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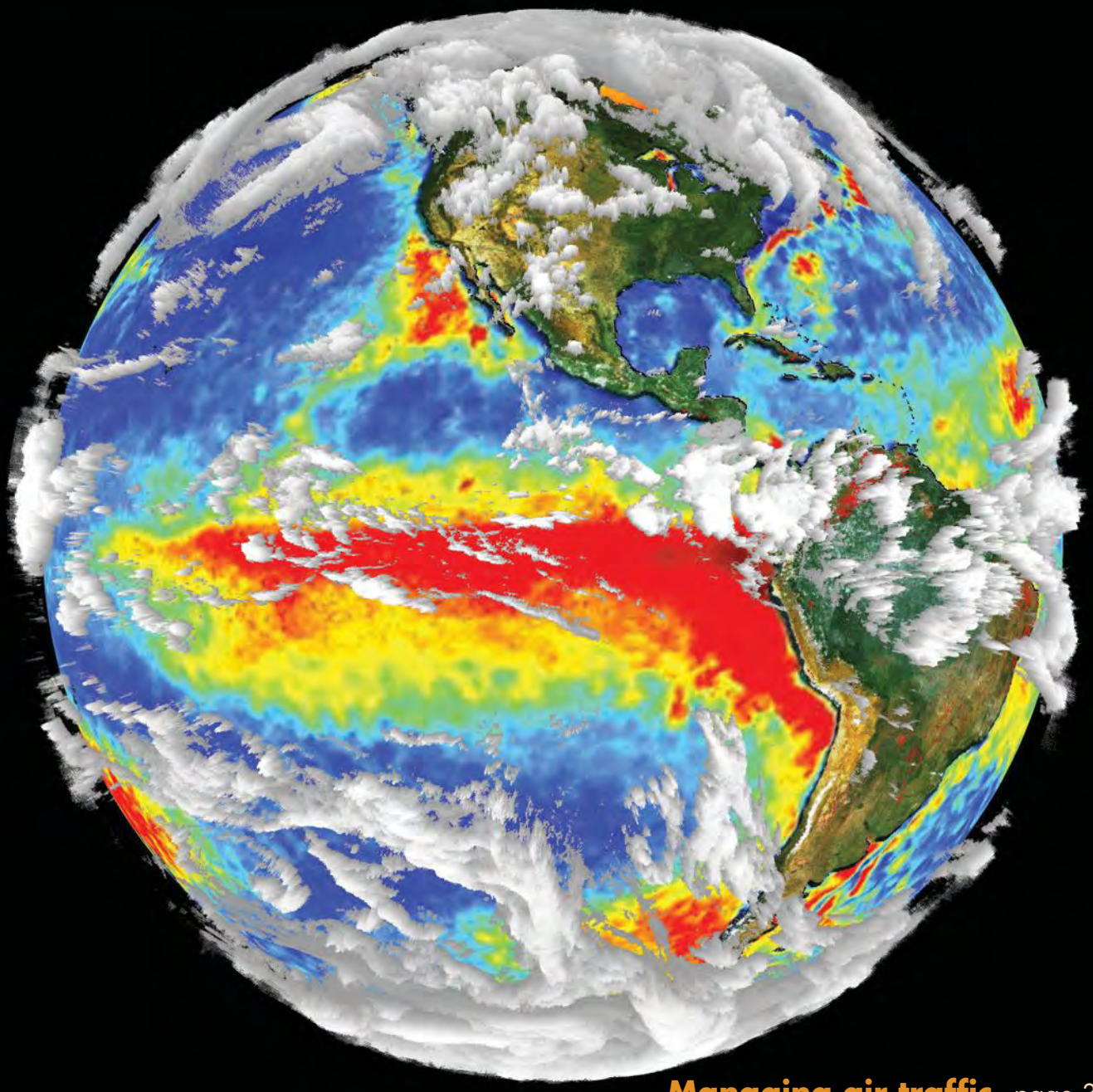
AEROSPACE AMERICA

Target: Climate change

Two satellites that could cool the debate



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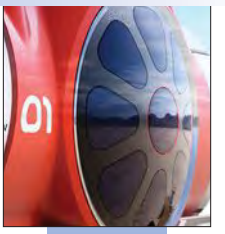

Prove-it time for space tourism

With Virgin Galactic set to begin suborbital flights for space tourists this year, competitors are readying their own entries for the new market. XCOR's Lynx Mark 1 is scheduled to fly for the first time this year carrying a 120-pound payload. In commercial service, it will take a single passenger 65 kilometers. The Mark 2, due to enter operations a year later, will transport a passenger to 100 kilometers.

Balloon and parafoil concepts could vie for business against Virgin Galactic's SpaceShipTwo. Credit: Virgin Galactic

In March, XCOR announced its firing of a full piston-pump-powered rocket engine, "which is the foundation for fully reusable spacecraft that can fly multiple times per day, every day," said the company.

In January 2013, U.K.-based Unilever Group and the Netherlands' Space Expedition announced a purchase of 22 tickets on the Lynx Mark 2, which has a target in-service date of 2016.

Meanwhile, subscale testing on Paragon Space Development's World View edge-of-space balloon capsule is due to start this month. Flight operations are expected to begin in late 2016, taking six passengers—each paying $75,000—and two crew in a fully pressurized space-certified capsule up to 30 kilometers in a helium-filled balloon, remaining aloft for about two hours before gliding back to Earth with the aid of a parawing. In September the FAA determined that World View's spacecraft and its operations fall under the jurisdiction of the Office of Commercial Space Flight.

"For the initial flight tests, we are using one-tenth-scale full sensor array, and the first flight will be with a parafoil rather than a parawing," says Jane Poynter, chief executive officer of World View. "What we're really testing here are the aerodynamics of the parafoil at that altitude. Parafoils have been flown hundreds of thousands of times, but at lower altitudes. Once we've done these first flights we will have an ongoing program to really map out the entire operational parameters at that altitude."

World View has set up a research and education committee to study the market for offering flights to the science community. The company will be able to carry the scientists with their research "in the same [way] the shuttle would allow for payload specialist flights," according to Poynter. "We haven't researched yet in much detail the lower Earth orbit launch platform concept, but it appears there is the possibility for this as well."

The first commercial flight in Virgin Galactic's suborbital space program is scheduled for later this year, though no definitive date for the launch has yet been released. The hybrid-rocket-powered SpaceShipTwo, carrying up to six passengers and two crew, will take off from the company's terminal in New Mexico slung beneath the WhiteKnightTwo mothership. After being dropped from that ship at 50,000 feet, SpaceShipTwo will fire its hybrid rocket motor and carry its customers and crew to an altitude of 110 kilometers in a suborbital path.

Virgin Galactic has a tough schedule to meet if it is to start operations this year. SpaceShipTwo made just two flights in 2013 to test the hybrid rocket motor. On the second flight, in September, the spacecraft reached 65,000 feet and a speed of Mach 1.6, according to a company statement.

World View Enterprises plans to carry passengers to almost 100,000 feet altitude in a capsule lifted by a balloon. Credit: World View Enterprises.

The price of a ticket is $250,000 per person, and the company says it has already received $80 million in deposits from more than 600 customers.

Poland's Flaris LAR 1 is due to make its inaugural flight, with production to start later in the year. Credit: Flaris LAR 1

Personal jet market re-emerges

Personal jets—small planes that generally weigh 7,000 pounds or less—may be poised for a comeback. The first Cirrus SF50 personal jet built to conform with FAA airworthiness certification is due to fly early this year.

Cirrus is building three of the single-engine planes—C-Zero, C-One and C-Two—on the assembly line that will be used for production aircraft during the test and certification campaign.

"We are expecting the first flight of C-Zero in the first quarter 2014, and certification and first deliveries in late 2015. European Aviation Safety Agency [EASA] certification will follow shortly thereafter," says Gary Black, Great Plains Regional Sales Director for Cirrus. The company, based in Duluth, Minn., says 75 aircraft are likely to be delivered in the first full year of production, rising to 150 a year after that. More than 500 deposits have been taken for the plane.

According to Cirrus, C-Zero will be mainly used for performance verification, flying qualities certification, and production tooling and process development. C-One will be used for aircraft systems development and certification, plus refinement of production components and assembly planning. C-Two will enter flight testing in the late stages of certification and will reflect, as closely as possible, the first production configuration aircraft in equipment as well as manufacturing processes.

The SF50 is not the only personal jet in development. Within the next few weeks, Poland's Flaris LAR 1 is due to make its inaugural flight, with production to start later in the year. FAA and EASA certification are expected in 2015.

The $1.5-million all-composite aircraft has detachable wings and horizontal stabilizers, a nose-mounted ballistic parachute, and a fuselage-mounted fuel tank. The plane will have half the takeoff weight of the SF50, according to Maciej Peikert of the Flaris Team. It will initially be certified as an experimental aircraft under Polish airworthiness regulations with full EASA certification planned for a later stage. Flaris's parent company, Metal Master—a supplier of components to European truck manufacturers—is financing the program, which also received 13 million euros from the European Union's regional development fund between 2007 and 2013.

The first Cirrus SF50 built to conform with FAA airworthiness certification is due to fly early this year. Credit: David Lednicer

A key challenge for personal jet developers in the past has been the escalating costs and the length of time between the first flight and the plane's delivery to customers. According to announcements at the National Business Aviation Association's 2013 convention in Las Vegas, the development costs of the SF50 are $150 million, of which $50 million has been spent and $100 million further committed by Cirrus's parent group, China Aviation Industry General Aircraft.

Development cost increases also were among the main reasons cited by Peter Maurer, president and chief executive of Diamond Aircraft Industries Canada, for the February 2013 suspension of his company's personal jet program, the Diamond D-Jet.

The market for personal and twin-engined VLJs—very light jets—collapsed in the wake of the 2008 financial crisis that engulfed North America and Europe. But the long-term future for these planes is looking more positive, for several reasons: the recent recovery in these markets, the advent of a new generation of more affordable personal jets, and a growing interest in

VLJs from customers and investors outside the U.S.

Although sales of Embraer's Phenom 100 and Cessna's Citation Mustang VLJs have fallen in recent months, new VLJs are entering the market. FAA certification flight testing of the HondaJet VLJ is due to start in early 2014, with type certification expected in early 2015, according to a company news release. The first customer delivery of the Eclipse EA 550 VLJ was in October, and the current production rate is between 1.5 and two aircraft a month, said a company spokesman at the Las Vegas meeting.

Meanwhile, at the annual London Business Aircraft Europe event in September, Richard Koe, managing director of business aviation analysts WingX Advance in Germany, said that between 2008 and 2012, VLJ activity in Europe had increased to 33,000 flying hours from 4,000, and VLJs had increased their market share from 3.6 percent of the market to 33 percent. Planes such as the Embraer Phenom 100 and Cessna Citation Mustang have done well at the expense of the Citation XLS and Hawker 700.

The U.K.-based International Bureau of Aviation's "Business Jet Asset Report 2013" said, "During the period 2005-2010 the VLJ sector saw a period of spectacular growth on products such as the Eclipse EA500, Embraer Phenom 100 and Cessna Citation Mustang. Despite these entry level aircraft faring poorly during the recent economic downturn, IBA's expert opinion predicts this sector will show significant growth by 2025."

Cargo airship gains global partners

In the past few months Worldwide Aeros Corp., known as Aeros, has signed a number of deals with partners aimed at accelerating development of two Aeroscraft dirigible cargo airships: the ML866 and the ML868, which would be able to carry 66-ton and 250-ton cargo payloads, respectively, according to the company.

Worldwide Aeros Corp. is accelerating development of the Aeroscraft ML866 dirigible cargo airship. Credit: Worldwide Aeros Corp.

In December, the Montebello, Calif., company announced a strategic partnership with Luxembourg's cargo airline Cargolux to investigate the potential for new airfreight services in Europe and North Africa based on the ML866 and ML868. The services would exploit the vertical takeoff and landing abilities of these airships for carrying standard intermodal containers as well as heavy and outsized cargos. This announcement followed a November agreement with Icelandair on developing cargo operations to Arctic Circle destinations on multiple continents. This would turn Iceland into a cargo hub for airship operations linking destinations in Greenland, Siberia, Alaska and Northern Canada.

Also in November the company signed an agreement with aviation simulator company CAE on developing simulation and training aids for the new generation of airships.

"Aeroscraft will introduce air cargo options for high-value payloads with a time of delivery and cost per ton-mile in between current airlift and sealift," says the company's chief executive officer, Igor Pasternak. At the same time, he says, the firm will introduce point-to-point delivery to "side-step intermodal transfers and delays [as well as] infrastructure development costs, delivering cargo faster than is now possible by boat, rail and truck."

In September Aeros received an airworthiness certificate from the FAA for research and development flights for its Aeroscraft. This 266-foot-long engineering craft will be operated in designated controlled airspace to test and validate some of the key enabling technologies for the ML866 and ML868.

One of these technologies is a control-of-static-heaviness system—a buoyancy management system that compresses inert helium for in-flight ballasting. Other key technologies include an internal cargo handling system to minimize loading and unloading time, and fly-by-wire systems to connect all flight, engine and utility controls within a single fiber optic network. The proof-of-design demonstration ship for the Aeroscraft established its internal variable buoyancy technology in January 2013, and the advanced prototype demonstrated integration of this technology with other innovative subsystems during flight operations in the last quarter of 2013, according to the company.

Aeros plans to have the first of its initial fleet of 22 Aeroscraft operating in 2016, and current production plans are based on the manufacture of four smaller ML866s and 18 larger ML868s.

"The initial fleet of vehicles will be allocated based on our clients' needs, which include Project Cargo, resupplying offshore oil rigs, moving wind components across the vast landscapes and over borders of Southern Africa, and bringing renewable energy power sources and equipment to rural villages in India," said Pasternak at the 2013 Air Cargo Europe Convention in Munich. "Recognizing that about half the fleet will be located in South America, the Arctic and sub-Saharan Africa, our vehicles have been tested and developed with the goal of global operations in all climates."

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