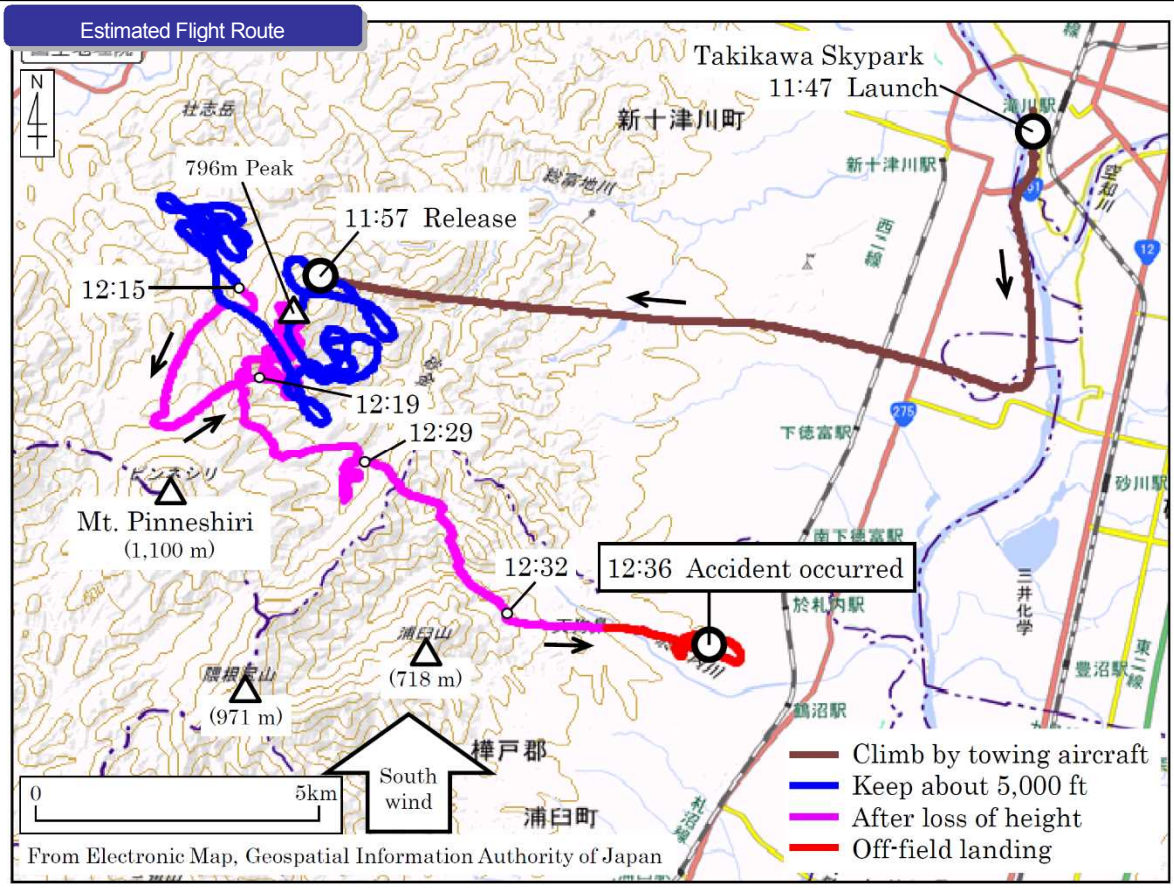
3. Case Studies of Accidents

Case 1 Due to unexpected circumstances (Unable to maintain altitude due to a downdraft and failure to start the engine)

After being released from the towing aircraft, the motor Glider greatly lost height due to failure to start the engine, and finally crashed. (Captain: Age 44, Total flight time: 1,195 hours)

Summary: On Saturday May 30, 2015, a privately owned Schempp-Hirth Discus bT, launched by aerotow from Takikawa Skypark for navigation training and was released from the towing aircraft in a point about 13 km west-southwest of Takikawa Skypark at an altitude of about 5,300 ft. At 12:36 Japan Standard Time (JST: UTC+9 hr: unless otherwise stated all times are indicated in JST), the glider crashed into the grassland about 11 km southwest of Takikawa Skypark at an elevation of about 85 m.
Only the captain was on board and fatally injured. The glider was destroyed but there was no outbreak of fire.

Estimated Flight Route



Developments Leading to the Accident

11:57–12:15

After release, the Glider flied at an altitude of about 5,000 ft above the 796 m Peak (the mountain of 796 m above sea level) 13 km west-southwest of Skypark.

12:15–12:19

The Glider greatly lost the height to about 3,200 ft when it approached Mt. Pinneshiri (the mountain of 1,100 m above sea level, which is highest in the mountainous regions where the Glider flied) from the north side.

12:19–12:29

The Glider flied at an altitude of about 3,000 ft above the south of 796 m Peak. After around 12:25, the Glider flied from the mountainous regions in the southeast and once lost the height to about 2,200 ft before crossing a ridge line for plains, but climbed to an altitude of 2,600 ft or more at high climb rate.

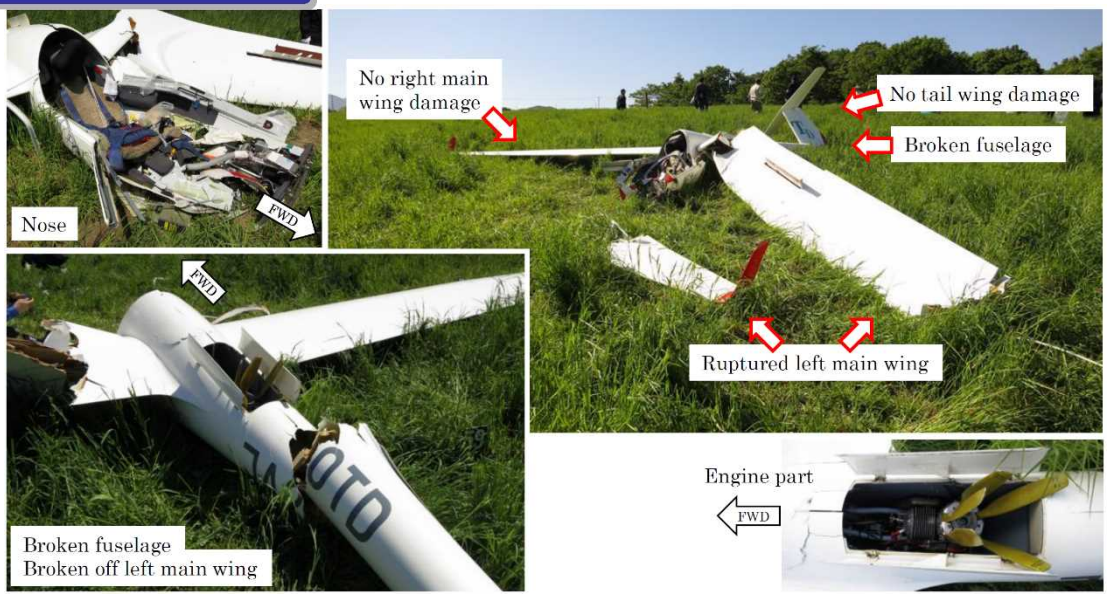
12:32 or later

During the flight for the east, the ground speed of the Glider exceeded 150 km/h around an altitude of 1,500 ft.

12:36

The Glider crashed during the left turning at low altitude.

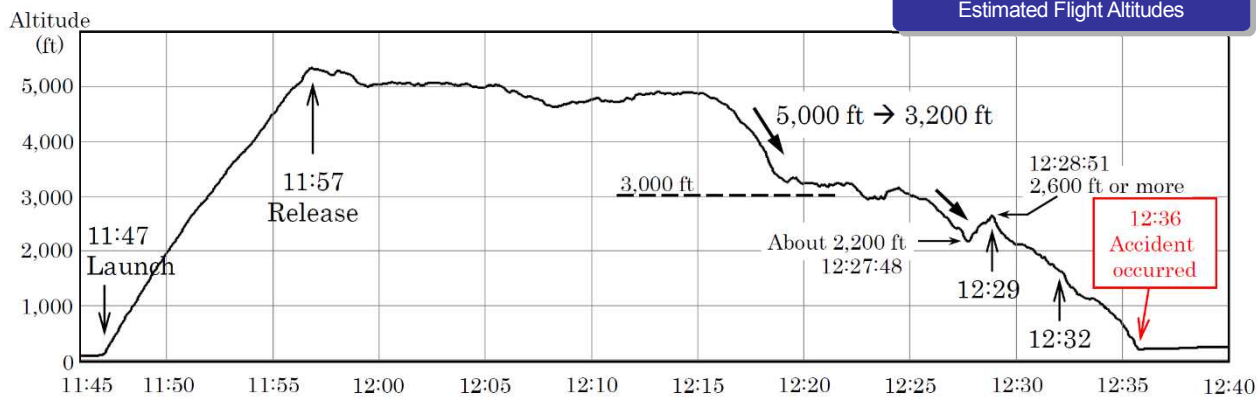
Detailed Damage Description



Analysis of Causal Factors of the Accident

Situations Leading to the Accident

Estimated Flight Altitudes



○ Fuel Confirmation before Launching

On May 24, 2015, the captain refueled five liters to the Glider together with the head of the Glider owners, and the following engine operating time was about 20 minutes; therefore, it is somewhat likely that he thought in calculation that there was a margin to the quantity of fuel.

There were no problems for the flight of the Glider even without the engine.

→ It is somewhat likely that the captain launched the Glider without confirming the fuel quantity in the fuel tank.

○ Flight after Release

The Glider went south towards Mt. Pinneshiri from around 12:15 and turned to the left on the way to get away from it, during which it largely descended to an altitude of about 3,200 ft.

Other gliders which flied above the same mountainous regions in the same time period as well as the Glider also lost the height at high descent rate near the almost same place.

→ It is highly probable that the large descent was caused by entry into the downdraft zone (sinking zone) which occurred in the north of Mt. Pinneshiri.

○ Attempting to Start Engine

According to the records of the GPS unit and the values calculated from the records (such as climb/descent rates and flight direction), no signs that the Glider climbed by engine power were found on the day when the accident occurred; therefore, it is probable that the engine did not start.

The fuel quantity in the fuel tank was less than the non-usable fuel; therefore, it is highly probable that the engine did not start due to the fuel exhaustion.

○ Off-field landing

The grassland where the captain finally attempted to make landing was a slope; therefore, it is somewhat likely that it was difficult for the captain to visually judge the altitude.

The engine of the Glider remained extended; therefore, it is probable that the glide performance was decreased, the loss of height was large, and no sufficient altitude was left; and consequently, it was difficult for the captain to keep the airspeed necessary to continue the flight.

There were taller trees surrounding the tree with broken branches. Based on the thickness of broken branches, the distance between the tree and the impact marks, and other facts, it is probable that the Glider greatly lost the height during the left turning, which made the left main wing collide with the tree.

Ensuring Sufficient Altitude

The Glider is a motor glider; therefore, it is somewhat likely that the captain was not strongly aware of ensuring sufficient altitude, considering that it was possible to keep the altitude or climb by engine if necessary. However, if there are no other choices but to make off-field landing in the place other than predetermined places, it is necessary to ensure sufficient altitude due to the following reasons:

Confirmation of landing place

It is probable that the captain made the decision to land in the grassland which is the accident site under the situation of no sufficient altitude.

If the pilot tries off-field landing in an unfamiliar place without background knowledge, it is necessary to closely confirm the space, wind, approach direction, slope or heave, conditions on the surface, obstacles and other things, from the air. In addition, if the place is not suitable, another place must be selected again.

Keeping airspeed

It is probable that it became difficult for the captain to keep the necessary airspeed due to no sufficient altitude.

In the case of a glider without power plant, basically, the altitude is decreased for accelerating the airspeed and low altitude may be not enough to regain the airspeed.

Ensuring final approach course and keeping descent angle

It is probable that the captain attempted to land without ensuring the straight final approach course.

It is necessary to ensure the straight final approach course and keep the adequate descent angle in consideration of wind in order to make off-field landing safely.

○**For Safety Flight**
The Glider pilots need to objectively judge safety margin to be ensured considering such as environments, performances, experiences while always refining knowledge or skills to foresee the change of situations during flight.

Probable causes: In this accident, it is probable that the Glider crashed because it greatly lost the height during left turning at low altitude when the captain attempted off-field landing in the grassland without ensuring the straight final approach course.
It is somewhat likely that the large loss of the height during left turning at low altitude was because the glider was nose up while turning to the left under the situation of no sufficient altitude, which decreased the airspeed, or because lack of coordinated turn control during the turning made it slid down to the left.

The investigation report of this case is published on the Board's website (issued on June 30, 2016).
http://www.mlit.go.jp/jtsb/eng-air_report/JA20TD.pdf

Similar accidents (Lack of height)

Date of occurrence	Operator	Category	Pilot's age	Total flight time	Summary of the accident / Probable causes
March 15, 2013	Private	Glider	58	5,811	The Glider took off from Memanbetsu Airport for a recreational flight to Shikabe Airfield in Shikabe, Kayabe-gun, Hokkaido, and the aircraft went missing during the flight. The Glider was destroyed but there was no outbreak of fire. It is highly probable that this accident occurred when the Glider, flying over the Hidaka Mountains, encountered a downdraft that was blowing down from the ridgeline of the mountains, which made the Glider descend below the altitude needed to safely pass over the ridgeline, and crash into a slope on the mountain; consequently, the aircraft was destroyed, and the pilot and the passenger suffered fatal injuries. It is probable that the reasons that the Aircraft descended below the altitude were that while the Glider decreased its ground speed against the downdraft, the pilot judged that the Glider would be able to maintain the altitude to safely pass over the ridgeline and the Glider began to approach Kyunosawa Valley, where the accident occurred, at an altitude with almost no margin. Along with this, the downdraft became stronger than the pilot had expected and the pilot could not stop descent with the climb performance of the Glider.
March 5, 2014	Private	Small aircraft	76	1,074	The Aircraft took off from Nagoya Airfield and collided with a tower for high voltage power transmission lines. The Aircraft was destroyed and scattered; accordingly, post-crash fire broke out. It is highly probable that the Aircraft collided with the Tower for high voltage power transmission lines set up on the ridge of the hilly area because it flew below the minimum safety altitude while it flew from the Nagoya Airfield towards the Omaezaki area under the visual flight rules. It is somewhat likely that the Aircraft tried to have visual contact with the ground surface by flying below the minimum safety altitude because the visibility was very poor, and cloud was in a low state due to the weather conditions that day.
May 1, 2015	Group	Glider	73	4,711	The Glider took off from Hida Airpark in Takayama City, Gifu, for leisure flight and crashed into a slope ahead when approaching Mt. Norikura. In this accident, it is highly probable that the Glider fell to the altitude preventing the turnaround and could not climb along the gradient when it approached the mountain slope while climbing, so that the Glider collided with the slope. It is probable that it is because the Glider approached the mountain slope too close and did not fly at an altitude sufficient to avoid the downdraft that it fell to the altitude preventing the turnaround.