Antarctic cruise tourism: the paradoxes of ambassadorship, “last chance tourism” and greenhouse gas emissions

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This paper examines a paradoxical issue in tourism’s adaptation to climate change and emissions reduction demands. Operators increasingly take tourists to destinations threatened by climate change, with Antarctica and other polar regions as favourites and cruise ship and aircraft as main transport modes. The selling point is to see a destination before it disappears, a form of last chance tourism. This has been claimed to increase the environmental awareness of tourists and make them “ambassadors” for conservation and the visited destination. Antarctic cruise ship passengers tripled from 2000 to 2007. The paper finds that high levels of greenhouse gas emissions are created by cruise ship tourists in general, and especially high levels for those visiting the Antarctic, up to approximately eight times higher per capita and per day than average international tourism trips. A survey found no evidence for the hypothesis that the trips develop greater environmental awareness, change attitudes or encourage more sustainable future travel choices. Of the Antarctic cruise passengers surveyed, 59% felt that their travel did not impact on climate change; fewer than 7% had or might offset their emissions. Alternative opportunities for visitation to glacial/polar destinations that comply with the desire to reduce future emissions are discussed.

Keywords: climate change; adaptation; emissions; environmental awareness; cruise tourism; last chance tourism

Introduction

Climate change is gradually restructuring the tourism industry. Destinations around the world are beginning to understand the implications of climate change, resulting in increasing adaptation efforts and changes in destinations (ski areas are an example; see Scott, 2006; Wolfssegger, Gössling, & Scott, 2008). As contributors to climate change, with growing shares of national and global emission budgets, tourism and aviation increasingly attract the attention of environmental groups and politics (Bows, Anderson, & Peeters, 2009). The industry is responding to this challenge with calls for adaptation and by setting aspirational emission targets (Scott, Peeters, & Gössling, 2010; United Nations World Trade Organization, United Nations Environment Programme, & World Meteorological Organization [UNWTO-UNEP-WMO], 2008; World Travel and Tourism Council [WTTC], 2009). One outcome/form of adaptation is to create an opportunity out of a threat by marketing destinations that are threatened by climate change, the so-called last chance tourism. This paper explores the impact of such products on the environmental awareness and attitudes of Antarctic cruise tourists and assesses the impacts of Antarctic cruises on greenhouse gas (GHG) emissions and climate change.

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Last chance tourism

Publications like the Intergovernmental Panel on Climate Change (IPCC) Assessment Reports (e.g. IPCC, 2007), Al Gore’s *An Inconvenient Truth* and programmes like the International Polar Year (2007–2009) and the International Year of the Reef (2008) have drawn widespread attention to climate change and its impacts. Lifestyle and travel magazines have started publishing articles featuring must-see endangered destinations, stating which operators offer tours (e.g. Heinrichs & Howe, 2003; Hudson, 2009; McKie, 2007; Reed, 2007; Salt, 2006; Siber, 2008; Struck, 2004). Travel literature soon followed (Hughes, 2008; Lisagor & Hansen, 2008). Because of melting glaciers, bleaching corals or disappearing islands, destinations like Alaska, Kilimanjaro, Greenland, Antarctica, the Great Barrier Reef and Tuvalu usually make it into these “must-see lists”.

The media has followed, with generally critical articles, and has invented a variety of names for this new phenomenon: catastrophe tourism (Todras-Whitehill, 2007), climate tourism and extinction tourism (Leahy, 2008), climate change voyeurism (Intelligent Travel, 2007), climate sightseeing (JWT, 2007), doom tourism (Salkin, 2007), doomsday tourism (Shipman, 2007) and last chance tourism (Smith, 2008). Now researchers have started referring to the subject. Gras-Dijkstra (2009) added “climate disaster tourism” to the list of terms; several others refer to “last chance tourism” (Dawson, Stewart, Lemelin, & Scott, 2010; Randles & Mander, 2009; Scott, de Freitas, & Matzarakis, 2009). The authors of this paper prefer “last chance tourism”; it best captures the motivational essence behind the trips in question, i.e. visiting destinations before it is too late. Stewart (2009) believes that last chance tourism was first used by the tourism industry to describe increasing tourist interest for endangered Arctic glaciers and polar bears. This interest is confirmed by a Mintel report on circumpolar tourism:

Tour operators report that more and more travellers are asking about trips to the Arctic, evidently believing that it might vanish at any minute. They want to get there before the ice cap melts and the animals – especially the polar bears – drown or disappear. (Mintel, 2008a)

Carnival Corporation, controlling nearly half of the international cruise tourism market, acknowledges that it sees these opportunities related to climate change including higher demand to visit environmentally protected remote areas being impacted by climate change (for example the Antarctic and Alaska) (Carbon Disclosure Project [CDP], 2008).

Consequently, tour operators have started catering for the needs of these customers, but for many and different reasons. Intentions range from pure commercial interest to genuine concern about the fate of these destinations, but the overall effect is the increased interest in them. Some operators do acknowledge the environmental impact of the trips they promote, but reason that the pro-poor or pro-conservation benefits outweigh these disadvantages (McKie, 2007). The commercial perspective is emphasised by the following press release:

Next fall could be your last chance to see polar bears, the Kings of the North, in their natural habitat. […] In order to ensure your chance at spotting these great creatures in the wild, it’s necessary to book now for next fall’s polar bear vacations, with most packages already more than half full and the future uncertain. […] It would be a shame to postpone one of the world’s greatest wildlife experiences until it’s too late. (Fresh Tracks, 2008)

A more concerned perspective is taken by Inuit-owned Cruise North Expeditions. In 2006, Cruise North themed one of their Baffin Island cruises “Polar bears on thin ice”, which included discussions with a group of experts to help raise awareness of current global warming impacts in the Arctic and solutions to the problem (Cruise North, 2006).
The focus on raising awareness on climate change and the environment would classify polar last chance trips as ecotourism, one of five different polar tourism markets (Snyder, 2007a).

**Polar (cruise) tourism and greenhouse gas emissions**

Of all endangered destinations, remote ones like the Arctic and Antarctic are currently favoured by the sector and visitors alike. Ironically, climate change has reduced the amount of “available” glacial coastline in non-polar areas (Craig-Smith, Tapper, & Font, 2006) and has made many polar regions more accessible to marine tourism, due to reductions in sea ice (Dawson, Maher, & Slocombe, 2007; Stonehouse & Snyder, 2007). The advent of more and larger cruise ships has also put polar destinations in the spotlight (Craig-Smith et al., 2006). Cruise ships now transport over 1.2 million passengers to the polar regions each year (Snyder, 2007b). The number of Antarctic cruise passengers tripled between 2000 and 2007. With 37,500 passengers in 2008–2009, ship-borne tourism represents over 98% of all trips in the Antarctic (International Association of Antarctica Tour Operators [IAATO], 2009c). Of the Arctic and sub-Arctic regions, classic cruise destinations such as Alaska (over 800,000) and Norway (at least 700,000) receive most passengers, whereas cruise tourism to Svalbard (30,000), Greenland (23,000) and Arctic Canada has started more recently (Marsh & Staple, 1995; Mintel, 2007, 2008a; Stewart & Draper, 2006). Cruise numbers to Svalbard and Greenland more than doubled between 2000 and 2007 (Mintel, 2008a). Worldwide cruise demand in general has grown steadily at an average annual rate of 7.4% since 1990 (Cruise Lines International Association [CLIA], 2009) and is estimated at around 16 million for 2007 (Mintel, 2008b).

In view of the increased travel to polar regions, it is not surprising that the tourism research community has embraced polar tourism as a subject on its own (see Amelung & Lamers, 2006; Snyder & Stonehouse, 2007; Stewart, Draper, & Johnston, 2005). The socio-environmental impacts and regulation issues associated with polar tourism have received much attention (Haase, 2005; Haase, Lamers, & Amelung, 2009; Lamers & Amelung, 2007; Lemelin, Fennell, & Smale, 2008; Powell, Kellert, & Ham, 2008; Snyder, 2007a; Stewart, 2007; Stewart & Draper, 2006; Stewart, Kirby, & Steel, 2006). However, impacts are discussed on a local or regional level, whereas the global impacts of polar tourism “have been systematically overlooked” (Amelung & Lamers, 2007, p. 131). Becken and Schellhorn (2007) have criticised this as a closed-systems approach to tourism research; an open-systems approach, integrating both local and global dimensions, is required. Apart from Amelung and Lamers (2007) and Dawson et al. (2010), only a UNEP publication briefly discusses polar tourism emissions (Snyder, 2007a). While polar cruise tourism features strict environmental guidelines and codes of conduct (e.g. Association of Arctic Expedition Cruise Operator, n.d.; IAATO, 2009b; Snyder, 2007a) and cruise lines increasingly respond to “traditional” environmental issues (Sweeting & Wayne, 2006), the monitoring and/or mitigation of emissions in relation to climate change receives little attention. This is a serious omission as tourism energy use and emissions have been discussed for 10 years now (Becken, 2002; Dubois & Ceron, 2005; Gössling, 2000; Gössling, Hansson, Hörstmeier, & Saggel, 2002; Hoyer & Aall, 2005; Peeters, Szimba, & Duijnisveld, 2007; Schmied, Buchert, Hochfeld, & Schmitt, 2001) and are acknowledged by the main tourism bodies (UNWTO-UNEP-WMO, 2008; WTTC, 2009). The large role that long-haul flights play in tourism emissions has been shown by several of the above authors, but seems to be mainly ignored within polar cruise tourism where distances are by definition above the average for international tourism trips of 4100 km return distance (UNWTO-UNEP-WMO,
Cruise ship tourism has largely been excluded from the climate mitigation debate, because the cruise segment is still a relatively small one within the tourism industry.

Creating environmental ambassadors

Studies on the education and conservation benefits of nature and ecotourism often stress the positive effect that such activities can have on tourists’ environmental attitudes, sometimes even leading to an ethical and environmental transformation of the tourist (Weaver, 2005) and resulting in “longer term intentions to engage in conservation actions” (Zeppel & Muloin, 2009, p. 215). Polar tourism studies are no exception:

The main positive impact of polar tourism, if well done, is its educational value. Arctic and Antarctic visitors are fascinated by the sheer beauty, wilderness and natural phenomena of the polar environment. This can be used to make them not only to ambassadors for the protection of the visited regions, but also supporters of conservation activities and organizations worldwide. (Snyder, 2007a, p. 16)

The ambassadorship concept originates from the 1960s, when Lars-Eric Lindblad started ship-borne tourism operations in the Antarctic under a strong environmental ethic that is still applied today (Snyder, 2007a; Stonehouse & Crosbie, 1995). The Lindblad concept has been embraced by the IAATO in their Article II, Section I of IAATO bylaws: “To create a corps of ambassadors for the continued protection of Antarctica by offering the opportunity to experience the continent first hand” (IAATO, 2009a). As a representative of Quark Expeditions, one of IAATO’s members, says:

Our philosophy is that you must protect the environment but you must make sure that people get to see it, because if you don’t see it, you won’t value it. People who travel to these areas are keen to help fight global warming. They go home and tell their friends they’ve got to do something. (Campbell as cited in Shipman, 2007)

Objective and methodology

Polar cruises produce some of the highest per capita CO₂ emissions in tourism (Amelung & Lamers, 2007; UNWTO-UNEP-WMO, 2008). Clearly, this creates a paradoxical situation, where trips intended to raise awareness on climate change (and create environmental ambassadors) at the same time contribute significantly to climate change (see also Dawson et al., 2010). This paradox is one of the most debated aspects of ecotourism in general (Becken & Schellhorn, 2007; Higham & Lück, 2007). Yet, these trips are often marketed as responsible tourism products, even though the environmental, economic and socio-cultural impacts of polar tourism are heavily debated (see Stewart et al., 2005, for an overview). Focusing on Antarctic cruise tourism, this paper discusses this paradox by evaluating emissions, presenting a survey of likely “last chance tourists” onboard a cruise to Antarctica and reviewing the literature to verify the industry’s claim of creating environmental ambassadors that will combat climate change to help preserve the Antarctic.

Cruise tourism emissions

Emissions by cruises consist of two main parts: firstly, the emissions of transport used from the tourists’ homes to the port of embarkation and back from the port of disembarkation (usually flights) and, secondly, the emissions caused by the cruise ship itself. These latter
emissions cover the emissions both from moving the ship and from powering its onboard facilities and systems.

Ship CO\textsubscript{2} emissions are calculated by multiplying fuel consumption with an emission factor dependent on the fuel type. Apart from cruise ships with a gross tonnage (GT) of less than 2000 which use marine diesel oil (MDO), the global cruise fleet uses heavy fuel oil (HFO) (Buhaug et al., 2008). However, a large majority (>80%) of the cruise ships operating in Antarctica uses lighter fuel types such as diesel, marine gas oil (MGO) or MDO (COMNAP/IAATO, 2005). The International Maritime Organization (IMO) uses an emission factor of 3.13 t CO\textsubscript{2} per ton of fuel consumption for residual fuel oil (or HFO) and 3.19 for MDO (Buhaug et al., 2009). These are default factors prepared by the IPCC for GHG inventories (IPCC, 2006). In case the fuel consumption of a passenger ship is unknown, this can be estimated by applying the following equation by Trozzi and Vaccaro (1998), also recommended by the IPCC (2006), which is based on a linear regression analysis of fuel consumption and gross tonnage for passenger ships in Lloyd’s Maritime Information Services Ltd. database:

\[
C = 16.904 + 0.00198 \times GT
\]

where \(C\) stands for fuel consumption at full power (t/day) and GT for gross tonnage. Fuel consumption varies per operating mode. Trozzi and Vaccaro (1998) assume that all ship types operate at 80% of full power when cruising and that all passenger ships operate at 32% of full power when in “hotel mode”. Based on empirical observation, Amelung and Lamers (2007) suggest that Antarctic expedition cruise ships operate in cruise mode 75% of their time and the rest in hotelling mode. The per-passenger emission figures used in this paper do not include crew numbers, as they are an integral part of the cruise product. Most cruise ships carry large numbers of crew: inclusion would diminish these figures and fundamentally misrepresent the impacts of tourism.

Air travel emissions from cruise packages are calculated by multiplying flight distances (using Great Circle Mapper; http://gc.kls2.com) with a detour factor of 1.05 (Peeters et al., 2007) and an emission factor dependent on the plane type (in kg CO\textsubscript{2}/km; based on IPCC, 1999). This paper considers only CO\textsubscript{2} emissions. Therefore, the impact on climate change from air transport emissions is significantly underestimated, as the non-carbon impacts of aviation on radiative forcing (RF) may be up to five times the RF of all cumulated aviation CO\textsubscript{2} emissions since 1940 (see Lee et al., 2009). The problem here is that this ratio refers to “accumulated” CO\textsubscript{2} from aviation. Such an RF factor cannot be used as a kind of multiplier like the commonly used Global Warming Potential (e.g. see Forster, Shine, & Stuber, 2006, 2007; Shine, Fuglestvedt, Haillemariam, & Stuber, 2005) to calculate CO\textsubscript{2} equivalent (CO\textsubscript{2}-e) emissions (e.g. as applied in Amelung & Lamers, 2007; Dawson et al., 2010). Full-fledged scenario studies, including estimates of the global CO\textsubscript{2} concentration in the atmosphere, are needed to determine the impacts of aviation on RF (see Peeters & Williams, 2009). They are not used in this paper, but should be used in future papers.

Survey

The awareness of and attitudes to climate change of polar cruise tourists were assessed by printed survey. Questionnaires were to be handed out onboard by participating tour operators of Arctic and Antarctic cruises. Initially, over 60 companies were contacted, but only three operators were found willing to cooperate. The sample from two of these
operators, both from Arctic cruises, was found too small to include in the results \((n = 18)\). For various reasons, they differed too much from the third operator sample, which was from an Antarctic cruise operator and much larger \((n = 151)\). Hence, only the sample from this third operator, Hansa Kreuzfahrten, has been used and presented here. The questionnaire was distributed onboard two of their Antarctic cruises in January–February 2009. Both an English and a German version were distributed during the last two days of each cruise. (The English version can be found on the web-based version of this paper.) An introduction explained the company’s support of research projects and made a reference to the authors’ university and the research theme (Antarctic tourism and climate change). The number of passengers recorded for these two cruises was 721 (IAATO, 2009c), so the sample represents 21% of all passengers. The limited sample, compared with all Antarctic cruise tourists, can partly be ascribed to the survey distribution system, i.e. by the tour operator. Bauer (2001) noted that obtaining good results depends on researchers distributing the questionnaires. Another cause for the low operator support may have been timing, as the request was put forward during the high season of Antarctic tourism.

The survey featured open-ended and closed questions on the following issues: socio-demographics, motives and experiences, climate change, and previous as well as future travel plans. Questions on motives and climate change were used to assess the respondents’ awareness of climate change. Respondents could choose between several motives for their trip, of which “see the Antarctic before it disappears” was one. Important climate change-related questions were “do you believe climate change exists”, “do you believe that travel has a large impact on climate change” and “the emissions of my trip are (much less/less/equal/more/much more) compared to an average international holiday”. Respondents were asked for the continent they would travel to next and the transport mode they would use for that trip, to verify whether a transformation of environmental ethics is discernable.

**Results**

**Cruise tourism emissions**

CO₂ emissions (in metric tons) have been calculated using international sector data from the IMO and by using data from individual cruise companies. For the year 2007, the IMO estimated the global fuel use of all passenger ferries and cruise ships at 31.3 Mt, corresponding to 96 Mt CO₂ (Buhaug et al., 2008). (The IMO does not specify whether traditional coastal ferry operations like those in Norway and Alaska that now serve largely as cruise vessels are categorised as ferry or as cruise.) Fuel use of 6.12 Mt is attributed to “pure” cruise ships. Applying the CO₂ emission factors for HFO and MDO to the fuel consumption of the respective cruise ship size categories gives a figure of 19.17 Mt CO₂ for all cruise ships in 2007 (see Table 1). We have found one existing estimate for the emissions of ocean-going cruises, 34 Mt for 2005 (World Economic Forum, 2009), but cannot compare this with our figure because we lack a suitable methodology.

This figure is verified by cruise company figures. The two largest companies, Carnival Corporation and Royal Caribbean Cruises (RCC), share 47% and 22% of the global cruise market respectively (Mintel, 2008b). For 2007, Carnival Corporation reports 7.67 million passengers and 9.86 Mt CO₂ for its fleet (Carnival, 2008; CDP, 2008), resulting in an average of 1.29 t CO₂ per passenger and per trip. RCC report total fleet emissions of 3.68 Mt CO₂ for 2008 (2007 figure not available; RCC, 2009). The sum of both of these companies’ fleet CO₂ emissions would make up 71% of the 19.17 Mt CO₂ calculated before, coming very
Table 1. Cruise ship fuel use and CO$_2$ emissions per ship category and total, 2007.

<table>
<thead>
<tr>
<th>Cruise ship size (GT)</th>
<th>Fuel consumption (Mt)</th>
<th>Fuel type</th>
<th>CO$_2$ (Mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100,000+</td>
<td>1.189</td>
<td>HFO</td>
<td>3.72</td>
</tr>
<tr>
<td>60,000–99,999</td>
<td>2.547</td>
<td>HFO</td>
<td>7.97</td>
</tr>
<tr>
<td>10,000–59,999</td>
<td>1.928</td>
<td>HFO</td>
<td>6.03</td>
</tr>
<tr>
<td>2000–9999</td>
<td>0.309</td>
<td>HFO</td>
<td>0.97</td>
</tr>
<tr>
<td>0–1999</td>
<td>0.150</td>
<td>MDO</td>
<td>0.48</td>
</tr>
<tr>
<td>Total</td>
<td>6.123</td>
<td></td>
<td>19.17</td>
</tr>
</tbody>
</table>

Sources: Buhag et al. (2008, 2009).

Close to their joint market share of 69% (Mintel, 2008b). With 16 million cruise passengers in 2007 (Mintel, 2008b), the average passenger emits approximately 1.2 t CO$_2$ per trip, which compares reasonably well with the Carnival figure given above. The average cruise length in 2007 was 7.1 days (CLIA, 2009), so average emissions per passenger and day are estimated at 169 kg CO$_2$.

Antarctic cruise tourism emissions

It is in the per-passenger emission figures that Antarctic cruises stand out: longer on-ship travel distances cause considerably higher emissions than cruises to most other destinations. This is exemplified with emission data from Lindblad Expeditions. For 2006, Lindblad reported CO$_2$ emissions of 3.8 per guest and 256 kg per guest day for the National Geographic Endeavour (118 passengers), which was their only ship used for Antarctic cruises that year. The average emissions for their fleet (six ships), serving Antarctic and other regions, are much lower: 1.56 t per guest and 160 kg per guest day (Lindblad Expeditions, 2007). Amelung and Lamers (2007) estimated average emissions for Antarctic cruises of 6.3 t CO$_2$ per passenger (the authors give this figure as CO$_2$-e, but have used an emission factor for CO$_2$ only). However, all previous cruise emission figures – regardless of destination – lack one important component: the great majority of cruise tourists need to fly to and from their port of embarkation, and these are frequently long-haul flights. This is particularly the case with a remote destination like Antarctica. For the average Antarctic cruise, Amelung and Lamers (2007) estimated the flight emissions at 3.2 t CO$_2$ per passenger (the equivalence factor of 2.7 for non-carbon emissions has been deducted from the figure given by Amelung and Lamers).

Our respondents cruised the Antarctic on the MS Delphin (Hansa Kreuzfahrten). With a gross tonnage of 16,214, the MS Delphin uses approximately 49 tons of fuel per day at full power (as calculated using the equation by Trozzi & Vaccaro, 1998). Applying cruising and hotelling fractions to this figure for a 19-day cruise, we arrive at a total estimated fuel consumption of 633 t and 2019 t CO$_2$ per cruise (emission factor for MDO used). As 360 passengers were reported for each Delphin cruise on average (IAATO, 2009c), the average emissions are estimated at around 5.61 t CO$_2$ per passenger per trip and 295 kg CO$_2$ per passenger day. The cruise package included a direct charter flight by LTU/Air Berlin from Düsseldorf, Germany, to Ushuaia, Argentina, and back (Hansa Kreuzfahrten, 2008). A return flight between Düsseldorf and Ushuaia plus detour factor brings the total flight distance at 28,678 km. We assume that all 360 passengers used the charter flight and that the most likely aircraft that Air Berlin used for this flight was the Airbus 330-300 which produces 27.2 kg CO$_2$/km (based on IPCC, 1999; Peeters & Middel, 2007). Hence,
flight emissions per passenger are the order of 2.17 t CO₂. This brings total emissions per passenger to an estimated 7.8 t CO₂ per trip and 409 kg CO₂ per day. Note that these figures exclude emissions for connecting flights to Düsseldorf and for activities like Zodiac trips. (A Zodiac trip uses a high-specification brand of inflatable boat for side trips from the main cruise vessel.)

In Figures 1 and 2 we compare the above per-trip and per-day emission figures with those of a number of average tourism trips and per-capita emissions across a range of travel types and modes. Antarctic cruises are clearly in the upper segment of per-trip and per-day emissions, along with long-haul trips. Passengers of Antarctic cruises can produce as much emissions on their trip as the average European in a year. The average cruise figure appears
as relatively moderate on a per-trip basis, but excludes the flight that most people take to get
to their port. Also, the short duration of most cruises leads to high per-passenger per-day
emissions (again excluding flights). We have added the emissions for an alternative “last
chance” trip for German tourists to the European Alps where the impacts of climate change
on glaciers and landscape can also be experienced (see discussion later in this paper). This
shows that whereas many last chance trips produce emissions that are far above those of
the average international trip, there are efficient alternatives that stay well below this level.

With 19.17 Mt CO$_2$, worldwide cruises are responsible for around 1.5% of global
tourism emissions (see UNWTO-UNEP-WMO, 2008), but if flights are included, the figure
for cruise tourism may be at least twice as high. Per-capita emission figures are especially
high. Furthermore, both cruises and aviation show some of the highest growth rates in
tourism (Bows et al., 2009; CLIA, 2009; Mintel, 2008b).

Survey results: impacts on awareness of and attitudes to climate change

Despite the small sample ($n = 151$), respondent demographics match those of other studies
on polar (cruise) tourists; i.e. they are generally highly educated, of mature age and either
retired or professionals (Bauer, 2001; Bauer & Dowling, 2006; Cessford & Dingwall, 1996;
Dawson et al., 2010; Lemelin et al., 2008; Marsh & Staple, 1995; Powell et al., 2008). The
age of 87% of our sample was over 55 years (56% over 65) and 61% had an academic
background. The major difference to previous surveys is the dominance of travellers from
German-speaking countries: 74% were from Germany, 19% from Switzerland and 5% from
Austria. The remaining 2% were Dutch, French and Spanish. This is inevitably caused by the
company’s home base, which is in Germany. Consequently, nearly all filled-in questionnaires
were in German, which ought to have limited the chance of misinterpretation, as only 2%
did not receive a questionnaire in their mother tongue. After the United States and the
United Kingdom, Germany is Antarctica’s third largest source market, comprising 10% of
all passengers to the continent (IAATO, 2009c).

Motives and awareness

Of the motives for taking this trip, the “natural experience” ranked highest (90%), before
“discovery” (57%) and “education” (36%). Thirty-three per cent also chose the option “see
the Antarctic before it is gone”, confirming the “last chance to see” argument as an important
fourth ranking motive for visiting the destination. Less important motives were “adventure”
(12%) and “relaxation” (5%). Ninety-two per cent reported having received information
on climate change in the Antarctic during the cruise, although most of the information
reportedly focused on global changes. While 97% believed climate change existed, 55%
contributed this to natural causes and only 42% to anthropogenic causes. These percent-
ages vary considerably from other public surveys, with anthropogenic causes (50%–65%)
generally scoring higher than natural ones (20%–35%) (AEI, 2007; Anable, Lane, & Ke-
lay, 2006; DEFRA, 2007). Surprisingly, twice as many academically educated respondents
chose natural over anthropogenic causes. Furthermore, 78% of our respondents thought
climate change would become a problem for humanity, whereas 15% did not think so.

Forty-three per cent of the respondents experienced the effects of climate change during
this cruise. When asked whether the cruise had changed the respondents’ opinion on climate
change, more people answered that it was not as bad as they had thought (14%) than those
that thought it to be worse than they had previously thought (3%). The majority (77%) answered
that the cruise had not changed their opinion. Respondents were also asked
whether they believed travelling had a large impact on climate change. The number of respondents that believed travelling to impact climate change was 21%, while 59% did not believe this and 20% did not know. A quarter of those who believed climate change to be caused by humans said travelling had a large impact on climate change. Also, 17% of those who did not believe humans to be responsible for climate change still believed tourism to have a large impact. These results contrast with other recent surveys of tourists and air travellers that note a (much) higher awareness of travel impacts (Dawson et al., 2010; Gössling, Haglund, Kallgren, Revahl, & Hultman, 2009; Hooper, Daley, Preston, & Thomas, 2008). The wording (“large impact”) may have been a cause for the large amount of non-believers and the inconsistency of the last result. The majority of respondents (60%) believed that the emissions of this trip did not differ very much from an average international holiday trip, while 23% chose “(much) more” and 14% “(much) less” here. This does not necessarily point to a very low awareness of travel impacts, as up to two thirds of the respondents appear to be repeat long-haul travellers and may interpret “international” to be equivalent to “long haul” (see next section). Only 1% had offset their emissions; 6% said they were still planning to do so. Fifty-three per cent did not do this because they did not know it was possible. However, awareness of offsetting was also not a guarantee for participation, as illustrated by 34% of respondents who did not offset owing to other reasons than not knowing about it (the missing 6% did not answer this question).

Travel patterns and attitudes

In order to determine travel patterns and their influence on emissions, the respondents were asked for their previous holiday destination. An intercontinental trip was made by 47% of the respondents, including 10% of all respondents who had travelled to the Arctic or Antarctica before. Sixty-four per cent said that they intended to make their next trip an intercontinental one, including 8% of all respondents, who said that they planned to visit the Arctic. Hence, it was not surprising that 54% of all respondents intended to use air travel for their next holiday and 13% the cruise ship. Ten per cent planned to use more sustainable modes like the coach and train. These results identify up to two thirds of respondents as repeat long-haul travellers, which falls well within the range reported for repeat polar visits to the Arctic (50%–80%; Marsh & Staple, 1995; Seltmann, 2006).

To further assess whether respondents had changed their attitude on travelling, those who believed travelling had a large impact on climate change were compared with their future choice of transport. The sample is very small (n = 31), but only one person planned to use a sustainable mode (coach), whereas 61% would travel by plane or cruise, and the remaining 35% by car. The latter figure does not differ substantially from those who did not believe that travelling had a large impact (n = 85), of whom 73% would travel by plane or cruise. A similar result was obtained when comparing “travelling has a large impact on climate change” with “next continent for holiday”; two thirds of both groups (yes and no) planned to travel intercontinental.

Finally, those who experienced the effects of climate change during the cruise (n = 65) were asked whether they would travel to the Antarctic again and recommend it to friends and relatives: 77% would do so, half of whom would recommend doing so “before the Antarctic is gone”. The high percentage of Antarctic visitors that would recommend Antarctica as a holiday destination resembles that of earlier polar tourist surveys (Bauer, 2001; Seltmann, 2006). Negative experiences with climate change do not deter polar tourists from revisiting the region (Seltmann, 2006).
Discussion and conclusion

This paper assessed the paradox of last chance cruise tourism to the Antarctic that attempts to raise awareness on climate change while disproportionately contributing to it at the same time. We have explored both the impact of an Antarctic cruise on the environmental attitudes of tourists and the impacts of (Antarctic) cruises on GHG emissions and climate change. The survey results do not point towards a higher level of awareness of climate change for Antarctic cruise tourists compared with the average citizen. Also, no signs were found that pointed to any change of attitude about travelling with regard to climate change and travel emissions. We found that cruises in general, and Antarctic cruises in particular, produced above-average contributions to climate change, per trip, per capita and per day, by comparison with other international trips and the alternative “last chance” glacier trip discussed later in this paper. Cruise trip emissions are high owing to the high emissions from the cruise itself and the flights to the ports and back. We conclude that while Antarctic cruises produce relatively large amounts of CO₂ emissions, the assumed positive impact on environmental awareness and attitude could not be confirmed by this study. In this respect, our respondents qualify more as polar mass market tourists, who are “primarily attracted to sightseeing within the pleasurable surroundings of comfortable transport and accommodations” (Snyder, 2007a, p. 14), than as sustainable tourists concerned about the environment. It is very questionable whether these tourists, despite their plans for revisiting Antarctica or recommending it to others, would serve as true “ambassadors”, in the sense that their actions (advocating more travel to the Antarctic) will increase the problematic impacts of climate change and thus further endanger the Antarctic, instead of protecting it.

Nature-based tourism experiences and interpretation may lead to raised environmental knowledge and awareness, but seldom to an increase in pro-environmental attitudes and behaviour (see e.g. Bauer & Dowling, 2006; Powell & Ham, 2008). Likewise, most environmental behaviour research in tourism points to a rather weak link between awareness of climate change and actual changed behaviour in tourism and transport, i.e. not towards any significant reduction of travel emissions (Anable et al., 2006; Dickinson, 2009; Eijgelaar, 2009; Hares, Dickinson, & Wilkes, in press; Stoll-Kleemann, O’Riordan, & Jaeger, 2001). Concluding, we do not see the ambassador role of cruise tourists to the Antarctic as an effective candidate for reducing the impacts of climate change. Bauer (2001) already hinted that the ambassador concept is wishful thinking; only 1% of the ship-borne tourists he surveyed saw themselves as such. Powell et al. (2008) still see the potential for creating ambassadors, albeit requiring considerable efforts by Antarctic tour operators. Our survey points more towards a travel-happy clientele that enjoys an unspoilt natural environment, i.e. consumers instead of ambassadors. Perhaps Whitty (2008) is right to a certain extent when she comments, “The Antarctic aficionados still pilgrimage here, but they’re outnumbered these days by doom tourists chasing down the disappearing world and the nouveau riche absentmindedly checking off the premier stop on their grand tour of Planet Earth”. It could be argued that the Lindblad and Hansa cruises are not last chance trips per se, but the evidence presented in this paper does show increased attention for Antarctic tourism due to climate change and the resulting media attention for the continent, coupled with the steady growth of both cruise and polar tourism in general.

It is remarkable that tourism to climate-change-affected ice and snow destinations seems limited to Antarctica or polar regions in general, whereas most polar tourists have such destinations much nearer to home, notably in mountain ranges. Of the whole cryosphere (global snow and ice regions), Antarctica may actually show the least extreme signs of change. Melting rates are faster in the Arctic, in Greenland and on many mountain ranges (ACIA, 2004; UNEP, 2007). The latter may well be among the most endangered destinations
under current emission scenarios (UNEP-WGMS, 2008). Thus, tour operators who wish to offer this kind of experience, and at the same time reduce the carbon footprint, have excellent and much more efficient opportunities in these mountain ranges. Emissions are considerably lower owing to shorter travel distances and more efficient transport modes.

For instance, Studiosus, a German tour operator well known for its environmental leadership, offered the five-day tour “Climate change and the Alps” in 2008. The aim of this tour was to educate participants about climate change impacts through nature observation and to discuss sustainable tourism and environmental protection with experts. The tour price included the rail journey from any German, Swiss or Austrian station to Munich; further travel was by bus. The trip brochure stated that primary energy use from Munich was 450 MJ per person, which equals around 30 kg CO₂. As an example, an adjoining return trip from Berlin to Munich per high-speed train would have added about 60 kg CO₂ to the journey’s emissions (calculated at www.bahn.de). The trip won the GEO Saison Golden Palm, the most prestigious travel award for innovative tourism products in Germany, mainly for Studiosus’ courage to join the ongoing climate change discussion this way (GEO SAISON, 2008).

The counterargument against such a trip could be that many alpine areas lack the untouched wilderness aspect of the Antarctic. The alternative only holds if the main motive to experience or offer Antarctic cruises is to create ambassadors fighting climate change. Tour operators could then point to the shorter travel distances and lower costs of these alternatives, i.e. use social marketing methods (see Peeters, Gössling, & Lane, 2009). However, experiencing climate change is not the main motivation for tourists to visit the poles, as our survey has shown. Both tourists and companies seem to be largely motivated by the lure of travel to exclusive remote places like the poles.

With their industry responsible for “just” 1.5% of global tourism emissions, there is the risk that cruise industry officials may adopt a similar attitude to that of the aviation industry, using their low share for relative inaction (Gössling & Peeters, 2007; IATA, 2006). Cruise companies should also take responsibility for the emissions they cause through air travel to and from ports. The industry’s contribution to emissions is likely to double when flights are included, which is an aspect demanding further research. The rapid growth of cruises and increasing trip length (CLIA, 2009) will cause further growth of emissions. Sector leaders in cruise tourism and Antarctic cruise tourism seem to be working on their emissions, already setting reduction targets and showing achieved reductions in energy use (Carnival, 2009; CDP, 2008; Lindblad Expeditions, 2007; RCC, 2009), but as with aviation, their mitigation efforts might be too little to counter the extra emissions caused by the industry’s growth. Many other operators still need to adopt an open-systems approach (Becken & Schellhorn, 2007) and bear the responsibility for their emissions.

Antarctic cruise tourists easily double their annual emissions by taking such a trip, whereas daily new evidence emphasises the need to reduce GHG emissions by up to 80% within decades (Parry, Palutikof, Hanson, & Lowe, 2008). By 2050, annual per-capita CO₂ emissions will quite probably need to stay below 1 t (Allison et al., 2009). Consequently, only trips like the Studiosus example would stay within a low-carbon travel budget. If the tourism sector intends to continue its growth path, it will need to reduce its emissions and adapt to climate change at the same time. One effective form of mitigation is low-carbon product adaptation and stepping away from the “always further” motto, which is certainly valid for trips to Antarctica. In a low-carbon future, “luxurious” high-energy mobility products like these may even need to be phased out (Gössling, Hall, Peeters, & Scott, in press). As turning Antarctica into a no-go zone does not appear politically feasible, pricing would be the best way to reduce volumes. Usually this would lead to a discussion about equity, but
in this case, trip prices to Antarctica already exclude participation for most people in the world. Also, as Antarctica is uninhabited, the usual counterargument to mitigation efforts in tourism, poverty alleviation (Epler Wood, 2007; WTO, 2006), does not apply here directly. Applying Lars-Eric Linblad’s concept (“You can’t protect what you don’t know”) to climate change, as a means for legitimately increasing Antarctic tourism, would distance tourism yet further from other sectors than it already is and make the industry’s aspirational future emission targets more difficult to achieve.

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