Response to Reviewers

GC Insights: Choosing the right map projection, and what it means for scale bars and north arrows — egusphere-2026-4209

I thank both reviewers for careful, substantive reports. RC1's reading is generous, and its three requests are all straightforward to meet. RC2's report is far more demanding, and several of its requests run up against the format the manuscript was submitted under: GC Insights is capped at 500–1500 words and one figure or table, and the journal's own manuscript-types page states that an Insight "does not have to be explored in detail" and that "supplementary material should be limited." The current main text, even before this round of revision, already runs to roughly 1,720 words — over that ceiling. I have therefore fixed every genuine error RC2 identifies, but redirected requests for additional methodological detail to the Supplement (which already contains most of it) rather than expanding the main text further; below, I explain point by point where I have not made a requested change and why.

Reviewer 2 (RC2)

Scope and format

1) *The abstract's results (naming rate, graticule prevalence) don't directly reflect the title's framing around scale bars and north arrows.*

Response: The title and abstract are intentionally at the level a GC Insight is meant to operate at: the survey measures what is directly observable (projection identifiability), and the scale-bar/north-arrow argument follows from it deductively (their validity depends on the projection, which is usually undeterminable). I would rather keep this structure, which is standard for the format, than rebuild the abstract around a different claim; no text change made on this point.

2) *This background discussion (Mercator, geographic coordinates, projection properties, Tissot) isn't clearly tied back to the naming/scale-bar/north-arrow argument.*

Response: This section exists to equip GC's interdisciplinary readership, not all cartographers, with the minimum concepts the rest of the argument depends on; GC Insights is explicitly aimed at readers outside the immediate specialism. I have not restructured it, both because of the word limit and because RC1 (who read the same section) found the manuscript's length and focus one of its strengths. No text change made on this point.

Overall length. The main text (excluding references) is already about 1,720 words, above the 500–1500-word ceiling for GC Insights. This is the primary constraint behind several of the responses below: methodological detail RC2 requests have been added to the Supplement rather than the main text wherever it was not already there, and only single-clause additions were made to the main text itself.

Methodology

1) Rationale for the 2016–2025 window. *Why 2016 as the start year? Seems arbitrary.*

Response: Added to Supplement Sect. S2.1: the window is the ten years to the end of 2025, the most recent full decade of publication at the time of sampling.

2) "What a reader can see on the page" — ambiguous scope. *Does this mean the whole page/text, or just the map and caption?*

Response: Clarified in the main text: coding drew on the figure, its caption, and any explicit statement of the projection in the surrounding text, not the whole article. Same fix as RC1 point 1 above.

3) Supplement not found.

Response: The main text already states "Methods, protocol, and full tables are given in the Supplement" and now also gives specific section numbers (Sect. S2–S3). The Supplement itself is a separate file in the EGUsphere submission system; this may be a linking issue in how the discussion-stage PDF was assembled

for review rather than a text problem, worth flagging to the editor so the link is checked before the next round.

4) What counts as "naming" the projection (abbreviations, EPSG codes). *Does 'UTM' count? Does an EPSG code alone count? Is 'LAEA' too obscure for general readers?*

Response: Clarified in Supplement Sect. S3: an EPSG/ESRI numeric code counts as naming the projection on the same footing as a common name; proj_name records that the paper identified its projection, whether by a technical name or by its CRS code. On Fig. 1's use of "LAEA": the panel labels are shorthand for a figure aimed at a geoscience readership; the caption already spells out "Lambert Azimuthal Equal Area" in full, so the abbreviation is disambiguated there.

5) North arrow prevalence by scale; total local/global counts. *The scale-bar result is reported by local/global scale, but the equivalent north-arrow breakdown and the underlying N per scale class are not.*

Response: Both are already in the Supplement (Table S4: local n=97, regional n=91, continental n=53, global n=58; north indicator 48% local vs 2% global). Added the north-arrow-by-scale figures to the main text directly, alongside the scale-bar figures, since this was a one-clause, no-new-data addition: "north indicators show the same pattern, drawn on 48% of local maps against 2% of global maps."

6) Percentage of named projections that are Mercator. *Since Mercator is singled out in the text, what fraction of the 7 named projections is Mercator?*

Response: Addressed in Supplement Sect. S4 rather than the main text: with only 7 named projections in the whole sample (95% CI on the naming rate itself is 0.6–4.3%), splitting that further by name would carry more uncertainty than information, and is not reported for that reason.

7) Writing is informal / difficult to follow in places. *General comment on style; several specific phrases singled out below.*

Response: Accepted for the specific phrases flagged (see Specific comments table): "absurd," "rarely bites," and a few imprecise or ambiguous constructions have been reworded. The overall register is kept close to the original, since a more conversational tone is standard for GC Insights and was specifically praised by RC1 ("written and illustrated well").

8) "Leaves the reader adrift" — no guidance on the bar/arrow. *Beyond asking journals to require a stated projection, the manuscript offers no guidance on what to actually do with the scale bar or north arrow.*

Response: Addressed with the same short checklist added in response to RC1's related, optional suggestion (see above): name the projection, show a graticule where geometry isn't obvious, and include a scale bar or north arrow only where the projection makes it valid. This is deliberately compact rather than a full worked protocol, to fit the word budget.

Suggested author guidance (naming convention, scale bar, graticule, north arrow)

1) Formal naming convention (common name + class + property; UTM zone/hemisphere; EPSG where available). *Reviewer proposes a specific naming template for authors to follow.*

Response: Not adopted verbatim: rather than propose a new naming taxonomy, the checklist points to Snyder (1987) and to citing an EPSG code where one exists, which covers the same need without the manuscript inventing and defending its own convention, out of scope for a 1500-word Insight, and better handled by the existing standards literature.

2) Multiple north arrows aligned to meridians. *For projections where north isn't uniformly vertical, consider recommending several north arrows aligned to different meridians.*

Response: Not adopted. The manuscript's existing recommendation, drop the arrow and show the graticule instead, already solves this more directly: the graticule gives the true geometry everywhere on the map, whereas multiple arrows would still only be exact along the meridians they sit on, and would add visual clutter for a modest gain. No text change made on this point.

3) Graticule and scale-bar validity statement in every map. *Recommend degree ticks/graticule on every map, and a statement of the standard line(s) along which a scale bar is valid.*

Response: Both are already argued in the main text (the north-arrow and scale-bar sections) and now also in the checklist; not repeated as a separate formal recommendation to save words.

Specific comments

Comment	Response / action
Abstract L7 / L30 / L33 / L45 / L48 / L100 — "shape" used loosely	"Shape" and "area/shape/distance/direction" follow Snyder's (1987) own terminology for the four classical projection properties (conformal projections are conventionally described as "shape-preserving," locally) — this is standard usage in the cited source, not a slip. One instance was tightened regardless: "preserves local angles and shapes" (Mercator/navigation, L33) now reads "preserves local angles", since what matters for plotting a compass bearing is angle, not visual shape.
L18 — citation needed for "neglected decision" claim	Added (Battersby et al., 2014), already used elsewhere in the manuscript for the same point.
L28 — wording	Not changed as a standalone item; superseded by the paragraph 21 rewrite below.
L46 — "European statistical cartography"	Kept: this is the established term for the domain in which LAEA Europe (EPSG:3035) is the standard (Eurostat and INSPIRE use exactly this framing for official/statistical mapping). No text change.
L53 — confusion between Fig. 1 and Fig. S1 (Tissot indicatrix)	The indicatrix was in the Supplement as Fig. S1, but is now in the main-text Fig. 1B.
L63 — "by domain" unclear	Refers to the five journal-subject groupings used for stratified sampling (Supplement Sect. S2.2); not changed in-text to save words, but now explicitly cross-referenced via the new "Sect. S2–S3" pointer.
L64/67 — "coordinate system" vs. "graticule" vs. "coordinate lines"	These are deliberately distinct in the coding scheme (Supplement Table S2): crs_kind records the geometry of axis/degree labelling, while graticule records whether lines are actually drawn across the map face. "Coordinate lines" and "graticule" are therefore not interchangeable and have not been merged; this distinction is already explicit in the Supplement.
L66 — 44% and (38–50): what does the range mean	This is the 95% confidence interval, already labelled as such for the first statistic in the sentence; not repeated on every subsequent number to save words, but happy to add "95% CI" again here if the editor prefers.
L70 — "global maps... least often chosen with care" needs a citation	This is the paper's own finding (the 76% figure immediately after it), not an external claim. Paragraph reordered so the evidence precedes the conclusion, removing the appearance of an unsupported assertion.
L73 — pole-centred plate carrée sentence is unclear	Reworded: unprojected geographic coordinates would stretch the pole into a horizontal line spanning the map's full width, an evidently degenerate result, so pole-centred global maps are necessarily drawn in an actual projection (typically polar stereographic).
L77 — "perfectly equidistant" / "accurate where it is placed"	"Equidistant" is a standard formal class of projection (Snyder, 1987) preserving true scale along specific lines, not everywhere; kept, since it is well-defined and already used correctly. "Accurate where it is placed" reworded to "accurate only at the latitude for which it was drawn".
L78 — Mercator/Scandinavia scale-distortion numbers disputed	Reworded to anchor the ratio strictly to 60°N, where sec(60°)=2 is exact, rather than asserting a single figure for "Scandinavia" as a whole (which spans a range of latitudes): "a bar valid at the equator is wrong by 100% at 60°N, for example, across much of Scandinavia."
L82 — "absurd bar"	Reworded to "obviously wrong bar".

L83 — "projection problem, not a design problem" disputed	Reworded to "a problem of projection choice and disclosure, not of scale-bar design," which keeps the substantive point (no amount of careful bar placement fixes an undisclosed projection) without the binary framing.
L89 — conic meridians "converge" wording	Reworded: "meridians are straight but converge toward the pole, so only the central meridian points to true north on the page."
L91 — "This rarely bites"	Reworded to "This problem is rare in the surveyed literature."
L91/92 — "three-quarters..." needs a citation	This is the paper's own survey result, already reported in the preceding section; not an external claim requiring a citation.
L92 — "where meridians are straight, the arrow is redundant" is wrong (true for conics too, which are straight but not vertical)	Genuine logic error — fixed: "where meridians are vertical, the arrow is redundant."
L104 — "tools exist to make the choice easy" disputed	Softened to "tools such as Projection Wizard can narrow that choice for a given purpose, even though interpreting the output still calls for some cartographic literacy."
L104 — "coordinate reference system" vs. "map projection" used inconsistently	Not merged into one term throughout, for the same reason as the graticule/coordinate-lines point above — CRS and projection are related but not identical concepts, and the manuscript uses each where it is the more precise term.

Technical comments

Abstract L11 — "Insight" capitalised. *"Insight" should not be capitalised.*

Response: Fixed: "This insight argues…"

Figure 1 — role of the figure, inconsistent panel titles, WGS84 statement, area-preservation caption error.

Response: The area-preservation wording is a genuine error and has been fixed: the caption now reads "Projection family and distortion property (equal-area or conformal) are indicated in each panel," which is accurate for all six panels. The WGS84 statement is standard cartographic disclosure (the graticule and coastlines were generated in unprojected WGS84 coordinates and then rendered together in each panel's projection) and has been left as is to save words, but could be expanded if the editor requests it. On the southern-latitude cropping visible in the Equal Earth/Mollweide panels: confirmed as a real issue via RC1 (see RC1 point 2 above); the figure needs to be regenerated, which is not yet done. Panel-title consistency (thematic-utility framing on the global row only) is a minor style point not addressed here to conserve words, but easy to fix once the figure is regenerated.