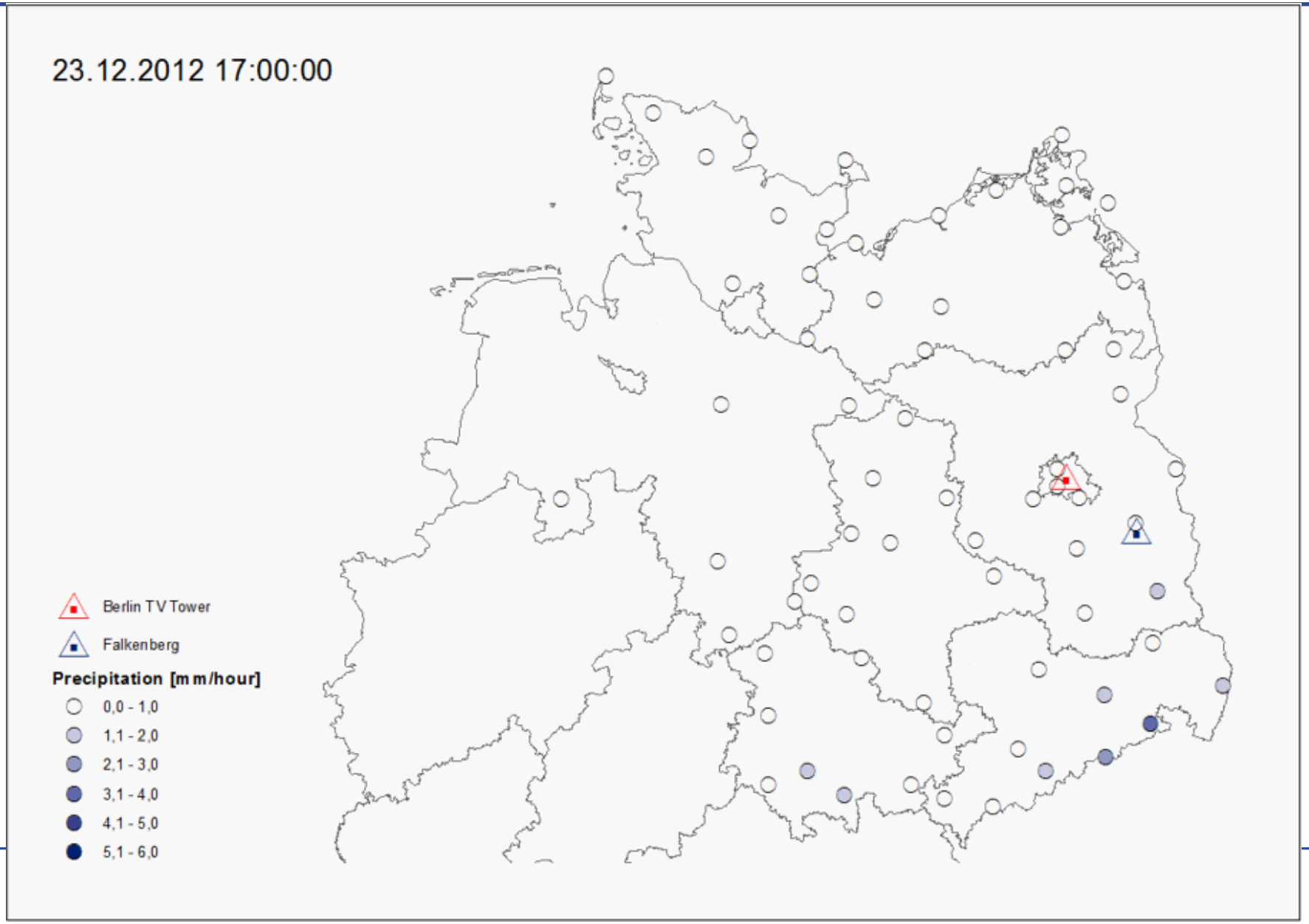
Meteorology: December 23rd, 2012

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Meteorology: December 23rd, 2012

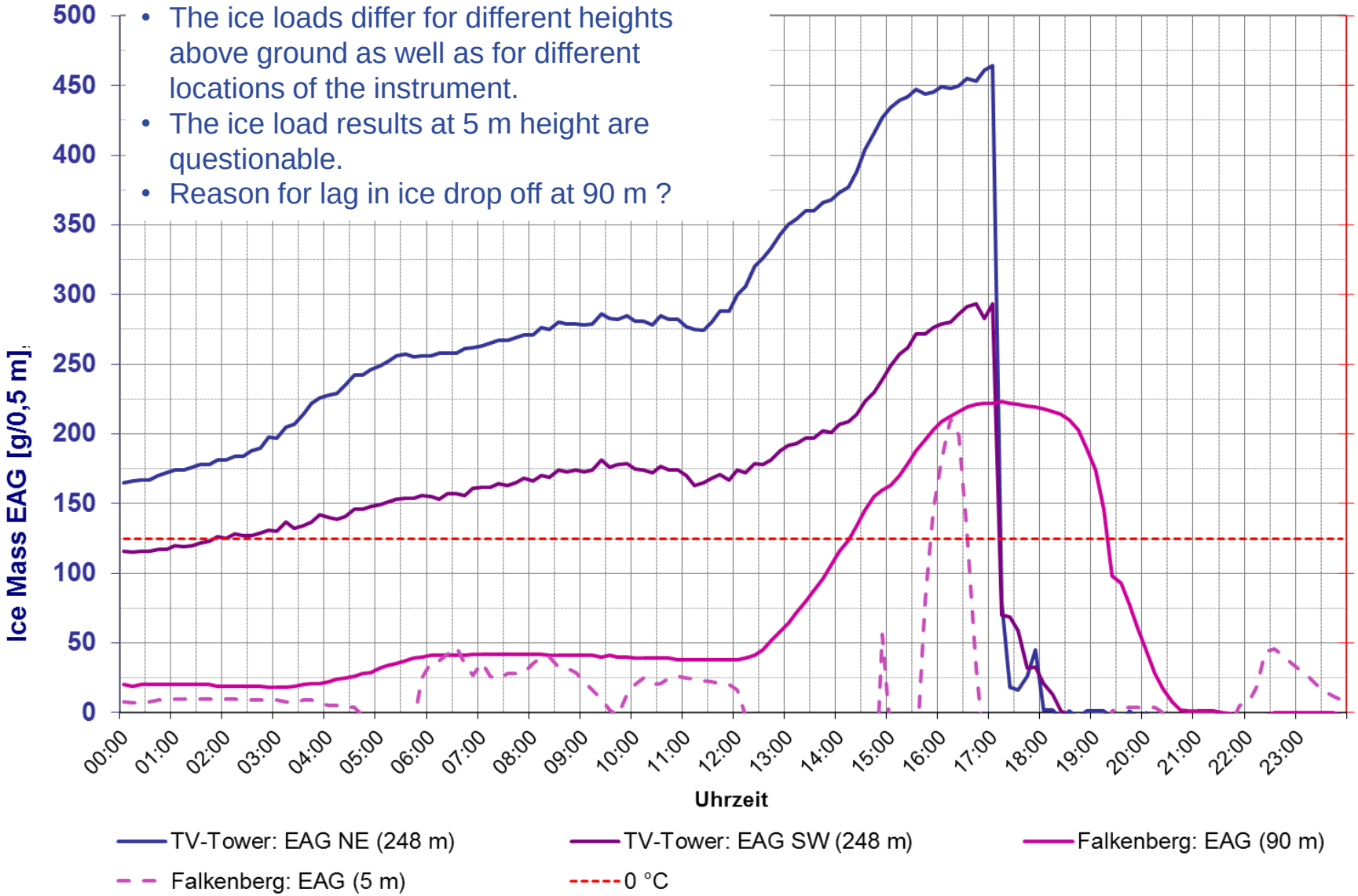
Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Results: December 23rd, 2012

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

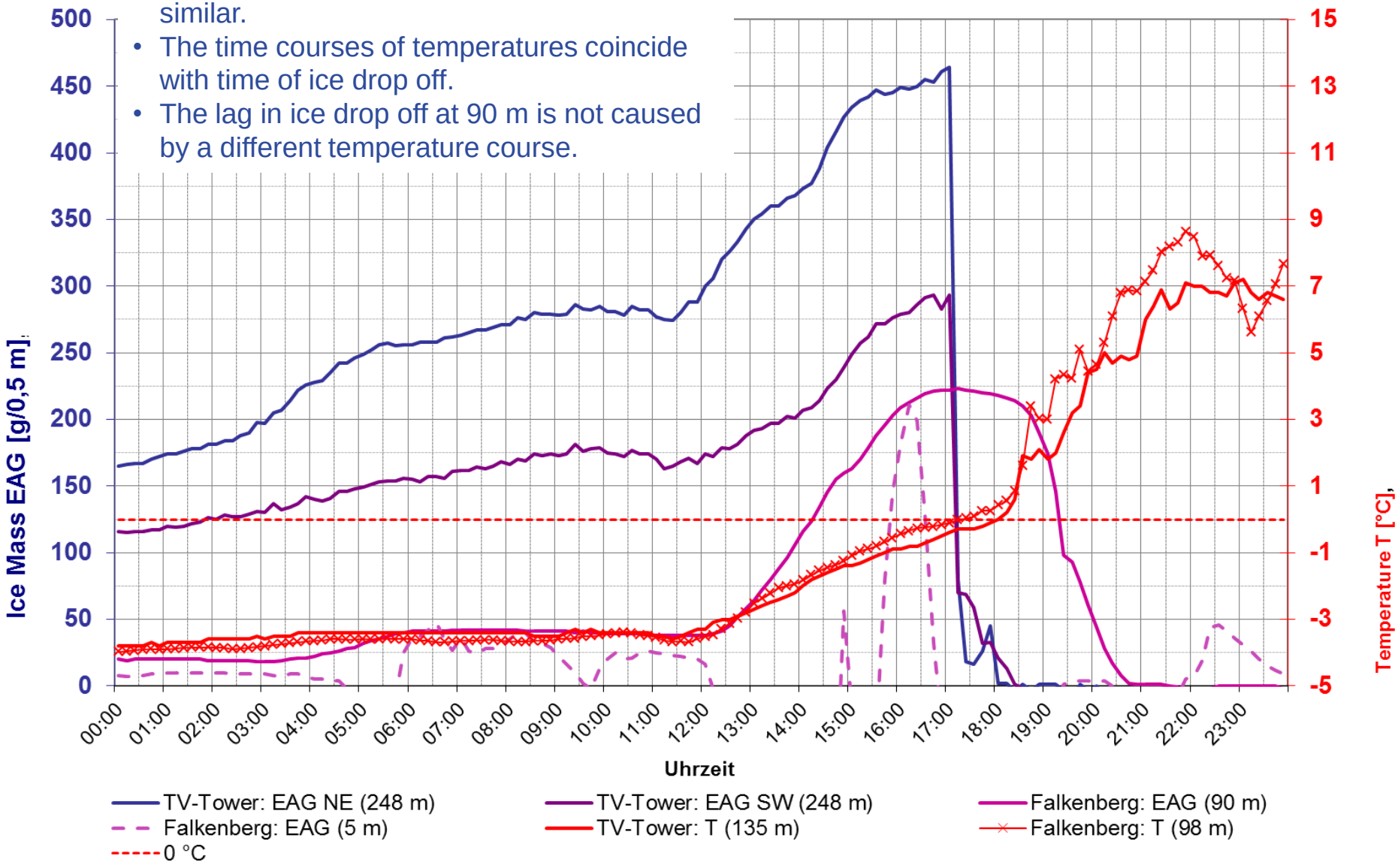
- The time courses of ice loads are similar.
- The ice loads differ for different heights above ground as well as for different locations of the instrument.
- The ice load results at 5 m height are questionable.
- Reason for lag in ice drop off at 90 m ?



Results: December 23rd, 2012

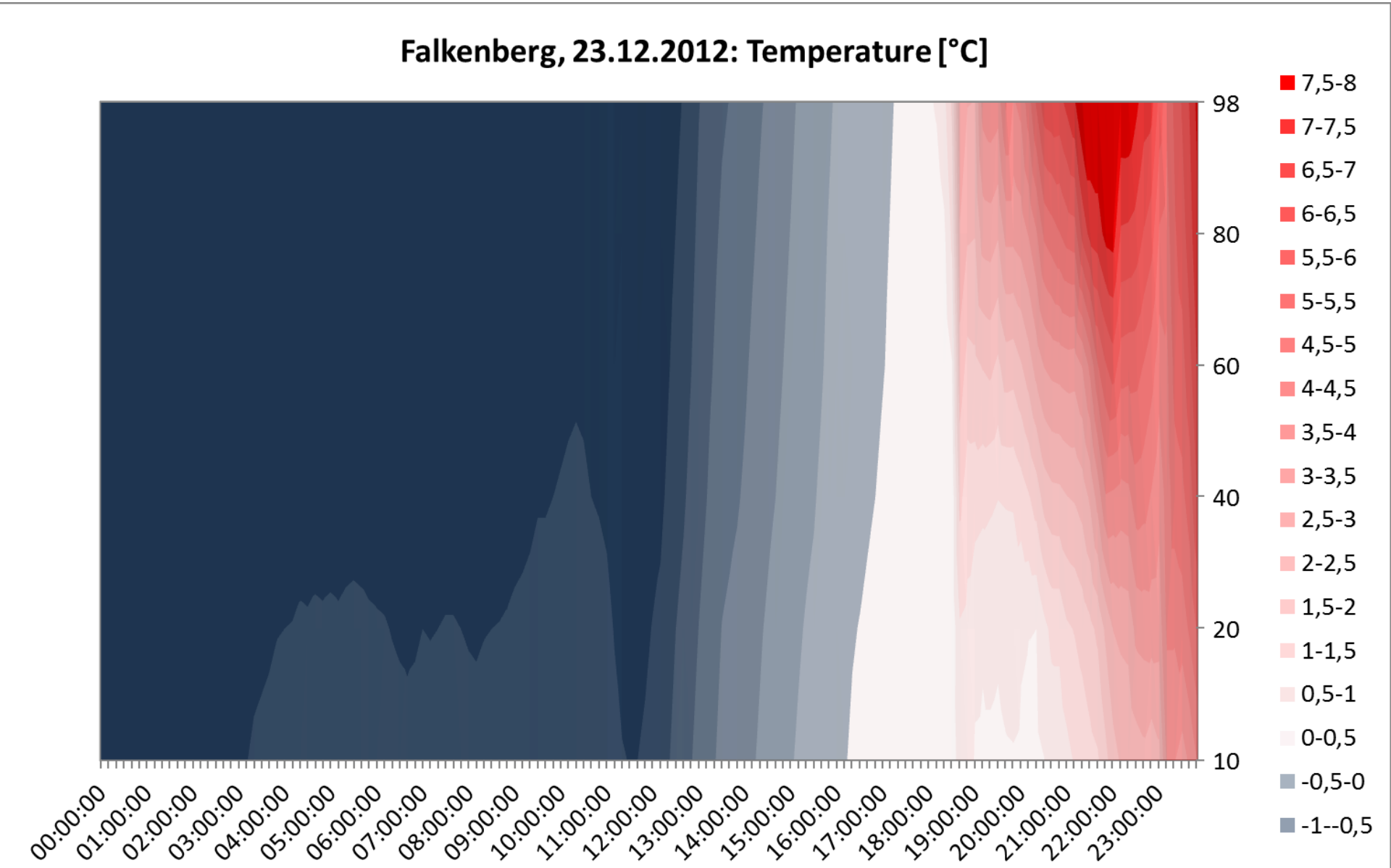
Deutscher Wetterdienst
Wetter und Klima aus einer Hand

- The time courses of temperatures are similar.
- The time courses of temperatures coincide with time of ice drop off.
- The lag in ice drop off at 90 m is not caused by a different temperature course.



Results: December 23rd, 2012

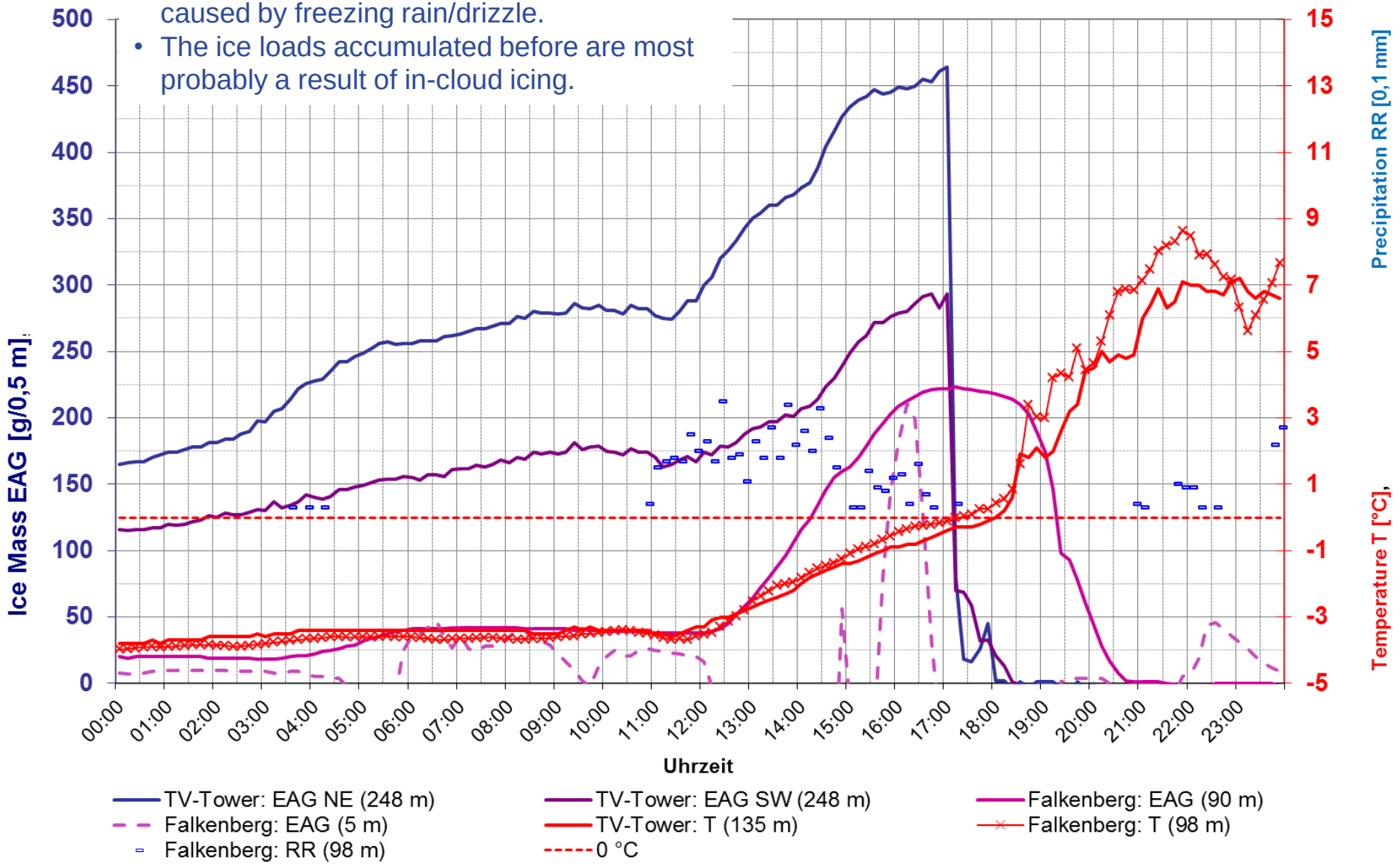
Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Results: December 23rd, 2012

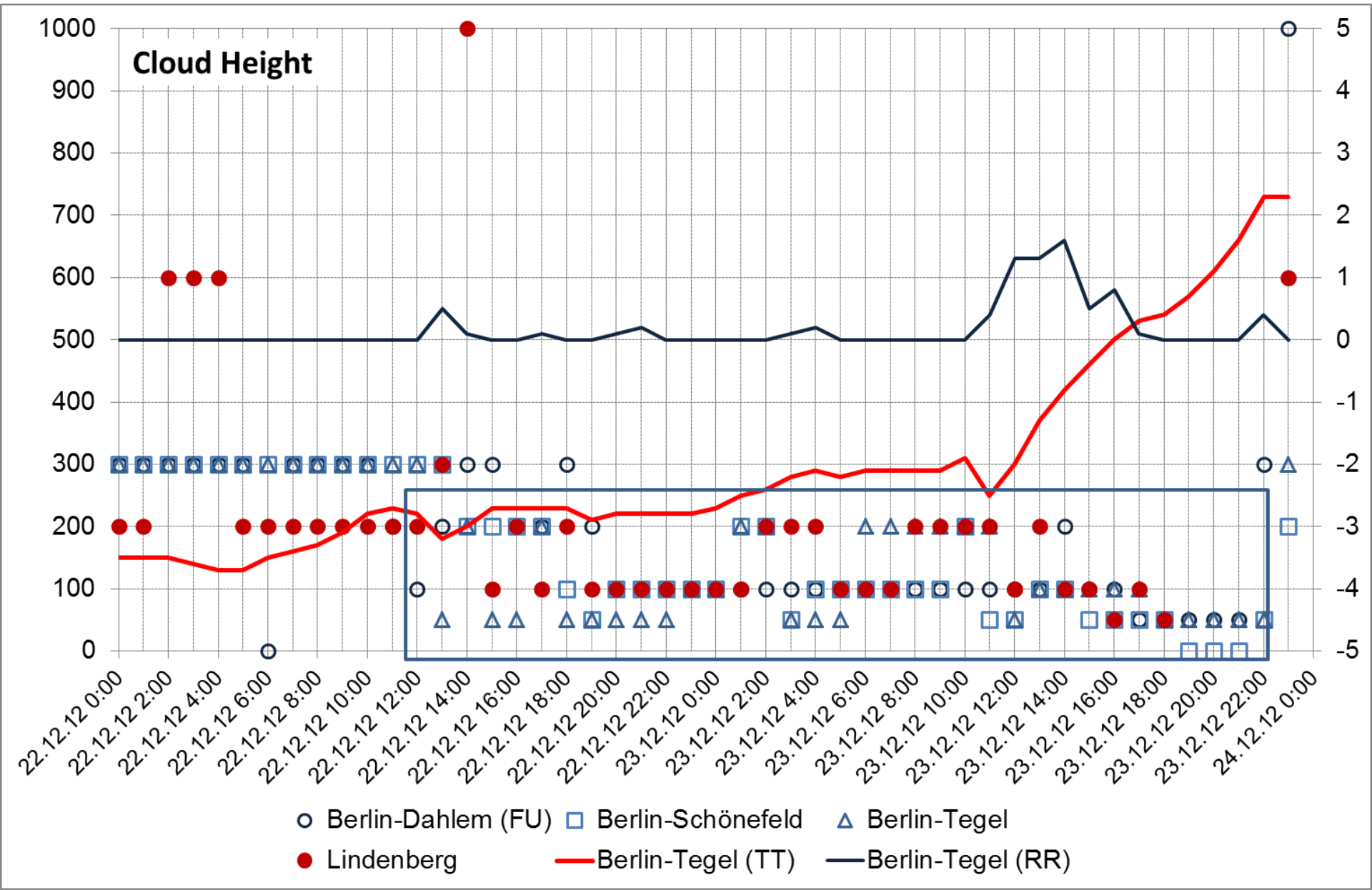
Deutscher Wetterdienst
Wetter und Klima aus einer Hand

- The increase of ice loads after 11:00 is caused by freezing rain/drizzle.
- The ice loads accumulated before are most probably a result of in-cloud icing.



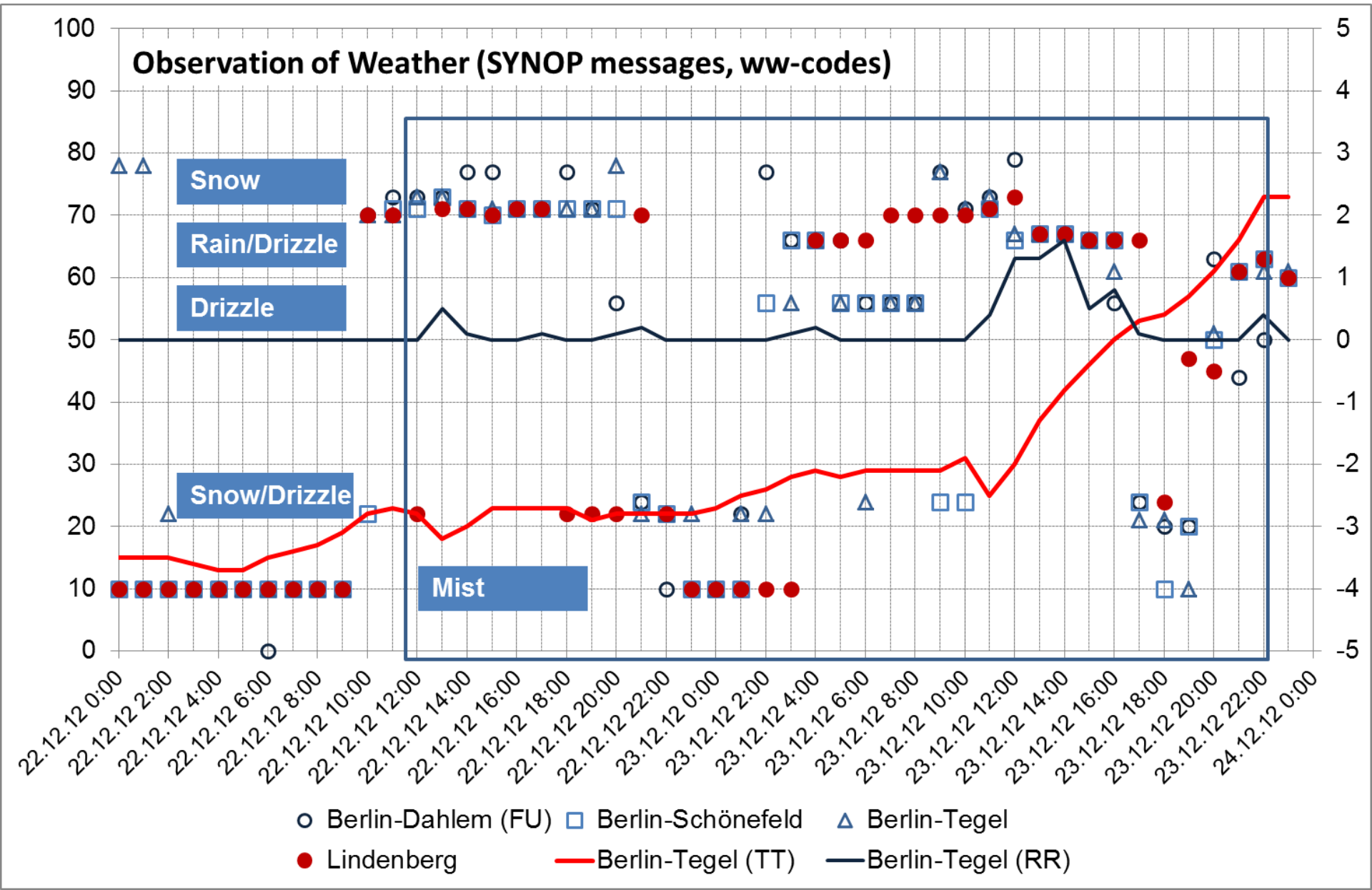
Type of ice accretion

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Type of ice accretion

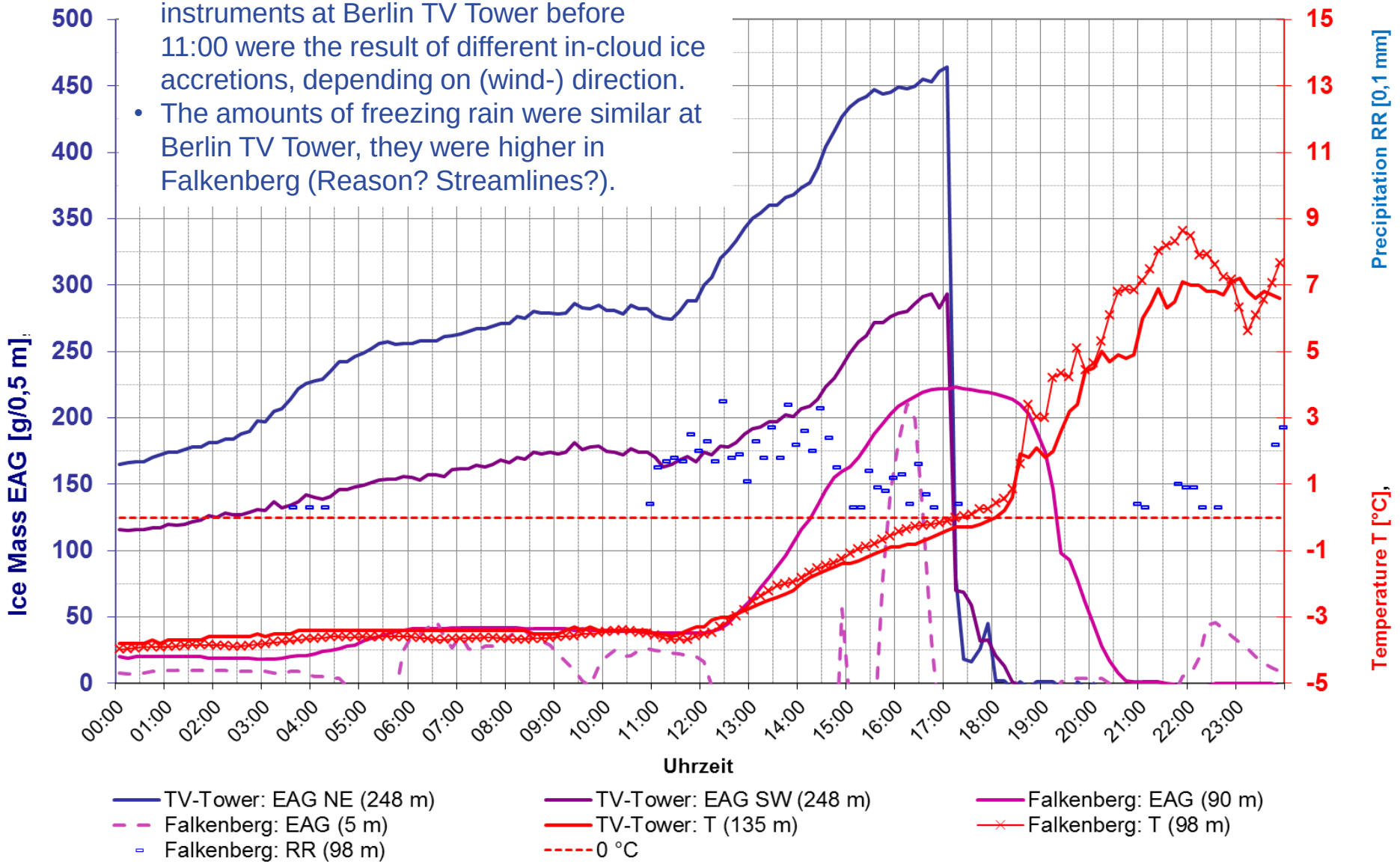
Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Results: December 23rd, 2012

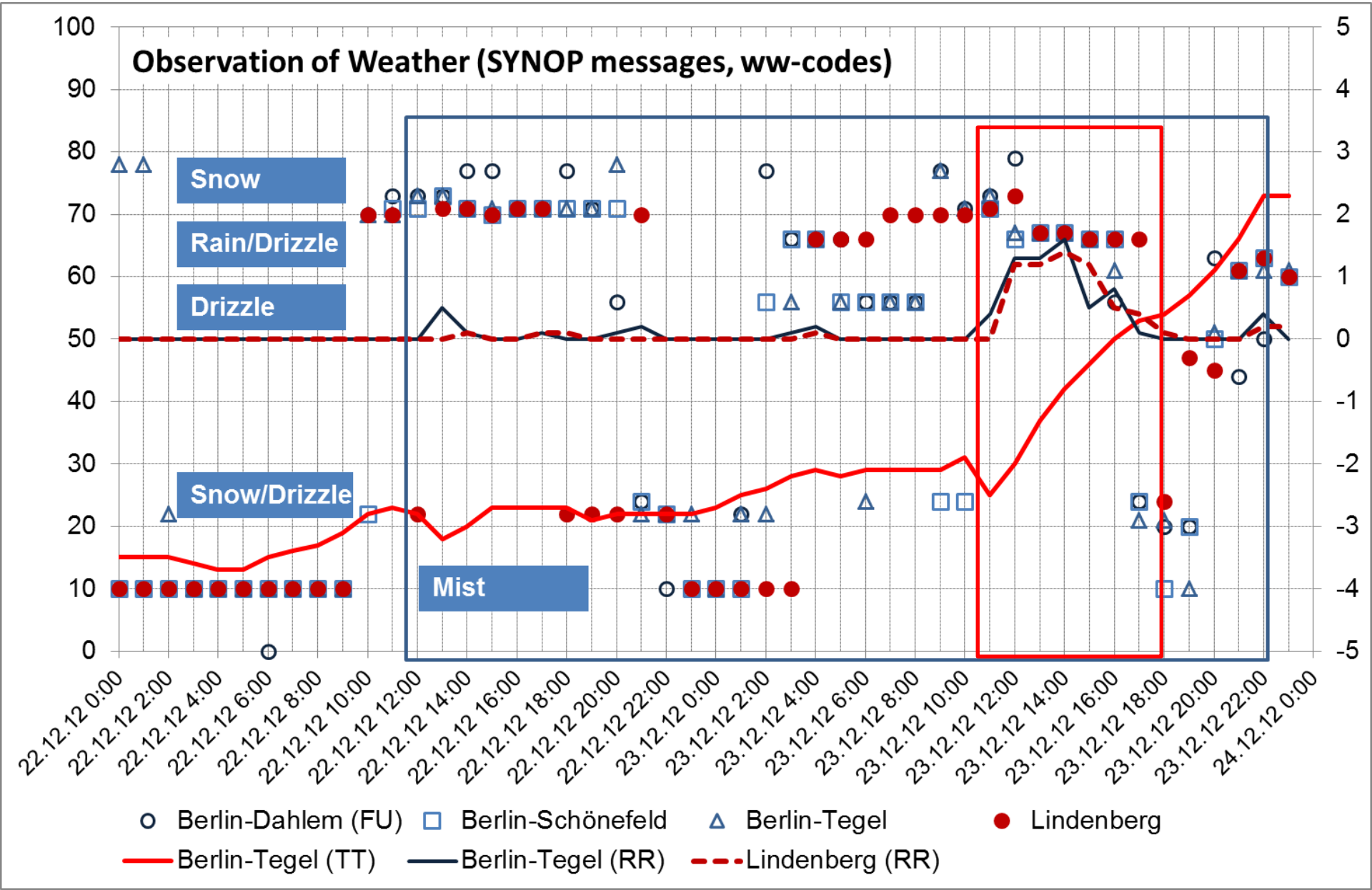
Deutscher Wetterdienst
Wetter und Klima aus einer Hand

- The differences of ice loads for both instruments at Berlin TV Tower before 11:00 were the result of different in-cloud ice accretions, depending on (wind-) direction.
- The amounts of freezing rain were similar at Berlin TV Tower, they were higher in Falkenberg (Reason? Streamlines?).



Type of ice accretion

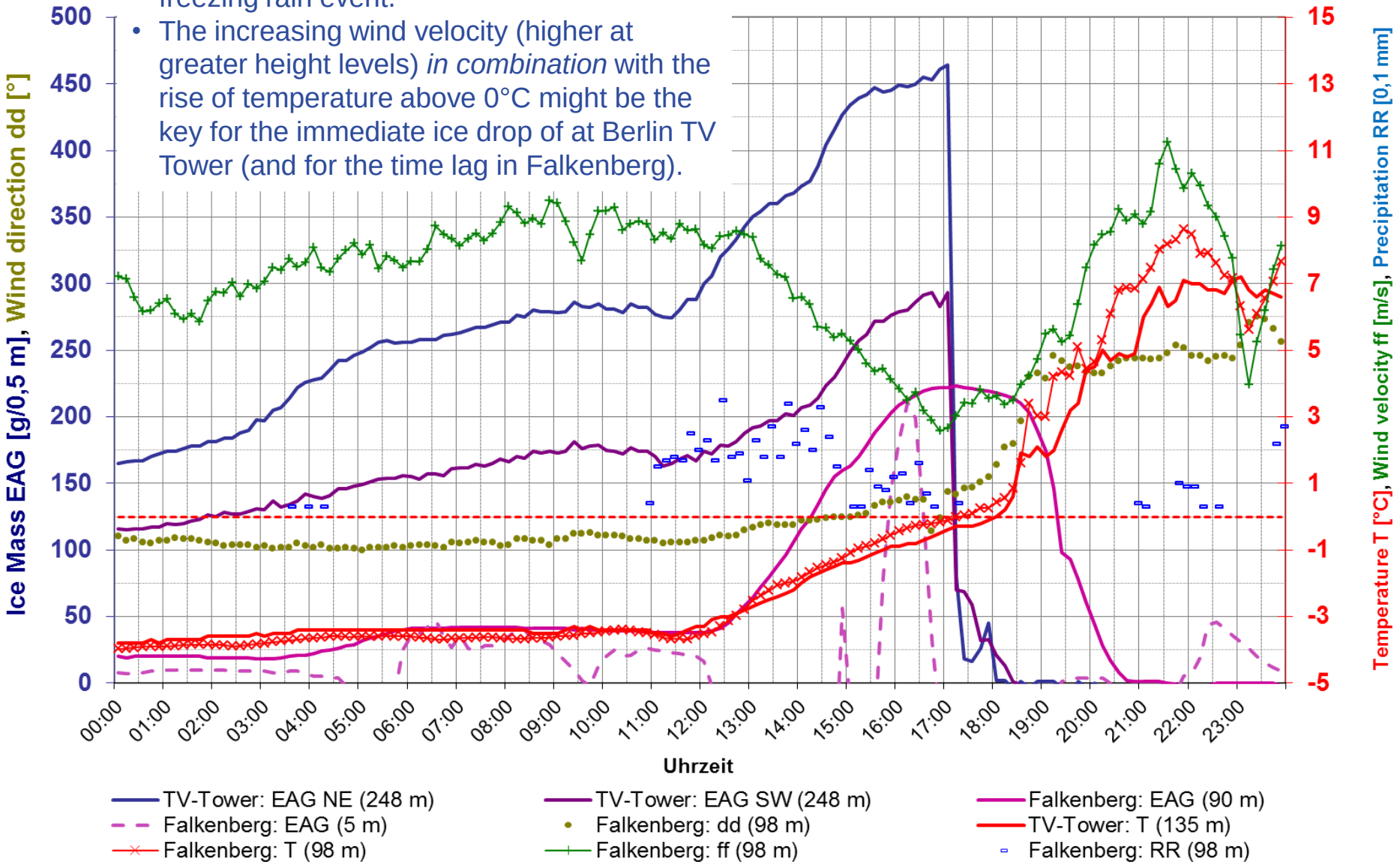
Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Results: December 23rd, 2012

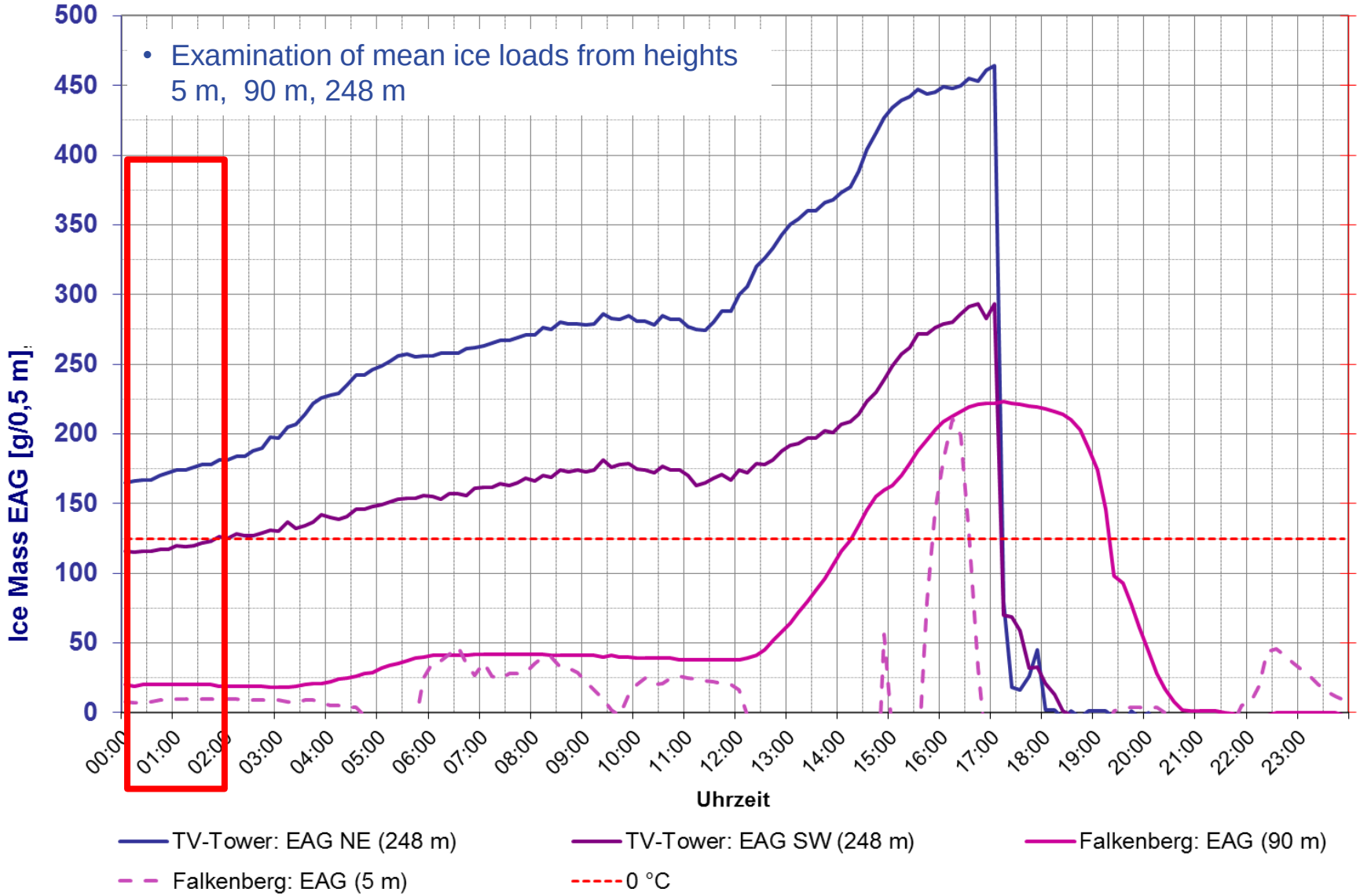
Deutscher Wetterdienst
Wetter und Klima aus einer Hand

- The wind velocity decreased during the freezing rain event.
- The increasing wind velocity (higher at greater height levels) *in combination* with the rise of temperature above 0°C might be the key for the immediate ice drop of at Berlin TV Tower (and for the time lag in Falkenberg).



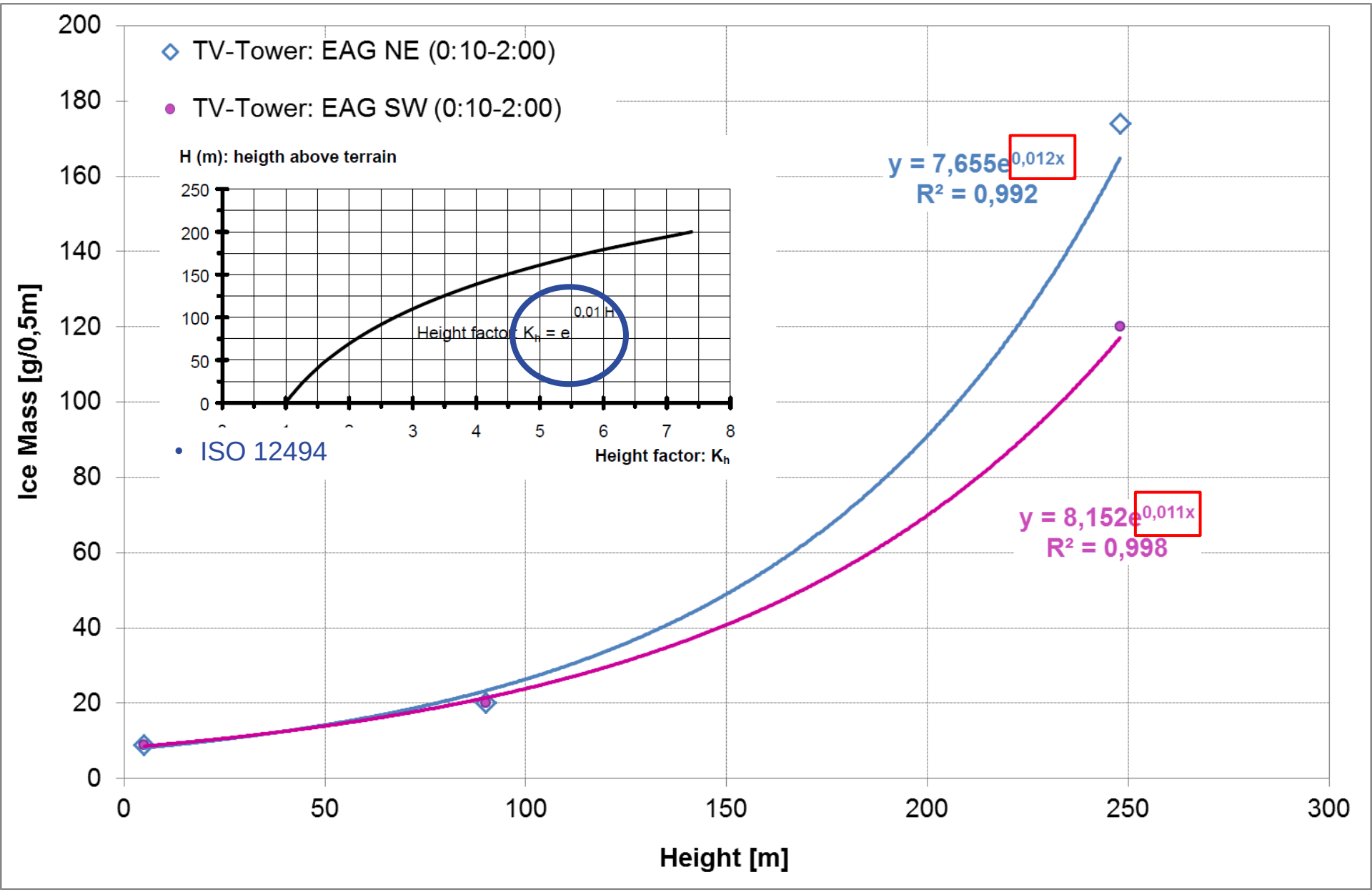
Analysis of height dependence of ice loads

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



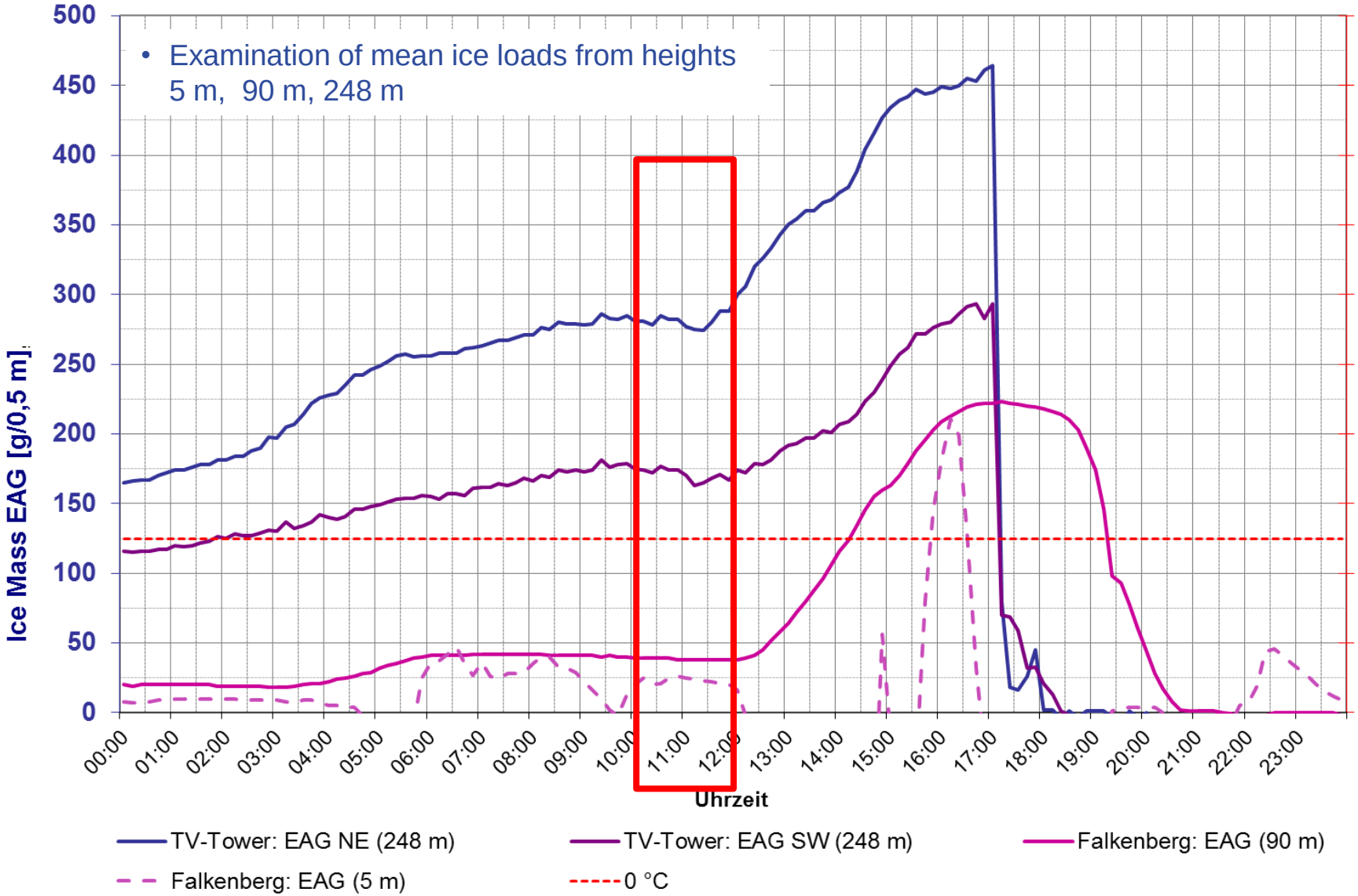
Analysis of height dependence of ice loads

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



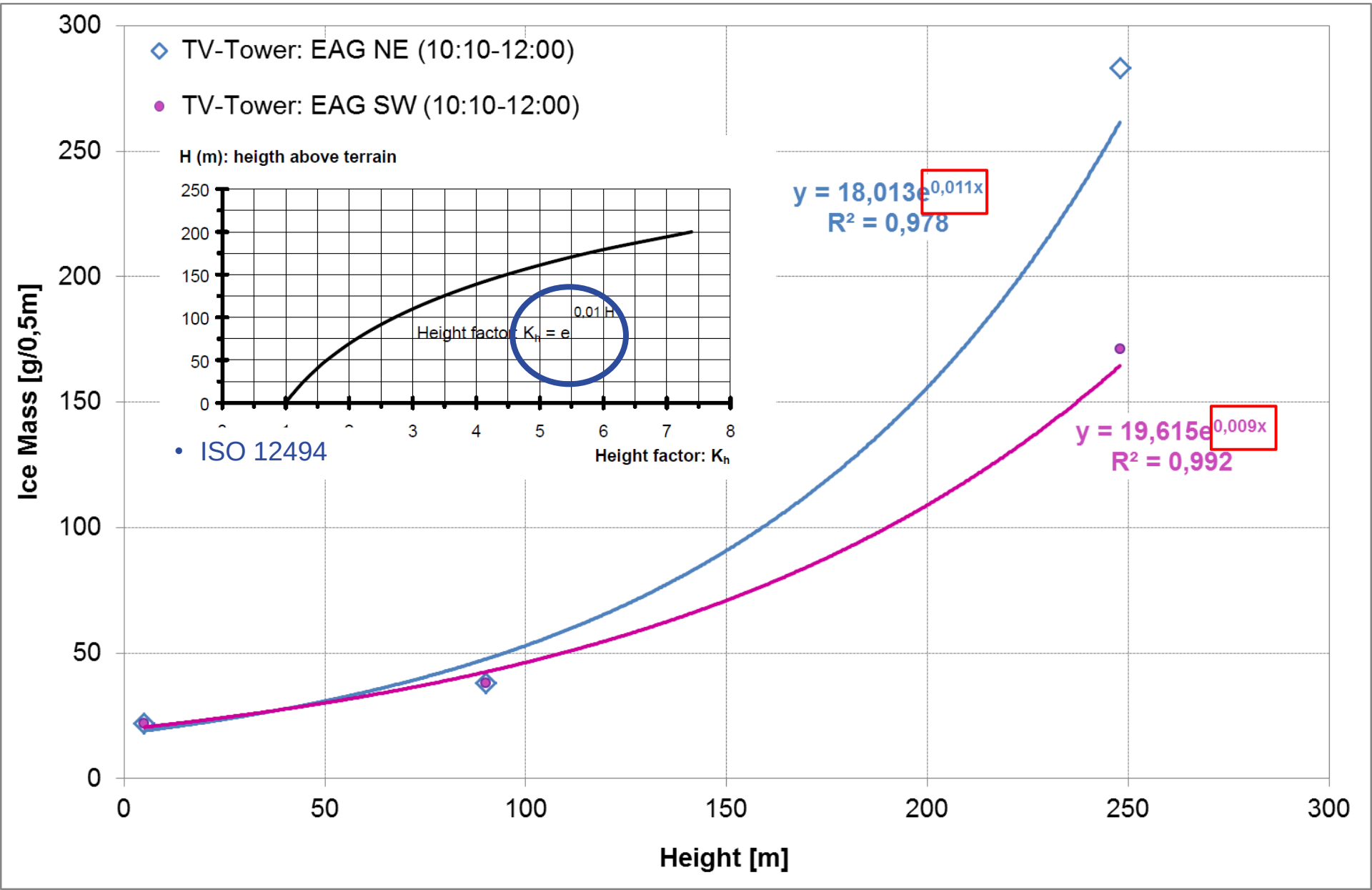
Analysis of height dependence of ice loads

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



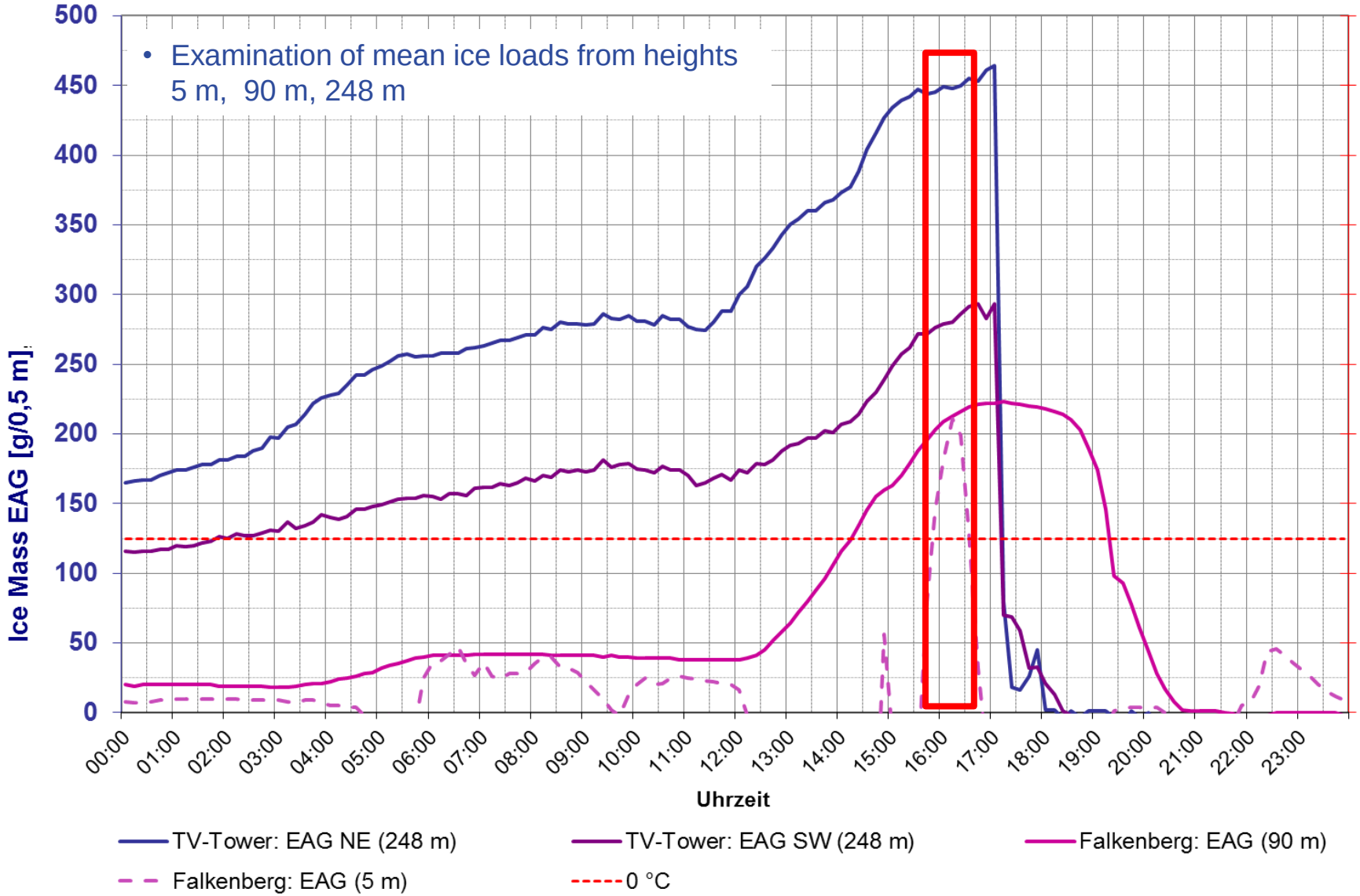
Analysis of height dependence of ice loads

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



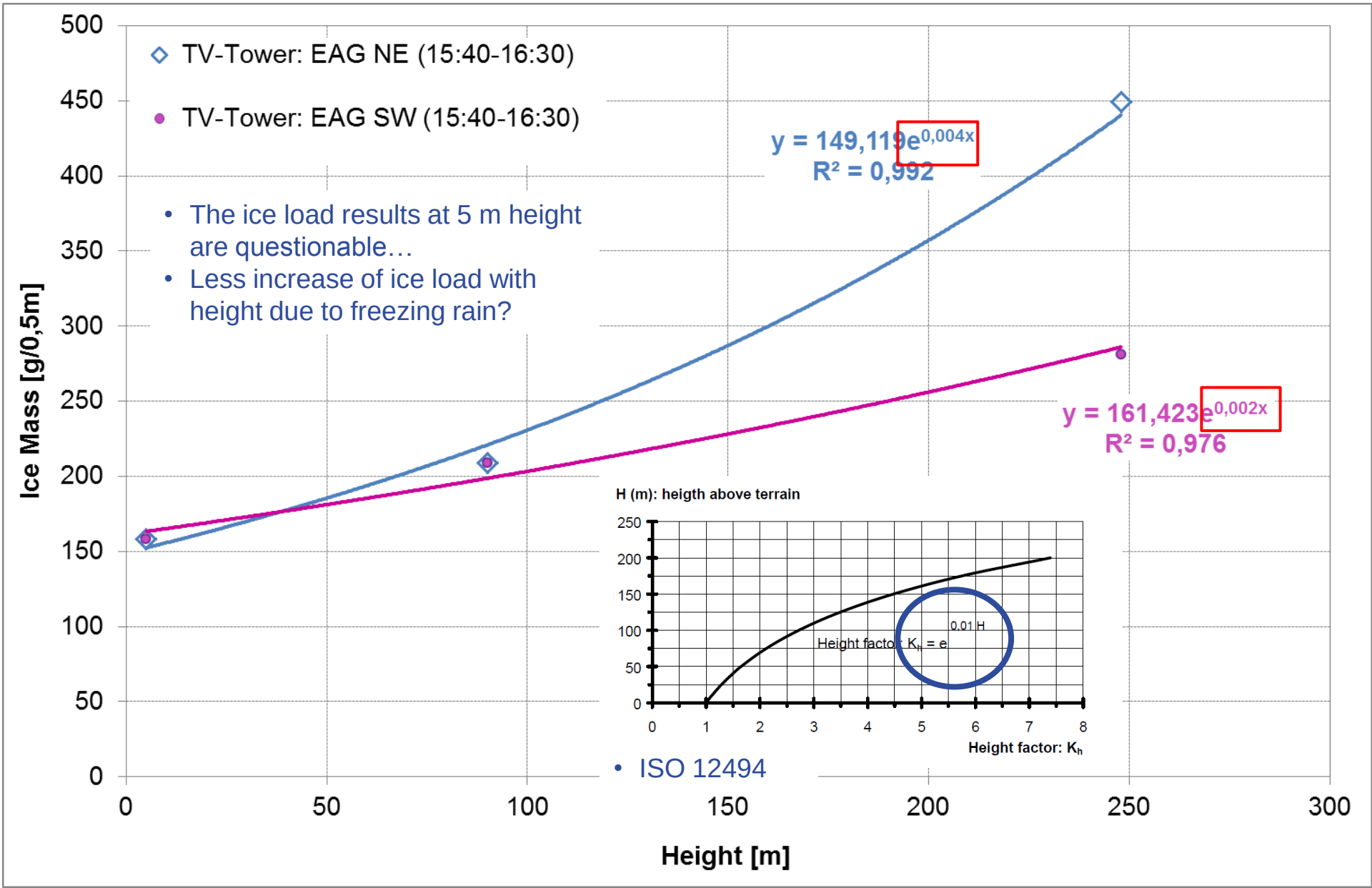
Analysis of height dependence of ice loads

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Analysis of height dependence of ice loads

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Summary

- The surrounding area of the Berlin TV Tower in the city center of Berlin was shut by the authorities due to ice fall on December 23rd, 2012.
- Observations and measurements of ice accretion are (in principle) available for Berlin TV Tower since winter 1969/70.
- New situation in 2012: Additional measurements of ice accretion as well as of supplementary meteorological parameters are available from a 100 m tall tower near Falkenberg.
- The time courses of ice loads were similar for the event. The ice loads differed for different heights above ground (Berlin, Falkenberg) as well as for different locations of the instrument (Berlin TV Tower).
- The time courses of temperatures were similar for the event. They coincide with time of ice drop off.
- The increase of ice loads after 11:00 were caused by freezing rain/drizzle. The ice loads accumulated before are most probably a result of in-cloud icing.

Summary

- The differences of ice loads for both instruments at Berlin TV Tower before 11:00 were the result of different in-cloud ice accretions, depending on (wind-) direction.
- The amounts of freezing rain were similar at Berlin TV Tower for both instruments, they were higher in Falkenberg.
- The wind velocity decreased during the freezing rain event.
- The increasing wind velocity (higher at greater height levels) in combination with the rise of temperature above 0°C might be the key for the immediate ice drop of at Berlin TV Tower (and for the time lag in Falkenberg).
- The analysis of height dependence confirms the height factor for ice loads (ISO12494) if they are a result of in-cloud ice accretion.
- The analysis of height dependence does not confirm the height factor for ice loads (ISO12494) if they are a result of freezing rain ice accretion.