AtlantikSolar

The first-ever crossing of the Atlantic Ocean using a solar-powered Unmanned Aerial Vehicle (UAV)

Autonomous Systems Lab

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Project Overview

An Atlantic Crossing - on solar power alone!

In May 1927, Charles Lindbergh put his life on the line to perform the first flight across the Atlantic in his gasoline-engine aircraft. In June 2015, in face of new pressing challenges such as climate change, the AtlantikSolar project will follow the footprints of the great aviator by demonstrating the first-ever fully solar-powered and autonomous crossing of the Atlantic Ocean.

The chosen flight route from Boston (USA) to Lisbon (Portugal) is packed with challenges: 4500km of flight distance, 5 days in the harsh Atlantic environment with potentially strong winds or thunderstorms. Beginning June 21st 2015, a “swarm” of three AtlantikSolar Unmanned Aerial Vehicles (UAVs) - fueled by solar power alone - will be launched to face these challenges.

Project Objectives

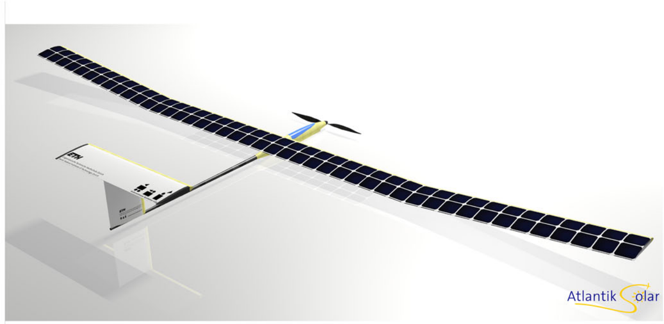
The Atlantic Crossing is an extreme showcase to demonstrate the advantages of solar-powered Unmanned Aerial Vehicles, namely their capability to perform multi-day continuous flights fueled solely by solar power. This ultra-long flight endurance is of prime interest in large-scale search and rescue (SAR) support, wildfire detection or meteorological surveys above otherwise unaccessible oceans. AtlantikSolar was already used within European SAR research projects ICARUS[4] and SHERPA[5], where it provided live-imagery to SAR first response teams on the ground to improve the rescue-mission planning.

A great challenge.
A tremendous adventure.
A unique chance to participate
when aviation history is written.
AtlantikSolar.

The AtlantikSolar UAV

A new generation of Solar UAV for a historic moment

In 2008, the Autonomous Systems Lab (ASL) SkySailor[6] was the first 3m-class solar-UAV worldwide to demonstrate flights of more than a day (24h) only on solar power. AtlantikSolar is a largely improved and upscaled aircraft based on SkySailor, which results in a new generation of 5m-class solar-powered UAV that is capable of performing continuous flights of up to 10 days. Optimized for low power consumption and flight efficiency, it combines efficient solar-technology with state-of-the-art Li-Ion batteries. During the Atlantic crossing, the aircrafts will be steered by an autonomous control system developed at ETH Zurich and will transmit live images to the public.



AtlantikSolar UAV – Technical Overview	
Wingspan	5.6m
Mass	~6.9kg
Flight speed	30-75km/h
Structure	Lightweight carbon fibre & kevlar structure
Power system	1.4m² solar panels with 2.9kg Li-Ion batteries
Flight control	Autonomous control system (by ETHZ) with GPS-Navigation
Payload	Digital HD-camera, live-image transmission

The AtlantikSolar prototype aircraft performed its first test flight on November 14th 2012 near Pfäffikon, ZH. Thanks to the excellent flight characteristics, the general aerodynamical and structural concept could be verified. The successful first flight was the first major milestone of the project!

Landing of the AtlantikSolar prototype after a successful flight on July 4th 2014.

An exceptional ambassador
for Dedication, Innovation and Sustainability.
An exceptional ambassador
for You.

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Atlantik-Solar is a project administered by the Autonomous Systems Lab (ASL) of the Swiss Federal Institute of Technology Zurich (ETH Zurich).

Atlantik Solar

(1) www.atlantiksolar.ethz.ch
(2) www.asl.ethz.ch
(3) www.youtube.com/user/atlantiksolar

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(4) www.fp7-icarus.eu/
(5) www.sherpa-project.eu
(6) www.asl.ethz.ch/research/asl/skysailor/
(7) www.sensesoar.ethz.ch
(8)Name of aircraft as e.g. used in public print media or as watermark on live-imagery, to be defined jointly with the project team.
(9) Design of aircraft rear section, to be defined jointly with the project team.

Image credits: Pakistan, 2010 DoD photo by Staff Sgt. Horace Murray, U.S. Army (front page, center left) and 2007 Florida Bugaboo Fire by Mark Wolfe / FEMA (front page, center right)

Atlantik-Solar project brochure (Version 14, October 2014)

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Partcipate in a great adventure...

... and help writing aviation history!

A solar-powered, autonomous crossing of the Atlantic is many things: A great challenge. A tremendous adventure. A unique chance to participate when aviation history is written. It is an excellent chance and ETH Zurich's inherent interest to reach out to the public; to convey the values and vision of the project alongside yours to your customers.

Your possible participation is organized into three main levels. As one of four Platinum sponsors - one per aircraft crossing the Atlantic - you are granted the exclusive option to advertize and "fly with your own aircraft" by choosing one aircraft name and design[8,9]. To bolster and profit of public interest, media events will be organized jointly for all sponsors before and during the Atlantic crossing. One of the highlights is a flying day in early 2015, with a live flying demo of the solar-powered UAV prototype and small exhibitions of related partner and major sponsor activities. In addition, all sponsors will be prominently represented in print and web products (e.g. [1,2,3]) and are encouraged to make maximum use of live flight reports and imagery. Join AtlantikSolar - and share the spirit of this historic undertaking with your customers!

Atlantik Solar *Platinum Sponsor*

Atlantik Solar *Gold Sponsor*

Atlantik Solar *Silver Sponsor*

Solar Unmanned Aerial Vehicles at ETH Zurich

Solar powered unmanned civil aircraft have been the focus of intense research at ETH Zurich's Autonomous Systems Lab since 2002. Among them are SkySailor[6], which in 2008 demonstrated the worldwide first solar-powered flight of more than 24-hours without the use of thermals, and SenseSoar[7], an advanced scientific platform designed towards missions such as search & rescue support.

The team

AtlantikSolar is headed by ETH Zurich's Autonomous Systems Lab, under supervision of Prof. R. Siegwart. Each core discipline is represented by one project partner. These current partners are:

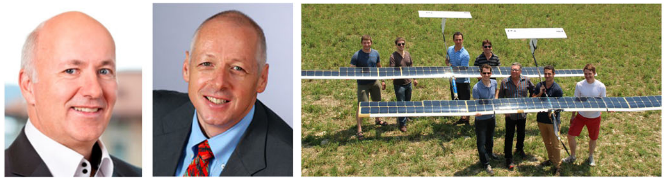
Autonomous Systems Lab, ETH Zurich
Project lead & overall aircraft design
www.asl.ethz.ch

Super Computing Systems
Electronics & satellite communication
www.scs.ch

Swiss Center for Electronics and Microtechnology
Solar Energy System
www.csem.ch

Skyguide
Flight regulations planning and support
www.skyguide.ch

MeteoSwiss
Meteorological planning and support
www.meteosuisse.ch



Prof. Siegwart, ASL (left), Prof. Gunzinger, SCS (center), and part of the Atlantik-Solar during field trials with the AtlantikSolar prototype (AS-P) and first series aircraft (AS-S1)

Project schedule

Phase	Milestone (and main tasks)	End date
Phase 1a	RC-controlled prototype first flight Development of aircraft structure and basic electronics	Nov. 14th 2012
Phase 1b	First solar-powered flight Development of solar panels and power management	Sept. 5th 2013
Phase 1c	Autopilot-controlled prototype first flight Development and testing of advanced avionics and autopilot.	March 26th 2014
Phase 2	Multi-day (24h+) flight demonstration Continuous flight testing as the final test for the Atlantic Crossing	April 31st 2015
Phase 3	**Atlantic Crossing**	**June 21st 2015**
Phase 3+	Industrial applications	After 2015

Up to the Atlantic crossing and later ultra-long duration flight applications, the project undergoes the major phases given above. Phase 1a, 1b and 1c have already been completed, with the last achieved milestone being the successful demonstration of an autopilot-controlled flight of the AtlantikSolar prototype in March 2014 and a 12 hour continuous flight under simulated night conditions in September 2014.