sustainability

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Opportunities in Identifying and Marketing Windsport Tourism Destinations: High-Resolution Wind Analysis

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Abstract: Windsports (e.g., windsurfing, kiteboarding) can contribute to important tourist experiences at destinations with suitable natural resources. In the context of future tourism decarbonization, it is expected that many distant locations will become less accessible to Europeans, which will increase the attractiveness of nearby destinations. This study provides an analysis of the natural resources of European and nearby windsport destinations, which proves to be important physical evidence for windsport experiences. The high-frequency output of a long-term, high-resolution numerical atmospheric reanalysis (COSMO_REA6) was thoroughly analyzed using a method specifically tailored to windsports. This gives us unprecedented insight into the geographical distribution of wind resources in the period from May to September. The wind and temperature analysis recognizes the most known windsport locations and identifies several potential locations for possible windsport development. The trend analysis identifies potential changes in future wind conditions. Detailed wind analyses are of great importance to destination managers and marketers, as these could support strategic planning at the destination level, which is necessary for sustainable development. Furthermore, the study can guide windsurfers and kiteboarders in their future destination choices.

Keywords: windsurf; sailboard; kiteboard; destination marketing; destination management; adventure tourism

Citation: Vodopivec, M.; Konečnik Ruzzier, M. Opportunities in Identifying and Marketing Windsport Tourism Destinations: High-Resolution wind Analysis. *Sustainability* **2022**, *14*, 16589. https://doi.org/10.3390/su142416589

Academic Editor: Alan Fyall

Received: 24 October 2022
Accepted: 7 December 2022
Published: 11 December 2022

1. Introduction

After a sharp decline in windsurfing (sailboarding) in the late 20th century [1], windsport has experienced a new rise in popularity with the development of kiteboarding (also known as kitesurfing) and technological advancements in windsurf designs and production. Consequently, the windsport tourism segment has grown as well [2,3] and some European nations have large numbers of recreational windsurfers and kiteboarders [4].

Adventure tourism supports substantial international commercial tourism industry subsectors [2–6], and although windsport represents a niche tourism segment, it can be of high economic importance for regional development [7–10]. Quintana and Canino [11] show that in the case of the island of Fuerteventura (Canary Islands, Spain), the René Egli kite and windsurf center alone attracts between 50,000 and 60,000 tourists per year, accounting for 3% of all tourists on the island. Moreover, this is only one of many windsport centers on Fuerteventura, albeit the largest one. Similarly, Gone Surfing Crete windsport center claims that Plakesatro (Crete, Greece) and its surroundings rely heavily on windsport tourism (personal communication).

Although a slight breeze is preferred by summer vacationers, strong wind is perceived as a nuisance in traditional tourism [12–18]. Through windsport offerings, windy regions could turn this into an advantage and attract a different segment of customers [19]. Studies show that sport tackles seasonality in tourism and investments in windsport tourism development could extend the tourist season in locations with suitable natural resources [10,20–24]. On the other hand, strategic planning is necessary to ensure sustainable development of tourist destinations [25]. Lack of management can cause unfavorable

influences of sport tourism on the environment [26] and society [27–29], and can lead to intergroup conflicts between bathers and sport practitioners [30].

The average windsport practitioner is middle-aged, well-off, and usually travels with a partner or a family [4,11]. Recently, the number of older adventure sports tourists has increased [31,32], in contrast with the general image of young 'surf bums'. Therefore, windsport tourists should be seen to represent desirable customers potentially significantly contributing to the local economy [10,24,28,33]. A study among golfers, scuba divers, horse riders, and windsurfers in Messinia (Greece) has shown that the latter spend more time in the region and have the second-highest expenditures in the group [8].

The recent coronavirus pandemic [34] has strongly affected the tourism sector and sport tourism is known to be more resilient in times of crisis [35–37]. Therefore, it should provide suitable destinations with a more stable source of income. Island tourism has been among the most affected by the pandemic [38] and according to Hellenic Statistical Authority (ELSTAT), the island of Crete (Greece) faced a decrease of 77.7% in nights spent in short-stay accommodation establishments from 2019 to 2020 [39]. On the other hand, Gone Surfing Crete windsport center reports only a 30% decrease in turnover (Mr. Zimatikas, personal communication). According to the latter, the people passionate about windsport (and adventure sports in general) find it harder to cancel their summer trips than regular sun and beach tourists.

According to Eurocontrol, the number of European flights in 2020 fell by 55% compared to the previous year [40]. It is expected that health concerns will reduce the number of passengers in the coming years, as the fear of contagious diseases has the power to modify tourist behavior [41]. Furthermore, with the anticipated reduction in oil liquids availability and reduction of greenhouse gas emissions [42], and in order for tourism to be considered sustainable, the carbon footprint of the tourism sector will have to be reduced considerably [43]. This means that long-distance flights will become less accessible to windsport tourists. From this perspective, and in the event of any future epidemics, it is to be expected that European kiteboarders and windsurfers will start turning to known nearby locations or looking for new favorable destinations that can be reached by (non-fossil-fuel-powered) cars or camper vans.

In sport tourism, it has been shown that the availability of natural resources is the primary criterion in the choice of travel destination [4,19,23,36,44]; therefore, the primary concern of windsurfers and kiteboarders is the availability of desirable wind conditions. Recently, a new long-term reanalysis of weather across Europe and neighboring regions has been made publicly available [45]. With high spatial and temporal resolution, it offers a perfect opportunity for a thorough analysis of suitable wind resources. The present study represents the first long-term, spatially homogeneous analysis of wind conditions over Europe and its surroundings. Therefore, it offers an unprecedented insight into the geographical distribution of wind resources in the period from May to September.

The purpose of this article is to provide an analysis of the natural resources for windsport in Europe and some of its close surroundings (North Africa and parts of Western Asia). Natural resources prove to be important physical evidence for windsport experiences. Detailed natural resources analyses are of great importance to destination managers and marketers to support strategic planning at the destination level [46]. Ignorance of the availability of natural resources in combination with expected increased pressure from European windsport tourists can lead to unsustainable growth of windsport tourism at target locations. Well-informed management should include local communities, waste, infrastructure, traffic, and environmental management, and prevent intergroup conflicts to ensure sustainable and environmentally friendly development [26,27,29,30,47]. Destination managers can decide whether to focus even more on developing windsport experiences in known destinations, or even develop new and innovative experiences in those destinations that have not yet incorporated this type of experience into their tourism offering but have the natural resources to develop it. In this context, they need to consider whether to include windsport tourism as part of the brand identity of the destinations. Recent research

has shown that many destinations could benefit from refocusing on more resilient and sustainable types of tourism in the post-COVID era [48,49]. In addition, our analysis is also of great value to European windsurfers and kiteboarders who want to have transparent physical evidence of natural resources at nearby windsurfing destinations. Our rigorous analysis of wind conditions and other important natural conditions can serve as useful information and physical evidence of which suitable and accessible European and North African destinations to choose for their short or longer holiday in the period from May to October.

2. The Role of Marketing in Developing Innovative Destination Experiences

Destination marketing focuses on developing new and innovative tourism products, identifying target markets, and encouraging cooperation between several stakeholders at the destination level [50–52]. For a destination to remain competitive and sustainable it is crucial to develop and design the so-called nine 'Ps' of tourism destination marketing mix elements. The four 'Ps' (product, price, placement, and promotion) should be upgraded by an additional three 'Ps' (people, processes, and physical evidence) and two additional 'Ps' invariably linked to destination marketing (politics and paucity) [53–56]. Adaptations in tourism destination marketing strategies should reflect the specific characteristics of tourism products, the specific nature of the tourism market, and the specific characteristics and uniqueness of each destination [50,57,58].

The first specific characteristic arises from the nature of the tourism product, which can be treated as a bundle of activities, services, and benefits that constitute the entire tourism experience [59] or as a combination of products, services, and experiences [50,51,58]. Interpreting and understanding tourism products as experiences phenomena [60], modern tourists want to be involved in unique experiences that fulfill their needs and wants in the best possible manner. As modern tourists are more demanding, they are seeking higher quality and value-added tourism experiences [61,62], which also upgrade their previous experiences. The tourism destination should, in accordance with its natural resources, identify what authentic and unique experiences it can offer to modern tourists. The identification (and later implementation) of unique and innovative experiences, which can be reasonably and successfully marketed to the appropriate target audience, should be one of the main priorities of tourism destination marketing.

Destinations are increasingly aware of the need to develop innovative yet sustainable experiences that support all three pillars of sustainable development: economic (profit), environmental (planet), and social (people) [63]. It is important to develop and enhance sustainable experiences that derive from the natural characteristics of the destination [64], are supported and co-created by all stakeholders in the destination [65], and are also demanded by environmentally conscious tourists [10]. As we study and develop experiences based on the wind in this article, they can be the basis for different leisure and sports activities. In addition, it is useful for destinations to consider whether they can use this source—wind energy—to develop other appropriate tourism and non-tourism products, such as wind farms [66,67], and possibly find synergies in these products.

The specific nature of the tourism market can be discussed at the international and national levels. The distribution of international tourists is irregular, so destinations need to be innovative in terms of not only successful communication, but also the development and successful implementation of innovative products. According to UNWTO, in 2018, four out of five tourists traveled within their own region, while the top ten destinations received 40% of international tourists [68]. Europe is still leading this position and accounts for half of the world's international arrivals, but in comparison to previous decades, it is losing its position. At the national level, the specific nature of the tourism market arises from the complexity of the destination phenomenon and its diverse stakeholders, among which all have their own interests and benefits, as well as responsibilities [50]. Destinations, as an amalgam of independent small and medium-sized tourism enterprises, bring forth

the challenge of cooperation rather than competence and pool resources to help develop an integrated marketing mix at the destination level [50,69,70].

Within the specific characteristics and uniqueness of each destination, a targeted marketing approach needs to be properly addressed, especially the idea of destination positioning [62,71,72] and identification of appropriate target segments [73–75]. The geographic location of a destination is set within the boundaries and determined by the structure of the resource area, which in combination with its main attraction cannot be completely changed. Destination managers and marketers need to confront the given natural attractions, but can still influence the creation of innovative experiences that destinations can offer. In this regard, they need to develop a unique destination identity [76–79] and market it to the target audience. The final aim is to build a strong destination brand, which is well perceived and evaluated in the eyes of tourists, and thereby to show high destination brand equity [78,80]. In accordance with the positioning process of the destination, marketers need to understand which tourist segments can be the best target segments for their destinations and thus reasonably attract and redistribute marketing activities to destination target segments. Lately, it is advisable to develop buyer personas [81] for a destination and better define their needs and priorities when visiting specific tourism destinations. With well-defined representatives of destination target segments or so-called destination buyer personas, a destination can establish an ideal-typical tourist profile and identify what prompts such tourists' interest in a destination.

3. Wind Analysis of European and North African destinations

Our research focuses on providing physical evidence (one of the nine Ps) of important natural resources of European and North African windsport destinations although we briefly touch on people and politics as well. Rigorous analysis of the natural resources of windsport destinations can be used as evidence for the strategic planning and marketing of destinations for further development or even the development of new windsport experiences (another P) at the destination level. Furthermore, the present analysis should help in the identification of destination attributes from a windsport perspective and ensure high self-congruity, which stimulates tourist intention to revisit and recommend [82]. In addition, this type of analysis may also be helpful to other providers on the destination (e.g., wind farms) that build their products based on and with the help of wind. Finally, our analyses of physical evidence of windsport destinations are also of great importance for the target groups of these destinations (i.e., windsurfers and kiteboarders), who want to get transparent information about natural resources (mostly wind conditions) before they decide to visit a destination.

There are several online services that offer weather forecasts tailored to windsports, and some of them offer historical wind statistics. All of these services provide only statistics for predefined locations. Windfinder.com and iWindsurf.com show statistics of wind measurements that are available for existing weather stations. These are relatively sparsely located, and the nearest weather station can be quite far from the location of interest or/and set in a very different setting (inland or parts of the coast that are sheltered from wind). Windguru.com offers wind statistics for all registered windsport locations based on historical NCEP GFS [83] forecasts. These are again based on a much shorter time span (from December 2008) than our analysis and have a much coarser model resolution. Whenwherewekite.com uses a different approach: it lets the user select the preferred conditions (wind strength, month of the year, temperature, distance) and recommends the best locations. The portal does not cite the data on which the statistics are based, but it is very likely that they are based on NCEP global reanalysis, historical forecasts, or weather stations. All have their shortcomings as listed above. Moreover, all of the mentioned statistics are based on a much shorter time span.

4. Methodology

Our study presents a significant step further from available services as we have analyzed a much longer dataset in higher spatial and temporal resolution. The COSMO_REA6 (source: Hans-Ertel-Centre for Weather Research) is a high-resolution atmospheric reanalysis based on the COSMO (Consortium for Small-scale Modeling) model [84]. It covers the CORDEX EUR-11 domain [85] in 6 km spatial resolution, the results are available in hourly time steps from 1995 to 2018. The boundary conditions are provided by ERA-Interim [86]; balloon ascents, aircraft reports, surface-level observations, and ship reports are assimilated using a nudging data assimilation scheme [45]. We analyzed all available data spanning 24 years with hourly outputs. Files in grib format were downloaded from the DWD repository [87] and converted to NetCDF format using the cdo (Climate Data Operators) command line suite [88]. All further processing was done in MATLAB and plots were prepared using the m_map package [89]. Our results are homogeneous in space and not limited to only known windsport locations. This is especially useful for locations that have not developed their windsport potential yet.

Our approach to wind statistics focuses on wind conditions that would matter to a windsport practitioner. Therefore, our analysis is based on the number of days that contained at least two consecutive hours with average wind speed above a certain threshold (3.6 m/s, 7.7 m/s, and 10 m/s). This approach stems from the reasoning that it takes some time to prepare the equipment and also that a certain amount of time has to be spent on the water in order to consider a day successful from the windsport perspective.

Only wind speed values between 6 and 19 h CET were used as nighttime values are of no use for windsports. This approach gives a much more realistic picture than using the monthly average wind speed or the number of days with the wind speed above a certain threshold. We present the average number of days and trend where statistical significance is at the 95% level. The 3.6 m/s (∼7 knots) wind speed threshold was chosen, as this is the wind minimum in Professional Windsurfers Association (PWA) slalom races [90]. The 10 m/s (∼20 knots) wind limit is usually required by windsurfers using high-wind gear (sails below 6 m^2 and boards with less than 100 L volume), whereas the 7.7 m/s (∼15 knots) wind limit was chosen, as it is the lower speed limit for the start of the Defi Wind long-distance race [91] and is also the approximate wind speed that should suffice for a recreational kiteboarder or windsurfer.

In addition to wind conditions, we performed a brief analysis of average water and air temperatures. The latter was calculated from monthly COSMO _REA6 2 m values [45], while average water temperature was taken from monthly OSTIA [92] values for the 2007–2019 period (obtained from Copernicus Marine Service; https://doi.org/10.48670/moi-00165, accessed on 10 March 2022).

5. Results of Wind Analysis of European and North African Destinations

The wind conditions summary for several representative selected locations and a 7 m/s threshold is shown in Table 1. The table lists the maximum monthly values in a sample with a maximum of three grid points (approx 18 km) offset for each exact location. This takes into account the discrepancy between the model and in situ topography and the fact that the coastline best suited for different windsports at different wind directions might be somewhat distant from the chosen primary location. The listed locations are shown in Figure 1. They were selected as representative locations in regions that were identified as windsport-favorable in our study and these will be the focal points of our further analysis. We have chosen well-known windsport spots (Sidi Kaouki, Tarifa, Klitmoller, etc.) where possible. There are also several areas that are less known even to windsport enthusiasts, such as Anamur, the Gulf of Bomba, and Cadaques.

Plots of monthly averages for all three wind speed thresholds (3.6 m/s, 7.7 m/s, 10 m/s) can be found in Appendix A. The same is true for monthly sea temperature and monthly air temperature.

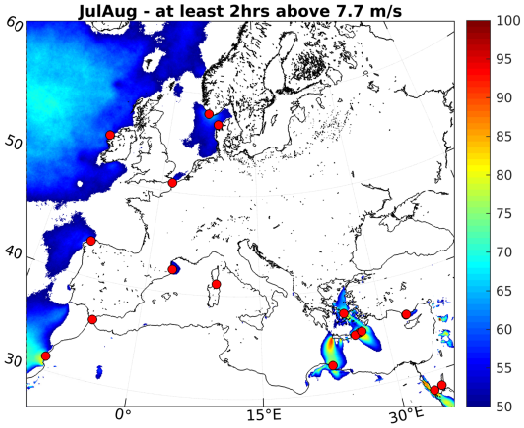

Figure 1. Average percentage of days with at least 2 h of wind above the 7.7 m/s threshold value during daytime for July and August. Only areas with values above 50% are shown. Locations that were chosen for more thorough analysis are shown in the following order (top to bottom): Lista, Klitmoller, Belmullet, Wissant, San Xurxo, Cadaques, Porto Pollo, Ftelia, Anamur, Tarifa, Gun Bay, Elafonisi, Sidi Kaouki, Bomba, Dahab, El Tur.

Table 1. Average percentage of days with at least 2 h of wind with speed above 7.7 m/s. Selected locations are listed in alphabetic order.

Location	May	June	July	August	September	October	Time Period
Anamur (Turkey):	59	70	72	72	59	33	1995–2018
Belmullet (Ireland):	63	58	55	60	67	78	1995–2018
Bomba (Libya):	60	72	89	85	63	50	1995–2018
Cadaques (Spain):	61	58	63	63	61	64	1995–2018
Dahab (Egypt):	69	85	73	82	88	75	1995–2018
Derna (Libya):	53	63	82	78	54	50	1995–2018
Elafonisi (Greece):	64	76	91	91	75	72	1995–2018
El Tur (Egypt):	79	92	91	94	93	86	1995–2018
Ftelia (Greece):	52	61	79	81	67	67	1995–2018
Gun Bay (Greece):	55	72	89	87	72	62	1995–2018
Klitmoller (DK):	57	58	53	58	71	79	1995–2018
Lista (Norway):	65	64	64	68	78	83	1995–2018
Porto Pollo (Italy):	58	55	57	48	55	54	1995–2018
San Xurxo (Spain):	63	56	57	57	58	61	1995–2018
Sidi Kaouki (Morocco):	61	67	80	70	51	40	1995–2018
Tarifa (Spain):	68	72	67	65	62	65	1995–2018
Wissant (France):	53	51	53	56	60	71	1995–2018

The **pre-season** (May, June) period is generally less windy than the main tourist season (July, August) and post-season (September, October). Favorable wind conditions can be found in the following locations: the Atlantic coast of Morocco, Galicia (Spain), Tarifa, Crete (Greece), southern Norway, Denmark, NW Ireland, and Outer Hebrides (United Kingdom). According to Table 1, the windiest locations in this period should be El Tur and Dahab. In this period, the southern locations offer more favorable water and air temperatures as well (see Appendix A, Figures A7 and A8).

The wind conditions in the **main season** probably garner the most interest. Figure 1 shows areas where more than half of the days have wind conditions above the 7.7 m/s threshold. Percentages for all three thresholds and statistically significant trends are shown in Figure 2. There are several larger regions with generally favorable wind conditions for mid-size gear during the summer vacation period: the Aegean Sea, northern Red Sea, Atlantic coast of Morocco, Libya, Outer Hebrides, Ireland, Galicia, the Atlantic coast of Denmark, and southern Norway. Then there are a few more localized areas such as the Strait of Gibraltar, Anamur, Cap de Creus (Spain), the Strait of Dover, the Lisbon area

(Portugal), and the Strait of Bonifacio. The windiest of the selected locations in Table 1 is again El Tur, this time followed by Elafonisi. In this period, the temperature difference between inland air and (relatively colder) sea drives thermal winds in many locations (Bomba, Dahab, Derna, Ftelia, Gun Bay, Sidi Kaouki). The only locations which experience a slight drop compared to the pre-season are Bellmulet, Porto Pollo, and Tarifa. It is obvious (see Figure 2) that numerous locations in Europe offer light wind conditions (suitable for large windsurfing sails and boards, large kites), while high wind conditions suitable for high-wind gear are much more scarce. In fact, only the surroundings of Essaouira (Morocco), Gulf of Suez (Egypt), Gulf of Bomba (Libya), Crete, and several Aegean Islands (Greece) show more than 50% of days with wind conditions suitable for high-wind gear (above 10 m/s). As expected, the Mediterranean Sea and the Red Sea are much warmer than the seas of northern Europe (Figure 3). Due to summer upwelling, the Moroccan and Portuguese coastal waters are rather cold despite their temperate latitude. Although the most enthusiastic practitioners of windsports are concerned primarily about wind and wave conditions, recreational practitioners, those who are seeking locations to learn, and their travel companions are less willing to tolerate cold or extreme heat. According to Scott, Gösling and de Freitas [14] the optimal air temperature for summer beach tourism is between 25 °C and 28 °C.

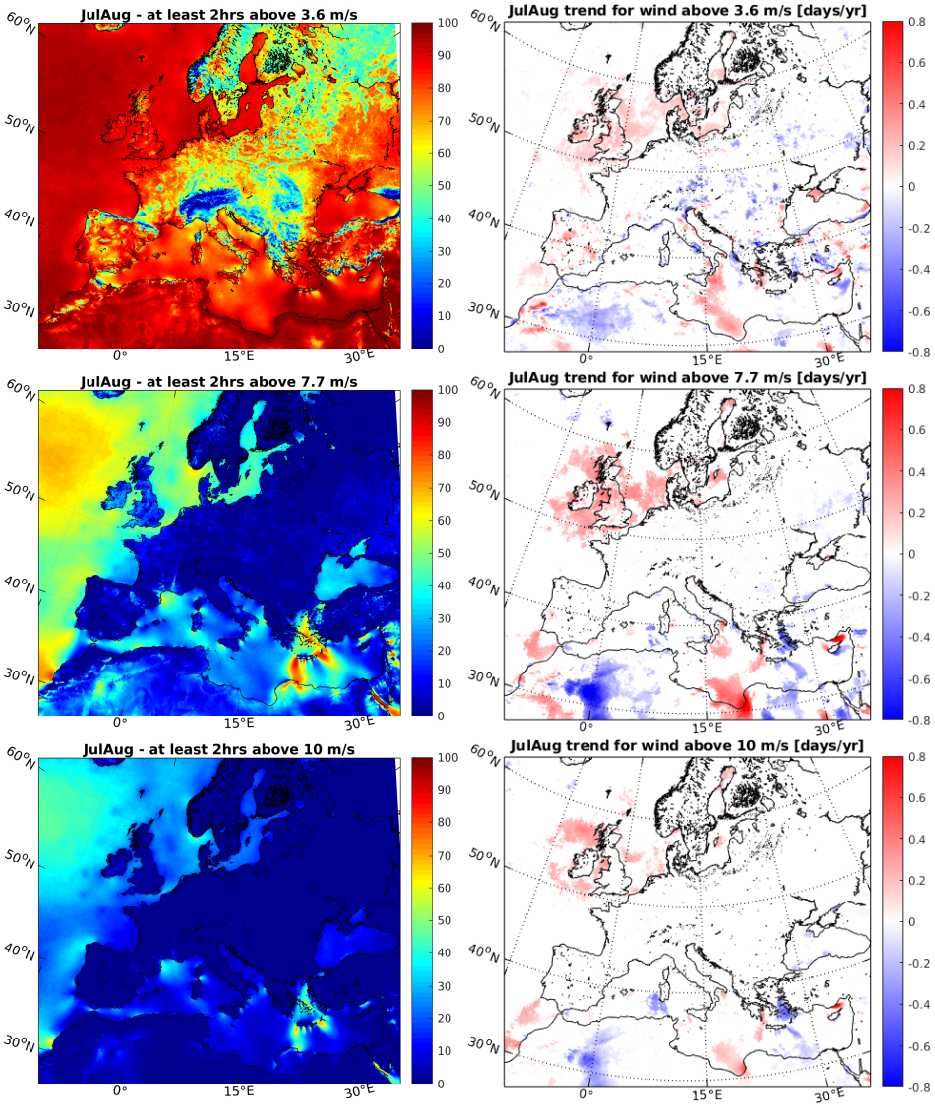

Figure 2. Left: Average percentage of days with at least 2 h of wind above the threshold value during daytime for July and August. **Right**: Trend of days fitting the same criteria—only statistically significant values are shown (right).

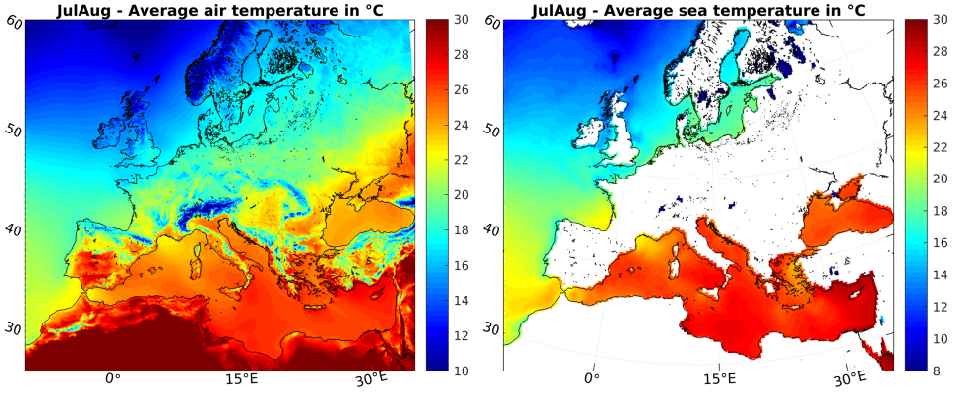

Figure 3. Average air temperature (**left**) and sea surface temperature (**right**) for the July and August period.

In the **after-season** the northern parts of Europe are subject to strong winds stemming from weather fronts coming from the west. Therefore, the windiest places in our table after El Tour in this period are Klitmoller and Belmullet. While Crete and Karpathos still show a considerable number of windy days (see Appendix A), there is a striking difference between the images for the September–October period and the images for the July–August period for the northwestern parts of Europe. Parts with more than 80% of days over the 7.7 m/s threshold are western Denmark, southern Norway, Outer Hebrides, and NW Ireland. Galicia, large parts of Ireland and the United Kingdom, and the Baltic Sea also show a high frequency of favorable wind conditions. Generally, there are two very different situations in the after-season: strong winds and lower temperatures (see Appendix A) in parts of the Atlantic coast, and somewhat more moderate winds and warm temperatures in the southeast of the study area (Greece and Egypt). The former should appeal to die-hard windsport enthusiasts, while the latter more to recreational windsport practitioners and families.

Due to the fast pace of climate change, and the need for an adequate response from the tourism sector [93–95], it is sensible to perform a trend analysis on our wind statistics and get a glimpse of expected changes in the availability of wind resources [96]. Although the time span in this study is somewhat shorter than the 30-year period required for the calculation of climate normals by the World Meteorological Organization [97], the trends in some locations are statistically significant ($p < 0.05$). Only these are shown in the right half of Figure 2 to indicate whether some locations have more potential for the future than others. Trends are surprisingly high in some locations, and it seems that climate change in the last two decades has had a considerable influence on wind conditions in some places.

A positive trend in summer wind can be seen in the Anamur region (Turkey), around the United Kingdom and Ireland, in some parts of the Netherlands, and in western Denmark (Figure 2). Some of these areas already have a considerable number of windy days, and windsport-related investments in these regions are even more justified if the trend continues. In contrast, our results show that the eastern Aegean Sea is facing a considerable negative trend. The trends for the monthly values are shown in Appendix A. The trend patterns are surprisingly similar for all wind speed thresholds and time periods.

We have selected some of the meteorological station statistics provided by iwindsurf.com, and these are shown in Table 2. Weather stations that are close to one of the locations in Table 1 and have a time series longer than 10 years were selected; only three matched these criteria. The web service offers information about the average percentage of days with wind speeds above several thresholds during the daytime. This is very similar to our approach, and we list the results for the 15 mph threshold, which is only slightly lower than our 7.7 m/s limit. Our statistics match the measurements strikingly well. The discrepancies can be attributed to several factors: different micro-locations of meteorological stations, the different and shorter sampling period, and the slightly different threshold

and methodology. The high similarity between Tables 1 and 2 confirms the high model skill of the COSMO_REA6 reanalysis [45] and the accuracy of our statistical approach.

Table 2. Wind measurements from meteorological stations (Karpathos airport (GR) is in close proximity to Gun Bay). Percentage of windy days per month during daylight. Wind speed threshold: 15 mph (Source: iwindsurf.com, accessed on 3 August 2022)

Location	May	June	July	August	September	October	Time Period
Belmullet (IE):	75	64	62	65	71	69	2009–2020
El Tur airport (EG):	82	92	96	100	100	92	2009–2020
Karpathos airport (GR):	65	72	93	100	88	77	2007–2020

6. Discussion

In the theoretical contributions of the article, we point out the important role of marketing in identifying and developing products and experiences that are not only innovative but also sustainable. In the long run, only the development of sustainable experiences will allow destinations to continue to grow sustainably while meeting the needs and desires of all destination stakeholders. Since tourism is only one (albeit important) part of destinations, the synergies for sustainable tourism development must be extended to the development of non-tourism products where possible. Destinations that can harness the power of the wind can develop and market meaningful tourism and non-tourism sustainable products that need to be managed and co-developed by all key destination stakeholders and hopefully become examples of good sustainable destinations.

Our analysis shows that the locations suitable for high-wind gear in Europe and its close surroundings are scarce during summer. However, high wind enthusiasts represent a minority among windsport tourists. We show that there are regions that could attract a large majority of European windsurfers and kiteboarders (along with their families) during the summer season. The results show that during the summer period the most favorable conditions (50% of days above 7.7 m/s) are found in the Aegean Sea, the northern Red Sea, the Atlantic coast of Morocco, Libya, the Outer Hebrides, Ireland, Galicia, the Atlantic coast of Denmark and southern Norway, the Strait of Gibraltar, Anamur, Cap de Creus, the Strait of Dover, the area around Lisbon, and the Strait of Bonifacio. All the locations in Table 1 meet the same criteria. While many of these are well-known windsports spots, some are less known (Anamur, Bomba, Cap de Creus, southern Norway). Furthermore, many windsports enthusiasts are poorly informed about the wind availability in Europe and its surroundings and could be attracted with reliable data about favorable wind conditions. Thus, with the right marketing and management, these findings could lead to success stories for some of the local communities and regional tourism.

In the two months following the summer season, frequently favorable wind conditions can be found in northwestern Europe, the Aegean Sea, and the northern Red Sea. In these locations, windsport could be used to reduce the problems of seasonality [10,20,21]. The two months before the summer season are markedly less windy and the sea is still relatively cold in most places, but some locations could still benefit from investments in windsport tourism in this period (see Table 1). Those looking for more detailed guidance can find monthly plots in Appendix A and the dataset and high-resolution images in the Mendeley online repository (http://doi.org/10.17632/tpgvnyyfyz.3).

Our trend analysis (Figure 2 and Appendix A) shows that some regions should expect a drop, while some others should expect an increase, in the number of windy days. This indicates that the windsport development aspect of a given destination should be seen as dynamic. Investments should thus account for future projections of availability of natural resources.

There are many reasons why focusing on windsport should prove beneficial in locations with suitable wind resources. Various tourism activities create a co-branding effect, improving the image of a destination [98]; product diversification has been shown to re-

duce the negative impacts of seasonality [22]; furthermore, sport (and domestic sport in particular) offers relatively reliable travel flow in times of crisis [35,36]; adventure tourism is increasingly integrated with wellness tourism and ecotourism—AWE [99]. Like surfers, windsurfers and kiteboarders are usually pro-environmental [100,101], and therefore, developing windsport tourism could steer destinations towards more ecologically sustainable tourism. On the other hand, disorganized windsport tourism can have unsustainable ecological and sociological impacts [25,26,29,102–104] due to unregulated car parking, wild camping, litter, and inter-group conflicts, among other issues [30]. The latter arise between bathers and windsport practitioners, but also between surfers, windsurfers, and kiteboarders. These issues have been successfully addressed by beach partitioning into designated zones (e.g., El Medano beach, Tenerife, Spain). Following Fredline and Host [27], and Ponting and O'Brien [105], it is essential that the impact of sports tourism on the host community is properly managed with all the stakeholders in mind. This should ensure that the tourist activity does not have negative implications for the quality of life of residents. Furthermore, commercial success and long-term sustainability depend on the support and involvement of the local community [47,106,107]. This can only be ensured if the benefits outweigh the negative impacts. Windsport tourism could form synergistic effects with offshore wind farms. Wind power is one of the flagships of green technology and could promote the sustainable (green) image of nearby destinations [66]. This fits well with the predominantly pro-environmental orientation of windsport practitioners [100,101]. The high natural resources overlap between windsport and wind power will undoubtedly attract both to similar locations. The farms are usually placed quite far from the shore to reduce negative visual impacts [66,108], although research on the effects of the Block Island Wind Farm (USA) shows that tourists can also be attracted by the sight of wind farms [67,109]. However, wind farms are often not directly accessible to most windsurfers and kiteboarders, but in such cases, the tourist destination offering could consist of guided visits and perhaps even organized "sail between windmills" tours [110].

On the other hand, the ecological impact of offshore wind farms is non-negligible [111] and should also be taken into account with its indirect effects on tourism as well. E.g. it has been shown that offshore constructions can contribute to jellyfish blooms [112–114], which would likely have negative consequences for tourism. Such effects should be considered in advance and properly managed.

Whereas natural resources are usually the primary factor in attracting windsport tourists [4,19,36,115], there are also other factors that influence the choice of travel destination. The amount and quality of primary infrastructure (e.g., hotel rooms, apartments, campsites, camper stops, on-site parking, equipment rental, and storage facilities, windsurfing/kiteboarding schools), then secondary infrastructure (i.e., factors not essential but beneficial to windsport tourists; e.g., restaurants, sport shops, surf repair shops, and children's entertainment), and additional sport activities (walking routes, cycling routes, climbing sites, diving centers, etc.) should be considered in sustainable destination management and marketing [36,50,116,117], which should be reasonably incorporated and coordinated to develop an appropriate destination branding strategy [79,118].

Another aspect to consider is that adventure tourism is facing an aging market [31]. Although the older clientele has maintained their enthusiasm, their capabilities are reduced. Therefore, they require or at least appreciate assistance, comfort, and safety (windsport centers, gear rentals, rescue service). The destinations should provide these and use them in their marketing strategy.

Providing suitable destination management to attract European windsport tourists to nearby locations should increase the environmental sustainability of windsport tourism by reducing the need for air travel. There are also several further steps that could improve its ecological sustainability on the local and regional levels. One suggestion would be to provide enough parking spaces to prevent disorganized parking which can harm sensitive ecosystems. Campsites and motorhome parking areas in close proximity to windsport beaches should reduce wild camping attempts. Another suggestion would be to install a

sufficient number of electric charging stations to attract ecologically conscious windsport tourists using electric transport. Ensuring enough wastebins with frequent maintenance to reduce littering and plastic pollution is self-evident but often overlooked.

Study Limitations

Although our study makes important contributions to windsport destinations, the current analysis suffers from some limitations and thus offers avenues for future improvements.

First, even though the high spatial resolution of COSMO_REA6 atmospheric reanalysis gives an unprecedented insight into wind conditions, its domain is limited to Europe and North Africa. Furthermore, in some locations, the orography contributes to very localized sub-scale effects that can cause considerable wind acceleration (e.g., Guincho, Portugal). These can be properly modeled and identified only when using even higher resolution models.

Modern model reanalyses are as close to reality as possible, but there can still be discrepancies. Therefore, when planning a management or marketing strategy, we recommend seeking measurements (where available) and contacting local windsurfers and kiteboarders for firsthand experiences.

Second, this study offers information on the availability of two natural resources, namely wind and temperature. An important natural resource that was not considered in this study is the coastline orientation and topography. Preferences in this area differ greatly among different segments. While offshore winds are preferred by speed windsurfers looking for flat water, they are usually considered dangerous for most kiteboarders. Another important resource is the waves, which are essential for wave sailors, but useless for speed sailors and beginners.

Author Contributions: Conceptualization, M.V. and M.K.R.; formal analysis, M.V.; investigation, M.V. and M.K.R.; methodology, M.V.; writing—original draft preparation, M.V. and M.K.R. All authors have read and agreed to the published version of the manuscript.

Funding: M.V. would like to acknowledge the financial support from the Slovenian Research Agency (research core funding P1-0237 "Coastal research", project DE-COMB J7-2599, and postdoctoral project Z7-1884).

Institutional Review Board Statement: Not applicable

Informed Consent Statement: Not applicable

Data Availability Statement: COSMO-REA6 (Source: Hans-Ertel-Centre for Weather Research) output files are available at the Deutche Wetter Dienst server [87]. All the data derived from the original COSMO-REA6 and OSTIA files used in this study are available in the Mendeley Data repository at http://doi.org/10.17632/tpgvnyyfyz.3.

Acknowledgments: The authors are deeply thankful to Christos Zimatikas (Gone Surfing Crete) for much useful information, and Ralf Buckley (Griffith University) for comments on the initial version of the manuscript which led to significant improvement. We would also like to thank Alenka Malej (NIB) and Ana Križaj for their insightful discussions. Parts of the study have been conducted using E.U. Copernicus Marine Service Information.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

The average percentage of days with the same thresholds as presented in the main body of the paper is shown, but this time the analysis is performed on monthly instead of seasonal data. The averaging is performed over the whole 24-year period. The results show that wind availability variations from month to month can be significant.

We present also monthly wind trends that were statistically significant ($p < 0.05$), which hints at which places are likely to provide more or less windy days in the coming years compared to the multi-year average.

As water and air temperatures are of great importance when evaluating and marketing a tourist destination, average monthly values are shown at the end of Appendix A.

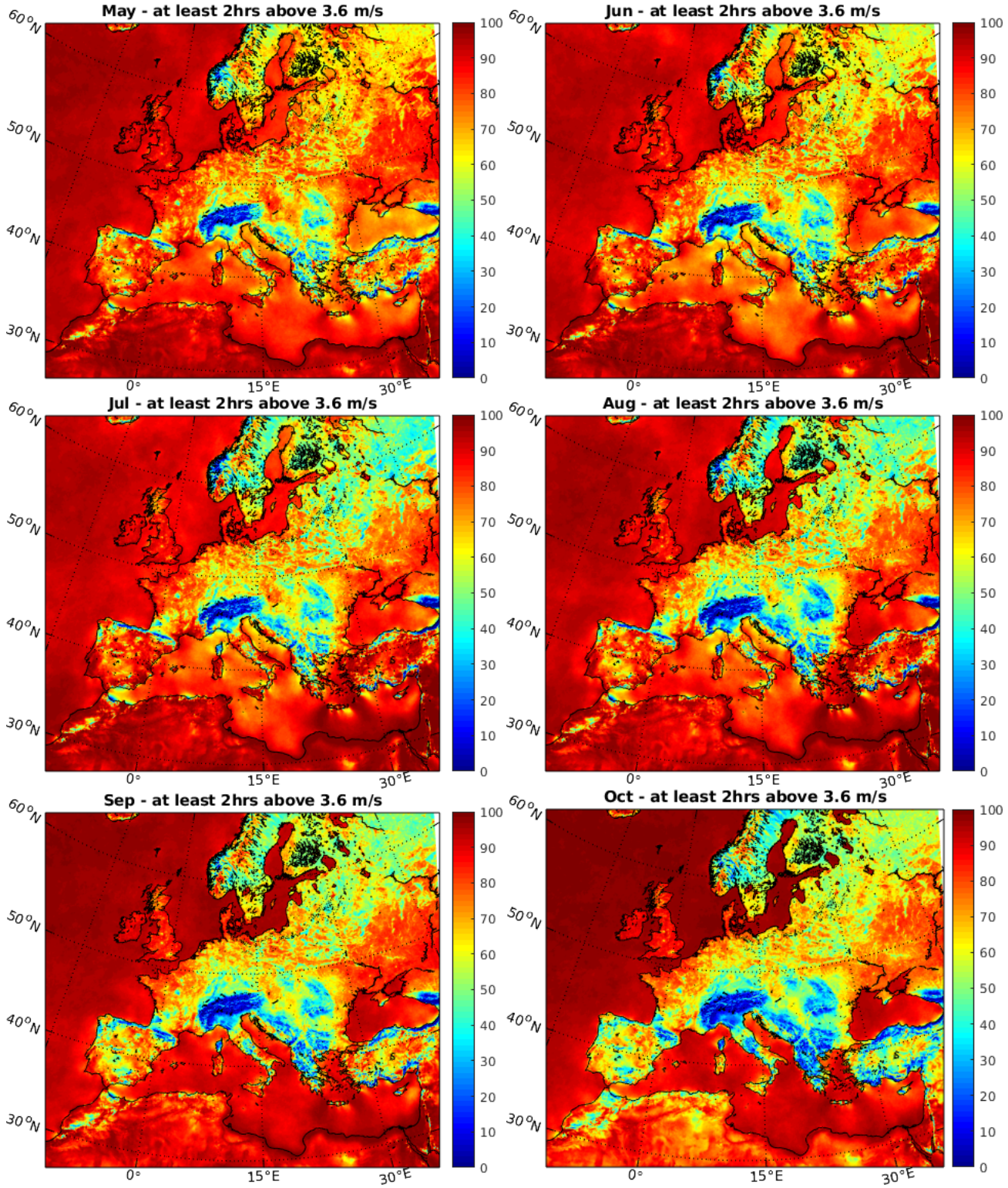

Figure A1. Average percentage of days with at least 2 h of wind above 3.6 m/s threshold value during the daytime.

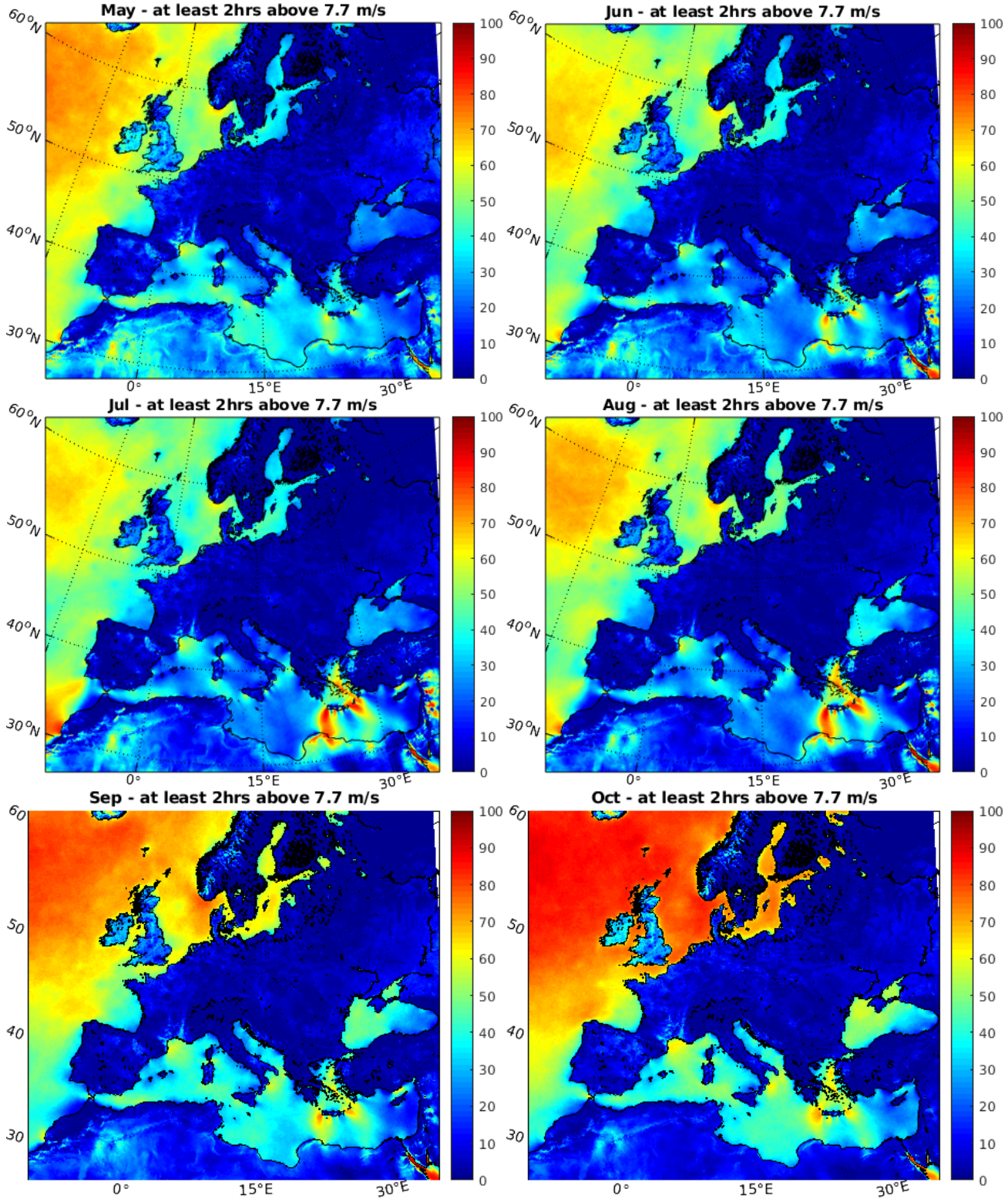

Figure A2. Average percentage of days with at least 2 h of wind above 7.7 m/s threshold value during the daytime.

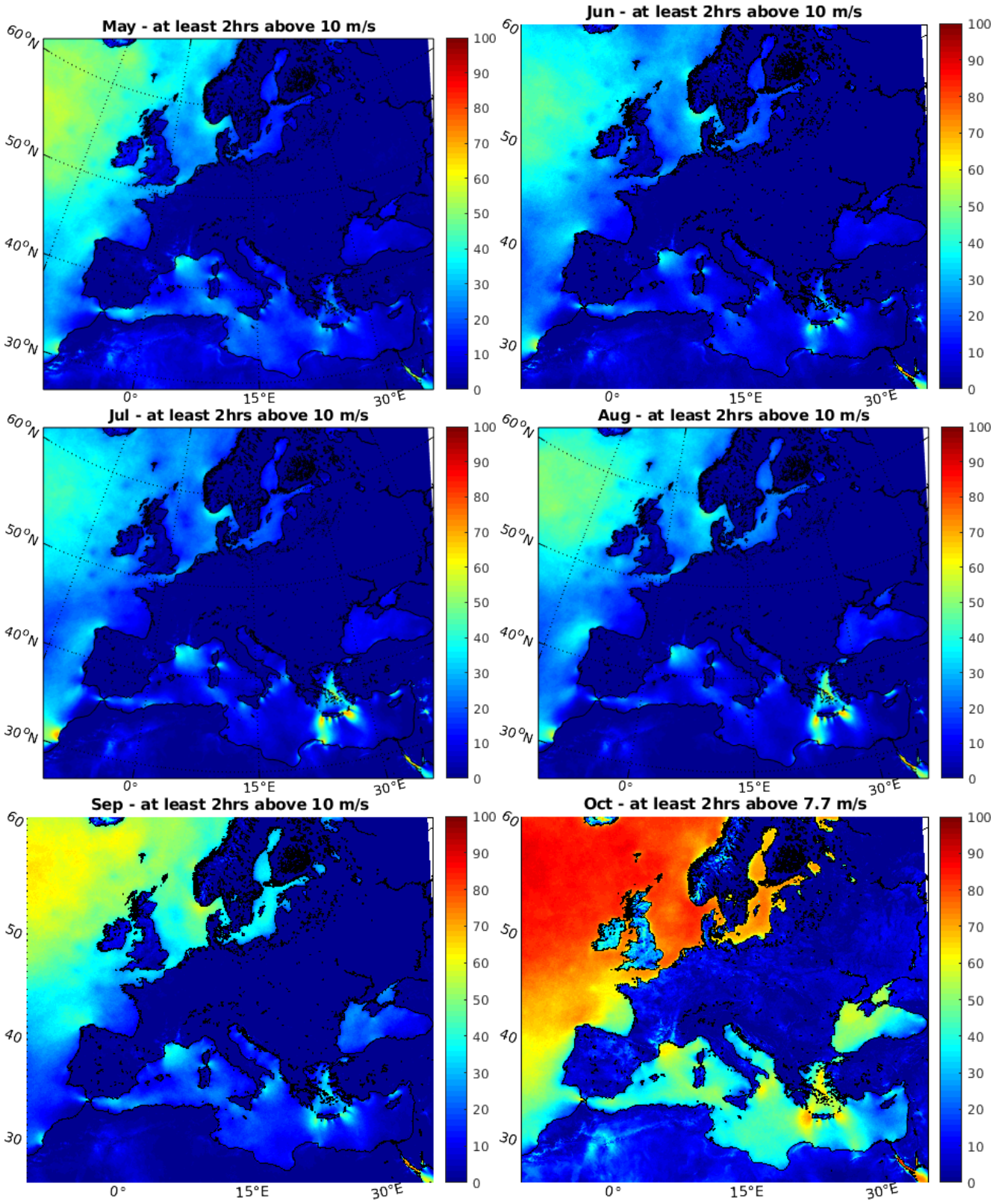

Figure A3. Average percentage of days with at least 2 h of wind above 10 m/s threshold value during the daytime.

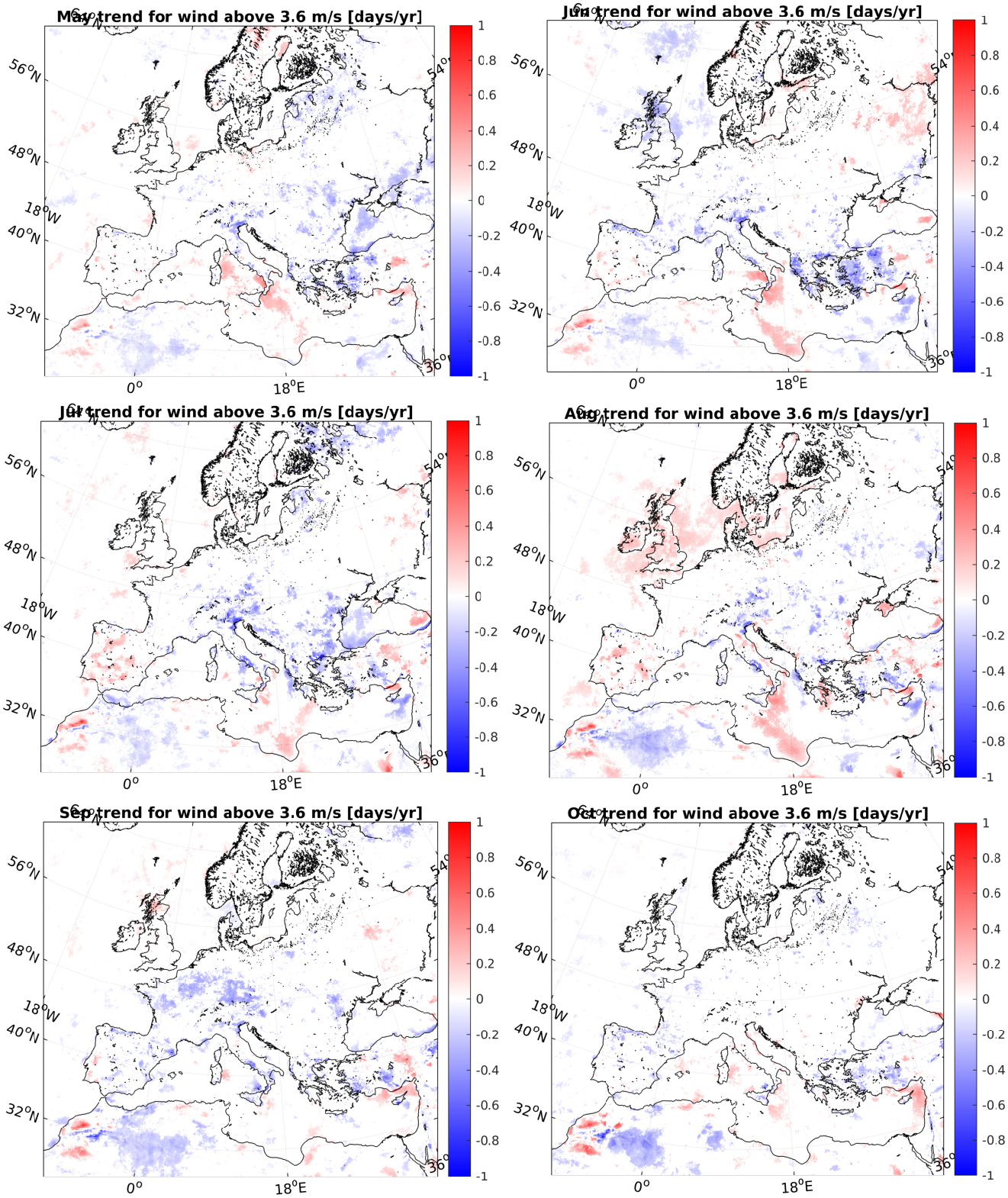

Figure A4. The 24-year trend for the number of days with at least 2 h wind speeds above 3.6 m/s during the daytime. In days per year, where the trend was statistically significant ($p < 0.05$).

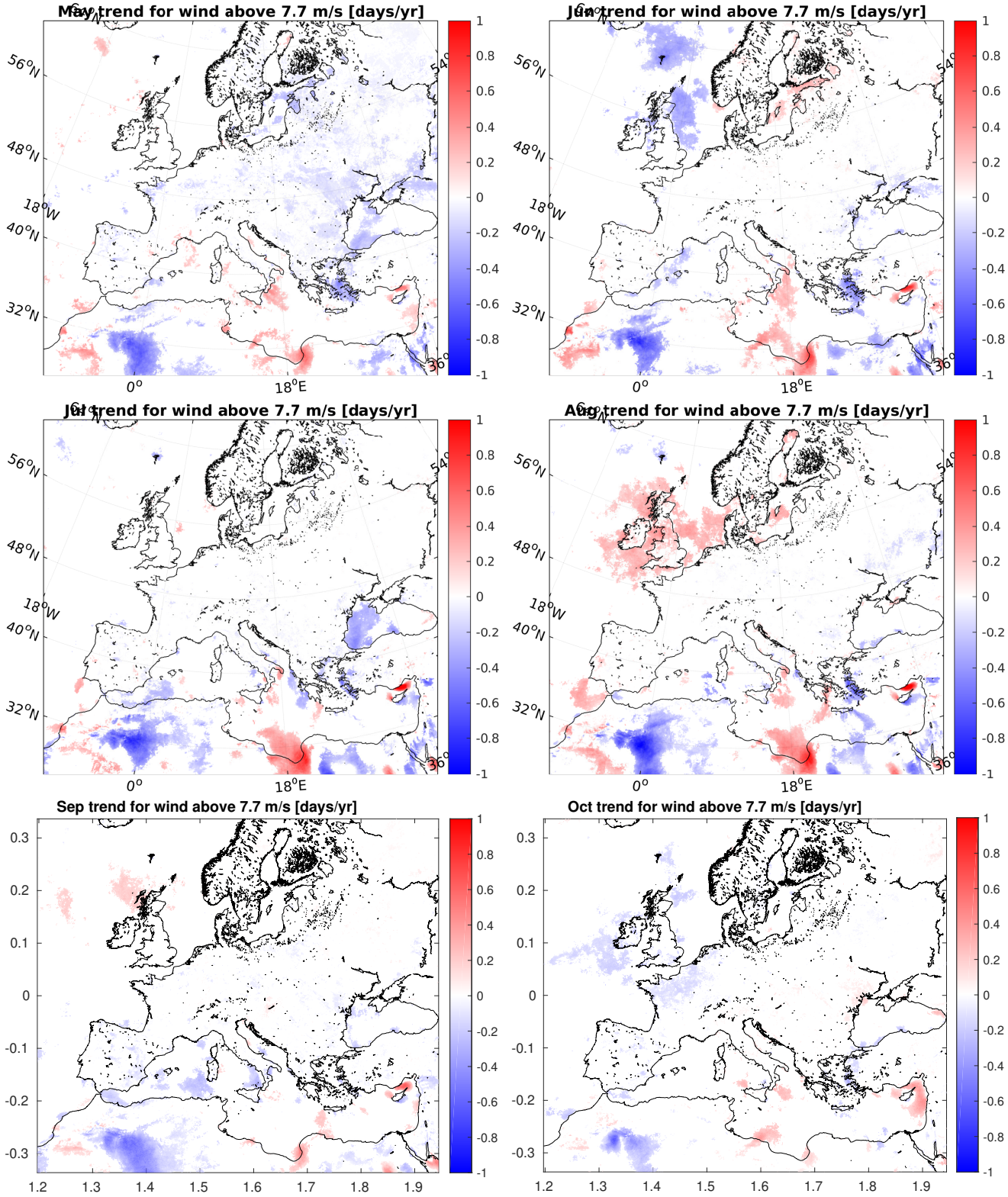

Figure A5. The 24-year trend for the number of days with at least 2 h wind speeds above 7.7 m/s during the daytime. In days per year, where the trend was statistically significant ($p < 0.05$).

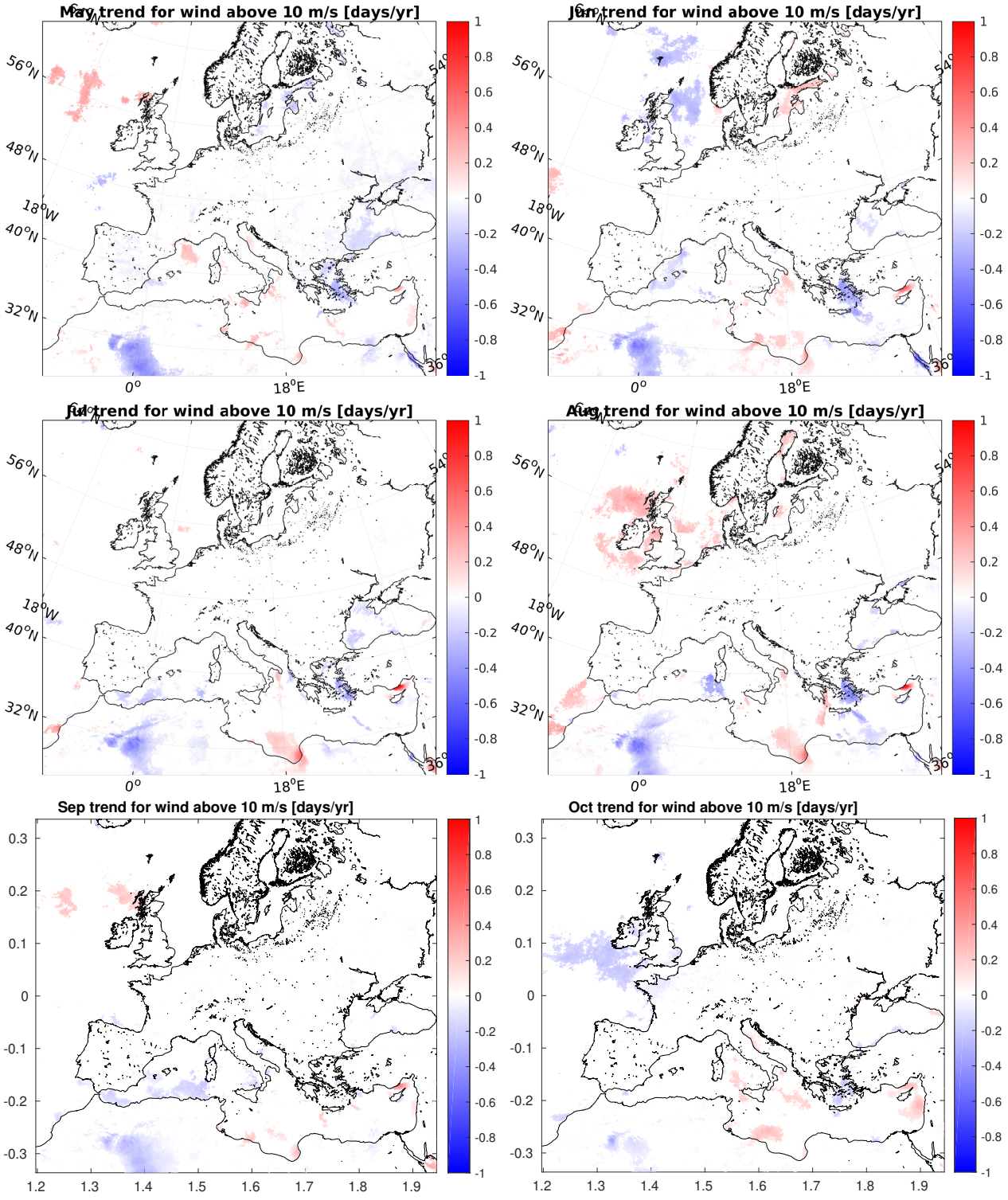

Figure A6. The 24-year trend for the number of days with at least 2 h wind speeds above 10 m/s during the daytime. In days per year, where the trend was statistically significant ($p < 0.05$).

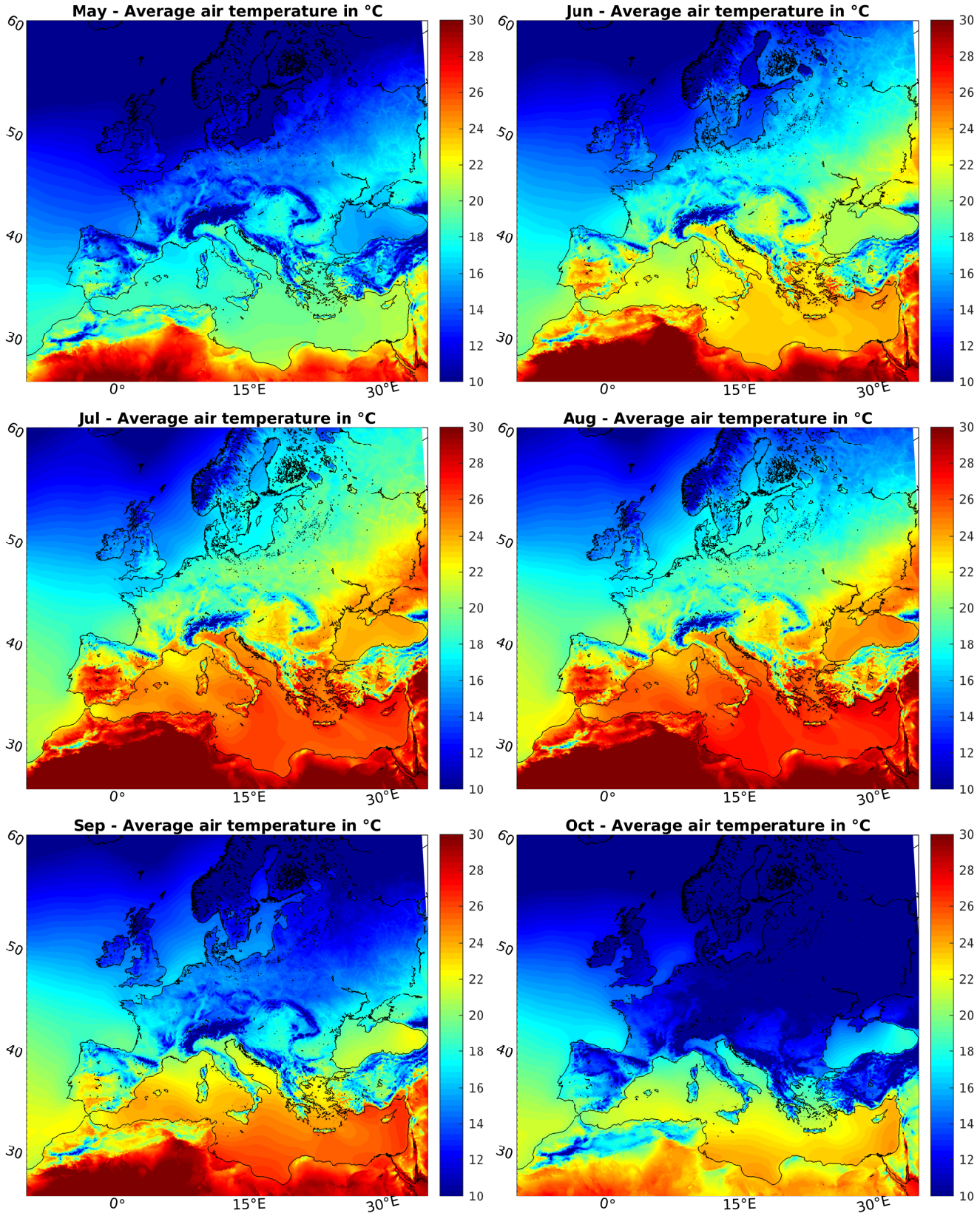

Figure A7. Average monthly 2 m air temperature (based on COSMO_REA6 atmospheric reanalysis).

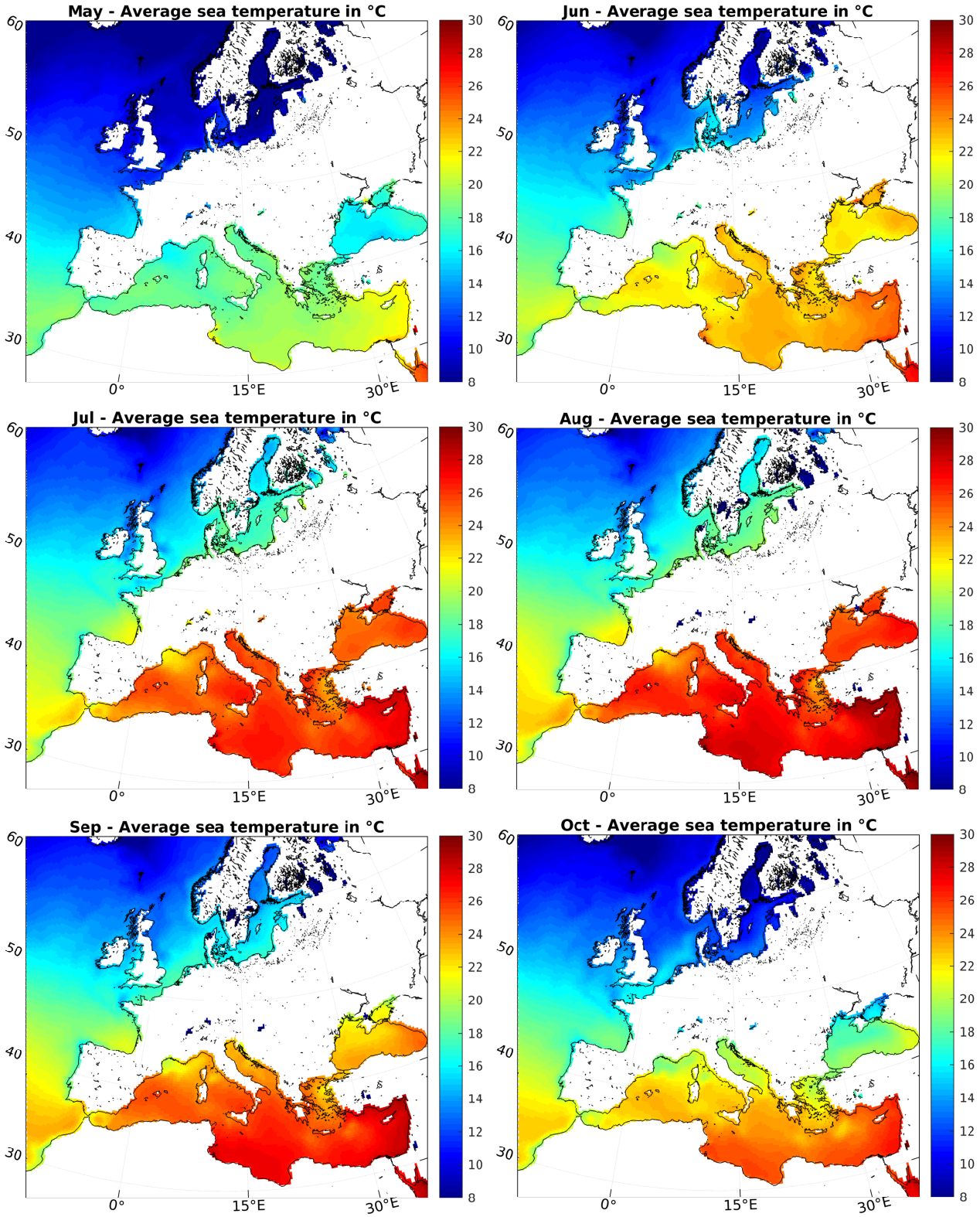

Figure A8. Average monthly water temperature temperature (based on OSTIA SST—obtained from Copernicus Marine Service).

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