

Comments on: “Iberulite fall and formation mechanism during a Sahara dust event in Switzerland in February 2021” by Grobety et al.

Summary

Grobety et al. report an observed iberulite fall event in Switzerland and present analyses of the particles’ composition, morphology, and size distribution. Based on the meteorological conditions during the event, the authors propose a formation mechanism for these particles. This study represents the first documented iberulite fall beyond Spanish latitudes, i.e., outside regions relatively close to the main dust source areas. The authors further suggest that these specific iberulites may have formed within snowflakes or ice crystals.

The authors have revised the manuscript in response to the first-round comments, and some of the requested changes have been implemented. Specific efforts should be made to clarify the possible relevance of iberulites. The comments below are given to the reviewed tracked-changes version of the manuscript.

General Comments

Despite the revisions, the manuscript still gives the impression of being unfinished. Several reviewer comments from the first round have not been addressed, or were claimed to be addressed but are not reflected in the text. The tracked changes file is incomplete and does not capture all modifications made.

The introduction still lacks a clear narrative connecting its topics to the paper’s actual goal. The reader loses sight of why each piece of information is relevant to the study. This issue carries over into the discussion section.

Figure quality remains below publication standards in several cases, as detailed in the specific comments below.

The discussion of the formation mechanism still lacks a clear logical thread, as noted in the first round. A step-by-step structure presenting the proposed formation sequence would considerably improve readability.

Specific Comments

L24. The Greenfield gap is still mentioned in the abstract, despite a reviewer suggestion to introduce it later in the results or discussion.

L36. The list of aerosol threshold values could be simplified; not all reference values are necessary here.

L49. References to the economic impact of dust in Iran, Iraq, and the US are not relevant to the scope of this paper and should be removed.

L51–52. The transition between passages in the introduction is not smooth. Additionally, it is not explained why iberulites specifically are of interest; the climate, ecosystem, and health effects described apply to dust in general. If iberulites have distinct effects or implications, these should be stated explicitly.

L55. If the observation of iberulites north of 42°N is one of the study’s novelties, it requires more setup. Was this unexpected? Surprising given the distance from source areas? This context would help the reader appreciate the significance of the finding.

L64–. The formation mechanism passage is too long and technical for the introduction. A simplified overview could remain, with the detailed physics of ICS/BCS and the Greenfield gap moved to supplementary material or the methods section.

L86. The definition (how is calculated) of collection efficiency (CE) should be introduced when the term first appears in the text.

L113. The research gap and study objectives appear abruptly. The novelty of the study (an observation north of 42°N under well-documented meteorological conditions) should be stated more explicitly and built up more clearly.

L121. The sentence “The geology of the surroundings of both sites is” is unfinished. Please complete it.

L126. Figure 1 does not meet publication quality. Labels appear underlined, and the map includes unnecessary information such as roads and towns. A legend clarifying the role of each location (e.g., iberulite observation site, radiosounding, lidar measurement) would improve clarity considerably.

L128. Table 1 appears to be empty. Please verify.

L149. The term “afternoon dust” is unclear. Please rephrase for clarity.

L151. The reference to the dust detection method is difficult to follow. Please rephrase.

L157. “or this study” → “For this study.”

L166. Earlier in the manuscript, aluminum foil is described as the collection method, but here iberulites are stated to have also been collected from the ground. Please clarify the collection procedure.

L168. “All single particles” is ambiguous. Please clarify whether this refers to individual dust grains or to iberulites.

L213. Please clarify whether the 1.4 value is derived from this study or from the literature. If the latter, add the appropriate reference.

L218. There appears to be a typo — “28” after 70. Please verify and correct.

L249. If FLEXPART is used in the analysis, it should be described in the methods section.

L255. The statement about temperatures is unclear. Please clarify whether the authors mean that conditions were relatively warm for Switzerland in February, but colder than those reported in previous iberulite fall events on the Iberian Peninsula.

L262. Figure 4: a vertical line is visible on the right side of the plot and should be removed. Additionally, a black horizontal line at 5000 m is shown but not explained, please describe what it marks in the figure caption.

L275. Figure 6 requires several corrections: the title is redundant (“Ceilogram Ceilometer profile” → “Ceilogram”); the right-side axis label (a.u.) is partially underlined; grid lines extend outside the plot area; and “clouds’ bottom” should be replaced with “cloud base.”

L279. There appears to be missing text between the end of this line and the beginning of the next. Please verify.

L302. Figure 8: “Figure 8f” should be replaced with “(f).”

L309. These sentences are duplicated from L299. Please remove the repetition.

L320. “Dust plumes” is more appropriate than “dust clouds.”

L359/370. This sentence appears twice. One instance should be removed.

L360. The discussion of frozen hydrometeors versus raindrops remains scientifically interesting but disorganised. The argument shifts between collection efficiency, relative humidity, temperature, and the Greenfield gap without a clear logical thread. A step-by-step structure would strengthen the case considerably.

Technical Comments

L120. ASL)) → ASL)

L130. Section title and numbering have not been updated. Please correct.

L152. (Ashpole and Washington, 2013) → Ashpole and Washington (2013)

L182. “is is higher” → “is higher”

L202. d_m and d_{ve} should be formatted with subscripts throughout.

L258. Remove “a very low.”

L401. “5. Conclusions” appearing at the end of the line should be removed.

L415. Please check for typos and incomplete text in the Acknowledgements and Financial Support sections.

Throughout. Several instances of missing spaces following text deletions are present across the manuscript. Please perform a careful proofread.