ZEPPELIN NT
Die schönste Art zu fliegen

Zeppelin NT airship

The versatile airborne platform

zeppelin-science.de

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Introduction

The Zeppelin NT is a multi-purpose passenger airship, certified by European and US-American aviation authorities to transport up to 15 passengers or up to 2 tonnes of mission equipment. It features a semi-rigid design principle, consisting of a high-tech pressurized external hull and a rigid internal framework, made from aluminum and carbon fibre. Various kinds of external payloads can easily be fitted to the numerous structural attach points. The large cabin provides ample space for passengers as well as mission racks and operators, still giving room for an on-board lavatory. Its smooth and gentle flight characteristics make it unique compared to fixed-wing aircraft and helicopters, while it can hover, take-off/land vertically (VTOL) and cruise with up to 65 kts just like those. Its minimum field requirements allow for operation on remote fields which need not to be certified airfields. Due to its innovative ground support equipment, only three ground crew persons are required for operation. This allows the airship to be based very close to its area of operation, maximizing time-on-station. The airship features a state-of-the-art cockpit with large MFD screens and fly-by-wire controls. It can be operated by a single pilot. Over the years, cost of operation for scientific missions have proven to be very competitive in the aerial research sector.

The Zeppelin NT airships safely transport about 20'000 passengers per year on sightseeing tours around the Lake of Constance in Southern Germany. Over the recent decades, the airships have proven to be a safe, valuable and reliable work-horse for scientific and commercial applications.

Climate and Atmospheric research:
Special equipment like the top platform, the possibility of high payloads and unique flight characteristics enabled researchers to convince the EU to use the Zeppelin NT within Europe-wide research projects for atmospheric process understanding and air quality measurements. Many revolutionary findings for climate research were gathered during several multi-year measurement campaigns with the Zeppelin NT.

Observation and Remote Sensing
With long endurance and low noise emissions, the NT has already demonstrated its suitability as an eye in the sky over many major events. It was also used to demonstrate border patrol support, law enforcement surveillance and defense against terror attacks. The Zeppelin NT has been chartered many times by European scientific organizations for special missions involving remote sensing.

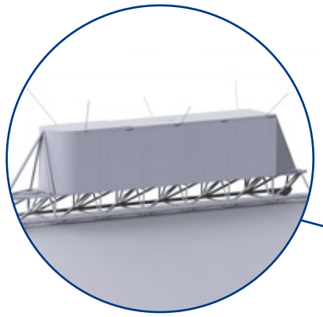
Geophysics and Marine Research:
Equipped with a Microgravimeter and a Magnetometer, the Zeppelin NT was used successfully for mineral exploration in Botswana/Africa. With its ability to precision-hover for several hours the Zeppelin NT provided a unique capability as sensor platform and airborne coordination base for multiple science vehicles in marine research.

The Zeppelin NT at a glance:
- 20 years of safe operation, mature technology
- Operate from unpaved fields with small ground crew
- Long-time precision-hover for on-spot measuring
- Climb/descent vertically to gain vertical data distributions
- Extremely low cabin vibration enables better data quality
- All-in-one support for design, engineering, manufacturing and certification of equipment or changes to the airship

The home of the Zeppelin NT is Friedrichshafen in the south west of Germany. Blessed with a centennial airship history, Friedrichshafen and the brand Zeppelin stand for airships all around the globe. The heritage of the Zeppelin airship today lives in the sister companies DZR (Deutsche Zeppelin Reederei) and ZLT (Zeppelin Luftschifftechnik). The Zeppelin NT airships in Friedrichshafen are operated by the DZR, which itself is certified as airship operator since 2001.

Design, development, certification, manufacturing and maintenance is performed by ZLT, who is type certificate holder for the Zeppelin NT and is a certified design organization under EASA 21J. Missions with very complex installations stretching the airship's operational envelope can also be performed by ZLT under permit-to-fly.

Zeppelin NT – the versatile airborne platform



Top platform (optional):
- Up to 450 kg scientific equipment
- Mounts for 19” racks
- Undisturbed airflow & radiation
- Power & data link from cabin

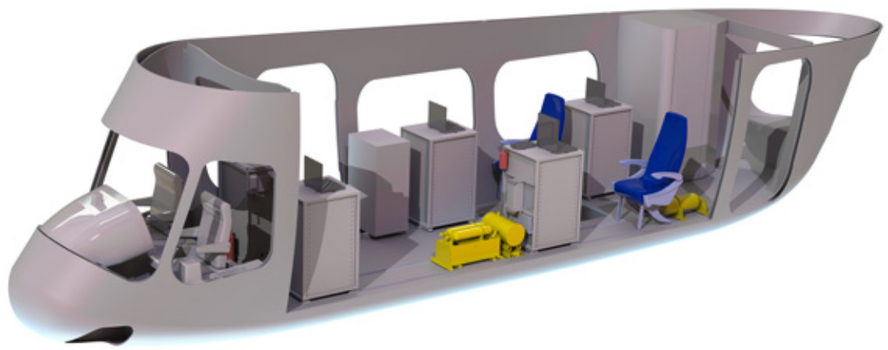
Airship envelope:
- Customized branding
- Load hooks for banners, sensors, external wiring

Rear engine gondola:
- Mounts for sensors
- 8 kW generator (optional)

Airship nose:
- Attach points for 65 kg
- Camera / sensor mount

Nose Boom:
Multiple Sensors, e.g.
Temperature, Humidity,
Pressure, 3D-Wind, others

Cabin Nose Mount:
Attach points for up to 165 kg,
e.g. Gyro-stab. Camera,
Nose boom, Sensor rack, Radar



Airship Cabin (unpressurized):
- Large Volume, on-board lavatory, heating available
- Lightweight standard 19” racks available for instruments, computers and equipment
- Multi-functional cabin floor, large doors with window openings
- Floor hatch for external equipment/load hook
- Link to airship air data computer incl. GPS, VOR/DME data (AIRINC 429)
- Standard equipment power up to 5 kW at 28 VDC

Technical Data

Dimensions	
Hull Volume	8,425 m³

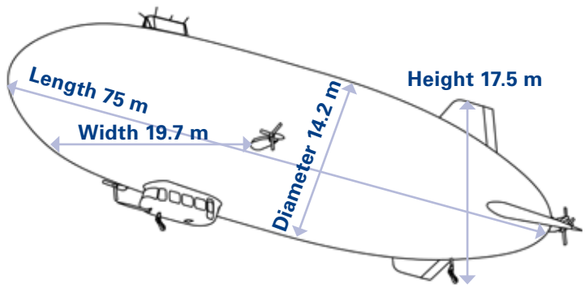
Weights	
Max. weighable Mass	8,630 kg
Maximum Useful Load	1,950 kg
Max. Cabin Payload	1,450 kg

Flight performance	
Max. Speed	70 kts (130 km/h)
Typical cruise speed	35 kts (65 km/h)
Max. Climb / Descent rate	6 m/s / 5 m/s
Flight altitude (typ./max.)	600 m / 3048 m (2'000 ft / 10'000 ft)
Min. Flight altitude	- 500 ft above ground - Down to 250 ft with special permission
Endurance (typ./max.) (*)	10 hrs / 23 hrs
Range (typ./max.) (*)	300 km / 1100 km (160 nm / 600 nm)
Position hold precision	+/- 5 m
Cabin vibration	Max. 0.02 g
External fly-over noise	Below 70 dB(A)

(*) 2 000 ft GND – FL60, 35 kts, no wind. Range extender kit available

Cabin and systems
Dimensions L: 6.5 m (door to door), L: 11.6 m (total) W: 1.67 m, H: 1.8 – 1.67 m
Openings Two main doors: W 1.0 m x H 1.675 m; Floor Hatch 0.49 x 0.69 m
General information Unpressurized, No Air Conditioning, Heater available, On-board toilet, Total cabin volume 26 m³
Acquisition systems ARINC and aircraft bus data, GPS, inertial and attitude
Electrical power & voltages for customer equipment - Baseline approx. 5 kVA at 28 VDC - Optional up to additional 8 kVA at 28 VDC - 230 V AC power available on request

> The atmosphere of the Earth is a biological entity and alive as soil or water. The air hosts a wide variety of organisms, spores of bacteria, viruses, small algae, spores of lichens, and many more. Airborne organisms can travel through the free troposphere over long distances, even between continents, influencing atmospheric processes and the formation of clouds. Some of them may be involved in infectious diseases, can elicit allergic responses or cause contamination of plants and agricultural crops. The atmosphere as biological habitat is poorly understood and an emerging field of research, with utmost importance for understanding ecology of life on Earth, environmental and climate changes and spread of microbial diseases. Because of its unique vertical and slow flight profile, the Zeppelin NT is an ideally suited research platform for atmosphere biology and for the benefit of environmental research and monitoring, ecology, agriculture and human health.
>
> Prof. Hon.-Prof. mult. Dr. Dr. Oliver Ullrich



ZLT Zeppelin Cabin Rack

- Lightweight, tailored by ZLT for use in the Zeppelin NT
- Industry standard 19" wide opening, up to 25 HE tall
- Available with 0.6 m and 0.78 m depth
- Can be installed forward- or rear-facing (side-facing on request)
- Rated Equipment Load up to 140kg (increase on request)
- Max. number of racks in cabin dependent on total weight and cabin arrangement
- Quick & easy exchange of equipped racks in open field
- All-in-one design, engineering, manufacturing and certification support by ZLT for the rack, equipment and airship installation

Example installation

featuring six ZLT racks, customized sensors, two operator seats and a lavatory

Missions and types of application (selection)

Helmholtz-Zentrum Geesthacht (HZG) & Geoforschungszentrum Potsdam (GFZ)
Marine & costal research 2014, 2016
(Picture: © Helmholtz Research Center Geesthacht)

I2c campaign (EU): 2013–2014
Maritime surveillance

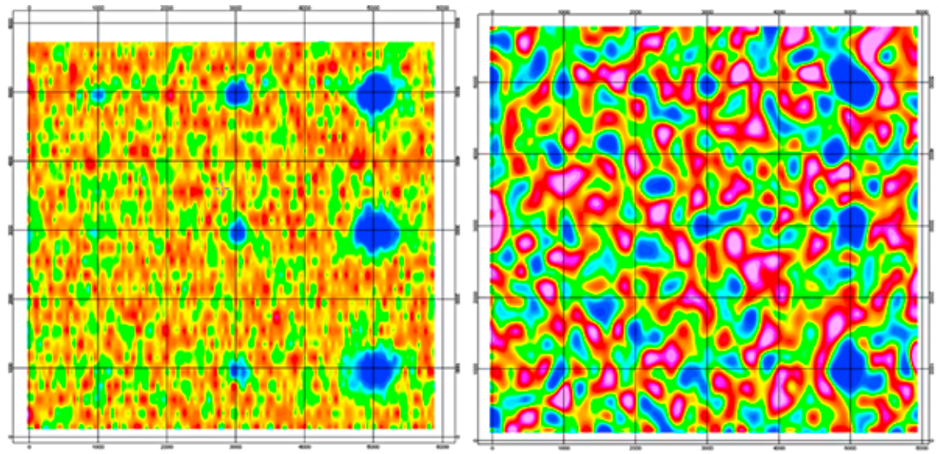
PEGASOS (Forschungszentrum Jülich/EU) 2012–2013
Explore chemistry of the PBL atmosphere

Commissariat à l'Ènergie Atomique (CEA)
Gamma ray map of Paris – 2011
(Picture: © CEA)

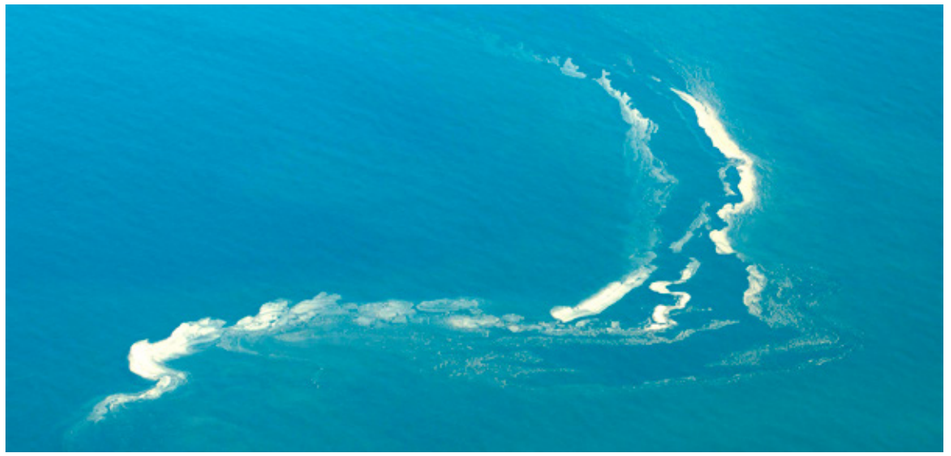
LATMOS Paris – 2014
Air quality measurements

DeBeers Botswana 2005–2007
Mineral exploration

German Police / DLR, 2005, 2006
Traffic management / civil protection



Detecting burried minerals (blue): Resultion with instrument on airship (left) and aircraft (right)
(Picture: Bell Geospace / DeBeers)



Distribution of algae indicating water eddies and fronts (Helmholtz Research Center Geesthacht)

> (...) We were extremely satisfied. We could monitor two of the vortices permanently for 50 minutes with the Zeppelin, which was hovering above them. Nothing like this had ever been done before. (…) The concept of using a Zeppelin (…) has proven 100% right. And thanks to the years of preparation it worked very well. The Zeppelin as data acquisition and coordination platform offers many advantages. And – worth mentioning - it is a very cost-effective solution. (…) The transfer flights with the Zeppelin were great events, too. Feedback from the public, especially during the stopover in Berlin, was amazing. (…) We were only able to realize the fascination and sympathy, which people feel with the Zeppelin flying over their heads, when we saw it with our own eyes. No one would have expected that the feedback on twitter would be skyrocketing as well. (...)
>
> Prof. Dr. Burkard Baschek Director of the institute of Coastal Research, Helmholtz-Zentrum Geesthacht, Germany, Project "Uhrwerk Ozean"

Zeppelin NT Scientific Advisory Board

Key researchers from disciplines with significant use of airborne research platforms provide scientific and technological advice to ZLT and DZR concerning their fields of application, these are:

- Atmospheric research, physics & chemistry of troposphere (planetary boundary layer)
- Remote sensing, earth observation
- Life Sciences
- Coastal and Marine research
- Geography, Geo physics, environmental research

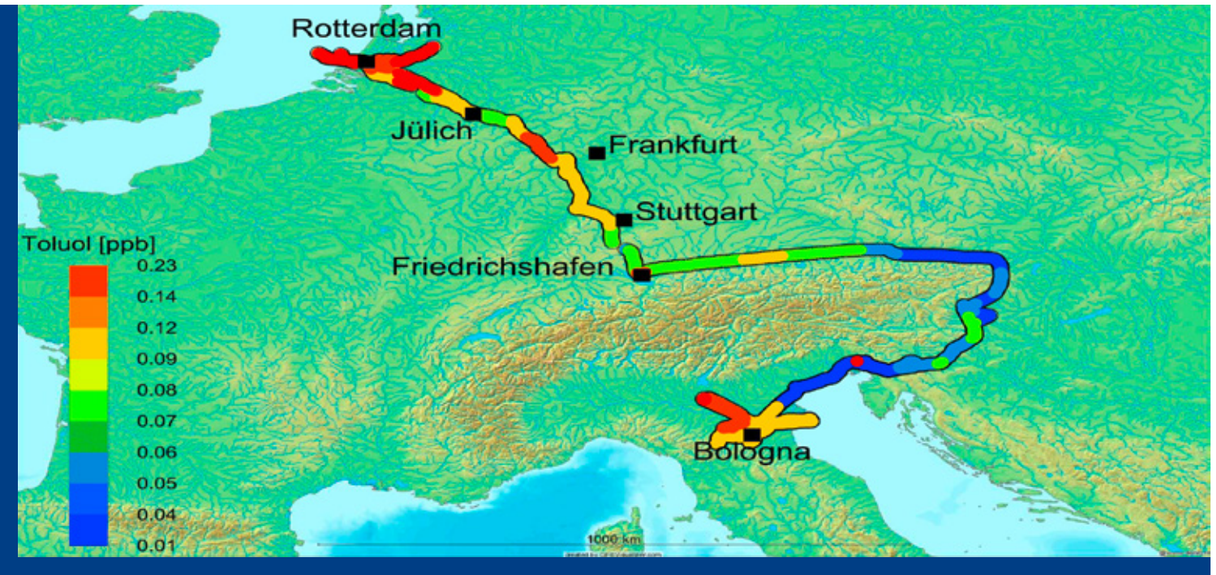
Prof. Dr. Dr. h.c. Andreas Wahner
Director of the Forschungszentrum Jülich GmbH,
Institute for Energy and Climate Research IEK-8: Troposphere, **Jülich, Germany**

Prof. Dr. Michael E. Schaepman
Remote Sensing Laboratories
Dept. of Geography, University of **Zurich, Switzerland**

Prof. Hon.-Prof. mult. Dr. Dr. Oliver Ullrich
Gravitational Biology and Space Life Sciences, University of **Zurich, Switzerland**
Otto-von-Guericke-University Magdeburg, Germany, Kennedy Space Center, USA,
Director Swiss Parabolic Flights, President Swiss SkyLab Foundation

Prof. Nikolaus J. Kuhn, PhD
Head of Physical Geography and Environmental Change Research Group
Department of Environmental Sciences, University of **Basel, Switzerland**

Particle distribution in the atmosphere along flightpath (Research Center Jülich)



Cooperation partners for special missions (selection)

German Aerospace Center (DLR), Cologne, Germany
http://www.dlr.de/dlr/en/

Forschungszentrum Jülich (FZJ), Jülich, Germany
http://www.fz-juelich.de/portal/EN/

Helmholtz Research Centre for Geosciences (GFZ), Potsdam, Germany
http://www.gfz-potsdam.de/en/

Helmholtz Zentrum Geesthacht, Center for Materials and Costal Research (HZG), Geesthacht, Germany
https://www.hzg.de/index.php.en www.clockwork-ocean.com

Bundesnetzagentur (Governmental telecommunications office), Bonn, Germany
https://www.bundesnetzagentur.de/EN

Bell Geospace, Houston/USA, Edinburgh/UK
http://bellgeo.com

L3-Wescam, Burlington, Canada
http://www.wescam.com

German Police, Cologne, Germany
https://www.polizei.nrw.de/koeln/

Préfecture de Police, Paris, France
https://www.prefecturedepolice.interieur.gouv.fr/English

De Beers Mining Company, Johannesburg, South Africa
https://www.debeersgroup.com/en/

ONERA – French Aerospace Research Center, Paris, France
http://www.onera.fr/en

General Secretariat for Defence and National Security (SGDSN), Paris, France
http://www.sgdsn.gouv.fr/sgdsn-in-english/

Ministry of Defense (DGA), Paris, France
http://www.defense.gouv.fr/english/dga

French Alternative Energies and Atomic Energy Commission (CEA), Paris, France
http://www.cea.fr/english

DCNS naval industry services (DCNS), Toulon, France
http://en.dcnsgroup.com

Impressum

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