

A PROBE OF SOARING A STRAIGHT DISTANCE OF 2,000 KM

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SUMMARY

Reviewing meteorological inspection, on-the-spot investigation and flying exploration in the northwestern part of China over ten years, the Anyang Aero Sports School considers that this region has strong waves and thermals which are necessary for soaring straight distances of 2,000 km. Many important factors such as topography, terrain, climate, communication and so on are quite favorable for long distance soaring. Therefore, the course from Ürümqi to Xian is presently considered the best one for soaring a distance of 2,000 km in China.

PREFACE

The OSTIV set up a gold prize in 1988 for soaring a straight distance of 2,000 km. But up to now, no one has won this special honor.

In the past twenty years, the main reason for the world distance record not exceeding 1,500 km is that the utilizable time of thermals has been limited to 10 hours (10:00a.m. - 20:00p.m.). Therefore, if you want to break through the distance of 2,000 km, you must exceed the tie of thermals and use lee waves. The goal may come true by putting all 15 hours of daytime into soaring.

Obviously, selecting a suitable course for soaring a distance of 2,000 km is a task pursued by pilots from various countries.

In this paper, I present a primary analysis on the research of possibly accomplishing this pioneering event in China.

1. There Are Strong Waves In The Northwestern Part Of China.

Analysis of waves in the Tianshan Mountains:

The Tianshan Mountains in Xinjiang Autonomous Region is 600 km in length running from the east to the west, with heights of 4,000 to 5,400m. To the north of the mountains, is the Gurbantüngüt Desert, the only way for the cold air from Siberia to take after entering into Xinjiang. We have consulted the meteorological data concerned in Hami District and the observatory records of lenticular clouds by Mountains Meteorological Observatory. The lenticular clouds appeared in 8 days in the June of 1981, and the appearance of lenticular clouds averaged 6 days in the months of June and July of the two years 1981 and 1982.

Wave flying exploration in the Helan Mountains:

Located at the juncture of Ningxia Autonomous Region and Inner Mongolia Autonomous Region, the Helan Mountains are 120 km in length running from southwest to northeast with a height of 3,500m. The Badain Jaran Desert and Tengger Desert are located to the northwest of the mountains. When the northwestern thermal low flows over the border, strong wind passes through the vast deserts smoothly and is stopped by the Helan Mountains, bringing forth excellent conditions to generate waves. Consulting meteorological data of the last 30 years (1951 to 1980), balloon sounding data and observatory records by Helan Mountains Meteorological Observatory the number of times lenticular clouds appear in each month, 1978-82, is 16 times in June and 17 times in December. We have proved that there are strong waves in the Helan Mountains. On the 27th of December, 1984, it was fine weather with vast clear skies. A light breeze blew on the surface of the ground. However, reports that came from the observatory said that the wind speed on the top of the mountains was 16 m/sec. Very good waves were discovered by airplane sounding. Balloon sounding data on the 28th indicated that the wind speed was 48 m/sec. at 7,000 m and 70 m/sec. at 10,000 m altitude. On that day, a glider (Nimbus-2B) soared to the altitude of 8,500 m by taking advantage of non-lenticular

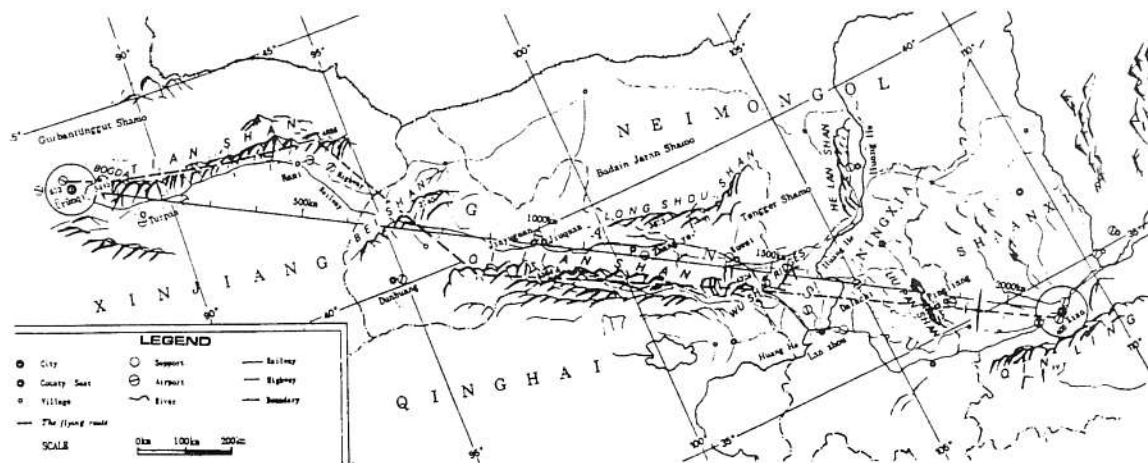


FIGURE 1. The map of the flying route.

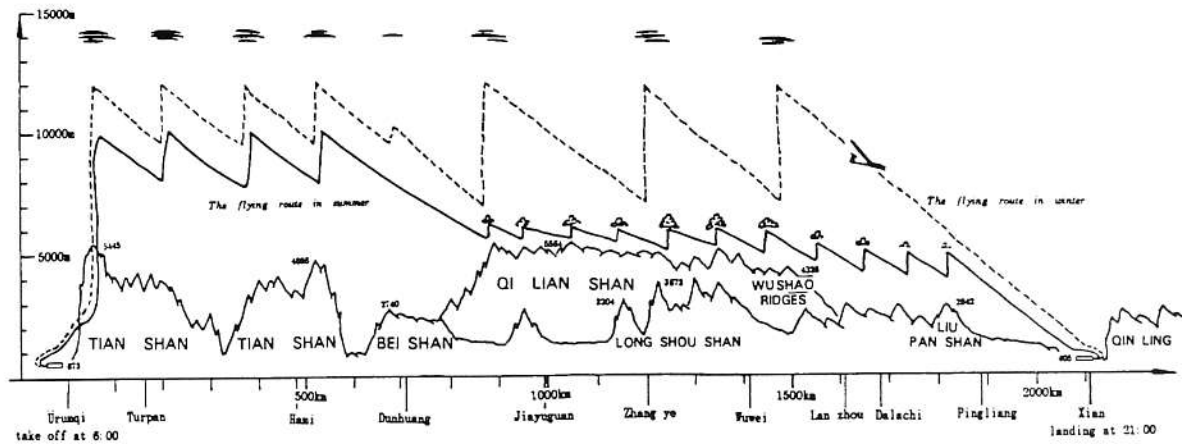


FIGURE 2. The sketch map of flying.

clouds waves, and stopped climbing only because it became dark. On the 29th, the glider went up to 11,000 m, and was stopped by the limitation of oxygen. The waves on that day were calculated to go beyond the altitude of 15,000 m.

The analysis of waves along the way:

The topography and meteorological data shows that there are very good mountain shapes and regions to generate waves in the Qilian Mountains, Wushao Ridges and Liupan Mountains.

2. The Gansu Corridor Boasts Strong Thermals.

The Gansu Corridor is a narrow and long zone situated in the west from Dunhuang, and east to Huanghe River (neighboring the Mountains of Beishan), with the Longshoushan and Tengger Desert to the north. This corridor is nearly 1,000 km long to the north of the Qilian Mountains.

The results from the analysis of the data from both the ground and the air over 10 years (1971 to 1980) by the 12 meteorological observatories in the Gansu Corridor are as follows:

The total amount of clouds is typically few, the sunshine time is long and solar radiation is strong. The latitudes of this area are high, and the climate is arid. The total amount of clouds is little, and the average in cloudy seasons is only 4/8. Sunshine hours averages 2,800-3,200 annually. The annual sunshine rate is 62-74%. The general radiation by the sun is between 130 and 160 kcal./cm² year.

The air temperature is suitable and the heat is high on the ground. There is a big difference in the temperature in the day, with a high temperature typically reached just before nightfall. The temperature averages 22-24 °C in July. Since the surface of the ground in this area is composed of gravel and desert the heat capacity is small, therefore, the temperature on the ground surface increases quickly after the sun shines. The ground temperature difference in the afternoon averages over 20°C, and usually reaches 23.4 °C in June. The temperature at 14:00 is typically 10°C higher than that at 08:00, and the temperature at 20:00 is only 1-2°C lower than that at 14:00. This is an important factor to generate strong thermals. The climate here is arid with low humidity and little rainfall. The rainfall of the whole year

is 30-80mm in the western part and 100-200mm in the eastern part. The annual evapo-transpiration is 2,000-3,500 mm. The temperature/dew-point deficit averages 17-19°C in the afternoon.

The amount of cumulus clouds is moderate, the wind typically high and there are few thunderstorms. The amount of cumulus clouds averages 2/8 in the months from June to August. Strong wind lasting full days averages 5, and the days of thunderstorm averages no more than 4. Sandstorms occur mostly in April and May, and average 3 days in a month.

Experiences of on-the-spot flying in the Gansu Corridor:

On the bases of the above-mentioned data, the Jiayuguan Gliding Base was set up in 1988. Friends of a gliding circle from Australia, Germany, France, Japan and so on, have gone to Jiayuguan both early and late in the season. It has been proved through many years of gliding that there are indeed very strong thermals in the area of the Gansu Corridor.

There are many days with cumuli, typically 15-20 days in summer and the amount of cumuli is 2/8. Thermals are strong. The average rate of climb is about 3-5 m/sec., and sometimes 6-8 m/sec. The temperate drop with altitude averages 0.7-0.8°C/100 m.

The duration of thermal activity is long. The sun rises at 6:00' and sets at 20:59' in July. The thermals form early and disappear late, with a total duration of often over 10 hours. The thermals reach a high altitude which is over 4,000 m and sometimes over 6,000 m above sea level. To fly at this altitude, 30-40 km/h of ground speed can be realized, which is extremely good for flying cross-country.

3. Conditions Of Geography, Topography And Transportation In The Northwestern District:

Xinjiang Section (the western section):

Most areas along the railway and highway from Lanzhou to Urumqi and to the south of the Tianshan Mountains are covered with gravel and desert. The geography is plain and hard, which is good for gliders to land and to be transported. Furthermore, there are airports at Urumqi, Turpan, Hami and so on, to support outlanding.

The section of the Gansu Corridor (the middle section):

The mountains are 2,000 to 3,500 meters high in the north, and over 5,000 meters in the south. The corridor topography is high in the west and south, and low in the east and north. The vertical distance is between 1,000 and 1,500 meters. Excepting the three cities of Jiuquan, Zhangye and Wuwei are surrounded by 3 oases respectively. Most areas of the region are covered with gravel and desert. The surface of the desert is hard and plain and can be used for landing. The Ürümqi-Lanzhou Railway and Highway run through the area and there are adequate highways in all counties. All these features are good for transportation after landing. In addition, there are the airports of Dunhuang, Jiayuguan, Zhangye, Wuwei, Lanzhou and so on, in support for landing.

The Loess Plateau Section (the eastern section):

Passing over the Huanghe River, the contemplated course enters the Loess Plateau in the Ningxia Autonomous Region and Shaanxi Province. Here are many hills with fewer suitable areas for landing. However, the topography becomes obviously better after passing the Liupan Mountains and more spots for landing can be seen. In this section, there are the airports of Dalachi, Pingliang and so on in support for landing.

4. The Selection Of The Best Flying Route And Months

I believe the best flying route would be taking off from Urumqi Airport at daybreak and utilizing the waves of the Bogda Peak of the Tiansha Mts to climb up; then flying along the south of Tianshan Mts. eastward, and utilizing waves to obtain the highest altitude (above 10,000 meters at best) at Hami District. Then one would fly southeastward to the Qilian Mts., and try to utilize the waves or thermals to maintain altitude. Then one would fly along the east of Qilian and proceeding southeastward, finally fly over the Wushao Ridges and Liupan Mts. arriving at the

Xian Airport. The distance is 2063.505 km (see Figure 1).

I think the best time for this flying attempt would be the summer months, from May to June. In this season the waves and thermals are very good; the daytime is long and rainfall is little. It's ideally suited for cross-country soaring. Moreover, there is a possibility to utilize waves in the whole course after over 2 days of strong wind in December of the winter (see Figure 2).

In addition, there are thermals in this area due to the influence of the atmospheric circulation and topography, and flying before the wind increases greatly the flying ground speed. Arid climate, few clouds, obvious ground marks and fine visibility are good for high flying. Several big meteorological observatories and stations of Hami, Jiuquan, Lanzhou, Yinchuan and so on, can supply reliable meteorological data.

In summary, there are strong waves and thermals necessary for soaring cross-country in China's Northwestern District. The important factors of topography, geography, climate, transportation and so on, are also very favorable for soaring cross-country. Thus, the course from Ürümqi to Xian is the best one at present in China for the straight soaring of 2,000 km.

In view of the limited funds that the China Air Sports Federation has available for gliding activities and because advanced and high-performance gliders and navigation equipment are not affordable, it is very difficult to self-organize such a large-scale cross-country flying attempt. So, friends of gliding from various countries are welcome to China to help in the common development of this course. We will cooperate with master gliding pilots from various countries and offer our limited help in striving for rapid accomplishment, for the benefit of gliding history and mankind, of this straight soaring flight of 2,000 km.