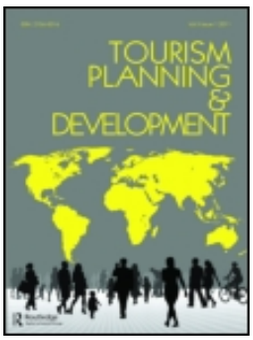

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Will the Mediterranean Become "Too Hot" for Tourism? A Reassessment

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ABSTRACT *Climate, particularly temperature, is one of the most important resources of a tourist destination. With projected climate change in the twenty-first century, this attribute of tourism destinations is anticipated to change, leading some to conclude that the Mediterranean region will become "too hot" for tourist comfort in the peak summer season by as early as the 2020s or 2030s. This study sought to reassess these claims in the literature and media. Perceptions of "too hot" for comfortable tourism activities at beach and urban destinations was quantified for the young adult travel segment by means of a survey of 850 university students in five countries that represent source markets for the Mediterranean (Austria, Germany, the Netherlands, Sweden and Switzerland). The threshold that defines "unacceptably hot" for the majority of respondents was then compared against thermal conditions (temperature and humidity) in a baseline climate (1961–1990), and an early (2011–2035), mid (2046–2065) and late century (2080–2099) climate change scenario (A1B) for 10 Mediterranean destinations. By early century under the warmest available climate change scenario, no additional beach or urban destination became unacceptably hot. By mid century, thermal conditions for two additional beach and one additional urban destination became "too hot" during the peak summer months. In the late century scenario, several, but not all, of the destinations (four beach and five urban destinations) were found to exceed the stated "unacceptably hot" thresholds in the summer months. However, given this length of time and the potential for northern European travellers to acclimatize to warmer average temperatures at home, it remains uncertain whether the thermal comfort threshold identified by this sample will persist. An important contrasting point is that at the same time there is a larger decrease in the number of months that are considered "unacceptably cool" for both a beach and urban holiday and an increase in months that become "ideal". The findings hold important implications for critically assessing the potential impact of climate change in the study area and other destinations more broadly, and can be used to refine models intended to predict the influence of climatic change on the geographic and temporal patterns of international tourism.*

Introduction

The world's leading tourism destination is the Mediterranean, attracting almost one fifth of total international tourism arrivals (19.4%) (UNWTO, 2009) and over 30% of the world's

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total international tourism receipts (US$ 205 billion) (UNWTO, 2007). The largest single flow of tourists in the world, accounting for 116 million tourists, is the flow of Europeans from the temperate northern regions, south to the Mediterranean (UNWTO, 2003).

One of the principal reasons behind the popularity of the Mediterranean is the demand for a predictable sunny and warm destination. The world's major tourism flow highlights the fact that weather is an intrinsic motivator, with "sun-lust" and "sunshine destination" packages boasting the highest tourism demand (Bigano *et al.*, 2006; Perry, 2006). Studies that have examined climate as a motivation for tourists have emphasized it as either the most (Mintel International Group, 1991; Morgan *et al.*, 2000; Kozak, 2002; Gomez-Martin, 2005; Hamilton and Lau, 2005) or one of the most important factors (Lohmann and Kaim, 1999; Hamilton, 2005; Gössling, 2006; Scott *et al.*, 2008a) for a tourist when selecting a travel destination.

While climate is one of the most important natural tourism assets of the Mediterranean region, over the past 10 years a number of researchers and the media have raised concerns over the implications of climate change for this tourism resource. There is now evidence that the global climate is changing. The IPCC (2007a) concluded with very high confidence (>90%) that the net effect of increased atmospheric greenhouse gas (GHG) concentrations, as a result of anthropogenic activities, has been one of warming (0.76°C increase in total global surface temperature since the late 1800s). In the Mediterranean, annual temperatures will increase 1.4°C to 8.2°C (1.7°C to 6.5°C in the summer months) by the end of the twenty-first century (Christensen *et al.*, 2007), with likely (>66%) increases in the risk of heat waves, wildfires and drought (Alcamo *et al.*, 2007, IPCC, 2007b).

The literature that discusses the link between climate change and tourism demand in the Mediterranean (Perry, 2000a, 2000b, 2001, 2006; Agnew and Viner, 2001; Maddison, 2001; Amelung and Viner, 2006; Amelung *et al.*, 2007), have unanimously concluded that by mid century or earlier, climate change will push Mediterranean temperatures above the threshold for human comfort, but increase shoulder season demand, resulting in the region becoming "too hot" during the summer peak tourism season. Using a modified pooled travel cost model, Maddison (2001) concluded that Greece and Spain will experience reduced summer tourism demand because of higher temperatures. Agnew and Viner (2001) simply speculate that some undefined thermal comfort threshold will be exceeded without any empirical evidence. Perry (2006) and Amelung and Viner (2006) base their argument on analyses that used Mieczkowski's (1985) Tourism Climate Index (TCI).

Media statements have been far more bold, pronouncing that "the likelihood [is] that Mediterranean summers may be too hot for tourists after 2020" (*Guardian*, 2006), and "by 2030, the traditional British package holiday to a Mediterranean beach resort may be consigned to the 'scrap-heap of history'" (Easier Travel, 2006, BBC News, 2006 (based on the *Holiday 2030* report produced by Halifax Travel Insurance, 2006)). The contention that the Mediterranean is to become "too hot" and arrivals adversely affected have also appeared in prominent reports that are provided to decision makers worldwide. The IPCC's Fourth Assessment Report states that "higher summer temperatures may lead to a gradual decrease in summer tourism in the Mediterranean" (Alcamo *et al.*, 2007). Similarly, a report by Scott *et al.* (2008) states that the "direct effect of climate change might be significant enough to alter major intra-regional tourism flows where climate is of paramount importance, including northern Europe to the Mediterranean."

Although the Scott *et al.* (2008) report states that a notable departure between the perceived optimal temperatures for a beach holiday and the projected maximum summer temperatures may become evident, it counters previous claims by projecting this departure to be in the late decades of the twenty-first century and only under high emissions scenarios. Even

with this projected change in temperature regimes, it remains uncertain whether or not these warmer temperatures will be sufficient to alter tourist perceptions of the Mediterranean as a destination. In order to assess whether tourism demand in the Mediterranean region may be affected as a result of climatic change, a more comprehensive analysis of climatological preferences and thresholds is required. What tourists perceive as ideal, acceptable and most importantly unacceptable climate conditions needs to be determined if we are to assess whether the Mediterranean could become "too hot" for comfortable tourism at anytime in the future. To date, no known study has examined what tourists perceive to be "unacceptably hot" for any particular destination type or tourism activity (e.g. 3S [sun, sand, surf] holiday and urban sightseeing) in the next two to three decades.

The objective of this paper is to reassess the claims that the Mediterranean will become "too hot" for summer tourism as a result of projected climate change by the mid twenty-first century (or earlier) using the stated preferences of a sample of tourists and climate change scenarios for high profile destinations in the region. This study is the first known attempt to empirically assess what tourists perceive to be "unacceptably hot" thermal conditions for two major tourism environments that dominate the Mediterranean region: beach and urban. Perceptions are pertinent when they trigger a decision or action (Meze-Hausken, 2008), and hence this study provides valuable insight into the identification of temperature thresholds at which behavioural response is initiated. The term "unacceptable" can be interpreted as the threshold to which tourists respond to the climatic stimulus—i.e. the point at which temperatures (climatic stimuli) are "too hot" in the Mediterranean (threshold) that tourism demand declines (behavioural response). While it is understood that climatic variables are viewed and interpreted differently between societies and individuals (Meze-Hausken, 2008), including within the tourism sector (Scott *et al.*, 2008a), the purpose of this study is not to explain the contextual conditions as to why certain tourists identify certain temperatures as unacceptable (although an important area for future inquiry, it is beyond the scope of this paper). The stated temperature range and thresholds that define "ideal" and "unacceptable" temperatures for urban and 3S holidays, as well as the influence of media stories about Mediterranean "heat waves" on tourists travel plans are discussed. The implications of these findings for incorporation into models that predict tourism demand and international tourism flows, as well as the development of improved tourism climate indices will also be explored.

Method

With northern Europe being the primary tourism market for the Mediterranean, a sample of university students from this region was invited to complete the survey. Between March and May 2009, structured questionnaires were administered to examine stated climate preferences for tourism in the Mediterranean. The total survey sample consisted of 866 respondents, with 230 from Austria, 303 from Germany, 163 from the Netherlands, 81 from Sweden and 89 from Switzerland. The survey instrument was built on previous work by Scott *et al.* (2008a), which was the first *ex situ* study of tourist climate preferences. As a second generation survey, this instrument more precisely determined the range of optimal climate for beach and urban tourism, and explored the thresholds (hot and cool) within the continuum from "ideal" to "unacceptable". A pilot of the survey ($n = 129$) was conducted at the University of Waterloo, Canada, and modifications were made to improve the clarity of some questions. The survey was conducted in English in all five countries.

Similar to Scott *et al.* (2008a), there are two known limitations to this analysis due to the sample. First, distributing the surveys exclusively to students controls for a few

demographic variables, primarily level of education and age (almost exclusively under the age of 30 years). Second, the spatial coverage of the survey was geographically restricted to students attending university in northern Europe. Consequently, the results should only be considered to represent the young adult traveller market and not the broader, global population of leisure tourists. However, a limited public sample ($n = 197$) of tourists in the same community as the student sample in Germany revealed no significant difference ($p > 0.05$) with respect to any of the threshold temperatures in either tourism segment (Wirth, 2009). This provides some evidence that the young adult results are not dissimilar to broader tourist preferences.

Five Mediterranean beach destinations (Larnaca, Cyprus; Milos, Greece; Antalya, Turkey; Nice, France; and Costa Brava-Gerona, Spain) and five urban holiday destinations (Athens, Greece; Istanbul, Turkey; Marseilles, France; Barcelona, Spain; and Venice, Italy) were selected for the climate analysis. These locations were chosen based on their popularity as tourist destinations and to explore the potential differences in impacts across the region. These study areas are illustrative only, with further analysis required for other destinations. To calculate the current suitability of thermal conditions in the Mediterranean for tourism based on the stated preference results from the survey, monthly norms for average daytime high temperatures (WMO, 1996) and the average relative humidity (Weather Online, 2009) from the baseline period of 1961 to 1990 were calculated using the humidex formula (Environment Canada, 2009). To calculate the future climate suitability of the Mediterranean for tourism, projected annual temperatures under the A1B emission scenario for the period 2011–2035 (+1°C) and 2046–2065 (+2.5°C) (Meehl *et al.* 2007) were added to the baseline humidex temperatures. For the period 2080–2099, seasonal temperature projections and humidity for the maximum emission scenario (A1B) was used (4.5°C to 6.5°C) (Christensen *et al.*, 2007). The A1B scenario was selected because the A1 emissions scenario family is the warmest of the Special Report Emissions Scenarios (SRES) scenarios (representative of a "worst case"), with readily available annual (early to mid century) and seasonal (late century) projections.

Results

Climate Preferences for Mediterranean Beach Holidays

Three classifications for beach holiday temperatures have been identified in this study; ideal, unacceptably cool and unacceptably hot, with each classification defined by the majority of respondents (>50%). Figure 1 illustrates the distribution of ideal and cool/hot temperature thresholds for a beach holiday. The majority of respondents define ideal temperatures as between 27° and 32°C, with less than 22°C identified as unacceptably cool and greater than 37°C identified as unacceptably hot. Temperatures between ideal and unacceptably cool/hot temperature thresholds represent transition zones.

The three temperature classifications have been compared with the monthly average daytime high temperatures (accounting for the effects of relative humidity on thermal sensation) from the baseline period of 1961 to 1990 (WMO, 1996) for five popular Mediterranean beach destinations (Figure 2). In these locations, ideal temperatures for beach tourism occur during the summer months (July and August) for the Costa Brava, while June and September are considered ideal in Nice, Cyprus is ideal in April and May, Milos is ideal in May and September, and Antalya in May and October (total combination of 10 months with ideal temperatures across the five beach destinations). All five destinations are rated as unacceptably cool during the winter months, with Cyprus and Antalya having the least amount of unacceptably cool months (four), followed by Milos

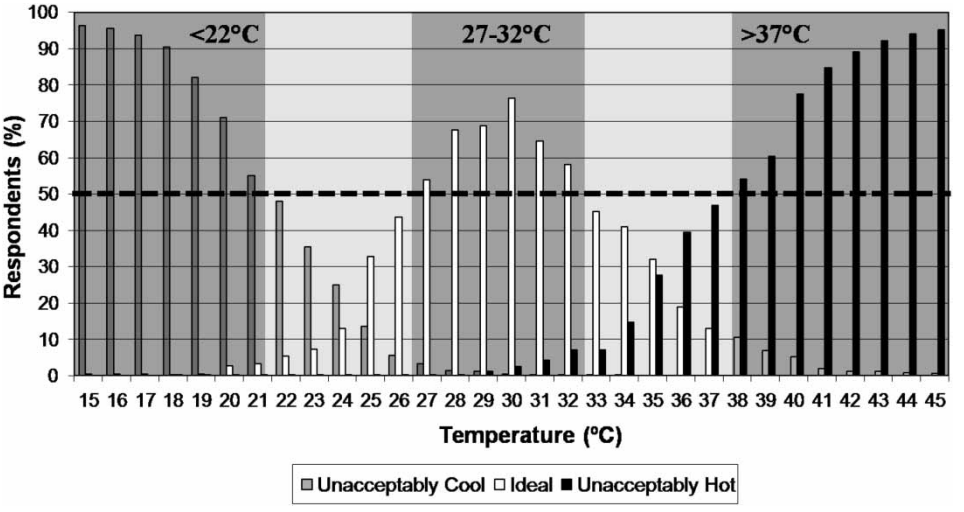

Figure 1. Rating of temperatures for beach holidays

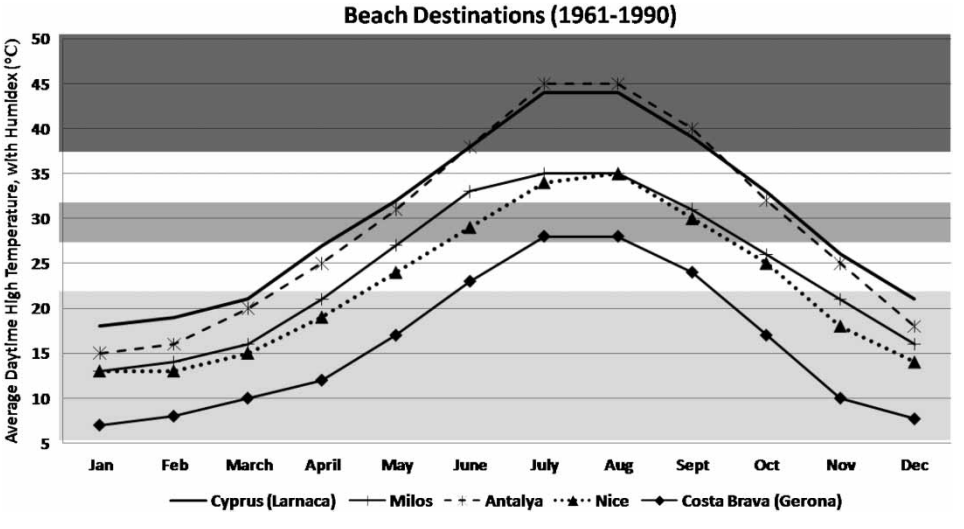

Figure 2. Baseline monthly ratings of average daytime high temperature (1961–1990) for beach holiday destinations

and Nice (six) and Costa Brava (eight) (total combination of 28 months with unacceptably cool temperatures across the five beach destinations). According to the baseline climate, both Cyprus and Antalya are already considered unacceptably hot for beach tourism from June to September (total combination of 8 months with unacceptably hot temperatures across the five beach destinations).

Under the early twenty-first century scenario (2011–2035), the months with ideal temperatures varies only slightly from the baseline conditions (Figure 3). Antalya will no longer be considered ideal in October, Cyprus will no longer be ideal in May but will be in November, and Milos is projected to become ideal in October (total combination of months with ideal temperatures across the five beach destinations does not change from baseline conditions). Unacceptably cool months remain the same for Antalya, Costa

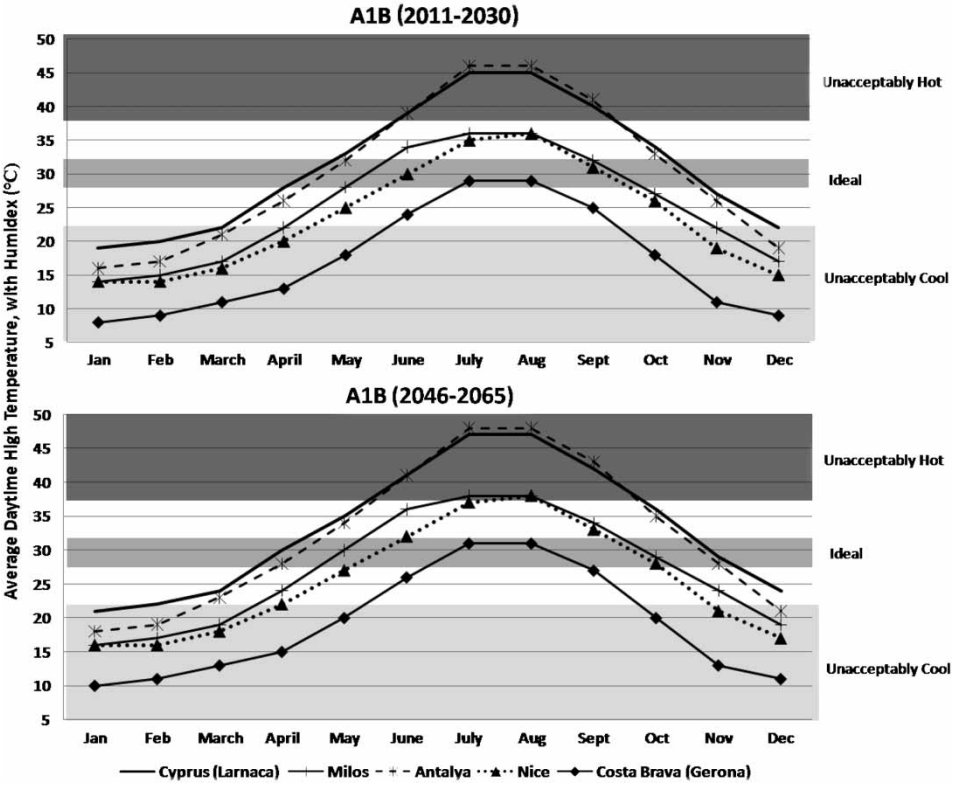

Figure 3. Projected monthly ratings of average daytime high temperatures for 2011–2030 and 2046–2065 for beach holidays

Brava and Nice, while Milos is no longer considered unacceptably cool in April and November, and Cyprus is no longer unacceptably cool in March and December (total combination of months with unacceptably cool temperatures decreases by four when compared to baseline conditions). The number of unacceptably hot months remains the same during this time period (June through September in Cyprus and Antalya).

During the 2035–2046 time period, ideal temperatures occur during the months of April (Cyprus and Antalya), May (Milos and Nice), September (Costa Brava), October (Milos and Nice) and November (Cyprus and Antalya) (Figure 3). During the summer months, temperatures are projected to be ideal in Nice during June and in July, and the month of August in Costa Brava (total combination of months with ideal temperatures increases by two across the five beach destinations when compared to baseline conditions). The number of unacceptably cool months decreases substantially in Cyprus to just one month (January), followed by Antalya (three months), Milos (four months), Nice (five months) and Costa Brava (eight months) (total combination of months with unacceptably cool temperatures decreases by seven when compared to baseline conditions).Cyprus and Antalya continue to be unacceptably hot in mid century under the A1B scenario (from June to September). In addition, Milos (July and August) and Nice (August) are also becoming unacceptably hot in July and August and August, respectively (total combination of months with unacceptably hot temperatures increases by three when compared to baseline conditions).

Figure 4 shows the maximum A1B temperature projections for late century (2080–2099), revealing that the months with ideal temperatures increasingly shift outside the

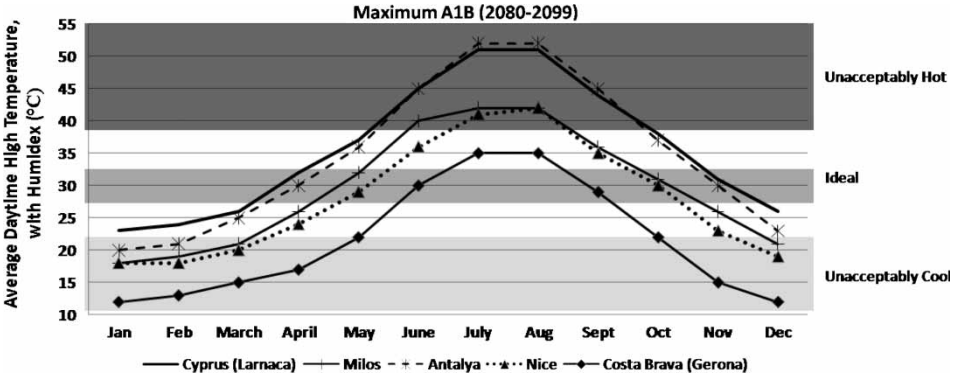

Figure 4. Projected monthly ratings of average daytime high temperatures for 2080–2099 for beach holidays under the maximum A1B scenario

current peak summer tourism season, leaving Costa Brava to be the only location projected to have ideal summer temperatures in June (total combination of months with ideal temperatures increases by one across the five beach destinations when compared to baseline conditions). The number of unacceptably cool months decreases considerably versus that of current conditions, with Cyprus no longer considered "too cold" for any month in the year, followed by Antalya (two), Milos and Nice (four) and Costa Brava (six) (total combination of months with unacceptably cool temperatures decreases by 12 when compared to baseline conditions). The number of unacceptably hot months is also projected to increase, with Cyprus projected to be "too hot" from June to October, followed by Antalya (June to September), Milos (June to August) and Nice (July and August). Costa Brava is the only destination that is not projected to become unacceptably hot during any month of the year by the end of the twenty-first century (total combination of months with unacceptably hot temperatures increases by six when compared to baseline conditions).

Climate Preferences for Mediterranean Urban Holidays

The three classifications of ideal, unacceptably cool and unacceptably hot temperatures have similarly been defined for a Mediterranean urban holiday. Based on the majority of respondents (>50%), ideal temperatures have been defined as between 20° and 26°C, with less than 17°C identified as unacceptably cool and greater than 30°C identified as unacceptably hot (Figure 5).

The three temperature classifications have been compared with monthly average daytime high temperatures (accounting for the affects of relative humidity on thermal sensation), from the baseline period 1961 to 1990 (WMO, 1996) for five popular Mediterranean urban destinations (Figure 6). Under baseline conditions, all five urban destinations have ideal temperatures for at least two months of the year, ranging from April to November (total combination of 11 months with ideal temperatures across the five urban destinations). December to February is unacceptably cool for all five destinations, with Barcelona and Marseilles unacceptably cool for six months of the year, beginning in November until April (total combination of 24 months with unacceptably cool temperatures across the five urban destinations). Under baseline conditions, Athens and Antalya are considered unacceptably hot June through to September, as well as Venice from June through to August (total combination of 11 months with unacceptably hot temperatures across the five urban destinations).

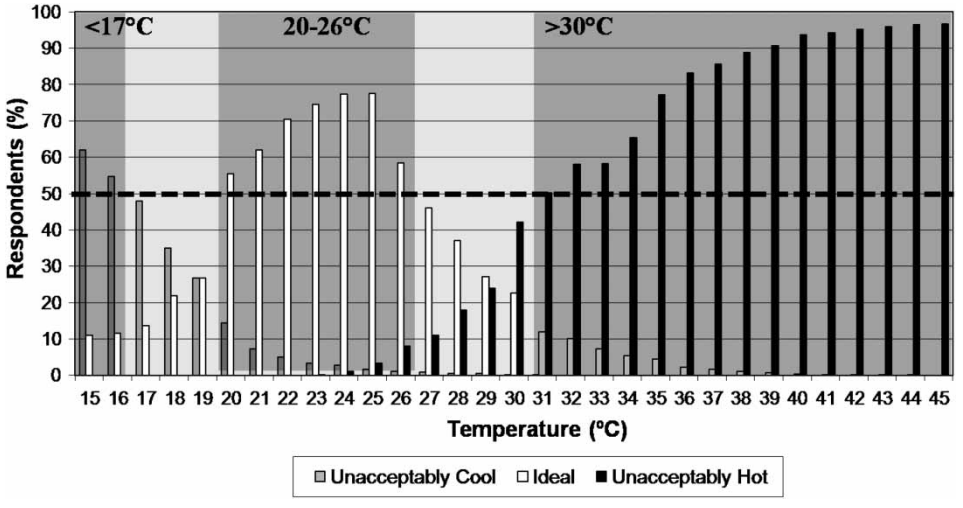

Figure 5. Rating of temperatures for urban sightseeing holidays

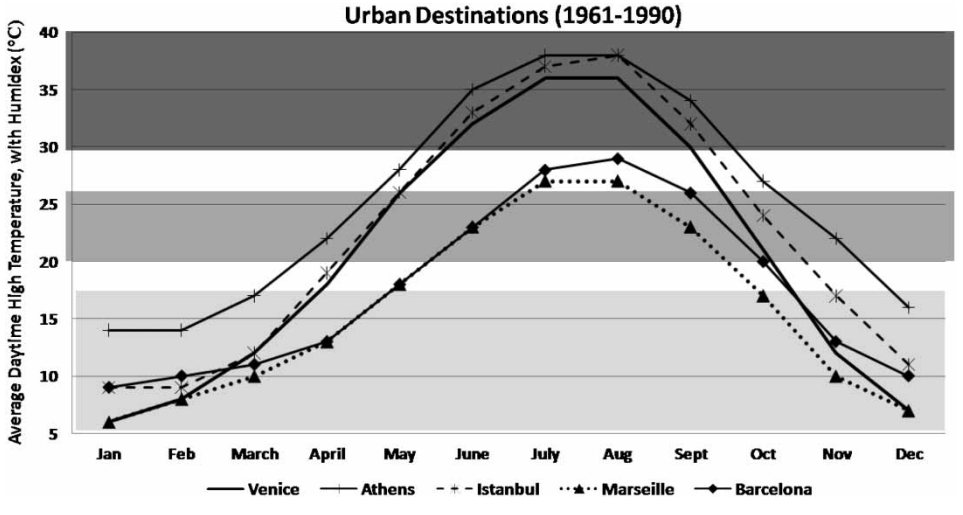

Figure 6. Baseline monthly ratings of average daytime high temperature (1961–1990) for urban sightseeing holiday destinations

Under the A1B scenario projections for the early twenty-first century (2011–2035), the number of ideal and unacceptable months for an urban holiday does not vary greatly from baseline conditions (Figure 7). The exceptions are Barcelona, which will no longer be ideal in September, Istanbul, which is projected to be ideal in April but not May, and Venice, which is no longer ideal in May and projected to be unacceptably hot in September (when compared to baseline conditions, the total combination of months with ideal temperatures across the five urban destinations decreases by two, unacceptably cool conditions decreases by one, and unacceptably hot conditions increases by one).

By mid century (2035–2046), Marseilles and Barcelona continue to be the only two destinations with ideal temperatures during the summer peak season (June). Athens is projected to become ideal in March, Marseilles in May and October, Venice in April but not

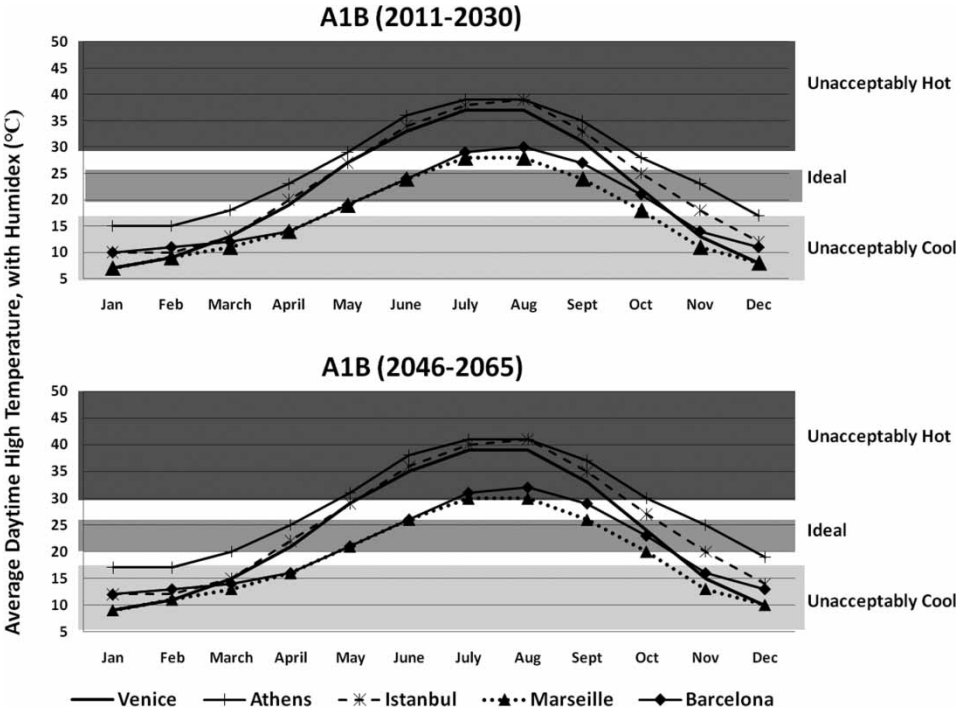

Figure 7. Projected monthly ratings of average daytime high temperatures for 2011–2030 and 2046–2065 for urban sightseeing holidays

May, Barcelona in May, June and October, and Istanbul in April and November but not in May and October (total combination of months with ideal temperatures increases by three across the five urban destinations when compared to baseline conditions). The number of months with unacceptably cool temperatures remains almost unchanged, with the exception of Athens which is projected to no longer be considered "too cool" during any month of the year (total combination of months with unacceptably cool temperatures decreases by three when compared to baseline conditions). Unacceptably hot conditions increase with Athens projected to become unacceptable in May, Venice in September and Barcelona in July and August. Istanbul remains unchanged, continuing to be "too hot" June through to September (total combination of months with unacceptably hot temperatures increases by four when compared to baseline conditions).

When comparing the baseline conditions with the maximum A1B scenario for the period 2080–2099, Athens is projected to be ideal in March and December, and Istanbul in November (Figure 8) (total combination of months with ideal temperatures decreases by one across the five urban destinations when compared to baseline conditions). Marseilles will no longer be considered unacceptably cool in April, along with Barcelona in April and November, Venice in March and November and Istanbul in March (total combination of months with unacceptably cool conditions decreases by 10 when compared to baseline conditions). As expected, the number of unacceptably hot months increases by the end of the century, with all five destinations unacceptably hot for at least two months of the summer tourism season. More specifically, Athens is projected to become "too hot" May through to October, followed by Venice and Istanbul May to September, Barcelona July to September and Marseilles July and August (total combination of months with unacceptably hot conditions increases by 10 when compared to baseline conditions).

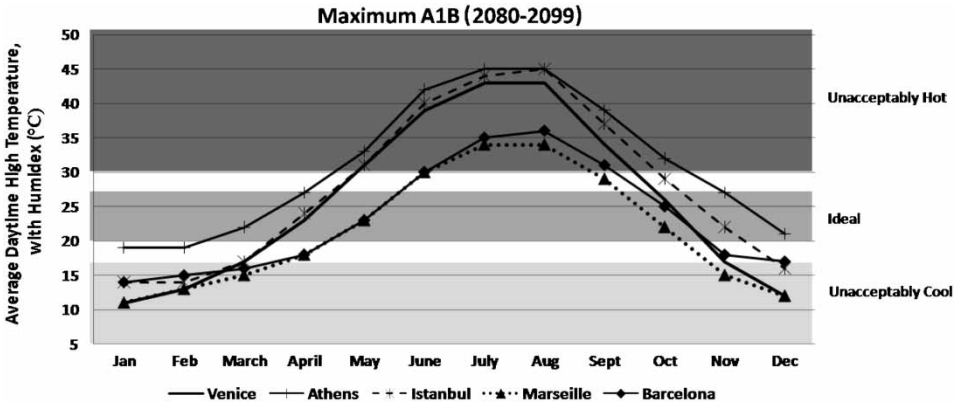

Figure 8. Projected monthly ratings of average daytime high temperatures for 2080–2099 for urban sightseeing holidays under the maximum A1B scenario

Influence of Media Stories on Mediterranean Holiday Planning

To help respondents gain perspective on the types of media stories that are projecting "too hot" claims, an article from a popular UK newspaper, the *Observer*, was included in the survey instrument (2007). Participants were then asked to evaluate the influence that this or similar articles would have on their travel plans. Table 1 reveals that only a small percentage of the respondents are not influenced by this type of media story (12%). The largest proportion of respondents (39%) were unsure how the media story would influence their Mediterranean travel plans, while 32% stated that such stories would have a strong or very strong influence on their plans.

To better understand the potential behavioural response to media stories, respondents were asked to assume they were planning a Mediterranean holiday, but had not yet booked their travel reservations (Table 2). More than half of the respondents (52%) stated that they would change their travel plans in some manner. Most (28% of total sample) stated they would still book a Mediterranean holiday, but would book a location that was not experiencing a heat wave, 19% (of total sample) would book a later departure date, and 5% (of total sample) would forego the Mediterranean altogether and go on a

Table 1. Influence of media stories on? travel plans in the Mediterranean

How much influence would media stories have on your Mediterranean travel plans?				
No influence		Neutral/unsure		Very strong influence
12%	17%	39%	28%	4%

Table 2. Influence of media stories on heat waves if holiday reservations not yet booked

Media's influence on Mediterranean travel before booking holiday reservations	
Would book the holiday	32%
Would book the holiday, but at a location not undergoing a heat wave	28%
Would the holiday, but with a later departure date	19%
Would not go to the Mediterranean	5%
Would seek additional information before deciding	16%

Table 3. Influence of media stories on heat wave if holiday reservations already booked

Media's influence on Mediterranean travel after booking holiday reservations	
Would go on the holiday	57.1%
Would go on the holiday, but change destination to one not undergoing a heat wave	17.3%
Would go on the holiday, but change departure date	9.3%
Would cancel the holiday and chose a non-Mediterranean destination	1.2%
Would seek additional information before deciding	12.9%
Invalid or missing response	2.2%

holiday in another region. The remaining respondents (32%) stated they would still book their holiday at the original location and time, while 16% would seek additional information before deciding what to do.

Respondents were also asked about the influence of media stories if their holiday reservations had already been booked (Table 3). As expected, fewer respondents would change their plans, with the majority stating they would still go forward with their Mediterranean holiday reservations as originally booked (58%). Nevertheless, a substantial number (29%) stated they would alter their reservations. This includes 18% (of total sample) who responded that they would switch their Mediterranean destination to one not undergoing a heat wave, 9% (of total sample) would alter their departure date, and 2% (of total sample) would forgo the Mediterranean and travel to a different region. The remaining 13% (of total sample) stated that they would seek additional information before deciding if or how they would alter their booked reservations.

Discussion and Conclusions

Tourists have the greatest capacity to adapt to the impacts of climate change, with comparative ease and freedom to avoid undesirable climatic conditions by either altering the timing of their trip or avoiding the destination altogether (Scott *et al.*, 2008). It is therefore imperative to understand what climatic conditions tourists deem as unsuitable for a holiday or would diminish the quality of vacation experience. The results indicate that ideal and unacceptably cool/hot temperatures vary by tourism segment. Ideal, unacceptably cool and unacceptably hot temperatures were warmer for beach tourism than for urban holidays ($<22^{\circ}$C, $27^{\circ}-32^{\circ}$C and $>37^{\circ}$C, compared to $<17^{\circ}$C, $20-26^{\circ}$C and $>30^{\circ}$C). This supports Scott *et al.*'s (2008a) contention that there is no single optimum temperature for all tourism, raising questions about the validity of defining a simple optimum temperature or temperature range for all tourism as done in Besancenot *et al.* (1978), Mieczkowski (1985), Maddison (2001), Lise and Tol (2002), Scott *et al.* (2004), Hamilton (2005), Hamilton *et al.* (2005), Bigano *et al.* (2006), Amelung and Viner (2006), Perry (2006) and Amelung *et al.* (2007).

In order to reassess claims that the Mediterranean will become "too hot" for summer tourism by 2020 or 2030, the stated temperature preferences for a beach and urban sightseeing holiday were applied to the baseline temperatures (1961–1990) and to projected temperatures under the A1B climate change emission scenario for early (2011–2035), mid (2046–2065) and late (2080–2099) twenty-first century (accounting for the affects of relative humidity on thermal sensation). Based on the results from this study, there is scientific evidence to support a portion of these claims. Among the five beach tourism destinations examined, Cyprus and Antalya are currently unacceptably hot during the peak summer months, and it is not until mid century that Milos and

Nice become unacceptable. Costa Brava is not projected to be "too hot" for beach tourism at any point in this century. Similarly, among the five urban destinations, Athens and Istanbul are currently deemed unacceptably hot during the peak summer months. Barcelona becomes unacceptable at mid century, with Marseilles becoming unacceptable in the late century under the maximum A1B scenario. There is no evidence to support the contention that the Mediterranean region as a whole will become "too hot" by the 2020s or 2030s. In fact, only those destinations that are already considered to be "too hot" under baseline summer conditions will be "too hot" by 2011–2035, with eight destinations to become unacceptably hot by mid century (four beach and four urban destinations) and nine to become unacceptably hot by late century (four beach and five urban destinations).

Two studies further support the conclusions of this study. Moreno *et al.* (2009) employed webcams to identify tourist density on a beach in the Netherlands, finding that the day in which the beach had the highest density occurred when the temperatures were the warmest. Martinez Ibarra (2008) found similar results during the European heat wave of 2003, in which the number of tourists involved in beach recreation increased as the temperatures increased. Unfortunately the maximum temperatures in both these studies were not provided, making it difficult to draw direct comparisons to the thresholds found in this study.

Other studies have projected that under climate change the months with suitable temperature conditions may shift to the Mediterranean's current shoulder season of spring and autumn (Maddison, 2001, Lise and Tol, 2002, Bigano *et al.*, 2006, Hamilton *et al.*, 2005, Amelung and Viner, 2006, Amelung *et al.*, 2007, Alcamo *et al.*, 2007, Wilbanks *et al.*, 2007, Scott *et al.*, 2008). This study found that by late century, a total combination of 12 months across all five beach destinations and 10 months across all five urban destinations would no longer be considered unacceptably cool. As a result, there is the potential for a much longer warm weather tourism season, with suitable weather for tourism. Hence, demand may not necessarily decline as a result of climate change, but rather contribute to a shift in the timing that tourists visit in the region by mid to late century. Ultimately such changes will depend on the strength of several factors, including institutional seasonality and the ability of the destination to adapt to or take advantage of the improved shoulder season climate (Scott *et al.*, 2004).

Perhaps a more central question is the strength of the media and how it may influence tourists' holiday plans. Based on stated temperature preferences, the temperatures are not projected to become unacceptably hot across the Mediterranean, but the possibility still remains that the stories published in the media could influence tourists' decisions to travel to the region. The media story provided in the survey focused on heat waves, and resulted in a large percentage of the survey respondents stating they would change their holiday plans in some way (52% before booking and 28% after booking holiday reservations). The results of a study by Moreno (2010) hint to the notion that the media's influence may be even greater, as the stated influence of heat waves on holiday planning was ranked the lowest behind risk of disease, forest fires, water restrictions in hotels and reduced beach extension. Therefore acknowledging and understanding the potential that the media has to influence tourists travel plans will be important, particularly as the implications of climate change become more pronounced. Additionally, with a trend towards shorter time frames for travel planning and the rise in "last-minute" holiday bookings, communicating accurate conditions and forecasts for very specific destinations (i.e. Athens versus all of Greece) in a timely manner will be vital (Scott and Lemieux, 2009). This will help ensure tourists make informed travel decisions and avoid unnecessary impact to unaffected destinations.

This study has only begun to yield insights into the accuracy and influence of the "too hot" claims for Mediterranean tourism. The results offered are exploratory. While temperature is important, there are multiple other climate parameters that need to be considered (e.g. sky, wind, precipitation), warranting continued research. Building upon this paper, which has focused on the young adult tourism segment, a more public and globally distributed survey may prove beneficial in identifying cross-cultural differences in preferred climate conditions for tourism. Moreover, one emission scenario (A1B) was reasoned to be sufficient for this exploratory study, and was selected because the A1 scenario family is the warmest (representative of a "worst case") with readily available seasonal projections. Should other SRES scenarios (B1, A1T, B2) have been selected, "too hot" conditions would have occurred even later in the century (if at all). In the future, a range of SRES could be investigated to increase the robustness of the results.

It is also important to note that the temperature projections are based on calculations from the monthly climate norms, neglecting to account for the frequency and intensity of extreme temperature conditions. While it is difficult to predict these extreme events, they may be more important to understand since tourists experience actual weather conditions and average temperatures (de Freitas, 2003). Understanding the influence of extreme weather on tourists when they are planning a holiday, as well as the level of importance tourists assign to being able to predict their intensity and occurrence needs to be investigated further.

The role climate plays in destination choice and its effects on tourist decision making remains under studied, an important knowledge gap. There are very few studies that identify ideal or preferred conditions for tourism and even fewer that examine the sensitivity of tourism to atmospheric conditions generally. The empirical evidence presented here illustrates how complex the relationship between climate and tourism can be, even in a simple framework where climate preferences and thresholds are the only explanatory factors taken into account. With very limited literature on this relationship, it can be difficult to assess what impact climate change may have on the Mediterranean and on other climate-dependent tourism regions. Further research is needed to determine the actual perceptions, expectations and responses of tourists to the current and future influence of climate on the geography of travel patterns.

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