Supplementary file

The Cold Spell That Never Was: Climatological Assessment of the Winter 2025/26 Cold and Snowfall Episodes in Bucharest and Their Disproportionate Media Representation

Monica Ionita[1], Bogdan Antonescu[2,3] and Viorica Nagavciuc[1]

[1]Alfred Wegener Institute Helmholtz Center for Polar and Marine Research, Bremerhaven, Germany

[2]University of Bucharest, Faculty of Physics, Măgurele, Romania

[3] National Institute for Earth Physics, Măgurele, Romania

Correspondence: Monica Ionita (Monica.Ionita@awi.de)

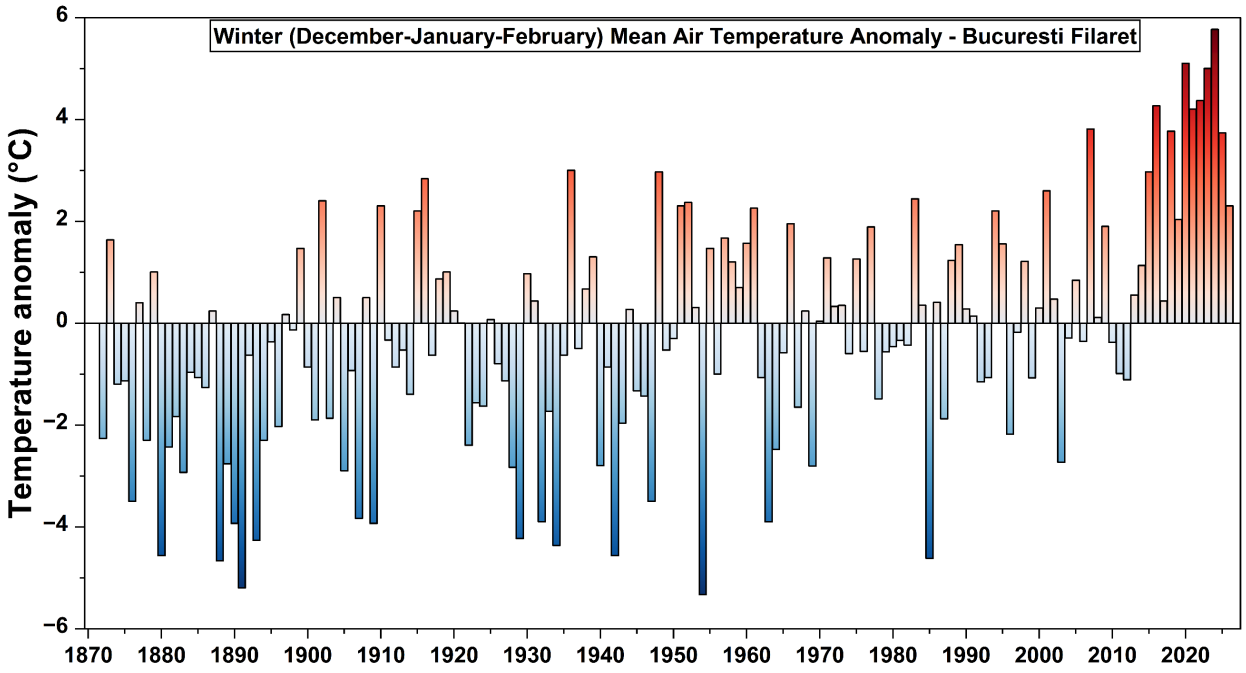

Figure S1. Winter (December – January – February) mean air temperature anomalies at Bucuresti Filaret station, over the period 1871 – 2026. Reference period: 1971 – 20000.

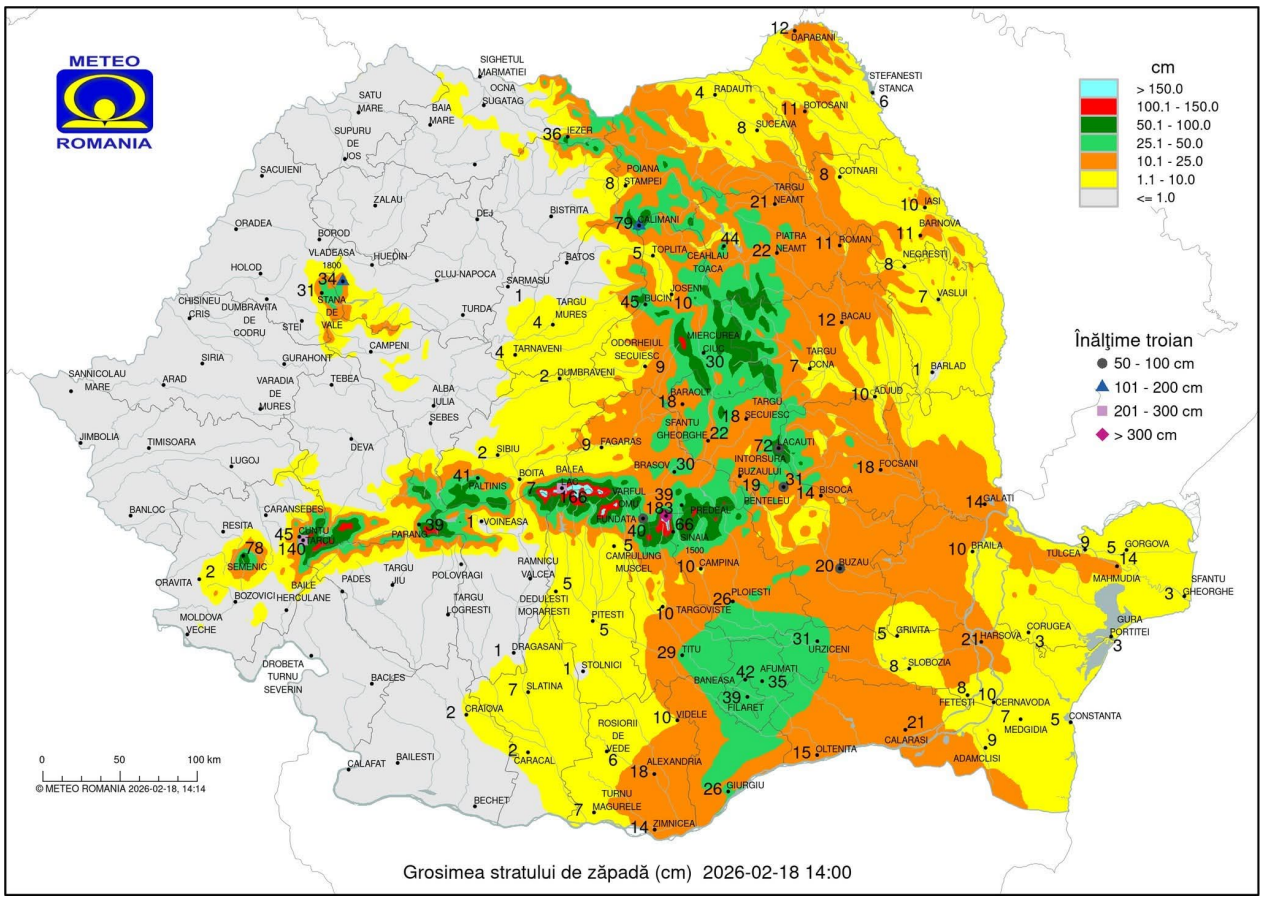

Figure S2. The depth of snow cover on the 18th of February 2026 over Romania. Data source: www.meteoromnia.ro

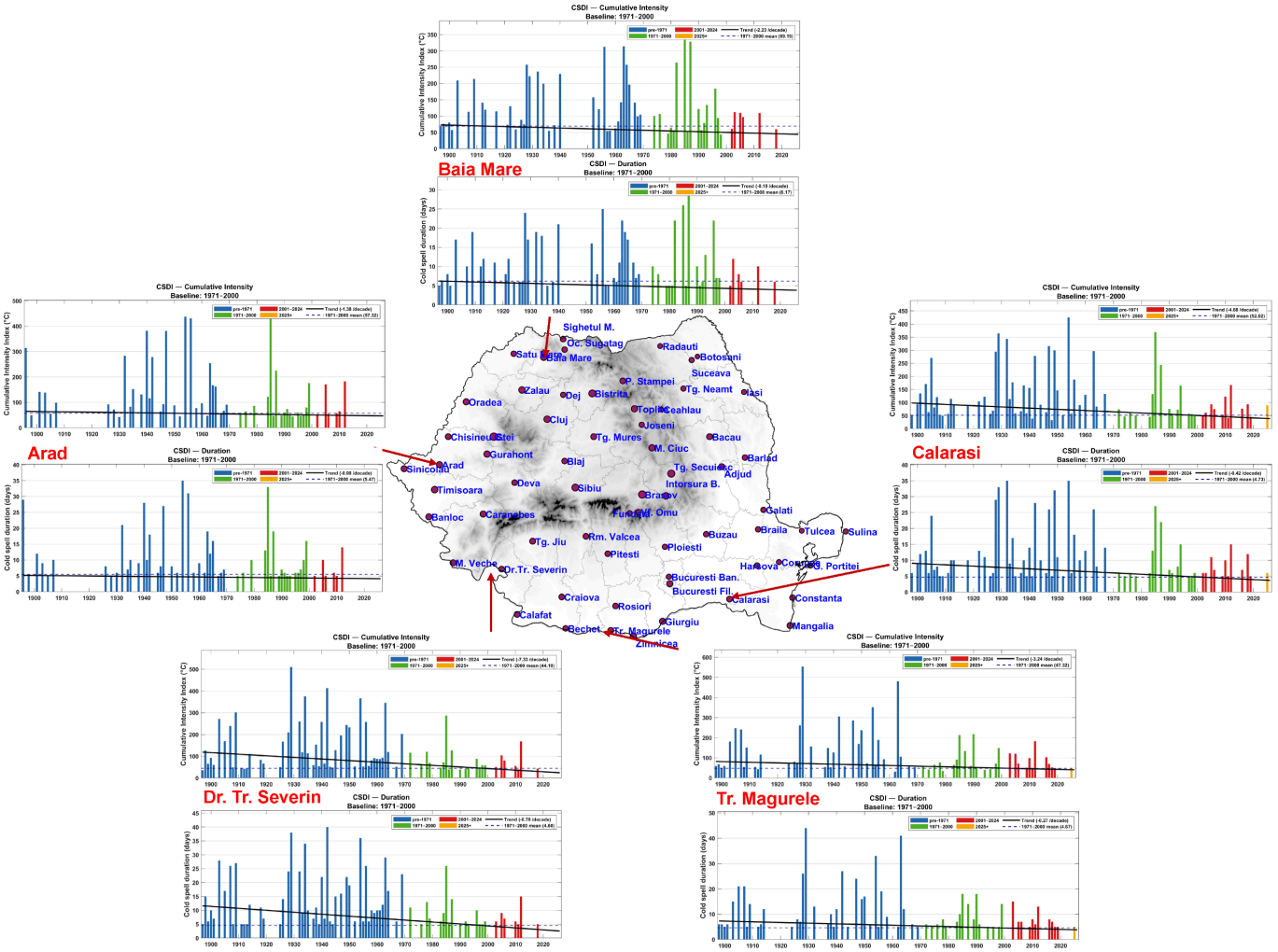

Figure S3. Winter (November – March cold spell summary (i.e., cumulative intensity and the total duration of cold spells per winter) at 5 meteorological stations with long-term daily minimum temperature: Baia Mare, Arad, Drobeta Turnu Severin (Dr. Tr. Severin), Turnu Magurele, and Calarasi. For the winter 2025/26 only the data from November ot Feruary was used.

Table S1. Stations metadata (i.e., latitude, longitude, altitude, data availability and missing intervals). For 2026 only data until end of February are available. The long-term metrological stations used in this study are bolded.

Station Name (abbreviation)	Latitude (°)	Longitude (°)	Altitude (m.a.s.l.)	Data availability	Missing data
Adjud	46.1047	27.1704	101	1961 – 2026	
Arad	**46.1335**	**21.3536**	**117**	**1895 – 2026**	**1910 – 1925**
Bacau	46.5319	26.9125	174	1961 – 2026	
Baia Mare	**47.6608**	**23.4916**	**186**	**1897 – 2026**	**1919 – 1920**
Banloc	45.3827	21.1364	83	1961 – 2026	
Barlad	46.233	27.6444	172	1961 – 2026	
Bechet	43.7897	23.9442	36	1961 – 2026	
Bistrita	47.1491	24.5139	366	1961 – 2026	
Blaj	46.1784	23.9352	337	1961 – 2026	
Botosani	47.7356	26.6455	161	1961 – 2026	
Braila	45.2066	27.9197	15	1961 – 2026	
Brasov	45.6958	25.5262	534	1961 – 2026	
Bucuresti Baneasa (Bucuresti Ban.)	44.5104	26.0782	90	1961 – 2026	
Bucuresti Filaret (Bucuresti Fil.)	**44.4121**	**26.0938**	**82**	**1879 – 2026**	**1917 – 1928**
Buzau	45.1327	26.8517	97	1961 – 2026	
Calafat	43.9849	22.946	61	1961 – 2026	
Calarasi	**44.2057**	**27.3383**	**19**	**1898 – 2026**	
Caransebes	45.4171	22.2263	241	1895 – 2026	
Ceahlau Toaca	46.9775	25.9499	1897	1961 – 2026	
Chisineu Cris	46.5185	21.5417	96	1961 – 2026	
Cluj-Napoca	46.7778	23.5713	410	1961 – 2026	
Constanta	44.2138	28.6455	12.8	1961 – 2026	
Corugea	44.7343	28.342	219	1961 – 2026	
Craiova	44.3101	23.867	192	1961 – 2026	
Dej	47.128	23.8989	232	1961 – 2026	
Deva	45.8649	22.8988	240	1961 – 2026	
Drobeta Turnu-Severin (Dr. Tr. Severin)	44.6265	22.6261	77	1961 – 2026	
Fundata	45.4315	25.2715	1384	1961 – 2026	
Galati	45.4729	28.0323	69	1961 – 2026	
Giurgiu	43.8752	25.9327	24	1961 – 2026	
Gura Portitei	44.6898	28.9989	2	1961 – 2026	
Gurahont	46.2792	22.3333	177	1961 – 2026	
Harsova	44.6917	27.9635	381	1961 – 2026	
Iasi	47.1709	27.6283	749	1895 – 2026	
Intorsura Buzaului (Intorsura B.)	45.6683	26.0568	707	1961 – 2026	
Joseni	46.7057	25.5126	750	1961 – 2026	

Mangalia	43.8161	28.5872	6	1961 – 2026	
Miercurea Ciuc (M. Ciuc)	46.3713	25.7726	661	1961 – 2026	
Moldova Veche	44.7223	21.6261	82	1961 – 2026	
Ocna Sugatag (Oc. Sugatag)	47.777	23.9405	503	1961 – 2026	
Oradea	47.0357	21.8959	136	1961 – 2026	
Pitesti	44.8489	24.866	316	1961 – 2026	
Ploiesti	44.9557	25.9874	177	1961 – 2026	
Poiana Stampei (P. Stampei)	47.3246	25.1344	923	1961 – 2026	
Radauti	47.8378	25.8904	389	1961 – 2026	
Ramnicu Valcea (Rm. Valcea)	45.0888	24.3628	237	1961 – 2026	
Rosiori de Vede	44.1072	24.9787	102	1961 – 2026	
Sannicolau Mare	46.0713	20.6016	85	1961 – 2026	
Satu Mare	47.7215	22.8872	123	1961 – 2026	
Sibiu	45.7893	24.0914	443	1895 – 2026	
Sighetul Marmatiei (Sighetul M.)	47.9393	23.9043	275	1961 – 2026	
Stei	46.528	22.4665	278	1961 – 2026	
Suceava	47.6329	26.2405	352	1961 – 2026	
Sulina	45.1485	29.7589	12	1961 – 2026	
Targu Jiu (Tg. Jiu)	45.0406	23.2593	204	1961 – 2026	
Targu Mures (Tg. Mures)	46.5333	24.5338	310	1961 – 2026	
Targu Neamt (Tg. Neamt)	47.2121	26.3792	387	1961 – 2026	
Targu Seciuesc (Tg. Secuiesc)	45.9929	26.1151	568	1961 – 2026	
Timisoara	45.7711	21.2581	86	1961 – 2026	
Toplita	46.9264	25.3599	687	1961 – 2026	
Tulcea	45.1905	28.8241	4	1961 – 2026	
Turnu Magurele (Tr. Magurele)	**43.7602**	**24.8785**	**31**	**1896 – 2026**	**1917 – 1922**
Varful Omu (Vf. Omu)	45.4458	25.4567	2504	1961 – 2026	
Zalau	47.1949	23.0467	295	1961 – 2026	
Zimnicea	43.6615	25.3536	34	1961 – 2026	

Media samples and coding protocol

The media samples were assembled by searching the Factiva and Google News aggregators, and by direct review of outlet websites and broadcast archives, using terms like: 'frig' / 'ninsoare' / 'iarnă' (Romanian) and 'cold' / 'snow' / 'winter in Romania' (English) covering the period 5th of January – 28th of February 2026. Items were included if they referred explicitly to the meteorological conditions in Romania, contained at least one claim about the severity, historical rank, or social impact of the winter episode, and exceeded 150 words in length. The final media sample comprised 89 items: 52 Romanian-language (RO) and 37 international English-language (EN), drawn from 14 outlets.

Each item was coded by two independent annotators. A pre-defined alarm vocabulary list of 12 terms (Table S2), operationalized in Romanian and English equivalents, was applied to identify all alarm-vocabulary occurrences. Each item was then coded on three binary dimensions: (i) Baseline reference (e.g., whether the item contained any quantified historical comparison like anomaly, percentile rank, return period, or named historical year with metric); (ii) Authority citation (e.g., whether a scientist or institution was quoted directly with methodological grounding) and (iii) Primary framing category, namely "Catastrophist" (e.g., item leads with historical superlatives and societal breakdown language), Impact (item leads with operational disruption without historical claim), Operational (item leads with logistical response and service information), or Contextual (item leads with meteorological explanation and historical context). Inter-rater reliability was assessed on a randomly selected 20% subsample (n = 18 items) to evaluate the consistency and reproducibility of the coding scheme. The two independent coders, operating without knowledge of each other's classifications, produced a Cohen's κ coefficient of 0.84. According to the benchmark scale proposed by (Landis and Koch 1977), κ values falling within the 0.81–1.00 range are interpreted as reflecting almost perfect agreement, while values between 0.61–0.80 denote substantial agreement. A κ of 0.84 therefore sits at the lower bound of the almost perfect category, providing strong evidence that the categorical distinctions embedded in the coding instrument were sufficiently unambiguous to be applied consistently across raters.

Table S2. Alarm vocabulary code. Each term was searched in all linguistic variants and inflected forms in both Romanian (RO) and English (EN). Severity tier: Extreme = historically unprecedented or catastrophic framing; High = record-level or worst-in-years framing; Medium = generic emergency or disruption framing.

Romanian term	English equivalent	RO count	EN count	Severity tier
Paralizat / a paraliza	Paralyzed / paralyze	41	23	**Extreme**
Apocalipsă	Apocalypse / apocalyptic	18	11	**Extreme**
Catastrofă	Catastrophe / catastrophic	14	8	**Extreme**
Fără precedent	Unprecedented	26	14	**Extreme**
Record (superlative context)	Record (superlative)	52	29	**High**
Cel mai rău / grav	Worst / most severe	34	17	**High**
Criză	Crisis	37	19	**High**
Mortal / fatal	Deadly / fatal	17	9	**High**
Frig extrem	Extreme cold	43	22	**High**
Urgență	Emergency	78	44	**Medium**
Haos	Chaos	58	31	**Medium**
Înghețat / blocat	Frozen / gridlocked	29	18	**Medium**

Aggregate results: term-level frequency

Figure S4 presents the alarm-vocabulary frequency distribution across all 89 items, disaggregated by outlet language. The total alarm-vocabulary count was 692 occurrences across approximately 112 400 words, yielding a normalized density of 6.2 per 1000 words. 'Emergency / Urgență' was the most frequent term (122 occurrences) and is classified as Medium-severity framing; its frequency reflects genuine operational severity of the 18th of February snowfall event and does not in itself constitute catastrophist overstatement. The most epistemically consequential terms are those classified as Extreme severity: 'Unprecedented / Fără precedent' (40 occurrences), 'Paralyzed / Paralizat' (64 occurrences), 'Catastrophe / Catastrofă' (22 occurrences), and 'Apocalypse / Apocalipsă' (29 occurrences). Each of these terms makes an implicit historical rank claim that is directly contradicted by the climatological evidence presented in Section 3 of our paper. Romanian-language outlets contributed approximately 62 % of all alarm-vocabulary occurrences (429 of 692) despite comprising 58 % of the media samples by item count. The difference is most pronounced for Extreme-severity terms: RO outlets contributed 67 % of 'unprecedented' uses and 70 % of 'apocalypse' / 'catastrophe' uses, indicating that the tendency toward historically unfounded superlatives was more prevalent in the domestic Romanian media environment.

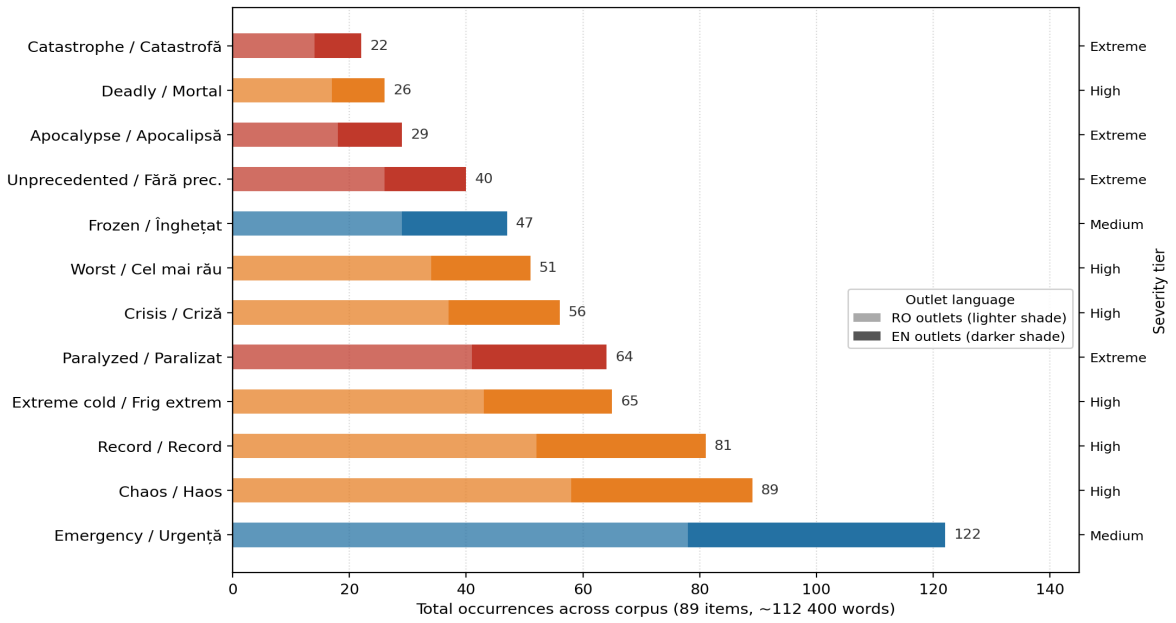

Figure S4. Alarm-vocabulary frequency by term and outlet language. Bars split by outlet language (lighter shade = Romanian; darker shade = English). Bar color indicates severity tier: red = Extreme; orange = High; blue = Medium. Total occurrences shown at right. Terms sorted by total frequency (lowest to highest, bottom to top). Corpus: 89 items, 14 outlets, January–February 2026.

Media outlet level analysis: alarm density, baseline citation, and framing

Figure S5a presents a scatter plot of alarm-vocabulary density (per 1000 words) against the percentage of items containing a long-term baseline reference, for all 14 outlets. The strong negative correlation (Pearson $r = -0.88$; $p < 0.001$) confirms that outlets with higher alarm density systematically provided less historical context. The RO group clusters at higher alarm density and lower baseline citation rates than the EN group. RO-TV1 (9.1 per 1000 words; 0 % baseline citation) and RO-TV3 (9.0; 0 %) represent the extreme amplification pole. RO-Online-1, the only Romanian outlet to publish counter-framing, recorded the lowest alarm density in the RO group (2.1 per 1000 words) and the highest baseline citation rate (55 %).

Figure S5b disaggregates items by primary framing category per outlet. Across all 14 outlets, "Catastrophist" framing was the most frequent primary category (weighted mean 42 %), followed by Impact (32 %), Operational (16 %), and Contextual (10 %). The framing contrast between RO and EN outlet groups is pronounced: Catastrophist framing accounted for 61 % of all coded RO items versus 33 % of EN items. Only two outlets (i.e., one from RO and one EN) had Contextual framing as their plurality category.

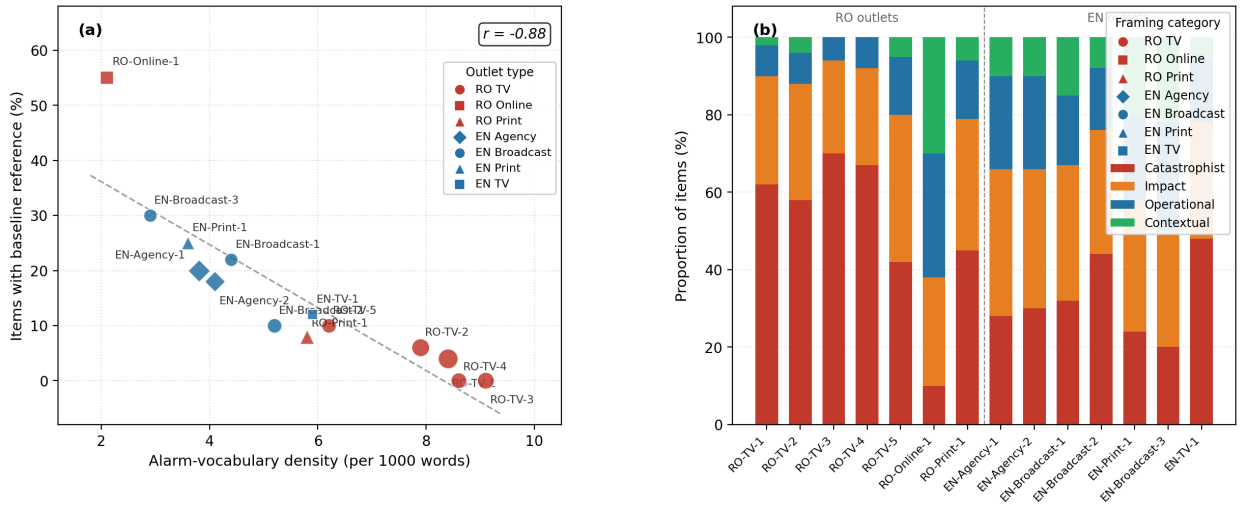

Figure S5. Outlet-level media metrics. (a) Alarm-vocabulary density (per 1000 words; x-axis) vs. percentage of items with at least one long-term baseline reference (y-axis). Point size proportional to item count; red = Romanian-language outlets; blue = international outlets. Dashed line: linear regression ($r = -0.88$). (b) Primary framing category breakdown (% of items) per outlet, separated into RO and EN groups. Color code: red = Catastrophist; orange = Impact; blue = Operational; green = Contextual.

Temporal dynamics of alarm output

Figure S6 shows the daily aggregate alarm-vocabulary count across all outlets for the full analyzed period (i.e., 5th of January to 28th of February). Two principal amplification episodes are identifiable. The first (~ 8th to 22nd of January) corresponds to the cold interludes during which ANM issued a Yellow Code alert; alarm output was elevated but moderate, peaking at approximately 15 occurrences per day. The second and dominant episode (18th to 24th of February) corresponds to the Red Code associated with snowstorm event and produced a sharp spike reaching approximately 35 occurrences per day at its peak, roughly 7–8 times the background rate of 3–5 per day during meteorologically unremarkable periods. The persistence of elevated alarm output for approximately 6 days post-event reflects the amplification cascade mechanism described by (Kasperson et al. 1988), namely, initial coverage generates follow-on commentary and secondary media cycles that sustain alarm signals independently of ongoing meteorological conditions.

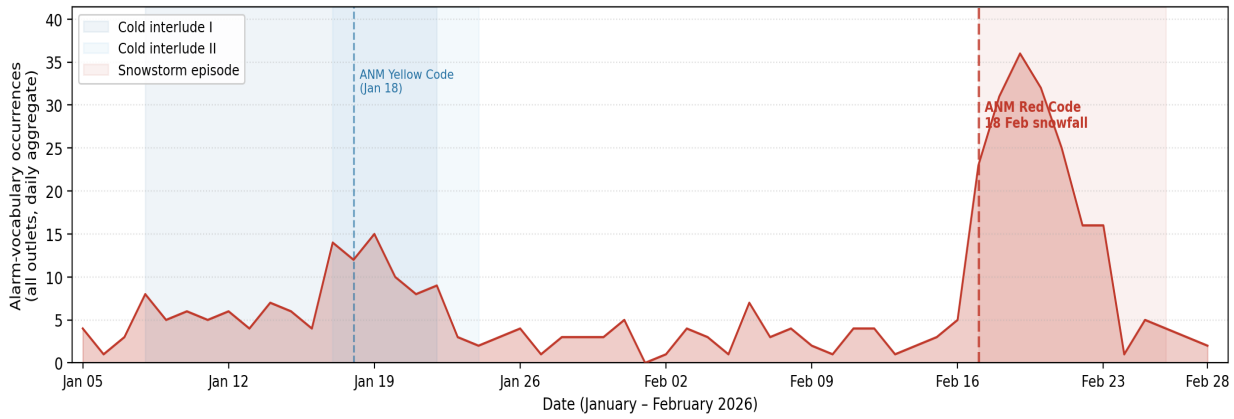

Figure S6. Daily aggregate alarm-vocabulary occurrence count across all 14 outlets, January–February 2026. Shaded regions: Cold interlude I (~8–22 Jan); Cold interlude II (~12–19 Jan, overlapping); Snowstorm episode (18–24 Feb). Vertical dashed lines mark ANM Yellow Code (18 January) and ANM Red Code (18 February 04:20 LT). The ~7–8× spike ratio between the Red Code peak and background rate reflects disproportionate amplification of the precipitation event relative to its climatological significance.

Representative headlines and claim–reality contrast

Table S3 presents selected headlines from the corpus with framing classification and the corresponding climatological reality for each implied claim. The table illustrates how a single technically accurate element, the Red Code alert, the 45 cm accumulation, the 495 emergency interventions, is systematically transformed into a historically unfounded claim by the addition of unqualified superlatives or implicit comparisons to benchmark events.

Table S3. Selected representative headlines and corresponding climatological reality statements. Frame codes: C = Catastrophist; I = Impact; O = Operational; X = Contextual. Headlines translated to English where originally in Romanian.

	Headline (translated)	Frame	Climatological reality
1	*Romania paralyzed: worst winter in living memory closes highways, cuts power to thousands*	C	No cold spell detected; Jan anomaly +1.5 °C
2	*APOCALYPSE IN BUCHAREST — snowfall without precedent buries the capital*	C	'Unprecedented' is factually incorrect: ~45 cm vs. 173 cm at Calarasi in Feb 1954; Mediterranean cyclone events recur 3–5× per winter.
3	*Temperatures like 1929: Bucharest freezes as cold wave grips the Balkans*	C	1929: cumulative intensity 828 °C; 2026: 0 °C.
4	*Red Code in Bucharest: 50 cm of snow in 4 hours, 495 emergency calls*	O	Operationally accurate; no historical rank claim made. Correctly describes a precipitation event.
5	*Romania's coldest winter in decades paralyzes the country's infrastructure*	C	Winter 2025/26 warmer than average at 63 of 65 stations; no qualifying cold spell; TN10p ≈ 0 %.
6	*Record snowfall brings chaos to Bucharest — experts warn of more to come*	I	'Record' unsubstantiated (See Table S4).
7	*Climate crisis: Romania faces its harshest winter in 30 years*	C	Directly contradicted by TN10p = 0 % and positive monthly anomalies. Last qualifying cold spell: 2019.
8	*Snow emergency declared after Mediterranean storm dumps record accumulation*	I	'Record accumulation' unsubstantiated: 50 cm is moderate by historical standards. 'Mediterranean storm' is accurate attribution.
9	*After the coldest January, now the worst February: Romania in an Arctic winter*	C	January anomaly = +2.3 °C (warm). February anomaly = +2.2 °C (warm). 'Arctic' inconsistent with Mediterranean cyclone attribution.
10	*Emergency services overwhelmed as winter grip tightens on south-eastern Europe*	I	Operationally accurate for 18 Feb; 'winter grip' implies sustained cold contradicted by the temperature record.

Table S4. Highest recorded snow depths (cm) at Romanian meteorological stations situated at altitudes ≤ 1.000 m a.s.l., ranked by snow depth. Data source: Romanian National Administration (ANM). The 2026 Bucharest accumulation of ~45–50 cm (Figure S2) corresponds to ≤29% of the historical maximum at comparable low-elevation southern Romanian stations.

Station	Altitude (m a.s.l.)	Snow depth (cm)	Date
Cotnari	289	**210**	14 Jan 1929
Calarasi	19	**173**	25 Feb 1954
Câmpina	461	**170**	29 Jan 1941
Joseni	750	**167**	13–16 Mar 1932
Botoșani	161	**156**	9 Nov 1959
Brașov	534	**152**	20 Jan 1923
Galați	69	**151**	8 Jan 1901
Turnu Măgurele	31	**150**	24–25 Feb 1954
Cernavodă	87	**138**	24 Feb 1954
Roșiori de Vede	102	**135**	24–26 Feb 1954
Slobozia	51	**133**	24–25 Feb 1954
Tulcea	4	**128**	23–26 Feb 1954
Titu	159	**128**	4 Feb 1954
București-Băneasa	82	**109**	24 Feb 1954
Baia Mare	186	**108**	9–10 Feb 1922

205 **References**

206 Kasperson, R. E., O. Renn, P. Slovic, H. S. Brown, J. Emel, R. Goble, J. X. Kasperson, and S.
207 Ratick, 1988: The Social Amplification of Risk: A Conceptual Framework. *Risk Analysis*, **8**,
208 177–187, https://doi.org/10.1111/j.1539-6924.1988.tb01168.x.

209 Landis, J. R., and G. G. Koch, 1977: The Measurement of Observer Agreement for Categorical
210 Data. *Biometrics*, **33**, 159–174, https://doi.org/10.2307/2529310.

211

212

213

214

215

216

217