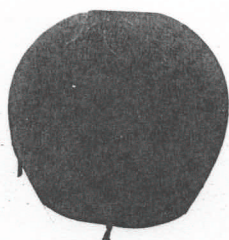


# Balloon Program 1932 to 1937

Sponsored by Professor R. Süring, Meteorol. Observatory, Potsdam  
33-35: 4 flights with Schwerdtfeger, to measure eddy diffusivity,  
35-38: 5 flights with K.L. to measure eddy diffusion of nuclei & dust



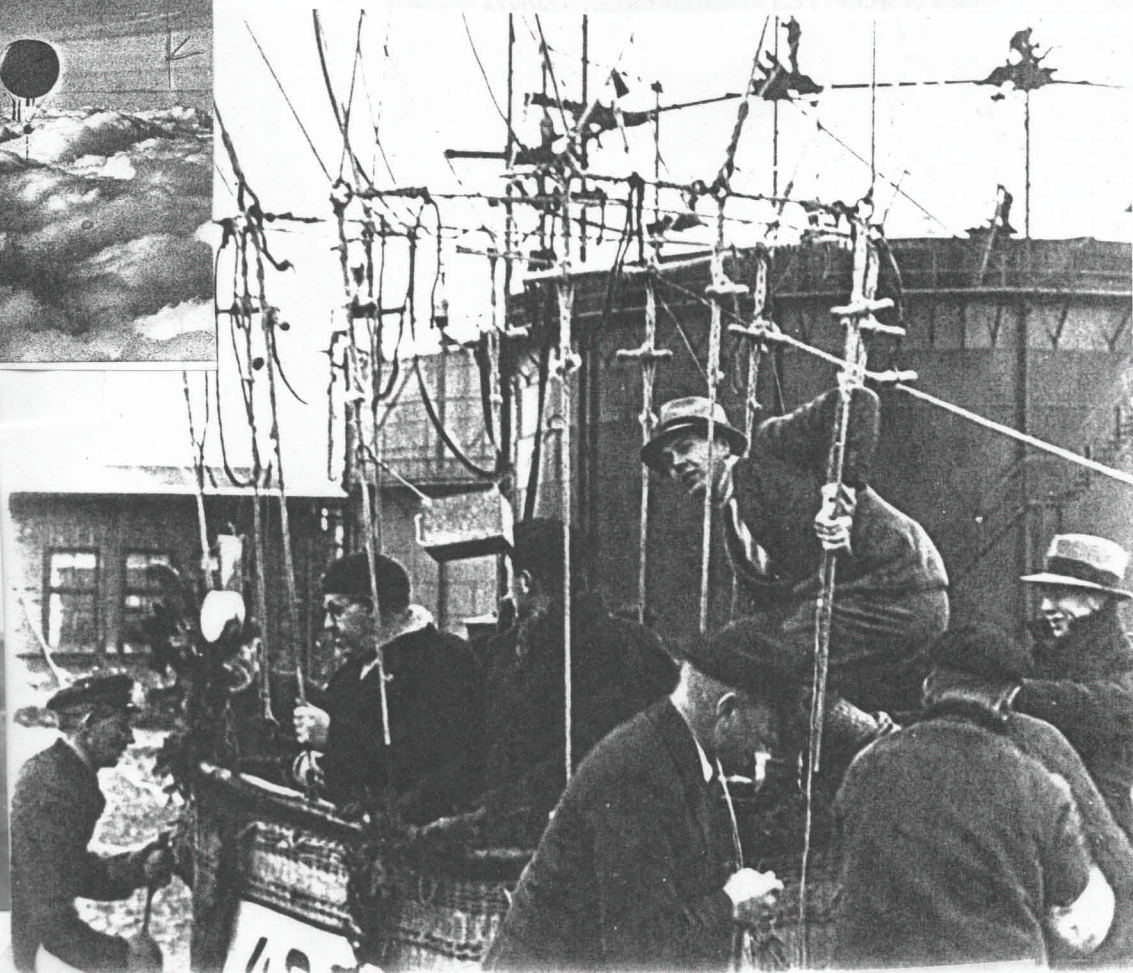
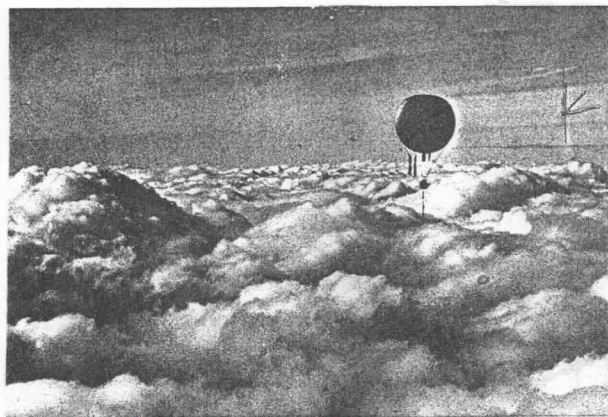
Marianne & Werner S.  
Robert Petcow, pilot, & H.L.



Start at Bitterfeld  
1,200 m<sup>3</sup> Hydrogen.



Kate with Nuclei-Counter



R. Petschow on occasion of his 400th ascent

Reference: John M. Lewis: The Lettau-Schwerdtfeger Balloon Experiment: Measurement of Turbulence via Austausch Theory. *Bulletin of the Amer. Meteorol. Soc.*, Vol. 78, No. 11, Nov. 1997, 2619 - 2635

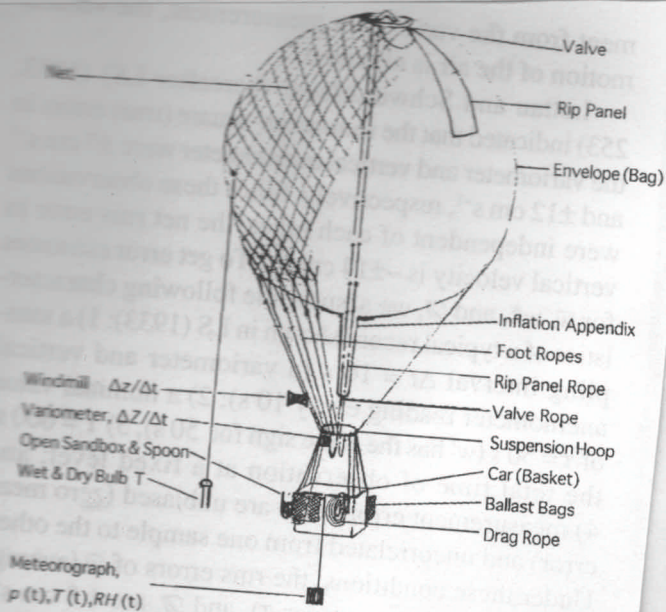
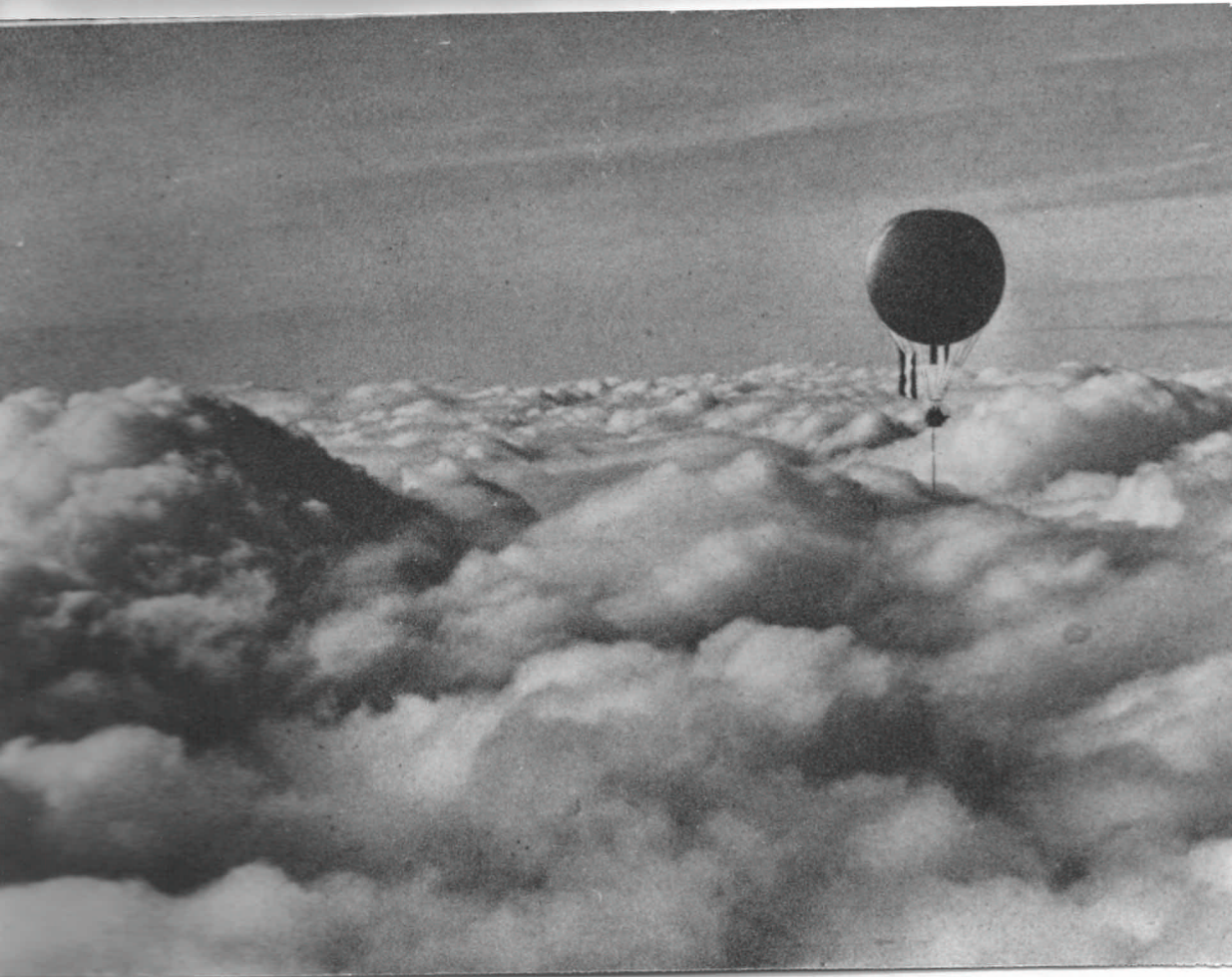


FIG. 6. Schematic diagram of the free balloon and its component parts. Courtesy of H. Lettau.

## How the Balloon program came off

My teacher Franz Linke (Univ. of Frankfurt, 1929-30) was an ardent research balloonist. I began to see the free balloon as a platform for measuring eddying components of airflow. Employed (1931-33) at the Geodetic Institute, on the Telegraph-Hill Research Complex near Potsdam, I visited Prof. Süring, director of the Meteorology Institute who had reached 10,800 m in 1901, a free-balloon record. He listened to my ideas and said, I would need an experienced navigator like Robert Petschow, and that funding of my "new" type of research required background data. I remembered (and got) un-evaluated records of eddying air motions surrounding a manned balloon, from Frankfurt. I persuaded Werner S. in 1932 to co-author in their evaluation, which was published in Vol. 50 of *Meteor.Z.* We started in 1933 on our first research flight, with Süring's promise of support for more

### About Balloon-Navigation during our Research Flights .

Seven of our eight scientific balloon flights started in Bitterfeld. This small town is about 50 km south of Berlin. Huge chemical plants generate hydrogen gas as byproduct. It is stored and sold for less than 3 marks per 10 cubicmeter to the german balloon society which keeps in Bitterfeld a fleet of balloons in "barns" near the gastanks to be rented and filled by interested people.

Our most experienced pilot and navigator was R. Petschow. He was a journalist, editing one of Berlin's larger newspapers. Over nearly 20 years he had devoted most sundays to his hobby of free ballooning. Suering told me that Petshow could control the height of the trajectory of a hydrogen-filled balloon within a meter or so. We saw how he did it. He kept his eyes continuously on the vertical anemometer (windmill type) and on the rate-of-climb meter. He counteracted a tendency to climb by a pull with his left hand on the vent line, and a down-tendency by discharging ballast sand with a small gardener's shovel in his right hand. Both actions in dosages adjusted to the "windmill" indications.

In addition to the altimeter he had a trumpet-like horn aboard. A short blast downward produced an echo useful for estimating height above ground when in a cloud. Moreover, Petschow always had the big yearbook of train schedules for Germany aboard. When we had finished our measurements, usually after 300 to 400 km travel, he looked for a railroad station in the downwind direction which offered the earliest trainconnection to Berlin and open fields for landing nearby.

We never had a really "close call" in hydrogen balloon flights. A few tense moments came on a flight in July 1937 from Chemnitz, Saxony, with a balloon filled with cooking gas. A local dentist was the navigator but had only altimeter and maps, neither rate-of-climb meter nor vertical anemometer nor "echo-sounder". We started with 6000 cubicmeter fill supplied by the local gasworks. The lift per cubicmeter is about 1/7 of that for hydrogen. Vertical navigation is more difficult because response to gasventing and ballast release is 7 times sluggisher than with hydrogen. One such flight was a requirement for my pilot certificate.

We climbed to 10,000 ft while Kate Doerffel-Lettau counted dust and nuclei and I measured solar radiation. A cumulus developed beneath us. When its top reached about 8,000 ft, the navigator got nervous without sight of the ground. He had been warned not to cross the czechoslovakian border, for political reasons. He thought, a hill appearing south of us in the haze was the Fichtelberg at the border. He insisted on gasventing to bring us quickly down below the cloud basis.

After the intense direct and reflected solar heating above the cloud, the gas cooled rapidly during 6000 ft descent through the still upwelling cloud mass, finally under the cloud I poured ballast overboard by the bagfull and succeeded in controlling the descent at a height sufficient to proceed over level terrain. But it just happened that downwind the ground sloped upwards to a little village. I had to cut the cord holding the "landing brake" (about 60 ft of heavy sisal hawser). Then, we were surrounded by the first houses of the village. The ropes connecting basket and bag were caught by wires strung between two tall telephone poles. Fortunately, the wind was weak and the wires did not break.

Thus, we came to rest, "landed", ten feet above ground and stayed in the basket. A host of excited villagers aroused from their sunday noon siesta pulled us upwind to a meadow, where we three disembarked and finally touched ground. After deflating the big bag the navigator found out that we were still more than 40 km from the czechoslovakian border. One villager gave his opinion: "You could have walked from Chemnitz to here!"