

Dear Authors, dear editor

Recommendation

I appreciate the opportunity to review the revised version of this manuscript. I also appreciate the effort the authors have made to clarify several aspects of the dataset, including the attribution of the fog types and, importantly, the use of rooftop-drip samples.

I understand the purpose of the manuscript. A well-documented long-term isotope dataset from Gobabeb and the central Namib would be a valuable contribution, and I would normally strongly support publication of such a dataset because making the underlying observations available allows other researchers to assess and reuse them.

Unfortunately, however, I do not think the present manuscript provides a sufficiently reliable and well-documented dataset for publication. My concerns are not primarily about presentation or minor methodological details. Rather, they concern the underlying rainfall and fog datasets and, consequently, the reliability of the central data product. In my assessment, these problems are sufficiently fundamental that I cannot recommend publication of the manuscript in its current form.

1. Rainfall dataset

The rainfall time series contains substantial discrepancies that need to be resolved before the dataset can be considered publishable. In particular, comparison with the Gobabeb rainfall records and previously published data reveals large differences in both the magnitude and temporal assignment of rainfall.

For the period 1963–2011, the rainfall dataset presented in the manuscript contains approximately 425 mm more rainfall than the corresponding record reported by Eckardt et al. (2013), and the differences are particularly pronounced before 2005. There are also inconsistencies between the monthly and annual totals in the submitted dataset. These discrepancies are far too large to be regarded as minor digitization or rounding errors, especially for a manuscript whose principal purpose is to provide a long-term archival dataset.

I therefore do not think the rainfall component can be published like that. There are two quality-controlled data sets available in Gobabeb. I strongly recommend including one of these.

2. Fog samples and classification

I have similar, and in some respects more fundamental, concerns regarding the classification of the isotope samples as fog water.

The revised manuscript now makes clear that a substantial fraction of the samples were obtained through rooftop-drip interception. I appreciate that this information has now been provided. However, this sampling approach makes the classification of the resulting water particularly important. Rooftop interception can collect both suspended fog droplets and water produced by condensation on the roof surface. Consequently, the presence of water in a rooftop collector does not by itself demonstrate that fog precipitation occurred.

I compared the reported isotope sampling events with the meteorological observations available from the Gobabeb FogNet station. There are a substantial number of events for which the meteorological record provides little or no indication of fog at Gobabeb, despite the corresponding rooftop-derived sample being classified as fog. I recognize that local spatial variability is possible and that fog may occur at one location without being recorded at a nearby station. Nevertheless, the number of such cases

appears sufficiently large that the samples cannot simply be treated as fog deposition without further evidence or qualification.

The manuscript's proposed screening criteria do not resolve this concern. In particular, relative humidity alone is not a reliable indicator of fog, and the criterion involving an observer's record of fog presence can be ambiguous when fog was observed approaching the site but did not actually reach Gobabeb. The manuscript therefore needs to distinguish much more carefully between confirmed fog, probable fog, and ambiguous atmospheric moisture deposition.

This is particularly important because the classification subsequently forms the basis for the fog isotope dataset and for the analyses of fog types and seasonal differences. If a substantial number of the samples classified as fog are actually dew, rooftop condensation, or another form of non-rainfall water deposition, the resulting isotope distributions and derived relationships are also affected.

3. Implications for the long-term fog record

There is also an important quantitative issue that should be resolved. The manuscript presents a long-term time series of total fog-water input, while the rooftop-derived samples classified as fog are apparently not incorporated quantitatively into that time series.

This creates a potential inconsistency between the isotope dataset and the water-input dataset that needs to be explicitly addressed. More generally, given the uncertainties surrounding the historical fog records, the different collection methods, the conversion between collector types, and the provenance of some of the historical values, I do not think the current manuscript provides sufficient confidence for the long-term fog time series or for the trends derived from it.

Overall assessment

Taken individually, several of the issues identified in my review could perhaps be addressed by clarification or correction. Taken together, however, they indicate a more fundamental problem with the reliability and documentation of the proposed data product.

In particular, the rainfall record requires substantial correction, while the fog isotope dataset requires a reassessment of sample provenance and classification. These are central components of the manuscript rather than peripheral details. Addressing them would require more than revising the text: it would require rechecking the underlying observations, reconstructing parts of the datasets, reassessing the classification of samples, and potentially repeating a substantial portion of the analysis.

For this reason, I cannot recommend publication of the manuscript in its present form, and I recommend **rejection**.

I want to emphasize that this recommendation is based on the dataset and its documentation rather than on the scientific value of the underlying observations. I believe that a carefully reconstructed and transparently documented Gobabeb rainfall, fog, dew, and isotope dataset could be valuable to the community. However, the present version does not yet provide the level of data reliability and traceability required for publication as an ESSD data paper.

Kind regards

Roland Vogt

Supplementary material

The many issues identified in the review can be useful to the authors in improving a revised version of the manuscript.

In addition, there are quite a number of errors and inconsistencies in the preparation and presentation of the manuscript. While these do not necessarily need to be emphasized in the main text of the recommendation, I think it would be helpful to include them in an annex, so that the authors have a clear overview of the points that should be addressed in a future version. Some of these issues are quite substantial and should be carefully considered before resubmission.

Isotopic samples / Fog events

There are 20 days with two isotope samples per day/event. On 17 of those days there are two different fog types. How is this possible?

If there is fog, you can see it reflected in various meteorological variables

- Plotted longwave downward radiation (LD) shows a plateau-like structures. However, this may also be caused by stratus clouds or dew forming on the pyrgeometer.
- Visibility (VIS) is close to or ≤ 1000 m.
- The signal of the Leaf Wetness Sensor (LW) drops suddenly to close to zero (<10 Ohm). Drizzle from a stratus can also be the cause.
- Relative Humidity (RH) is typically $>90\%$. During clear-sky conditions with a temperature drop below dewpoint there are also high RH values.
- The cooling rate, the temperature decrease dT , becomes very small or zero. Occurrence of stratus clouds changes also the cooling rate. dT redundant to the signal of LD.

The trend of any single variable on its own is not a clear indication of fog, much less of fog precipitation, but when viewed in conjunction with other variables, it is possible to make highly probable conclusions. If there is no LD, no VIS and no LW signal, then there was very likely no fog. Any pair out of the three is also an indicator for likely no fog.

I checked the isotope sample events with data from the Gobabeb FogNet station including the visibility measurements, simply by visual inspection. Here an overview

	Isotope samples	No fog precipitation at GB FogNet station	no fog (no LD, no VIS, no LW)	likely no fog(pairs out of no LD, no VIS, no LW)
1.1.2014 to 30.6.2014	16			
1.7.2014 to 30.9.2019	131	28	2	10
1.10.2019 to 31.12.2023	297	131	41	49

One could certainly debate specific cases, but there are a significant number of days when there was no fog at the GB FogNet station, yet the rooftop samples taken 50 m away are said to have been caused by fog. It is not appropriate to categorize the samples as fog deposition across the board. The circumstances are more complicated, and this should be discussed in the presentation of the data.

Your selection criteria do not appear to be working

- (i) 2.4 mm mean probably Liter per square meter. How big is the source area of the rooftop drippings? It's probably much larger than the dew sampler. I can't find the 2.4 mm in Kaseke et al. (2017).

- (ii) An observer recorded fog presence. There are, after all, quite some cases out of the 131 with no Juvik fog precipitation where the fog front approached Gobabeb from the west, coming within a few kilometers of it, but did not reach or cross Gobabeb. The observer may have seen this fog in the distance and classified the sample as fog. Therefore, this should also be noted in the data to ensure clarity.
- (iii) "Meteorological indicators (e.g., sustained relative humidity > 75% together with fog signals)." What meteorological indicators except RH>75%? Concerning RH>75%: there are 9 events with RH < 75% like, 3.8.15 <50%, 24.9.15 < 70%, 25.7.18 <40%, 18.6.20 <25%, 11.9.21 <20%, 12.9.21 <60, 6.10.21 < 60%, 24.01.22 <50%, 13.7.22 <50%

Rainfall

The rainfall time series contains significant errors. With over 400 mm of excess rain and errors in the temporal assignment, it cannot be published.

Last time, I just skimmed over the rainfall data and figured there couldn't really be anything wrong with it. But this time, the high annual total for 1978 (158.12 mm) caught my eye, so I took a closer look at the data.

I'm familiar with the rainfall data insofar as I did around 10 years ago some quality control on the digitized handwritten weather records, an effort initiated by Mary Seely. The rainfall data were suitable for verifying the quality of the digitization because they were already available in an Excel spreadsheet. Eckardt et al. (2013, = E13) published the monthly rainfall totals for Gobabeb from 1963 to May 2011. Taimi Kapalanga, who is also a co-author of E13, prepared the rainfall data and made it available for E13. Eckardt used the data without further verification (pers. comm.). Someone forwarded me the data file which was available on the Gobabeb server.

When comparing rain from E13 with the digitized data, discrepancies also emerged between the weather book entries and the data used by E13. Overall, the errors were within acceptable limits. Total rainfall in E13 was 38.6 mm too low (1212.7 instead of 1251.3) with total absolute deviation of 138.4 mm.

I provided Gobabeb with the improved rainfall time series back then. Anyway at least the E13 rainfall data was and is available in Gobabeb.

Eckardt et al. (2013) report in their abstract *„Over this period of 17749 days only 381 rainy days produced a total of 1213 mm of rain with an annual average of 25 mm.“* In the dataset now presented the total is 1637.8 mm with an annual average of 33.19 mm. 425.2 mm more rainfall, the sum of the absolute differences amounts to 1725.71 mm. These large differences should have been noticed.

Most of the differences occur before April 2005 (404.1 mm). It looks as though the rainfall has been digitized from the Figure 1 by Henschel and Seely (2008 = HS08), along with errors. Furthermore, this Figure 1 from HS08 also appears to contain incorrect data. In January 1976 there was 60.1 mm of rainfall and not more than 80 mm as Figure 1 shows. Your data set reports 84.37 mm but only for June 1976. With the naked eye you can see that in HS08 the >80mm occur beginning of 1976.

Your monthly and annual totals of rain are not consistent. The monthly values sum up to 1864.2 mm, the annual values to 1844.59 mm. The differences occur 1978 and 2008.

Longterm Fog series – minor and major comments

- L135 What is meant with „light or short-lived atmospheric moisture deposition events“
- L144 Dew sampling: The dew collector with the glass plate: was it installed throughout the entire period? A photo would be helpful. The dew collector is described in greater detail here than in Tian et al. (2021).
- L151 Rainfall: Tian et al. (2021) report "*Five rainfall samples were collected in January, February, September 2014, and February 2016.*" (In the data there seem to be six: 3.+4.1.14, 11.+13.2.14, 24.9.14 and 2.2.16). Before July 2014 there was no FogNet station. Did you operate your own Young tipping-bucket rain gauge?
- L154 With „In the first half of the study period“ the distribution is better described. There are 12 samples up to April 2017 and one from July 2019, none after that.
- L159 Where in Fig. 3 one can see the „exceeded 15%“?
- L174 Gobabeb, Aussinanis, Station 8
- L175 pictures **showing** meteorological
- Figure 1 Captions can be shortened, as map sources are redundant. The captions for the individual photos can be improved (e.g. (g) and (h) are missing). I recommend to drop one photo of a station and add a photo of the dew sampler.
- Figure 2 What does Fig. 2b mean? The total of the bars is around 49%.
- Table 1 Coastal **Met**, Sophies Hoogte, Marble **Koppie**
- L206 ...**locally defined** fog types:
- L231 (1962-2023): None has data for 1962. Fog from 1966 on, rain from 1963 on, flooding from 1964 on. This should be adjusted in the figshare titles.
- L234 From 1966 to **1996**, the...
- L235 Concerning the dimensions of the Grunow collector: even if it is not that important, it is still wrong. In connection with Li et al. (2025), I communicated to the three authors of this paper how the dimensions of the Grunow cylinder works. Once again in Fig. 1: The mesh is pulled downward at the three support rods, resulting in a cylinder height of 22 cm (h1) at that point. Between the rods, the mesh height is only 18 cm (h2) at most. Thus, the lateral surface corresponds almost exactly to a cylinder with a diameter of 10 cm and a height of 20 cm, i.e., only 628 cm² and not 691 cm² (and the projected area is also not 220 cm², as stated in Li et al. 2025). These inaccuracies can be omitted. The projected area of the collector (cylinder) represents better the collection area and is thus more relevant for the deposition process than the total area of the cylinder.



Figure 1: Grunow collector as used in Gobabeb.

L236 Henschel and Seely (2008) do not mention Grunow collector nor the dimensions. They give the reader the impression that the „Monthly fog deposition recorded at Gobabeb between January 1966 and December 2002“ stems from a SFC and refer to Henschel et al. (1998).

L243 I don't think raw monthly SFC data from **1997-2002** are documented in Henschel et al. (1998). Please delete the reference.

L248 See above L235.

Concerning the fog data 1966 to 1996.

What is the exact source for the data? There are no data attachments in the report (Henschel et al. 1998), not even on Joh Henschel's ResearchGate page.

The monthly fog data in Fig. 2 in Henschel and Seely (2008) are based on Grunow data as reported in Henschel et al. (1998). The monthly fog data as presented in Fig. 2c in Henschel (2021) are also from Henschel et al. (1998) although it is not mentioned. Joh Henschel provided me with the original Grunow data, which allowed me to verify Fig. 2c in Henschel (2021), where in this case fog data are expressed in Juvik units, in this instance, Grunow $\times$ 3.3 (Henschel 2021).

The following Fig. 2 shows a detail from Fig. 2c in Henschel (2021); the annual fog totals, as they are now set to be published, are indicated in blue. There are large discrepancies. Similar to rainfall I recommend to do further investigations.

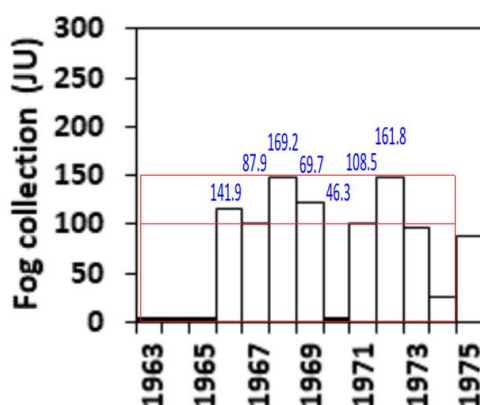


Figure 2: Excerpt from Fig. 2c in Henschel (2021). The annual fog amounts from the present dataset are added.

The total of the monthly fog series is 5821.17 mm and that of the annual fog series is 5994.5 mm. Something appears to be wrong.

L277 to L284 What is meant with “totals of 11.9 mm in August and 9.5 mm in September (Fig. 3a).” Looking at Fig. 3a I don't see how this makes sense. Even if you try to discuss the average monthly annual course of fog totals which I show here in the following table.

Month	1	2	3	4	5	6	7	8	9	10	11	12
mm	6.04	6.73	6.56	4.25	5.05	8.58	10.13	13.60	11.38	9.72	9.57	8.76

Flooding

L265 “The dataset of annual Kuiseb River flooding occurrence days downstream of the Kuiseb River catchment from 1964 to 2022 is available at Mizuno and Yamagata (2005) and Morgan *et al.* (2020a)”

The reference Mizuno and Yamagata (2005) is not mentioned in the data file, instead Morgan et al. are listed (where can one find data there?) except for the last three years.

L291 “The multi-year (1964-2022) average of the annual total occurrence days of Kuiseb River flooding was 16.2 ± 24.8 mm (Fig. 2c).” Days instead of mm. The same in the axis label in Fig. 3c.