

SEASONS IN THE SUN – WEATHER AND CLIMATE FRONT-PAGE NEWS STORIES IN EUROPE’S RAINIEST CITY, BERGEN, NORWAY¹

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Abstract This paper is a portrayal of aspects of weather and climate as front-page news in Europe’s rainiest city, Bergen, Norway. It descriptively explores the coverage and different contextualization of weather and climate. By asking the simple question of what actually constitutes a good or bad weather day in Bergen, short-lived weather descriptions in the news are compared with climatological data. The study reveals a complex picture with different annotations of good and bad weather depending on the season. It is found that while the amount of sunshine is important for defining a good weather day during winter, it is temperature that determines a good summer day. In spring, holidays and the anticipation to the summer result in a lower sunshine threshold for what to call a good weather day. The conspicuousness of rainfall is shown by both the amount of articles and the various contexts in which bad weather is presented in the newspaper. It is suggested here that it is not the amount of rainfall that creates headlines, but rather the context of the surrounding event, as well as the weather of the previous period. Human perceptions cannot be read off meteorological stations. Nevertheless, they can strengthen measurements and therefore, have a value in themselves. As a result, perceptions of seasonal or daily weather anomalies may well play a role in how society in Bergen will think about and experience a probable climate change with a projected increase in rainfall.

Keywords Weather · Climate · Sunshine · Rainfall · Perception · Media

¹ Preprint. Paper published in *International Journal of Biometeorology* (2007)

DOI 10.1007/s00484-006-0064-5

Received: 23 March 2006 / Revised: 18 September 2006 / Accepted: 18 September 2006

Introduction

Discussing the weather cannot be regarded as the main topic of conversation only in Britain, as the cliché tells us. Rather it is considered an important issue in virtually every country. People always have a great need to articulate weather news, for economic reasons such as agriculture, fishing, transport, leisure activities such as sport or cultural events, as well as for reasons of exceptionality during spectacular disasters or extreme events. Seasons and weather cycles are often idealized and simplistic, but they give people the feeling of predictability and reliability and offer room for planning (Stehr 1997). During the last 15–20 years or so, weather news has been enriched by reports on climatic change and global warming, raising concern that the climate will not be the same as we are used to. While it may be argued that gradual climate change will contribute most to re-shaping the earth ecosystems, it is the climate variations and extremes where peoples' response can be grasped easiest and implications for a potential rapid climate change be projected.

Weather issues are one of the most publicly consumed items in the media. There is evidence that the way in which the media portrays climate has an impact on how society as a whole perceives the current state of the climate (Ungar 1999). This notwithstanding, one must acknowledge that the media does not necessarily form – nor thus represent – people's opinions. Rather than telling what to think, the media tells people what to think *about*, through its simple presence of articles published (Mazur 1998). The print media plays a direct role in many short-lived weather situations and makes constructive contributions, such as in-depth discussion on climate change impacts or storm definitions, and provide essential background information on longer-lived hazardous phenomena such as winter storms, droughts or floods. In addition, stories and features on issues related to season specific activities have a kind of entertainment value.

This paper explores aspects of weather and climate dealt with in print media over a period of 10 years. Two research issues are addressed: The first one investigates the diversity of contexts in which weather and climate information is taken up in a newspaper's front-page stories. This serves as a background for the second issue, which tries to uncover the cliché of good and bad weather by comparing weather descriptions in the news with factual meteorological data. It is hypothesized that defining a day as good is a matter of supply and demand, suggesting that during seasons with generally much rainfall and darkness, even a day with relatively little sunshine gives the impression of a good or beautiful day². An attempt is made to quantify the good and bad weather cliché in climatological variables and quantities. The underlying hypothesis is that the print-media's presentation of weather and climate issues can serve as a proxy for how people actually look at weather, climate and weather extremes and provides a first indication on the importance and perception of sunshine and rain. Thematically, this study can be placed in the field of cultural climatology, which considers the complex interactions between the climate system and the human social and cultural system (Thornes and McGregor 2003). This concerns the way how society utilizes, exploits and adapts to climatic characteristics manifested by the mean, variability and extreme values (Thornes and McGregor 2003).

The case study for this paper focuses on print media in Europe's rainiest city, Bergen, Norway. Bergen is the regional capital of the west Norwegian county of Hordaland. Bergen tops the statistics with an average of 242 days with precipitation (>0.1 mm), and a total of 2250 mm of precipitation per year (Norwegian Meteorological Institute, DNMI). Rapid weather changes within a day and from day-to-day are dominant. This wet and highly variable climate is likely to have influenced not only its people and lifestyle (Figure 1), but also the way media presents good and bad weather, as well as weather extremes in their daily news. Projections about an

² The notion of “good” or “beautiful” weather is used interchangeably in this paper, not giving more weight to one than the other.

even wetter and milder climate along the Norwegian west coast (Grönaas et al. 2003 and 2005, REGCLIM September 2005) raise the question of how people will cope with such changes. The recent winter season 2004/05, where precipitation between November and January was more than twice the normal, with 1389 mm instead of 684 mm, and a yearly total of 3050 mm in 2005, gave a taste of what may be expected.



Figure 1: Audon Hetland, artist from Bergen, presenting the very special relationship of the local people with their weather. (A) Look, here goes the last Bergenser. (B) High tide at Bryggen. With kind permission from 'Hetland's Atelier', Bergen, Norway.

Although here we explore peoples' perception in an extreme climatic environment dominated by high rainfall, a somewhat comparable study has been performed in a more moderate climate. Palutikof et al. (2004) investigate by means of a postal questionnaire public perceptions of

unusually warm summers and winters in the UK. They focus on how people modified their behavior in response to past extremes and how this would affect their behavior and planned adaptation in case of warm weather becoming more common in the future. Regional differences in response between households in southern England and southern Scotland were partially explained by the regional differences in climate. Perception of anomalous warm and dry weather was generally more positive and climate change more welcome in southern Scotland than southern England, mostly because of the lower present-day temperature and higher precipitation in the former region.

Two different sets of literature serve as a baseline for the present study: 1) Literature on changing journalistic coverage of environmental and global warming issues, which produced a number of publications. Their relevance for this paper is in terms of scrutinizing the changing attention towards climate issues over time and its relation to ongoing climate anomalies. 2) Literature on human perceptions of weather. Unfortunately, little relevant scientific literature has been found on weather clichés and possible determination of good and bad weather. This may be due to the fact that it is a highly subjective and perhaps culturally defined phenomenon.

Boykoff and Boykoff (2004) refer to the divergence of scientific (as presented by the Intergovernmental Panel on Climate Change (IPCC)) and popular discourse on climate change and mass-media coverage over time. This divergence is manifested in the existence of anthropogenic contribution to climate change and in decisions regarding actions. They suggest the failure of translation between the scientific community and the media to be rooted in journalistic norms and values.

Weingart et al. (2000) divides the discourse of climate change in German media and politics into three phases. First, they found a sceptical approach, followed by politicisation and parallel catastrophe scenarios, and then ending up as routine political regulation. For them, media adopt the role of translating climate change into concrete and relevant everyday experiences and possible actions.

Ungar (1999) analyzes US and international events and their linkage to climate change. He supports Weingart et al. (2000) about the various attention phases over time, and relates them to the issue-attention cycle suggested by Mazur and Lee (1993), implying that coverage tends to fluctuate over time. Although he finds increased coverage on extreme events, no relationship was evident between that coverage and the frequencies in real-world impacts with respect to hurricanes.

Similarly, Balling and Cervený (2003), in comparing the popular perception with trends in severe storms in the US, find contrasting results. Although they do not provide further proof on storm perceptions, they conclude that the records on reduced severe weather fail to confirm the public perception.

An explanation for the fluctuation of natural hazards coverage is given by Mazur (1998), who contends that media coverage has reasons external to the hazards themselves. Coverage increases when connected to other prominent issues, or because of existing personal relationship between scientists and journalists. In terms of media's influence on people's perceptions, Mazur believes that it is the general quantity of exposure in stories that affects public concern, rather than the content of the stories.

Rebetez (1996) looked at the general complaints of lack of snow in winter and lack of sunshine in the summer in Switzerland and concludes that these views were not supported by the climatological data. Her findings suggest that human perception and remembrance of long-term climate tendencies is very limited, compared to short-lived extreme events.

In an in-depth study on human climate perceptions and adaptation to perceived changes in Ethiopia during the last 30 years, Meze-Hausken (2004) suggests that their low correlation with the underlying climatological data may be explained only partially by poor data quality, with further explanation found in socio-economic, cultural and other environmental changes.

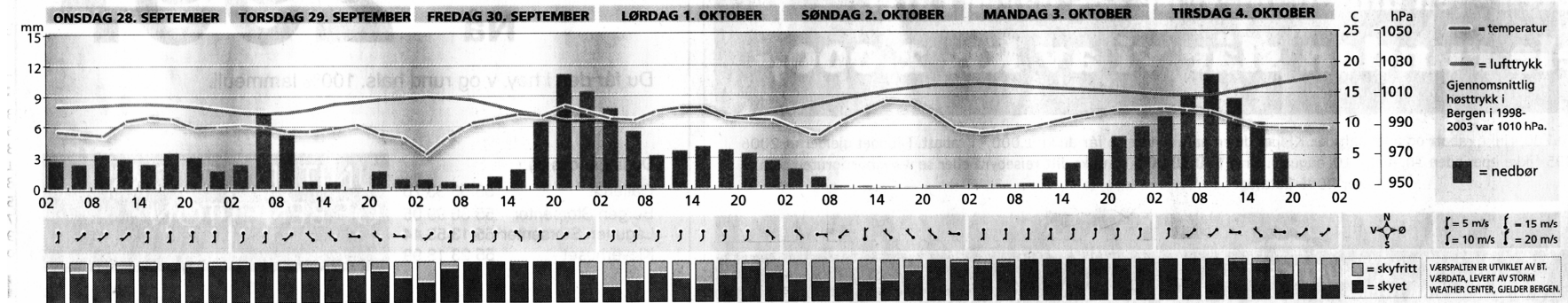
Per definition, weather can be described as the state of the atmosphere at a given time and place, whereas climate comprises the mean and the variability of the weather. Nevertheless, this differentiation is not made specifically in this paper. Because climate affects many aspects of our everyday life, in a positive or negative way, this study takes a wider view on newspaper coverage on that issue and comparing weather descriptions with actual data, rather than focusing on a single aspect such as climate-change news. It can easily be concluded that news or views on climate and weather reflect mostly perceptions on weather states and changes rather than being mirror-images of real-world events (Ungar 1999).

Data and Method

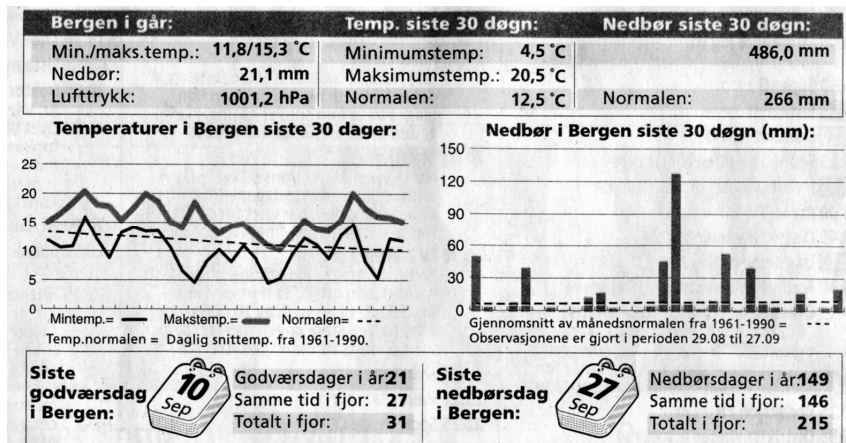
Material for this paper is collected from 10 years of front-page articles of the daily newspaper *Bergens Tidende*, spanning 1994–2003. *Bergens Tidende* is an independent, non-tabloid newspaper with a dominant status in the regional market of western Norway, with about 258,000 readers. It is arranged into two parts, the first part covering local, regional and foreign news, including economic issues, while the second part covers “general” stories, features, culture and sport.

First, a content analysis was performed to identify the different contextualisations of weather and climate. Content analyses involves sifting through large volumes of data and coding the content of documents, allowing inference by identifying special characteristics of messages (Holsti, 1969, in: Stemler 2001). Articles appearing on the front page (page one), as well as on the first page of Part II have been identified by hand search, and for simplicity both are referred to in the following as “front-page articles”. The sampling unit is the individual article, regardless of its size. The argument for restricting the content analysis to front-page articles was that the front page represents the editorial face of the newspaper, thus achieving greater exposure and being more likely to come to the attention of readers (Clayman and Reisner 1998, Fishman and Marvin 2003). A total of 809 front-page articles with a weather or climate context were found. These 809 articles made reference to 968 articles further back in the newspaper, where the topic received more in-depth treatment; here, however, only the front-page articles have been drawn upon. Without being able to compare with newspapers from other regions and countries, the occurrence of one weather-related article on the front page every 4 to 5 days on average gives a general indication about the importance of weather and climate in Bergen. *Bergens Tidende* emphasizes this through giving detailed 3-hourly weather forecasts for 7 days in advance and a 30-day weather review, so that the reader can set current weather issues in a broader temporal context (Figure 2).

Været time for time, syv dager i uken



a)



b)

Figure 2: Detailed outlook and review of the weather in Bergen. a) 7-day weather forecast on a 3-hourly basis. Graph shows estimates of precipitation (bars), air pressure (solid line), temperature (dashed line), wind speed and direction and cloud cover (dark bars at bottom line). b) upper Table: Temperature (°C), precipitation (mm), air pressure (hPa) for Bergen the previous day, minimum/maximum temperature and precipitation for the previous 30 days, as well as mean temperature and precipitation. Figure left: Minimum, maximum and mean temperature for the previous 30 days. Figure right: daily and mean precipitation for the last 30 days. Lower Table left: last day with good weather, number of good weather days so far this year, and previous year, and total number of good weather days the previous year. Lower Table right: last day with precipitation, number of rainy days so far this year, and the previous year, and total number of rainy days the previous year.

The criterion for text selection was that it was either: 1) dedicated specifically to weather or climate topics, e.g., discussing storm damages, accidents due to icy roads, climate conferences or a beautiful summer day, or 2) at least a tangential treatment of weather and climate, such as describing a sports or outdoor event and referring to the weather conditions surrounding that event. Thus, both weather and climate – by word or by meaning – were criteria for selecting an article. The results section offers excerpts from relevant statements that serve to document this selection. The articles on weather and climate cover a very broad spectrum of issues and contexts. An attempt was made to group them according to their main weather theme, such as disasters, seasons, or events. Nevertheless, the frequency distribution of themes revealed the demarcation of the categories to be questionable, admittedly artificial and not absolutely distinct. This would mean that many articles clearly had components from several categories, even if the primary weather message was the coding rule. In addition, a front-page text is ambiguous in itself, as the rules of what comes on the front-page are diffuse: it depends on the editorial policy, the competition with other news, as well as on the emotional impact of a story (Davis and McLeod 2003)

Geographically, the majority of articles were devoted to Bergen or the wider catchment area of the newspaper within the county of Hordaland. Others focused on broader even global scales, with issues dedicated to climate change or foreign weather disasters. From the 800+ articles, 149 were chosen – based on their description of weather/climate at a specific time and place (i.e., Bergen) – to study the cliché of good and bad weather in Europe’s wettest city. The rationale was to contrast perceived weather, as described in the news through a journalist, with actual weather data, without judging of how representative these descriptions are. The texts were placed in the two categories “bad” or “good” weather, according to which one of the two foci was chosen in the description. Nuances of very good or very bad weather were left out for reasons of simplicity. Each of these days was then compared with the meteorological data of that day from a weather station in Bergen. Out of the 149 articles, 77 front-page articles describe a specific *day* as the main news due to its especially sunny, rainy, hot or cold weather in Bergen. The other 72 articles represented *events* in Bergen, where specific reference was made to the weather during the event, such as an outdoor concert, anniversaries with open-air festivities, sports arrangements or visits of famous persons. Several events are described nearly every year by the newspaper. These events include Constitution Day on the 17th of May, the opening of the Music Festival in Bergen at the end of May, and several regattas (“Neglespretten” in January, or “Askøy Rundt” in August).

Weather data have been acquired by the Norwegian Meteorological Institute (DNMI, met.no). Sunshine data are from J.A. Olset, Geophysical Institute University of Bergen, Norway. The amount of sunshine is calculated as percentage of total possible sunshine for a specific day. This figure is more adequate than the usual measurement in hours of sunshine per day or month, as the variation of possible sunshine hours in northern latitudes varies considerably during the year. Basic long-term climatology of Bergen (station Florida) is listed in Table 1.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Precipitation mm	190	152	170	114	106	132	148	190	283	271	259	235	2250
Precipitation number of days >0.1mm	23	20	22	18	16	17	18	20	21	24	21	23	242
Temperature °C	1.3	1.5	3.3	5.9	10.5	13.3	14.3	14.1	11.2	8.6	4.6	2.4	7.6 (mean)
Sunshine hours	19.3	55.6	93.7	146.5	185	188.6	167.1	143.7	85.7	60.1	27.2	11.9	1184.4
Light breeze (8 m/s) or more - days	16	12	16	12	9	6	5	7	10	13	14	16	137

Table 1: Mean monthly precipitation and temperature , sunshine and wind for a 30-year normal period (1961–90), based on meteorological measurements, Bergen/Florida station (12 meter above sea level).

Results

The different contexts of weather and climate

Looking at the overall trend in front-page *Bergens Tidende* articles with weather or climate content, a decline is apparent (Figure 3a). It is uncertain whether this indicates a real trend towards reduced attention to weather and climate, or merely a change in layout or policy of the news board. The year with highest (1997) and lowest (2001) number of articles differ by a factor of two, showing the high variation of attention given to that issue. As mentioned, 1997 had the highest number on weather and climate related front-page news. 1994, 1997 and 2002 were El Niño years, resulting in exceptionally warm and sunny summer seasons in Norway and extreme weather events in many parts in the world. Additionally, the Kyoto Protocol was negotiated in 1997. In 2001, the IPCC released its Third Assessment Report, although this did not result in any front-page news on climate change.

Figure 3b shows that most front-page articles with some weather/climate content appear during the winter months and in July. In January and February, avalanches, winter storms and accidents due to snow chaos or icy roads fill the news, while in summer, joy about sun or disappointment because of rainfall describe people's holiday experiences and expectations. The minimum is one weather- or climate-related front-page article per month, and maximum is 17, with a mean of 6.7 articles per month. Eight months during the 10-year observation period had 14 or more articles related to a specific weather issues: February 1998 (very rainy), July 1997 (dry and very warm), July 1998 (very rainy and flooding in Europe), and August 2002 (heat wave in Norway, flooding in Europe). The other months with ≥ 14 articles had varied weather and climate news on *Bergens Tidende's* front page. A total of 68 articles were dedicated to foreign weather and climate news, primarily on climatic extremes and global climate-change issues.

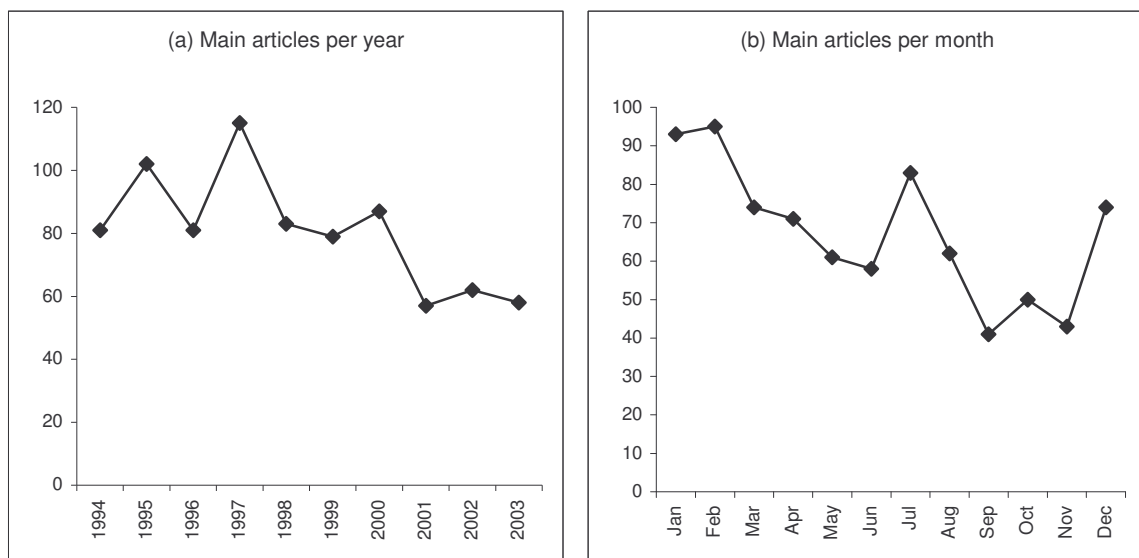


Figure 3: Annual coverage of weather and climate news on *Bergens Tidende's* front page. (a) Monthly coverage of weather and climate for the period 1994–2003, (b) Number of articles per month.

Seasonal issues receive by far the most attention on local weather and climate news. Front-page news linked to autumn and winter were nearly twice as common as summer and spring stories. The dominant issues are beautiful winter or spring/summer days. Other issues are related to

accidents due to icy roads, people missing in snowstorms or freezing to death, outdoor activities according to seasons, or hopes for weather conditions expected for a season (White Christmas, bathing weather). Exceptional circumstances such as ice climbing in Bergen (where winter temperature rarely creates frozen waterfalls), strawberries flowering in October or drought and water deficiency due to little rain receive attention as well. In addition, long-term weather conditions with impacts on economic activities are presented through case studies, e.g., the effects of temperature and precipitation on heating and energy prices, or the necessity to slaughter animals due to little fodder during a dry summer. Table 2 provides a translated excerpt of examples in the different categories. Weather extremes, mostly linked to accidents and damages, receive second most attention. There, issues related to avalanches dominate. Avalanches are perceived to be directly weather-related, although in several instances are triggered by human activities (e.g., skiers) rather than by specific meteorological conditions. Floods and storms, many of them leading to boat accidents, receive regular headlines, as well as occasional drought related fires, thunderstorms or heat waves, both locally and abroad. Stories on bad weather, in its simplest form equated with rainfall, are an important component of the front page as well. Negative aspects such as flooding, mudslides or complaints about the unpleasant conditions and weather depressions are regular features, even if rainfall itself is a very common event. Reduced ice-cream sales or amusement-park visits during rainy summers are contrasted with positive impacts of filling of hydro-power dams, reductions of drowning accidents, extra holidays for civil servants, or increase of sales in shopping centers and cinemas. Many stories about happy people doing sports during heavy showers give the impression that the challenge to live in this hard climate is met with pleasure.

Sometimes, weather and climate content is packed into front-page stories conveying seasonal feelings with poetic elements. They refer neither to a specific short-lived weather situation, nor to an event that needs to be mentioned in the newspaper. Rather, features are presented such as photo series on melancholic autumn atmosphere, about wedding plans in spring of loving couples, or motorcyclists preparing their Harleys for the first summer trip and hoping for good weather. While these types of stories are not published frequently, they do indicate clearly the need to articulate emotions and affections people have about weather and seasons. A number of stories are difficult to place in a broad category, such as on meteorological reports of weather predictions, statistics and prayers for good weather, or people moving to the warm South due to health reasons or to escape bad weather.

Table 2

Excerpts from relevant article statements or headlines in the individual categories.

Category	Examples of headlines and/or topics
Autumn and winter seasons	<ul style="list-style-type: none">• Cold beautiful New Year. The West Coast is covered in ice-cold, beautiful winter costume to honor the New Year. The cold created dream conditions for skiers.• Airborne goat-food. Goats in Akrafjord are on a slimming trip as the fjord is isolated due snow and ice. Monday food will be supplied by air route.• Many accidents on icy roads. The unexpected low temperatures have caused many traffic accidents, but fortunately no deaths
Spring and summer seasons	<ul style="list-style-type: none">• Benefit as long as you can. It may be that you have experienced the most brilliant Easter weather of this decade.• Last day of the summer? Sad but true. The good weather of the recent days can be the last for a while. So far, sale figures for barbeques and ice-cream are miserable for this year.• Good video-summer. The poor summer this year has given record sales for videos and sweeties. Get out, advises the psychologist. You cannot live in Bergen if you do not tolerate a bit rain.
Weather extremes	<ul style="list-style-type: none">• Insurance premium for natural disasters is going to rise. In the worst case, people on the West Coast must cover their whole risk themselves when living in regions with more extreme weather.• Fearing the flood of the millennium. The flood has forced already hundreds of people to leave their homes. Weather forecasts predict more rainfall.• Troublesome clean-up after the hurricane. Puddefjord Bridge is closed. An oil-platform which was in for repair, drifted into the bridge. One person killed by a slide flying through the air.
Bad weather	<ul style="list-style-type: none">• Unexpected slush stops Bergen. As people in town woke Thursday morning, the streets had become rivers and squares developed into lakes. Several schools decided to send children home again as they arrived completely wet from head to toe.• Rainfall record. Open the sluices! During the last 93 years Bergen has never measured so much rain in February as now. Weather depressed Bergen people get support from researchers: a rainy and dark February on the west coast can be worse than the permanent dark winter in Northern Norway.• Wet West Coast.... but what matters? Wet and happy. A group of tourists defied yesterday's weather-Gods washing the West Coast, and went on sightseeing through Bergen. Their good holiday mood could not be destroyed by flushing rainfall.

Table 2 (cont.)

Events	<ul style="list-style-type: none"> • Yesterdays' running competition was a historic sunshine event.. • Colorful festival in gray weather. 17th of May was celebrated very lively even if cold and rainy. • Sun-heated rain-festival in Bergen. While most of Bergen's population was sunbathing in the parks, the rain-festival was nearly eaten up by a sea of sun-beams.
Climate change	<ul style="list-style-type: none"> • A gas-power station is good climate politics. I am convinced that this will contribute to reduced CO₂ emissions, explains the energy minister. • Why do glaciers grow in Western Norway? The world's leading glaciologists and climate researchers meet at the glacier in Sogn, trying to answer difficult questions. Has anthropogenic climate change already started? Will global warming continue? • Climate change increases power generation. More rain and milder weather as a result of climate change will give higher water-power production. This will further increase our income on electricity.
Poetic	<ul style="list-style-type: none"> • The spring's final spurt: It is said that "spring" is a cliché. But when the sun starts to shine, the first beer been drunken outdoor, and people in Bergen prepare for a new season, it is not that dangerous (a report about different moods in people in expectation of an arriving warmer season). • Calm after the storm. It must be happiness, say people in Bergen, to become 100 years old and die with Wellingtons and an umbrella in your hands. Having lived for 100 years in Bergen, means, one has experienced around 28.000 days with rain and has owned nearly as many umbrellas (a report with many romantic pictures about left and destroyed umbrellas in the streets of Bergen). • Cold start for a warm relationship. They married outdoor while northern winds howled from the fjords (a story with many romantic pictures about a wedding couple in rough weather)
Others	<ul style="list-style-type: none"> • Prophesizing a wet summer. This warning comes from a 70-year old weather prophet in Asane. And there may be reason to believe her. Last year her prophecy matched well. This she could see already in October, as the forest was still green when the first snow arrived. And this is a secure sign for a following rainy summer. • Sun-filled aging for those who know how to enjoy life. Here are a lot of nice things to see, confirms an 80-year old lady, with a quick view over the overfilled beach in Benidorm in Spain. A brand-new retirement home is built for people from Bergen, far away from wind and rain. • Praying for good weather. All energy is used to celebrate the anniversary at Moster church as remarkable as possible. The wish for good and suitable weather is now an essential part of the prayer in all mass services in Sunnhordaland (south of Bergen).

The intensity and frequency of news about climate change has been dealt with in a number of publications (e.g. McComas and Shanahan 1999, Ungar 1999, Boykoff and Boykoff 2004). Climate change becomes newsworthy if identifiable events – such as an extreme event or an anomalous season – can be linked to a scientific issue (Weingart et al. 2000). For the people in Bergen – and thus *Bergens Tidende*, publishing a total of 66 front-page stories – the issue of climate change is quite important for two reasons. First, the University of Bergen intensively conducts geophysical research on climate change. This results in occasional newspaper headlines about research highlights and interviews with scientists. Second, several numerical models – including the Bergen Climate Model, a coupled atmosphere–ocean general circulation model (AOGCM) – project an increase in rainfall for western Norway in the order of 10 to 20%, especially during the autumn and winter and an increase of 15 days of rain per year by the end of this century (Grönaas et al. 2003 and 2005; REGCLIM September 2005). Although the year-to-year variability in rainfall is much larger than the long-term trend, the possibility of being confronted with even greater amounts of precipitation captures journalists’ attention. Local rainfall records or other weather extremes, not uncommon for western Norway, are then related to a first fingerprint for anthropogenic climate change.

Quantification of weather clichés

According to the Merriam-Webster Dictionary, a cliché is a stereotype, a trite phrase, or a characterization. Conversation about a “good/bad day today, isn’t it?” is a common and overused expression in many languages. But what actually makes a day good or bad? This question may sound very trivial, but to answer it is a complex problem. Opinions will vary depending on whom to ask. For example, good weather can be defined as weather suitable for outdoor activities, a shift in atmospheric conditions towards high pressure, or temperature suitable for a particular economic activity such as agriculture or tourism. For a sailor, sunny but calm is bad weather. For a person allergic to pollen, bad weather may be considered good weather. Every region in the world will have a different threshold and bandwidth of how to define weather as good or bad (Meze-Hausken, under review).

Example of text or headline	Coding
Gorgeous opening: Everything was as it should be when the festival in Bergen welcomed the King and the Queen: neatly dressed children, waving flags and beautiful weather.	good
Jazz in rainy-Molde. Moldejazz had a dreary start. 10 degrees C (in mid-summer) and pelting rain was not what camping jazz-enthusiasts were dreaming about.	bad
Anomaly: Wet homage to rainfall in Bergen. The opening of the 'rain-hut' at Lungegards-lake could not have got a more venerable frame. Pouring and incessant rainfall. Wet and cold. Clammy, grey and sad. As only Bergen can be. The artist has worked with a monument which is a homage to the elements of nature and to rainfall in Bergen especially.	(good)
Anomaly: 'Neglespretten' (cracking nails regatta) practically without wind. Wintry with 1°C and snow on the mountains. But it looked bad with proper wind. Therefore, what normally is known to be the winter's most nippy sailing adventure, became an idyllic and shortened event.	(bad)

Table 3: Translated excerpts from front-page stories classified as either 'good or beautiful' or 'bad'.

Here, in order to investigate the concept of good and bad weather, a total of 149 articles were chosen, as mentioned earlier. The following presents an attempt to link meteorological data to what is described by a journalist as a good or bad weather day in *Bergens Tidende* the following day. Note that the reader already knows that it was hot, sunny or rainy, as he has had first-hand experience himself, but once it is officially published in the local paper, it becomes news. Text connotations such as 'sunshine', 'finally summer', or 'beautiful spring day' were classified as good, whereas 'freezing', 'gray and wet', or 'rainy' were coded as bad. Note however that simply cold or windy conditions during a summer event may be a reason that an event was characterized as bad, if people or the journalist had been expecting warmer weather. Excerpts of the coding are presented in Table 3. By combining the temperature with the amount of sunshine on the described days, it is thought to extract a quantitative bandwidth of these variables that gave such days its positive image. Rainfall and bad weather are treated separately.

Ninety-six front-page stories described (A) a DAY so special that its weather characteristics were the main content, e.g. text about sun worshippers in the harbor during a clear summer day, and 91 stories (B) reported an EVENT, garnished with weather descriptions of that day. Of these, stories from places outside Bergen and those referring to climate variables other than sunshine, temperature and rainfall, were excluded from the in-depth analysis, leaving 77 DAYS and 72 EVENTS for further study. Events that encountered a weather condition unfavourable to the event, can be referred to as an anomaly. So for example if a day such as the annually celebrated "umbrella day" in Bergen falls on a sunny day, it is referred to as a bad-day anomaly, as the article tells that everyone is waiting for rain which usually comes reliable during that time of the year. Vice versa, if pouring rain during umbrella day or the opening ceremony of a rain monument, it was described as a good day event. In addition, a beautiful but totally calm day during a sailing competition is referred to as bad day event because everyone hopes for wind. A total of six stories were found on anomalous events. They are here mentioned as curiosities and have not been included in the graphs as their sunshine and precipitation values have opposite signals to what would be expected, and thus, otherwise would distort the results.

A - Good and bad weather DAYS:

In Bergen, good weather is the exception, rather than the rule. This may explain why stories about a good weather day tend to dominate in all except for one year (Figure 4). With an annual mean of only 1184 hours of sunshine (DNMI), Bergen has the least in Norway, and probably in Europe. For comparison, London and Berlin have 1837 and Athens 2884 sunshine hours per year. Thus, a sunny day or several consecutive days of sunshine may appear special enough to a journalist to be given high priority in the news. Other important variables related to good weather are temperature and, although not mentioned directly, calm stable air – Bergen has on average 137 days with light breeze (8 m/s) or stronger. When a certain day receives front-page headlines as good or bad weather, it may be due to an anomaly such as a strong deviation from the norm, a change of short-lived weather situations, the start of a season (first summer day, first winter snow) or an exceptionally long period of a certain weather condition. Figure 5 indicates the range of climatic variables that were linked to a front-page story. Maximum temperature relates to good weather headlines in spring (MAM) and summer (JJA), rainfall to bad days all year, and minimum temperature in winter (DJF) refers to good days as well, because cold periods during that time of the year mostly are accompanied by stable high pressure and sunshine. Autumn only occasionally produced stories on good weather days, certainly linked to the predominant low-pressures during that time of the year.

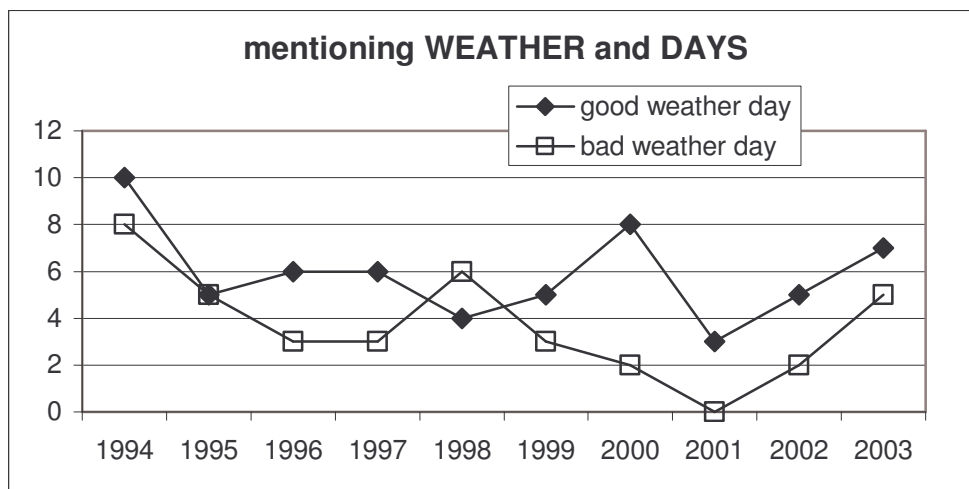


Figure 4: Front-page articles per year which have an especially good or bad day as the main theme. Except during 1998, good weather days get more headlines than bad weather days.

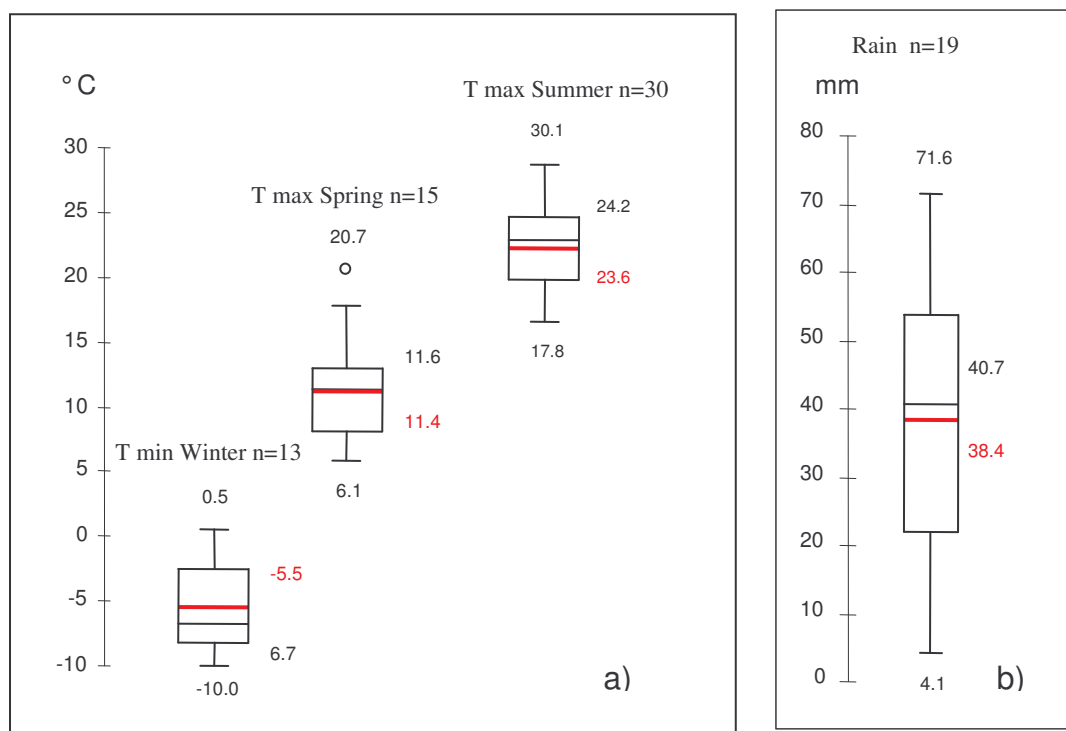


Figure 5: (a) Temperature range when mentioned as beautiful DAY according to the season. T min is minimum temperature on a beautiful winter day, T max is maximum temperature on a beautiful spring/summer day. Autumn is omitted as the sample number was too small to be representative. Box Plot includes mean, median, minimum and maximum values. The thick line in the box-plots represents the mean, the thin line the median. (b) Rainfall range when mentioned as bad weather day in mm/day.

Combining temperature with the amount of sunshine (relative sunshine in % of possible duration) makes it possible to extract which variable makes a day special enough for a journalist/editor to place an article about it on the front page. Figure 6(a) suggests that to be mentioned as a beautiful winter day, sunshine is most important, minimum 43%, and thus, the range of sunshine defining nice weather is smallest compared to other seasons. Low temperature is often just an indicator that the region is experiencing high pressure. In spring, the situation is more ambiguous. Figure 5(a) and 6(b) show the largest temperature range, between 6 and 20 degrees. Even if it is cold with relatively low amount of sunshine, 37%, headlines mention a beautiful spring day. This may have to do with the fact that the Easter holidays fall in the spring and these long public holidays are very important to the Norwegian society. Most people spend their days off in the mountains or in their cottages on the sea – and generally little spoiled with good weather during the year, even a non-rainy day with some sun gives them satisfaction. In addition, after the long and dark winter, people probably await the first signs of spring with great eagerness. Thus, for spring, the sunshine threshold for designating nice weather is lowest. To be categorized as a beautiful summer day in the headlines, temperature is most important. Figure 5(a) and 6(c) indicate a slightly narrower (but not significant) temperature width than in the spring, between 18 and 30°C, but the widest range of relative sunshine, between 12 and 100%. This suggests that media impart to their readers the feeling of summer as long as the temperature outside allows the wearing of summer clothes or beach-life, regardless of how cloudy it may be.

Front-page articles on rainfall and bad weather appear occasionally, even though the occurrence of rain in general is commonplace. In Figure 6(d) all bad weather articles are ranked according to the amount of rainfall of the day described, without any differentiation according to the season. The nearly linear point-scatter reveals that it is not the amount of rain that creates headlines, as a journalist writes about bad weather, flooding in the streets and rainfall if there is just 4 mm of rain or a record of 71.6mm within a 24-hour period. Therefore, such headlines on rainfall always need to be interpreted in connection with the happening – may it be an accident, or with the weather in the period before the rainfall event. So, the first rainy day after a week of summer sunshine may be worth a newspaper headline, the same is in the case for a continuous period of rainfall of several weeks, even if the single day that bears the headline only had a few millimeters of precipitation.

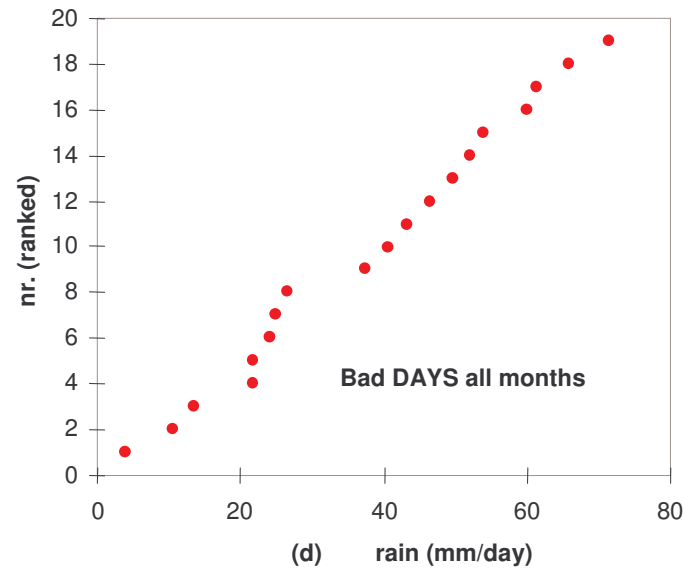
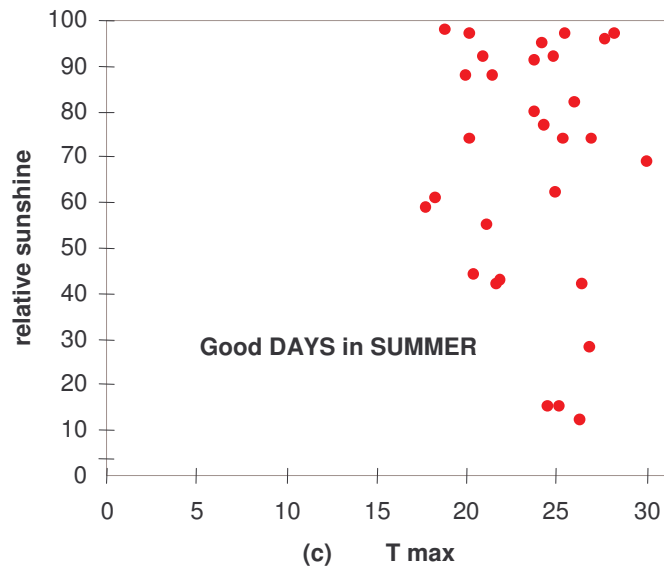
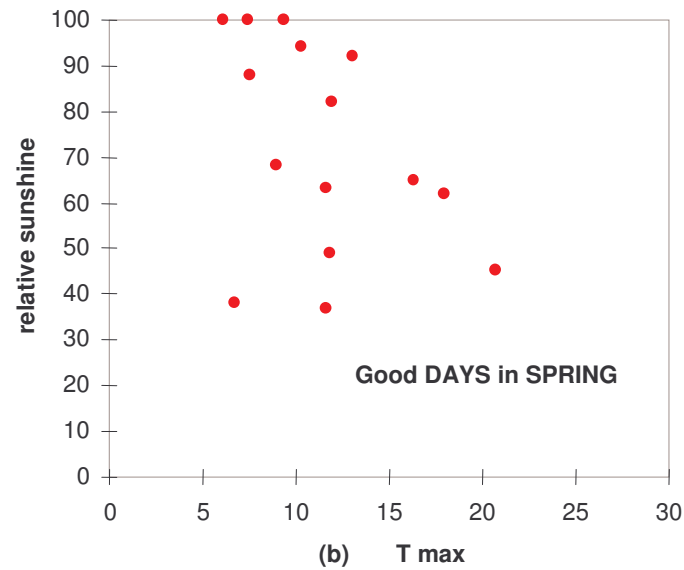
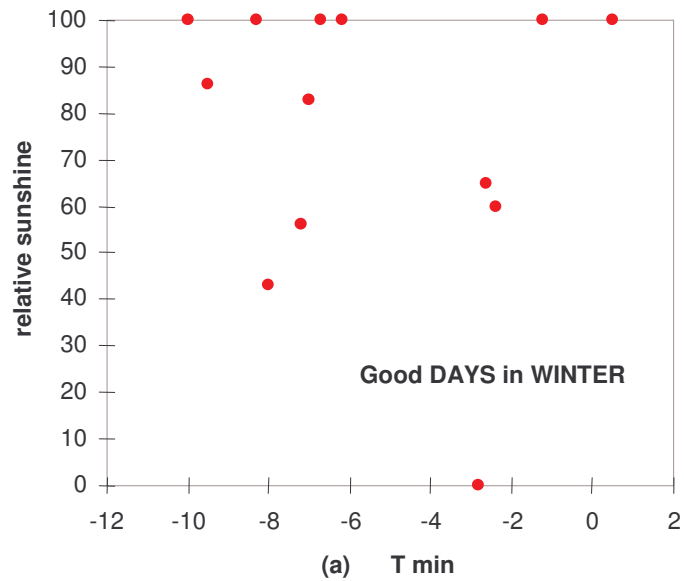


Figure 6(a-d): Climatic conditions for DAYS which have been described as good or beautiful with respect to sunshine and temperature on *Bergens Tidende's* front-page (a-c), and as bad, with respect to rainfall (d). Relative sunshine in percent of possible sunshine. Autumn is omitted as the sample number was too small to be representative.

B- Good and bad weather EVENTS:

Compared to good and bad weather DAYS that occasionally *may* receive headlines, local EVENTS and happenings almost surely will be described in the newspaper, albeit not necessarily on the front-page. Then again, if mentioned on the front page, it is not given that the article refers to the weather condition during the event. Nonetheless, for the articles selected, most had the weather included in the headlines, such as “Cold shower for music fans” (a music festival during heavy rainfall), “Icelandic sunshine visit” (Iceland’s president visits Bergen during beautiful winter sun), or “Defying weather for SS Norway” (people say goodbye to the world’s longest cruise ship, even if it is rainy and windy). Figure 7 ascribes, similarly as Figure 5 and 6, meteorological data to an event that has been described as beautiful or bad because of good or unsatisfactory weather. Again, only events that referred to climate variables such as sunshine, precipitation and rainfall have been picked out. The boxplot 7(a) shows that an event that is described as good weather (all year) does not need to have sunshine (e.g., an unexpectedly warm November day), but in most cases, it has between 30 and 85% sunshine. On such days it can rain even up to 18mm (not shown).

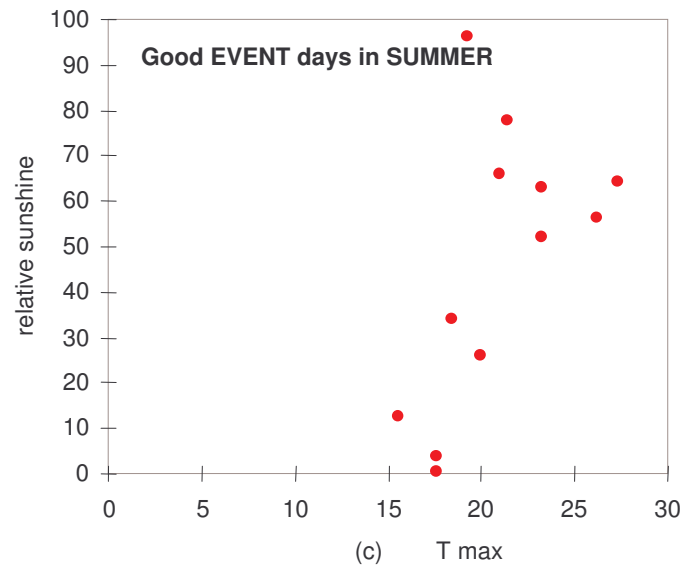
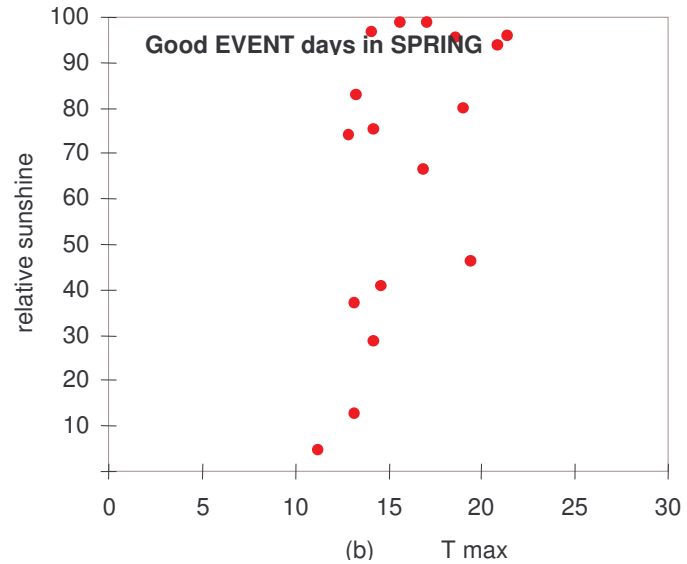
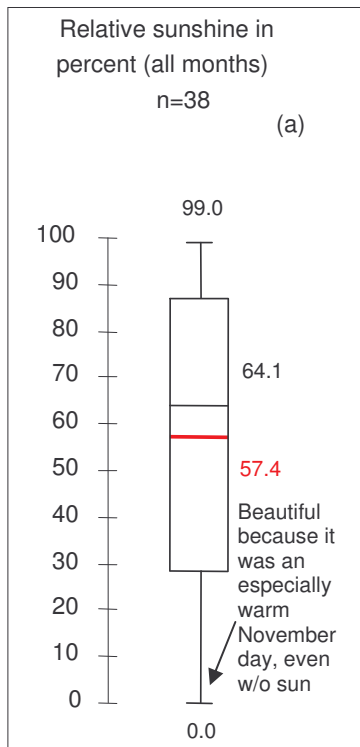


Figure 7: Climatic conditions for EVENTS which have been described as good or beautiful with respect to temperature and sunshine on *Bergens Tidende's* front-page. (a) sunshine-range alone, (b)-(c) combined temperature and sunshine. Box Plot includes mean (thick line), median (thin line), minimum and maximum values. Relative sunshine in percent of possible sunshine. Separate autumn and winter event days are omitted in the analysis as the sample size was too small to be representative.

Combining the amount of sunshine with temperature, Figure 7(b) indicates that during spring, an event to be described as having nice weather, temperature is above 12 degrees with at least 5% sunshine, but mostly between 70 and 100% sunshine. One reason for mentioning good weather even despite little sunshine, is related to the fact that the Norwegian Day of the Constitution (Nasjonaldagen), which receives attention on the newspaper's front page every year, falls in the spring (see below for further explanation). During summer, concerts, regattas or other sport competitions are mentioned as events with a weather description. There, a good day has to have at least a moderate temperature (e.g., 15°C), but sunshine is not necessarily needed, as the dots at the bottom of Figure 7(c) indicate. The good EVENT days analysis confirms what the analysis of good DAYS already shows, that the range of sunshine to be considered as a beautiful day is very wide in Bergen, from practically without sun to sunny the whole day. But sunshine in the spring is for both EVENTS and DAYS more important than in the summer (mean sunshine for good EVENTS in spring/summer is 63/46 % and for DAYS it is 72/68 %).

Bad EVENT days, presented in Figure 8(a) reveal that it does not necessarily have to rain much in order to give an event a bad weather appearance. On such a bad event day, it can still have up to 94% sunshine (see Figure 8(b)). It shows that except for two days, sunshine was below 45% and mostly below 10%. The two high sunshine values combined with little rain derive from cold temperature on that day, which gave the event a negative appearance. For EVENTS, the mean precipitation amount on bad days is considerably lower than for DAYS, 11.9 versus 38.4 mm. This is because the majority of events occur during spring and summer, when there is generally less rainfall.

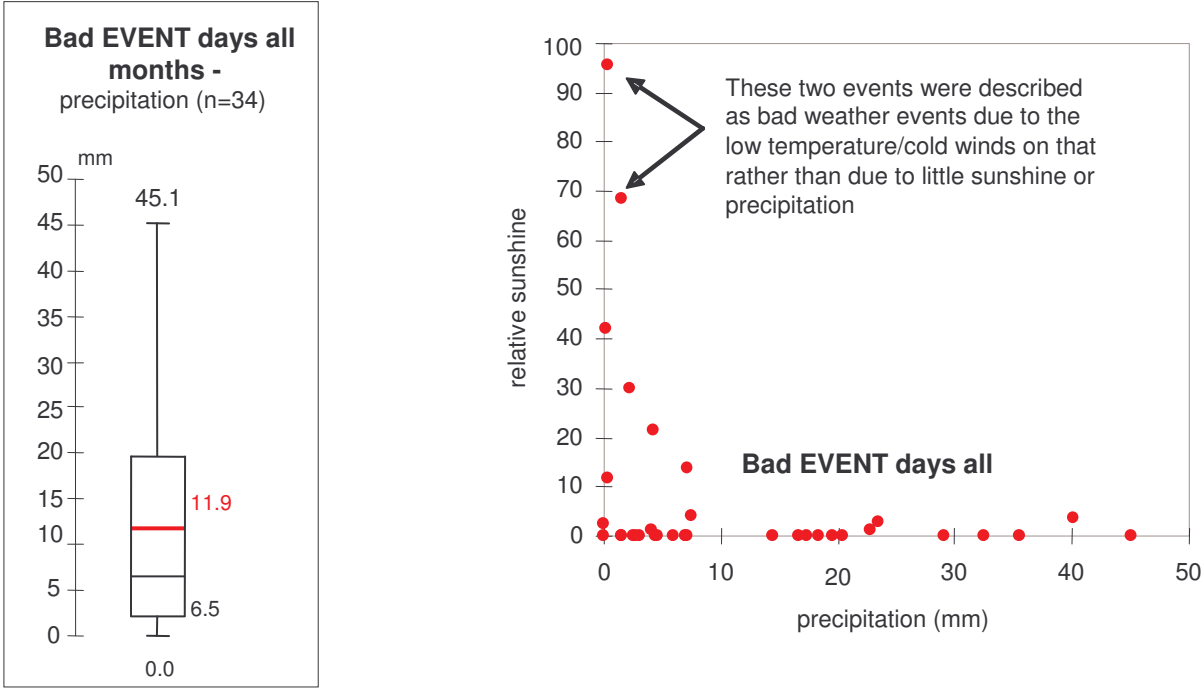


Figure 8: Bad weather EVENTS in *Bergens Tidende's* front-page with their respective precipitation and sunshine (sunshine in percent of possible sunshine). Box Plot includes mean (thick line), median (thin line), minimum and maximum values

The Norwegian Day of the Constitution, 17th of May:

The National Day, Norway's most celebrated event during the year with parades, parties and outdoor happenings, gets front-page headlines every year. Weather is an important feature of this event, because people wear their national costumes on that day, which are sensitive to rain, and most activities are performed outdoors. In nine out of 10 years, the weather on the National Day was

described on the front page of *Bergens Tidende*. The extent to which the event description reflects the actual meteorological data is summarized in Table 4. On two days, rain was mentioned on the front page, even if it occurred in negligible amounts. The fact that one of them was very warm – the warmest National Day during the period – was not even mentioned due to rain. To be remembered as a beautiful spring day, there apparently does not need to be more than 29% sunshine, as long as this sunshine comes through during the hours of the parade.

Table 4: Summary of weather on the 17th of May (Day of Constitution) in Bergen.

	Description of the day in Bergens Tidende's front page	Sunshine in %	Maximum temperature (°C)	Precipitation (mm)
1994	Sun and spring-weather, not a single umbrella seen	37	13.2	0
1995	Rain showers and some welcomed rays of sunshine	42	9.4	0.4
1996	Gray weather and cold, some rain and unpleasant wind	12	9.5	1.2
1997	Summer, nice weather, summer temperature	94	17.5	0
1998*	Beautiful weather	92	17.9	0
1999	Lovely spring weather	99	17.1	0
2000	Rain showers, dark gray sky	1	18.9	26
2001	Nice, rain postponed, sun peeps out	29	14.2	0
2002	Beautiful, to be remembered	66	16.9	1
2003	Sun and weather proper for national costumes	41	14.6	0

* only mentioned in the inner part of *Bergens Tidende*.

Discussion and Conclusion

Mass media have their own rules for determining if and how a given issue is covered, as their primary interest is to capture the attention of the targeted public. An analysis of *Bergens Tidende* has shown that climate and weather issues tend to dominate front pages throughout much of the year, truncating the normal range of news topics, although some seasonality is present. The issues are wrapped into a wide spectrum of news articles: Those giving information primarily on damage and accidents caused by weather calamities, and others, having more of an entertainment value than providing facts. Some stories on anomalous climate seasons or weather disasters lead to engaged debates over causes, impacts, and mitigation for the future, while others provide an event-description with some connotation of the weather during that event. Scientific knowledge on topics like climate change or El Niño is presented in a way which the audience comprehends without deeper knowledge of the subject, and is aimed to place local happenings in a wider time- and geographical perspective. In most cases, when identifiable events such as an anomalous warm summer or extremely rainy month are linked to climate change, comments from meteorologists of the University of Bergen are included, that something still lies within the normal range of weather calamities to give a more balanced view. Individual days with exceptional weather as front-page news indicate rarity and exceptionality of a condition and are often accompanied by illustrating pictures. Additionally, stories on narratives and feelings related to weather and climate convey a poetic atmosphere and romance.

Any interpretation of the quantitative and qualitative development of news attention to weather and climate over the 10-year investigation period must be done with caution. The annual number of articles shows great variance, as content of topics and alertness to weather and climate fluctuates over time. On the first glance, the 10-year period would suggest a waning of interest in such topics. Still, as the sample period is quite short, it is mere speculation whether or not this change is influenced by a reduction of newsworthy weather/climate conditions, a decrease of attention by the journalists or changes in the policy or layout of the print media. Editorial gatekeeping, the process of how stories are chosen for the first page from an available pool, is a social process, and cannot be explained by strict

selection criteria (Clayman and Reisner 1998). Extreme weather years like the El Nino in 1997 or the “storm of the century” in January 1994 on the Norwegian west coast create many front-page news stories in *Bergens Tidende*. However, comparing the amount of sunshine with the number of weather articles in the summer reveals that these two issues are not correlated. For example, there is no tendency for an anomalously sunny or wet July to result in more headlines than otherwise. Similar results have been confirmed by Ungar (1999) where television coverage of hurricanes was not found to reflect the frequency of real-world events. Thus, the competition with other urging issues leads to the conclusion that ‘the media will report what seems worth reporting, given the profession’s limits of space and time’ (Weingart et al., 2000). As Mazur (1998) suggests ‘The media are fickle. Unfortunately, their attention and concern rise and fall without much relationship to changes in the physical state of the world’.

In Bergen, Europe’s rainiest city, good weather news is at least as important as bad weather news. Although the rarity effect is more prevalent for good weather, bad weather news captures readers’ interest through their influence on daily life, as well as on damage and accidents. Presenting weather by a dichotomy of good and bad is certainly a simplification of the many nuances expressed in the news. In Bergen, journalists may describe rainfall in as many variants as there are for snowfall in the language of the Inuit. However, it can be hypothesized that it is this simplified “good” or “bad” picture that is kept in human memory.

Comparing good and bad weather descriptions in the newspaper with meteorological data from the same day reveals different annotation of weather depending on the season. It can be inferred that in the winter, the amount of sunshine is most important for defining a nice weather day, while temperature is most important in summer. In spring, it is the expectations of escaping the cold winter months that drive the perception of a nice weather day, as well as Easter holidays and various celebrations/events. There, the threshold for what is regarded as beautiful weather is lower, in respect to sunshine, and the temperature range of a perceived beautiful day is larger, than during other seasons. But in general, days with some sunshine/moderate temperature following a bad weather period are described as wonderful in respect to the weather. A bad weather day to be mentioned in the headlines is much more difficult to define, as the amount of rainfall on that day does not need to be very high. Both the duration and intensity of rainfall can be the trigger for producing a front-page article. Therefore, the story needs to be interpreted in the context of the happening – such as accidents due to flooding – or with respect to the weather of the preceding days.

Several years ago, suggestions were made in Norway of measuring a bad or good weather day through a more complex index than the one used currently³ (Bergens Tidende, 15.08.1997; Bernt Lie, DNMI, pers. comm.). Although the establishment of indices is a difficult and subjective task in itself, a weather index was proposed, ranging from 1 to 100, depending on a combination of hours of sunshine, temperature, and windspeed. The timing of sunshine should be taken into consideration as well, as a clear sky early in the morning when people are asleep does not contribute to human welfare. Similarly, a short rain shower during an otherwise sunny and warm day does not destroy the feeling of having enjoyed a beautiful day (as long as the shower does not coincide with, e.g., the opening of a concert or the arrival of the King). Such timing of stochastic weather conditions has thus considerable impact on the description of weather in the media headlines. However, this index has not been introduced yet.

Analyzing 10 years of the *Bergens Tidende* shows that people in Bergen have a highly ambivalent relationship to their weather and climate. On the one hand, the amount of rainfall creates pride – being the wettest city in a month, is at least as important as being the wettest on average throughout the year. Feature stories on more unorthodox topics like umbrella culture, rain clothes fashion, rain festival or celebration of the annual umbrella day strengthen the self-confidence and may act as a distraction and comfort while anticipating the next sunny day. However, using this rainy image as a peg in marketing campaign, such as the hydroelectric industry once tried for selling power in neighboring countries, is

³ The current good weather index defines a good day as being less than 50% cloudy at three observation times during a day and precipitation less than 0.9 mm.

strongly opposed by the regions' tourist council. What can be the argument against promoting Bergen as "The city under the rainbow"? On the other hand, journalists write about people in Bergen as champions in complaining about bad weather. Nevertheless, after every rainfall record (per season, month, decade) that is supported by statistical evidence, readers are calmed down by reminding them that there is no bad weather in Bergen, just bad memory – at least *selective* memory. A summer such as 1997, with warmer, drier and sunnier than average weather and the highest number of front-page weather articles of the observation period, probably raised people's expectations about nice weather the following year; thus, complaints about abnormally bad weather in the newspaper were nothing else than a description of the normal. People including journalists tend to remember only what they want to remember (White Christmas: Rebetz 1996, sufficient rainfall in drylands: Meze-Hausken 2004), and while positive experiences are kept fresh in mind, negative ones are thrust aside.

This study investigated how society, here represented through journalists and news in print media, value, think about, and perceive weather events and climatic conditions. It has become evident that human perceptions of weather cannot be read off meteorological gauges. Nonetheless, weather perceptions can strengthen measurements and therefore, have a value in itself. Further case-studies are needed on this issue as knowledge on perceptions of these seasonal and daily weather anomalies will give us a better understanding about how people may experience and perceive a likely anthropogenic induced climatic change (Ader 1995). For climate-change impact models, this information can serve as a baseline for societal response and as a mean to validate their outcomes against. People's expectations have been shown to play an important role in defining a day or a season as bad or good. Such expectations may certainly contribute to how residents of the Norwegian West coast are going to sense a projected increase in annual rainfall under global warming. In this region, good weather days will certainly get more importance, and thus, receive more media attention, due to its rarity effect. Eventually, thresholds of what to define a good day will change, thus, expectations of high temperature during summer, as well as of sunshine all year may lower. A day with some precipitation and at least periods of sun could appear as still beautiful, indicating the need to change the official classification of what can be called a good weather day. Similarly, as bad weather days may become more common, they may produce less news in the future. But as at the same time, adverse weather events may increase under climate change – for Bergen and western Norway in terms of storms or extreme rainfall episodes – the public and media attention towards the resulting negative consequences (on human life, economy, etc.) may be enhanced. As society becomes familiar with such a repetitive pattern, one can just wonder to what extent they come to regard it as a new normality and not as a pattern of change.

Acknowledgement:

I am indebted to JC Hansen for many interesting discussions on this topic. MW Miles helped with language editing. The study has been funded by the Norwegian Research Council and the University of Bergen.

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