

Arnie Weissmann

Augmented reality and virtual reality will change how travel is both sold and experienced. **10**



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THE TRAVEL INDUSTRY'S TRUSTED VOICE

Narrowing the

In recent years, the industry has made great strides in moving women into top executive positions, but challenges remain.

BY MICHELLE BARAN

gap



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TV ILLUSTRATION BY THOMAS R. LECHLEITER

[CAN'T BE TIED TO RECENT INCIDENTS]

Air turbulence could increase as Earth warms

By Robert Silk

The latest research suggests that climate change will increase air turbulence. But it's impossible to say what role, if any, global warming has played in a spate of recent turbulence incidents that resulted in injuries on commercial flights.

"I wouldn't draw anything from it," said Paul Williams, an atmospheric scientist at the University of Reading in England who has studied the connection between atmospheric carbon dioxide levels and air turbulence. "Certainly there needs to be some [scientific] work done."

In the past five weeks, news reports and social media sites have been filled with stories and videos of screaming passengers being violently rocked by turbulence.

Unless forecasting technology improves, an expected doubling of turbulence could generate a doubling of passenger injuries.

"All of a sudden, out of nowhere — out of nowhere! — I thought this was the end," passenger Gisela Arrow told WPLG in Miami after an Allegiant Air flight encountered heavy turbulence en route from Punta Cana, Dominican Republic, to Pittsburgh.

That May 5 flight had to be diverted to Fort Lauderdale, where seven people were taken to a hospital.

The Allegiant flight is just one of six that have made headlines since the second half of April due to violent air turbulence. Internationally, six people were injured on an April 18 Thai Airways flight from Jakarta to Bangkok.

See **TURBULENCE** on Page 24

'Digital detox' unplugs the mobile-fixated

By Michelle Baran

In a move that might seem paradoxical, a new survey showing that travelers are tightly attached to their mobile devices spurred Intrepid Travel this month to unveil a collection of "digital detox" tours on which no mobile devices,

computers or cameras of any kind are allowed.

Despite the potential benefits of this throwback form of travel — ranging from making deeper connections with the local peoples and cultures to a greater sense of exploration — it remains unclear if or how many travelers would actually be ready and willing to detach from all their devices.

"People feel naked without [mobile devices]," said Karen McCrink, director of leisure travel services at Milford, Mass.-based Atlas Travel. McCrink said that these days travelers are obsessed with whether WiFi will be available on their trips; they want to be assured they will have connectivity, whether to check work email or to post photos of a trip to social media.

But according to Intrepid Travel, that obsession is precisely the problem.

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IN THE HOT SEAT

JetBlue's Jamie Perry discusses the success of Mint and how it will expand in the future. **4**

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Travel advisers are cruise line agents, except when they are not. **7**

TURBULENCE

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Worse was an Etihad flight from Abu Dhabi, United Arab Emirates to Jakarta, Indonesia, on May 4 in which 31 people were injured and 10 were hospitalized when the Airbus A330-200 ran into violent turbulence about 45 minutes before landing.

On U.S. flights, the May 5 Allegiant incident was followed on May 8 by a Delta flight from Atlanta to Chicago that had to make an emergency landing in Nashville after turbulence caused an engine cover to come off. No one was hurt.

A day later, severe turbulence on a JetBlue flight from San Juan to Orlando sent eight people to the hospital.

And on May 16, four passengers were injured and two were hospitalized when a Southwest flight en route to Chicago Midway was forced to return to Boston after encountering heavy turbulence.

Despite this recent spate of incidents, FAA data shows that in recent years turbulence-related injuries have dropped over U.S. skies. Just 65 people sustained what the National Transportation Safety Board (NTSB) defines as a "serious injury" due to in-flight turbulence from 2013 to 2015, compared with 230 between 2008 and 2010.

But because airlines are only required to report serious injuries, such data is limited in scope. An older but more thorough FAA data set shows that turbulence-related accidents and injuries roughly doubled between 1982 and 2003 on a per-departure basis.

Though the report stated that higher passenger loads could account for the difference, Williams said he thinks climate change played a role as well.

"I think it's because the atmosphere has gotten more turbulent; that's part of the ex-

RECENT AIRPLANE INCIDENTS CAUSED BY TURBULENCE	
April 18	Six were injured on a Thai Airways flight from Jakarta, Thailand, to Bangkok on a Boeing 777.
May 4	Thirty-one were injured, including 10 hospitalized, on an Etihad flight from Abu Dhabi to Jakarta that used an Airbus A330-200.
May 5	Seven were taken to a hospital after an Allegiant Air flight from Punta Cana, Dominican Republic, to Pittsburgh, using an Airbus 319-100, made an unscheduled landing in Fort Lauderdale.
May 8	A Delta Atlanta-to-Chicago flight made an emergency landing in Nashville. The plane was a Boeing 717.
May 9	Eight were taken to the hospital following a JetBlue San Juan-to-Orlando flight on an Embraer ERJ-190.
May 16	A Southwest flight from Boston to Chicago using a Boeing 737-700 aircraft returned to Boston. Four were injured; two were taken to a hospital.

planation," he said.

Williams' views are based on his 2013 peer-reviewed study that was published in the journal *Nature Climate Change*. In conducting the study, he and co-author Manoj Joshi zeroed in on what is known as clear-air turbulence, which is the type of turbulence that causes most major incidents for commercial airliners.

Unlike turbulence caused by clouds and storm systems, which is easily visible, clear-air turbulence can't be seen by pilots through the cockpit window and cannot be detected by radar. It typically occurs at altitudes above the clouds, where jetliners like to fly, and it's often caused by sudden changes in atmospheric pressure or by the convergence of counter-moving jet streams.

Because it is invisible, incidents of clear-air turbulence often occur while the seat

belt signs are off, increasing the chances that a passenger or crew member will get injured.

Jet streams are expected to strengthen due to climate change. But Williams sought to determine how that strengthening would affect turbulence. He focused his study on the North Atlantic corridor, which some 600 flights traverse each day. Through the use of climate model simulations, he looked at how the frequency and intensity of clear-air turbulence changes as atmospheric carbon dioxide is doubled from its pre-industrial baseline of an estimated 280 parts per million.

At present, carbon dioxide levels have already increased from the baseline to 400 parts per million. Scientists project the doubled figure of 560 parts per million will be reached this century, perhaps even by the middle of the century.

What Williams' models showed is that in a world with carbon dioxide levels of double the pre-industrial level, the amount of air space that would contain significant clear-air turbulence increases by between 40% and 170%, with a cluster of results showing an increase of around 100%. In addition, the average strength of the turbulence would increase by 10% to 40%.

"It seems reasonable that if the volume of turbulence in the atmosphere is going to double, then the number of injuries is going to double as well, unless we can improve these forecasts," Williams said.

If the amount of invisible air turbulence is on the rise, the ways to counter it would be through improved forecasts or the development of new detection techniques.

The latter of those is already underway. Between 2009 and 2014, a team of European scientists tested a system in which ultraviolet lasers are pointed in the direction a flight is headed. The lasers detect changes in air density, giving pilots a warning of turbulence.

The tests suggested that the laser-based system could detect moderate turbulence at a distance of up to 30 kilometers. However, author Herve Barny noted that conclusion is not definitive because they ran into only light turbulence during the test flights. Thus far, airlines have not begun using the technology.

Meanwhile, effective use of big data could provide a way to improve the turbulence forecasts that are issued every six hours by the World Area Forecast Centers in Washington and London. Airlines keep detailed records of turbulence incidents, Williams said, but as of yet there's no central archive in which scientists can access that information to build turbulence models.

He called such data a "treasure trove."



JetBlue plans to expand its Mint service to four more cities by the end of 2018.

TW PHOTO BY JOHANNA JANICHILL

MINT

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on prices. While analysts interviewed for this story could not provide hard data on the topic, they agreed that by offering transcontinental business-class seating for as low as \$599 one-way, JetBlue has forced the legacy carriers into lower fares.

"It's clear it's had an effect," George Hobica, president of the Airfarewatchdog website, wrote in an email to *Travel Weekly*.

He said he had just booked a \$549 one-way ticket on United's lie-flat BusinessFirst class from Los Angeles to Newark and that American and United have lowered their business and first class fares as well.

"I remember when business cost \$2,400 each way," Hobica wrote, "now [American] charges \$1,200 or so on some flights." JetBlue isn't resting on its laurels.

Last month, the company announced that it will take delivery of nine additional Mint-configured Airbus A321 aircraft by the end of 2017. They'll be used to add Mint service on transcontinental flights out of Fort Lauderdale, Seattle, Las Vegas and San Diego.

Aviation analyst Bob Mann of R.W. Mann and Co. said another impact Mint has had is the role it played in Virgin America's decision to sell to Alaska Air-

lines last month. The introduction of a better premium product by a low-cost competitor left Virgin, which has built a niche around transcontinental service, with the choice of making expensive upgrades to its fleet or getting out of Dodge, Mann said.

"I guess we can say they punted," he said.

Brett Snyder, who writes the popular aviation blog *Cranky Flier*, said that unlike JetBlue, legacy carriers often upgrade members of their elite flyer programs for free.

"Because of that, they haven't been willing to invest a lot in the product," he said.

But Snyder noted that in recent years legacy carriers have been selling a higher percentage of their transcontinental business-class seats. That could make an expansion of the service to Boston or other markets more appealing, especially if Mint continues to be a moneymaker.

"At some point, the other guys are going to take a look at this and say, 'Wait a minute, are we going to cede this market to JetBlue?'" Snyder said.

Regardless of what the legacy carriers do, JetBlue might one day take Mint beyond the cities it has already announced, vice president of marketing Jamie Perry said. "The experience with Mint so far has led me to not rule out anything," he said.