

AA2015-2

**AIRCRAFT ACCIDENT  
INVESTIGATION REPORT**

**PRIVATELY OWNED**

**J A 2 4 0 5**

**February 26, 2015**



The objective of the investigation conducted by the Japan Transport Safety Board in accordance with the Act for Establishment of the Japan Transport Safety Board and with Annex 13 to the Convention on International Civil Aviation is to determine the causes of an accident and damage incidental to such an accident, thereby preventing future accidents and reducing damage. It is not the purpose of the investigation to apportion blame or liability.

Norihiro Goto  
Chairman,  
Japan Transport Safety Board

Note:

This report is a translation of the Japanese original investigation report. The text in Japanese shall prevail in the interpretation of the report.

# AIRCRAFT ACCIDENT INVESTIGATION REPORT

CRASH INTO THE MOUNTAIN SLOPE  
PRIVATELY OWNED  
HOFFMANN H-36 DIMONA (MOTOR GLIDER, TWO-SEATER),  
JA2405  
NORTHWEST SLOPE OF A MOUNTAIN 1,903M IN ELEVATION,  
LOCATED ABOUT 1.7KM NORTH OF  
MT. KAMUIEKUUCHIKAUSHI,  
NAKASATSUNAI-MURA, KASAI-GUN, HOKKAIDO, JAPAN  
AT AROUND 11:00 JST, MARCH 15, 2013

January 23, 2015

Adopted by the Japan Transport Safety Board

Chairman	Norihiro Goto
Member	Shinsuke Endoh
Member	Toshiyuki Ishikawa
Member	Sadao Tamura
Member	Yuki Shuto
Member	Keiji Tanaka

## SYNOPSIS

### < Summary of the Accident >

On Friday, March 15, 2013, a privately owned Hoffmann H-36 Dimona, registered JA2405, took off from Memanbetsu Airport at 09:08 Japan Standard Time (JST: UTC+9hr, unless otherwise stated all times are indicated in JST on a 24-hour clock) for a recreational flight to Shikabe Airfield in Shikabe, Kayabe-gun, Hokkaido, and the aircraft went missing during the flight. On Monday, March 18, 2013, the aircraft was found on the northwest slope of a mountain 1,903 m in elevation, located about 1.7 km north of Mt. Kamuiekuuchikaushi, in Nakasatsunai-mura, Kasai-gun, Hokkaido.

Both the pilot and the passenger on board the aircraft suffered fatal injuries.

The aircraft was destroyed but there was no outbreak of fire.

### < Probable Causes >

It is highly probable that this accident occurred when the Aircraft, flying over the Hidaka Mountains, encountered a downdraft that was blowing down from the ridgeline of the mountains which made the Aircraft 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 Aircraft decreased its ground speed against the downdraft, the pilot judged that the Aircraft would be able to maintain the altitude to safely pass over the ridgeline and the Aircraft 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 Aircraft.

Abbreviations frequently used in this report are as follows:

DME: Distance Measuring Equipment  
ELT: Emergency Locator Transmitter  
FSC: Flight Service Center  
GPS: Global Positioning System  
VFR: Visual Flight Rules  
VOR: VHF Omnidirectional Radio range

#### Unit Conversion Table

1 m: 3.281 ft  
1 km: 0.54 nm  
1 km/h: 0.54 kt  
1 m/s: 1.944 kt  
1 inHg: 33.86 hPa



# 1. PROCESS AND PROGRESS OF THE ACCIDENT INVESTIGATION

## 1.1 Summary of the Accident

On Friday, March 15, 2013, a privately owned Hoffmann H-36 Dimona, registered JA2405, took off from Memanbetsu Airport at 09:08 JST for a recreational flight to Shikabe Airfield in Shikabe, Kayabe-gun, Hokkaido, and the aircraft went missing during the flight. On Monday, March 18, 2013, the aircraft was found on the northwest slope of a mountain 1,903 m in elevation (hereinafter referred to as "Peak 1903"), located about 1.7 km north of Mt. Kamuiekuuchikaushi, in Nakasatsunai-mura, Kasai-gun, Hokkaido.

Both the pilot and the passenger on board the aircraft suffered fatal injuries.

The aircraft was destroyed but there was no outbreak of fire.

## 1.2 Outline of the Accident Investigation

### 1.2.1 Investigation Organization

On March 18, 2013, the Japan Transport Safety Board received an accident notification, and then designated an investigator-in-charge and an investigator to investigate this accident.

### 1.2.2 Representatives of the Relevant State

An accredited representative from Austria, the State of Design and Manufacture of the aircraft involved in this accident, participated in this investigation.

### 1.2.3 Implementation of the Investigation

March 19, 2013	Interviews
March 20, 2013	Interviews
March 21, 2013	Interviews and collection of pertinent documents
July 2, 2013	On-site investigation and aircraft examination

### 1.2.4 Comments from the Parties Relevant to the Cause of the Accident

Because the two persons involved in this accident were fatally injured, comments from the parties relevant to the cause of the accident were not invited.

### 1.2.5 Comments from the Relevant State

Comments were invited from the relevant State.

## 2. FACTUAL INFORMATION

### 2.1 History of the Flight

On March 15, 2013, a privately owned Hoffmann H-36 Dimona, registered JA2405 (hereinafter referred to as "the Aircraft"), took off from Memanbetsu Airport at 09:08 for a flight to Shikabe Airfield, with two persons on board: the pilot in the left seat and a passenger in the right seat.

The outline of the flight plan for the Aircraft was as follows:

Flight rules: Visual flight rules

Departure aerodrome: Memanbetsu Airport  
Estimated off-block time: 09:00  
Cruising speed: 80 kt (about 148 km/h)  
Cruising altitude: VFR  
Route: Obihiro, Hidaka, Tomakomai, and Muroran  
Destination aerodrome: Shikabe Airfield  
Total estimated elapsed time: 4 hours  
Fuel load expressed in endurance: 6 hours 30 minutes  
Persons on board: Two

According to the records of communications with Air Traffic Control (ATC) and Flight Service Center (FSC), the flight tracking records of a portable GPS carried on the Aircraft (hereinafter referred to as "GPS"), the statements of flying club members, and the history of the flight up to the time of the accident are summarized below.

#### 2.1.1 History of the Flight based on ATC/ FSC Communication Records and GPS Flight Tracking Records

- 09:08 The Aircraft took off from Runway 18 at Memanbetsu Airport.
- 10:06 The pilot reported to the Flight Service Center at New Chitose Airport (hereinafter referred to as "New Chitose FSC") that the Aircraft, current position of which was 25 nm (about 46 km) northeast of Obihiro Airport at a pressure altitude of 4,500 ft (about 1,370 m), was flying from Memanbetsu Airport for Shikabe Airfield via Tomakomai and Muroran. At the same time, the Aircraft requested New Chitose FSC to provide the latest aeronautical meteorological observation reports for Chitose and Hakodate.
- 10:06:31 New Chitose FSC informed the Aircraft of the aeronautical meteorological observation reports for Chitose and Hakodate as of 10:00.
- 10:15:00 Over the Tokachi River about 9 km east of Obihiro Station, the Aircraft was climbing at a GPS altitude of approximately 1,300 m.
- 10:15:09 The pilot reported to Obihiro Airport Traffic Control Tower (hereinafter referred to as "Obihiro Tower") that the Aircraft was flying over Obihiro at a pressure altitude of 4,500 ft, heading for the Mukawa VOR/DME via Mt. Horoshiri.
- 10:15:22 Obihiro Tower informed the Aircraft that the current altimeter setting (QNH<sup>1</sup>) was 30.02 inHg.
- 10:38:19 Over the southwest of the Tokachi Plain, the Aircraft began descending from a GPS altitude of approximately 2,500 m.
- 10:49:21 On the west side of the Mt. Iwanai Ridgeline located about 7 km east-northeast of the accident site, the Aircraft began climbing from a GPS altitude of approximately 2,000 m.
- 10:49:21 to around 10:52  
The Aircraft was climbing, with a zigzag movement heading in the south-north direction.
- 10:55:45 About 5 km east-northeast of the accident site, the Aircraft began descending from a GPS altitude of approximately 2,450 m.

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<sup>1</sup> "QNH" is a correction value that sets a barometric altimeter to display altitude above mean sea level. The value for normal atmospheric pressure (i.e., 1 atmosphere) is 29.92 inHg (1,013 hPa).



Around 10:58 to 10:59

The Aircraft was descending while decreasing its ground speed rapidly.

10:58:59 About 3 km northeast of the accident site, the Aircraft was descending at a GPS altitude of approximately 2,000 m.

11:00:10 About 500 m north-northwest of the accident site, the Aircraft began climbing from a GPS altitude of approximately 1,750 m.

11:00:16 About 400 m northwest of the accident site, the Aircraft was heading for Peak 1903.

11:00:30 The Aircraft was positioned on the northwest slope of Peak 1903 at a GPS altitude of approximately 1,800 m.

### 2.1.2 Statements of Flying Club Members

The pilot, as an instructor at a flying club, was teaching club members how to fly an airplane.

On March 8, the pilot ferried the Aircraft from Kitami District Temporary Operation Site (for agricultural use) to Memanbetsu Airport.

On March 14, the day before the accident, the pilot said that because the high altitude wind became strong, he canceled the departure of the Aircraft on that day.

On the day of the accident, the pilot and the passenger planned to fly to Hanamaki Airport via Shikabe Airfield. The final destination was Okinawa.

The accident occurred at approximately 1,800 m in elevation on the northwest slope of Peak 1903 in Nakasatsunai-mura, Kasai-gun, Hokkaido (42°38'25" N, 142°46'08" E) at around 11:00, March 15, 2013.

(See Figure 1: Estimated Flight Route (1), Figure 2: Estimated Flight Route (2), and Figure 4: Accident Site)

## 2.2 Injuries to Persons

Both the pilot and the passenger suffered fatal injuries.

## 2.3 Damage to the Aircraft

### 2.3.1 Extent of Damage

Destroyed

### 2.3.2 Damage to the Aircraft Components

- |                   |   |
|-------------------|---|
| (1) Fuselage      | Destroyed                                 |
| (2) Main wings    | Fractured                                 |
| (3) Empennage     | Split off from the fuselage and destroyed |
| (4) Landing gears | Main landing gears detached               |
| (5) Engine        | Destroyed                                 |
| (6) Propeller     | Blades fractured                          |

(See Photo: Accident Aircraft)

## 2.4 Personnel Information

Pilot Male, Age 58

Commercial Pilot Certificate (Glider)

February 13, 1990

Type rating for motor glider	May 17, 1988
Class 1 Aviation Medical Certificate	
Validity	March 16, 2014
Total flight time	5,811 hours 10 minutes
Flight time in the last 30 days	2 hours 15 minutes
Total flight time on the type of aircraft	3,171 hours 10 minutes
Flight time in the last 30 days	2 hours 15 minutes

## 2.5 Aircraft Information

### 2.5.1 Aircraft

Type:	Hoffmann H-36 Dimona
Serial number:	36240
Date of manufacture:	March 26, 1987
Certificate of airworthiness:	2012-24-04
Validity:	June 18, 2013
Category of airworthiness:	Motor Glider, Utility U
Total flight time:	2,833 hours 15 minutes
Flight time since the last periodical check (100-hour inspection on June 14, 2012):	76 hours 27 minutes
Aspect ratio:	16.8
(See Figure 5: Three Angle View of Hoffmann H-36 Dimona)	

### 2.5.2 Weight and Balance

When the accident occurred, the weight of the Aircraft was estimated to have been 752 kg and the position of the center of gravity (CG) was estimated to have been 359 mm aft of the reference datum line (the leading edge of the wing at the wing root rib), both of which were estimated to have been within the allowable range (the maximum gross weight of 770 kg, and the CG range of 270-379 mm corresponding to the weight at the time of the accident).

### 2.5.3 Performance of the Aircraft

#### (1) Cruise speed

150 km/h (about 81 kt) at an altitude of 1,500 m (approximately 4,920 ft)

#### (2) Stall speed

70 km/h (about 38 kt)

#### (3) Rate of climb

162 m/min (about 532 ft/min) above mean sea level under the flight condition that the outside air temperature is +15°C, the speed is 95 km/h (about 51 kt), and the propeller pitch is in climb pitch.

#### (4) The best glide ratio (at an airspeed of 105 km/h)

27:1

## 2.6 Meteorological Information

### 2.6.1 Weather Outlook

According to the general weather conditions for Kushiro, Nemuro, and Tokachi Regions that Kushiro Local Meteorological Observatory issued at 10:36 on the day of the accident, a trough was

forecasted to be passing the Hokkaido area from March 15 to March 16. It was fine at 09:00 on March 15. It was forecasted that the weather would be fine in the daytime and cloudy in the nighttime.

### 2.6.2 Weather Information at Obihiro Airport

According to an officer at Obihiro Airport Branch, Japan Meteorological Agency, during a regular observation at 10:00 on the day of the accident, the wind of Obihiro Airport was almost calm and visibility was good. The ridgeline of the Hidaka Mountains was clearly visible. Only a small amount of cumulus clouds were observed on a part of the Mountains at approximately 4,000 ft in elevation (about 1,220 m).

### 2.6.3 Information from the Wind Profiler

The wind profiler<sup>2</sup> observations at Obihiro, located about 48 km northeast of the accident site around the time of the accident, which were observed by the Japan Meteorological Agency, were as listed below:

Time Altitude	10:30		10:40		10:50		11:00		11:10	
	Wind Direction	Wind Speed	Wind Direction	Wind Speed	Wind Direction	Wind Speed	Wind Direction	Wind Speed	Wind Direction	Wind Speed
1,650 m	West	35 kt	West	40 kt	West	35 kt	West	35 kt	West	35 kt
2,000 m		45 kt		45 kt		45 kt		45 kt		
2,300 m		—		50 kt		50 kt		50 kt		
2,600 m		50 kt		50 kt		50 kt		50 kt		

### 2.6.4 Weather Conditions Stated by the Pilot Who Flew over the Hidaka Mountains on the day of the Accident

At around 10:20 on the day of the accident, a pilot on an AS350 helicopter took off from Sapporo Okadama Airport. At around 11:14, the helicopter flew eastward (toward Obihiro) at a pressure altitude of 6,000 ft (approximately 1,830 m) and crossed the ridgeline on Nissho Pass (about 40 km north of the accident site) in the northern part of the Hidaka Mountains.

While the Hidaka Mountains were covered on the west side with cumulus clouds, there were almost no clouds on the east side.

On the east (leeward) side of the ridgeline, the pilot observed turbulence, and there were occasional strong downdrafts. For this reason, the helicopter stayed away from the ridgeline further eastwards, heading south toward Cape Erimo. When the helicopter was flying westward (toward Tomakomai) for the ridgeline of Notsuka Pass (about 45 km southeast of the accident site), a head wind was blowing at a speed of 40 kt (about 74 km/h) and violently shook the helicopter at a pressure altitude of approximately 3,000 ft (about 915 m). At around 11:37, the helicopter encountered a strong downdraft just in front of Notsuka Pass. Given that the helicopter could

<sup>2</sup> "Wind Profiler" is equipment that observes wind directions and speeds up in the sky, by transmitting radio waves from the ground toward the sky, and by receiving/processing the radio waves scattered back from wind and other turbulences in the air.

barely maintain the same altitude even at the best rate-of-climb speed with maximum continuous power, the pilot thought that the downdraft might be as strong as 2,000 ft/min (about 610 m/min). The pilot judged that the helicopter could not fly over Notsuka Pass, and then the helicopter diverted to Obihiro Airport.

## 2.7 Information on Communications

The Aircraft, New Chitose FSC, and Obihiro Tower had communicated normally. An emergency locator transmitter (hereinafter referred to as "ELT") was on board of the Aircraft, but any distress signal had not been received.

The main unit of the retrieved ELT in a carrying case was switched off and the antenna was not installed on it.

In accordance with the provisions of Article 62 of the Civil Aeronautics Act and Article 150 (4) of the Ordinance for Enforcement of the Civil Aeronautics Act, motor gliders shall be equipped with an ELT in case of flying over water at a distance equivalent to more than 30 minutes at normal cruise speed or 185 km away from land suited to an emergency landing, whichever is the shorter distance. These provisions were not applicable to the Aircraft flying for Shikabe Airfield in accordance with its flight plan.

## 2.8 Accident Site and Wreckage Information

### 2.8.1 Accident Site

The accident occurred at approximately 1,800 m in elevation on the northwest slope (with an inclined angle of about 30°) of Peak 1903, which is located about 1.7 km north of Mt. Kamuiekuuchikaushi (elevation 1,979 m: approximately 6,490 ft) in the Hidaka Mountains, Hokkaido. The accident site was located on the east side of the ridgeline of the Hidaka Mountains and was the slope of a mortar-shaped valley northeast part of which was cut open along Kyunosawa.

At the time of the accident, the slope was fully covered with snow. On March 18, three days after the accident, a search and rescue aircraft of the Self-Defense Forces (hereinafter referred to as "Search and Rescue Aircraft") found the Aircraft on the snow surface at approximately 1,600 m in elevation, with the nose in a southeastward direction and the left side of the fuselage on the lower side of the slope.

Aircraft examination was conducted on July 2 for the first time after the snow had melted. The Aircraft had slid about 60 m in elevation below the site that was first identified on March 18. The components of the Aircraft were seen scattered around. In addition, the pitot tube<sup>3</sup> mounted on the top of the vertical stabilizer was found about 70 m in elevation above the site that was first identified on March 18.

(See Figure 2: Estimated Flight Route (2), Figure 4: Accident Site, and Photo: Accident Aircraft)

### 2.8.2 Detailed Damage

#### (1) Fuselage

The canopy (windshield) broke apart, and the aft fuselage was fractured. The cockpit was deformed and destroyed on its bottom apparently by the downward force.

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<sup>3</sup> "Pitot tube" is a part that measures the airspeed of aircrafts.

## (2) Main wings

The right main wing was fractured at one-third of the length from the wing tip, which was folded toward the aft fuselage. The left main wing was fractured nearly at the center, but the tips of both wings remained intact.

## (3) Empennage

The vertical and horizontal stabilizers were split off from the fuselage and destroyed.

## (4) Landing gears

The main landing gears detached, and the tail wheel remained attached to the bottom of the vertical stabilizer.

## (5) Engine

The engine support was deformed, and the engine was destroyed particularly on the bottom side. There were no anomalies with the spark plugs and the inside of cylinders.

## (6) Propeller

Both two blades were fractured, with one-fourth of the length remaining on the roots. The spinner was damaged at the tip.

(See Photo: Accident Aircraft)

### 2.8.3 Instruments

All the instruments in the cockpit were not damaged in appearance. The bearing indicator pointed at 110°. The barometric altimeter was set at a QNH value of 30.03 inHg.

The air brake was set for Retracted Position and the propeller pitch was in climb pitch (Low Pitch), respectively.

### 2.9 Medical Information

According to autopsy reports, the cause of death was that the pilot and the passenger died of brain dysfunction, as a result of the bruises and compression that strong blunt forces put on the whole body. Neither alcohol nor illegal drugs were detected from their bodies.

### 2.10 Search and Rescue

On the day of the accident, the Aircraft had not arrived at Shikabe Airfield even after its estimated arrival time. At 13:30, New Chitose FSC, Hakodate Airport Traffic Control Tower, and Hakodate Radar Approach control facility started communication search. However, there was no response from the Aircraft. At 06:05 on March 18, the Search and Rescue Aircraft, which had been involved in search activities, found the Aircraft on the northwest slope of Peak 1903. At 07:17, the Search and Rescue Aircraft recovered the two persons on board. At 07:55, the two persons were taken by ambulance to a hospital, and were confirmed dead at 08:16.

Among those organizations involved in the search activities for this accident were the Hokkaido Prefectural Police, Hokkaido Emergency Aviation Office, Japan Coast Guard, and Self-Defense Forces. A total of seven airplanes and 63 helicopters joined these activities.

The pilot and the passenger were found fastened with a seat belt and a shoulder harness, respectively.

### 2.11 Additional Information

#### 2.11.1 Flight Tracking Records of the Aircraft

The GPS manufactured by GARMIN of the United States of America (nuvi 1480 Plus) had

been carried on the Aircraft. It had recorded the flight track from Memanbetsu Airport to the vicinity of the accident site.

(See Figure 1: Estimated Flight Route (1), Figure 2: Estimated Flight Route (2), and Figure 3: Flight Altitudes and Ground Speeds)

#### 2.11.2 Climb and Cruise Procedures

The flight manual of the Aircraft includes the following descriptions in "Section 4: Normal Procedures." (Excerpt)

##### *4-8 Take-off and Climb*

(Omitted)

7. *The aircraft should climb at a speed of 90 km/h.*

*During climb, oil pressure, oil temperature and cylinder head temperature should be monitored continuously.*

*All these readings must stay within the range indicated by green arc lines.*

8. (Omitted)

9. *If there is no need to climb at a large angle of climb, changing the propeller pitch to Cruise pitch at this point would enable the aircraft to climb at a faster airspeed.*

*The propeller control can be changed in accordance with the following procedure:*

*Set RPM at 2,200 rpm, pull the propeller lever, and release.*

*This procedure changes the propeller pitch to Cruise pitch and RPM drops a few 100 rpm. Open the throttle as required to continue climbing at an airspeed of 120-140 km/h.*

##### *4-9 Cruise*

*As described in 4-8 9., propeller pitch should be changed from Climb to Cruise.*

*The normal operating RPM during cruise is 2,500-3,000 rpm.*

*Engine-related instruments and the amount of remaining fuel should be checked at intervals.*

#### 2.11.3 Air Currents in Mountainous Areas

With respect to air current conditions in mountainous areas, "Basic Glider Operations" authored by Kakuichiro Harada (published and distributed by Hobun Shorin Co., Ltd., 1990, page 174) includes the following descriptions. (Excerpt)

*When a weak wind is blowing in a mountainous area, the air current will only repeat a cycle of moderate climb and descent. On the other hand, when a strong wind is blowing over mountains, the air current will not become turbulent much on the windward side, but the air current will turn into a strong downwind on the leeward side. A glider that is flying over mountains toward the windward side may get caught in a strong downwind on the leeward side, which could put the glider in a dangerous situation.*

*It is assumed that when a strong wind is blowing straight to mountains, for example, at a speed of 25 m/s (about 49 kt) or above, a glider that is flying close to the mountains should keep an altitude at least 1.5 times higher than the height of the mountains.*

## 3. ANALYSIS

### 3.1 Qualification of Personnel

The pilot held a valid airman competence certificate and a valid aviation medical certificate.

### 3.2 Aircraft Airworthiness Certificate

The Aircraft had a valid airworthiness certificate and had been maintained and inspected as prescribed.

### 3.3 Meteorological Conditions

#### 3.3.1 Weather Condition Checks

As described in 2.1.1, the pilot contacted New Chitose FSC and Obihiro Tower during flight and obtained information about weather conditions. It is highly probable that the pilot had been heading for the destination while checking weather conditions on the route.

As shown in Figures 1 through 3, the pilot had changed the headings and altitudes of the Aircraft. It is probable that the pilot had been monitoring changes in ground speeds with the GPS, and flying while checking wind conditions.

#### 3.3.2 Weather Condition in the Vicinity of the Accident Site

As described in 2.6.2, the ridgeline of the Hidaka Mountains was clearly visible from Obihiro Airport, and only a small amount of cumulus clouds were observed on a part of the Mountains. It is probable that the weather was fair while some scattered clouds were around, and that visibility was good in the vicinity of the accident site.

As described in 2.6.4, the pilot, who flew a helicopter over the Hidaka Mountains on the day of the accident, made the following statement:

After crossing the ridgeline eastward, about 40 km north of the accident site, the pilot observed turbulence and occasional strong downdrafts, and therefore changed the heading to the south. When the helicopter was flying westward for a ridgeline located about 45 km southeast of the accident site, a head wind was blowing at a speed of 40 kt and violently shook the helicopter at a pressure altitude of approximately 3,000 ft. The helicopter encountered a downdraft as strong as 2,000 ft/min.

Based on the statement above, and the wind profiler observations as described in 2.6.3, it is probable that in the vicinity of the accident site on the east side of the ridgeline, a wind was blowing down from the west at a speed of 45-50 kt, with a strong downdraft.

### 3.4 Damage to the Aircraft

As described in 2.1.1, the records of communications with ATC and other relevant organizations contained no report on aircraft anomalies. As shown in Figures 1 through 3, the Aircraft flew to the vicinity of the accident site while changing its headings and altitudes. In addition, as described in 2.8.2, the spark plugs, and so on had no anomalies.

Based on these observations, it is probable that the Aircraft had had no anomalies with its engine and flight control systems before the accident occurred.

### 3.5 Situations Leading to the Accident

### 3.5.1 Flight Route

As shown in Figure 1, the Aircraft took off from Memanbetsu Airport at 09:08 and passed through the east of Obihiro city at 10:15, heading for the Hidaka Mountains. It is highly probable that the Aircraft had been flying a route roughly based on its flight plan.

### 3.5.2 Situation When the Aircraft Began Descending

As shown in Figures 1 and 3, the Aircraft had climbed at 10:38:19 to an altitude of approximately 2,500 m over the southwest of Tokachi Plains. Then the Aircraft had changed its heading to the west-southwest and descended at 10:49:21 to an altitude of approximately 2,000 m while increasing or decreasing its ground speeds.

It is probable that the pilot had climbed over Tokachi Plains to fly over the Hidaka Mountains ahead, which consisted of mountains as high as 2,000 m in elevation and that the Aircraft reached an altitude of approximately 2,500 m by the time it entered the mountainous area.

As described in 2.6.3, according to the wind profiler observations, during flight at an altitude of approximately 2,500 m, a strong head wind blew from the west at a speed of about 50 kt (about 93 km/h), and the speed of the wind became slower while descending the altitude. It is somewhat likely that judging from the wind condition on that day, the pilot had tried not only to increase its airspeed by descending with the cruise power setting but to reduce the headwind component in order to recover its ground speed decreased during climb.

### 3.5.3 Situation When the Aircraft made a zigzag movement heading in the North-South Direction

As shown in Figure 1, the Aircraft climbed from an altitude of approximately 2,000 m at 10:49:21 up to an altitude of approximately 2,450 m at 10:55:45 with a zigzag movement heading in the north-south direction on the west side of the Mt. Iwanai Ridgeline. It is probable that the pilot had climbed again before flying over the ridgeline while flying the Aircraft with a zigzag movement, taking advantage of an anabatic wind (a updraft blowing up along a windward slope) generated on the west side of the Mt. Iwanai Ridgeline.

### 3.5.4 Situation before the Aircraft Approached Kyunosawa Valley

#### (1) Situation When the Aircraft Began Descending Again

As shown in Figure 2 and 3, after reaching an altitude of approximately 2,450 m at 10:55:45, the Aircraft had been flying toward Kyunosawa Valley, while descending to an altitude of approximately 2,100 m until around 10:58 at a nearly constant rate of descent (about 140 m/min). During this period, the ground speed had increased from about 50 km/h to 100 km/h. It is somewhat likely that the pilot thought that the ground speed of 50 km/h was too slow to pass over the Hidaka Mountains at an altitude of approximately 2,450 m; therefore, the pilot had descended with the cruise power setting in order to recover its ground speed in the same way as a previous descent.

#### (2) Encountering Downdraft

It is probable that if the situation when the Aircraft began descending had continued, it would have maintained at the ground speed of about 100 km/h after 10:58. As shown in Figure 3; however, the Aircraft descended at a constant rate of descent from around 10:58 to 10:59, and its ground speed decreased rapidly from about 100 km/h to 40 km/h.

It is probable that the Aircraft decreased its ground speed rapidly because the Aircraft encountered a downdraft as described in 3.3.2 from around 10:58 before approaching



Kyunosawa Valley and the pilot lifted the nose up to try to avoid a steep dive, which led to the Aircraft decreasing its airspeed. In addition, the Aircraft decreased its ground speed as it came closer to Kyunosawa Valley (from around 10:58 to 10:59). It is probable that the downdraft became stronger as the Aircraft came closer to the valley.

### (3) Approaching Kyunosawa Valley

As shown in Figure 2, the Aircraft approached Kyunosawa Valley, where the accident occurred, at around 10:59 at an altitude of approximately 2,000 m.

While the Aircraft decreased its ground speed against the downdraft, its altitude was still 2,000 m at that point, approximately 300 m (about 1,000 ft) higher than the lowest ridgeline on the mountains ahead (elevation 1,732 m). It is probable that the pilot judged that the Aircraft would be able to maintain the altitude to safely pass over the ridgeline, and then began to approach Kyunosawa Valley.

#### 3.5.5 Situation after the Aircraft Approached Kyunosawa Valley

As shown in Figure 2, the Aircraft approached the valley at around 10:59, and then turned slowly to the left along the slope of Peak 1903. At 11:00:10, the Aircraft descended to an altitude of approximately 1,750 m, about the same height as the ridgeline, which was 1,732 m in elevation.

It is probable that while the Aircraft continued to face the downdraft after having approached Kyunosawa Valley, the pilot set in the climb configuration and tried to maintain its altitude so that the Aircraft could fly over the ridgeline. It is probable, despite the pilot's effort, the downdraft became stronger than the pilot had expected and the pilot could not stop descent with its climb performance as described in 2.5.3; consequently the Aircraft descended to an altitude of approximately 1,750 m.

Based on the altitude difference and elapsed time that were recorded in the GPS, the rate of descent between 10:59:00 and 11:00:10 was about 210 m/min.

#### 3.5.6 Situation when the Aircraft Headed for Peak 1903

As shown in Figure 2, the Aircraft began to climb at 11:00:10 after having descended to an altitude of approximately 1,750 m. It is probable that the Aircraft evaded from the downdraft near that point. It is somewhat likely that the Aircraft began to climb for the following reason. The downdraft became stronger than the pilot had expected after approaching Kyunosawa Valley and the Aircraft descended below the altitude needed to safely pass over the ridgeline. Then, the pilot turned the Aircraft to the left to try to climb again, taking advantage of an anabatic wind generated on the windward side of Peak 1903.

It is somewhat likely that the pilot did not turn the Aircraft to the right (to the valley side), where it would be able to have a larger height above ground level, for the following reason. The pilot feared that the Aircraft would decrease its airspeed and stall by putting it immediately below the strong downdraft coming up across the ridgeline, and exposing it to a tail wind.

#### 3.5.7 Situation When the Aircraft Crashed

As described in 2.8.2, the Aircraft was found in the following condition: the main landing gears detached, the cockpit was deformed and destroyed on the bottom floor apparently by the downward force, and the tips of both wings remained intact. As described in 2.8.3, the bearing indicator pointed at 110°. In addition, as described in 2.9, the pilot and the passenger had their whole body bruised and compressed by strong blunt forces.

According to these observations, it is probable that the following events took place. The pilot tried to climb by taking advantage of an anabatic wind generated on the windward side of Peak 1903. But the pilot failed to do it well. At around 11:00:30, the Aircraft, in a nose-up attitude parallel with the slope, eventually crashed beneath the bottom of the fuselage against a slope of approximately 1,800 m in elevation, with heading southeastward.

As described in 2.8.1, the slope was covered with snow. It is highly probable that the Aircraft had slid down to the position located approximately 1,600 m in elevation after the crash.

### 3.6 Pilot's Judgment on Maintaining Safe Altitude

According to the reference described in 2.11.3, it is assumed that when a strong wind is blowing straight to mountains (for example at a speed of 25 m/s or about 49 kt), a glider that is flying close to the mountains should keep an altitude at least 1.5 times higher than the height of the mountains (e.g., an altitude of approximately 2,600 m when the glider flies over a ridgeline of 1,732 m in elevation). As described in 3.3.2, the Aircraft was flying against a strong head wind blowing nearly straight to the ridgeline of the mountains at a speed of 45-50 kt. It is probable that in the case of this accident, the Aircraft should have maintained a sufficiently high altitude before it approached Kyunosawa Valley near the ridgeline of the mountains.

As described in 3.5.4 (3), while the Aircraft decreased its ground speed against the downdraft, the pilot judged that the Aircraft would be able to maintain the altitude to safely pass over the ridgeline, and began to approach Kyunosawa Valley at an altitude of approximately 2,000 m, where the accident occurred. However, as the downdraft became stronger than the pilot had expected, he could not stop descent. It is probable that the Aircraft approached the valley at an altitude with almost no margin, in hindsight. It is probable that approaching the valley at an altitude with almost no margin was one of the reasons why the Aircraft had descended below the safe altitude.

As described in 3.5.4 (2), it is probable in the case of this accident that the downdraft became stronger as the Aircraft came closer to Kyunosawa Valley. It is probable that the Aircraft could hardly climb again before coming closer to the ridgeline of the mountains. Therefore, it is probable that the pilot should have aborted passing over the ridgeline and turned back by the time the Aircraft began to approach Kyunosawa Valley (i.e., around 10:59), the front side of which was surrounded by the mountains.

### 3.7 Flight over Mountainous areas

When pilots fly over mountainous areas by visual flight rules, it is necessary to comply with the following basic points:

#### (1) Comprehension of Weather Conditions

The weather in mountainous areas is prone to change, which could lead to the occurrence of sharp declines in visibility, turbulence, strong downdrafts, and others. These changes in weather may affect safe flights in some cases. In addition, there are only a limited number of meteorological observation facilities in mountainous areas.

For this reason, not to mention accurately confirming weather conditions prior to flight, it is absolutely necessary to always check the conditions continuously during flight, and consider their effects on the flight.

#### (2) Flexibility of Flight Plans

Based on weather conditions obtained prior to flight, a flight plan should be carefully

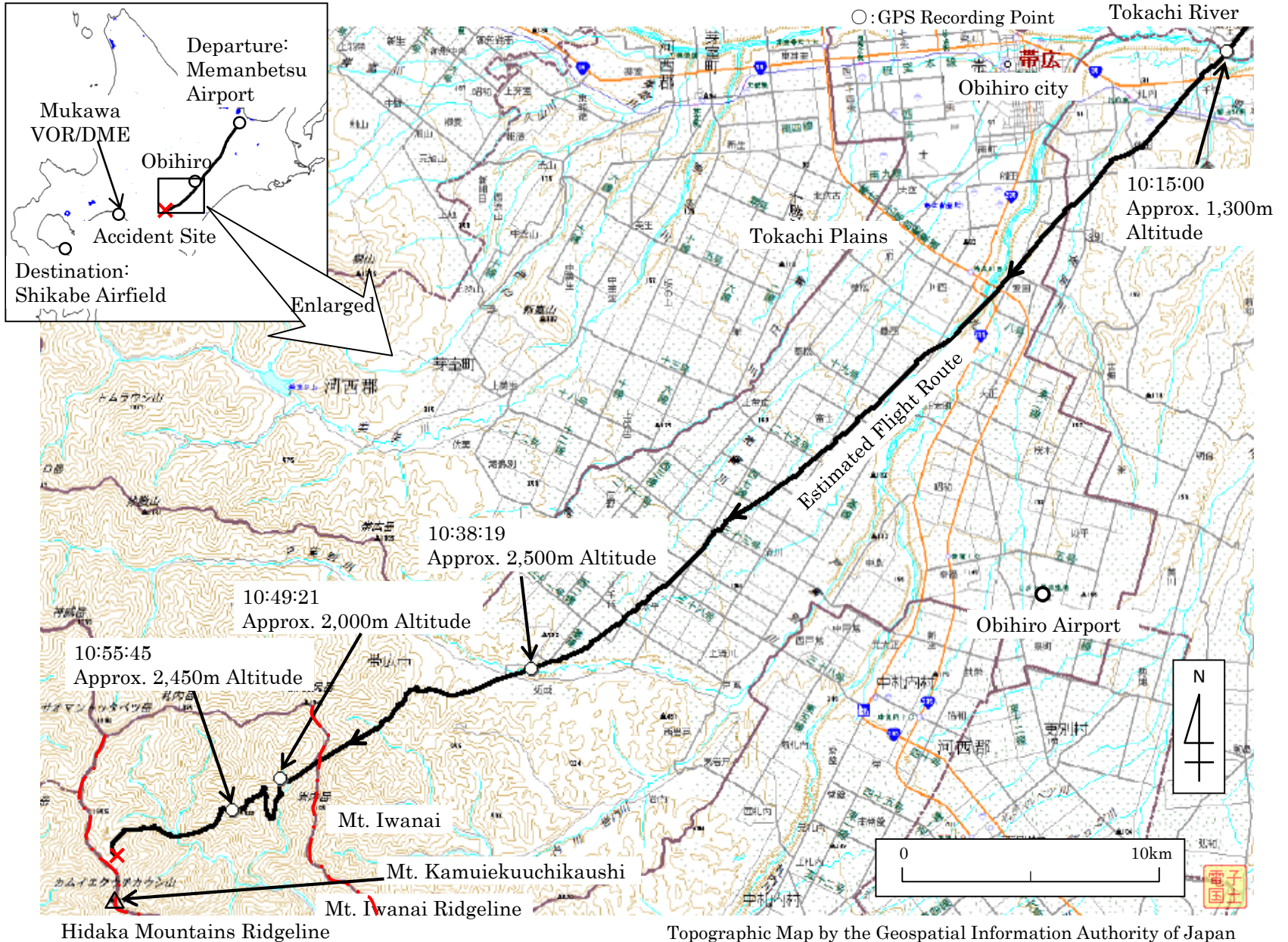
prepared. At the same time, during a flight over a mountainous area, where the meteorological environment is prone to change, it is necessary to consider safety the highest priority and to flexibly modify the flight plan according to the situation, without sticking to the initial plan.

#### 4. PROBABLE CAUSES

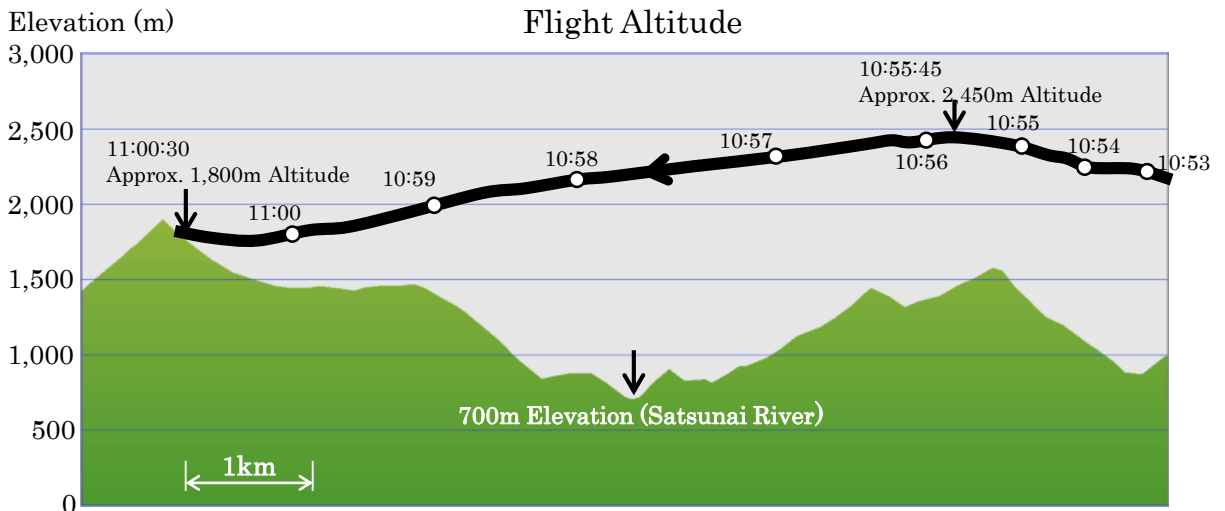
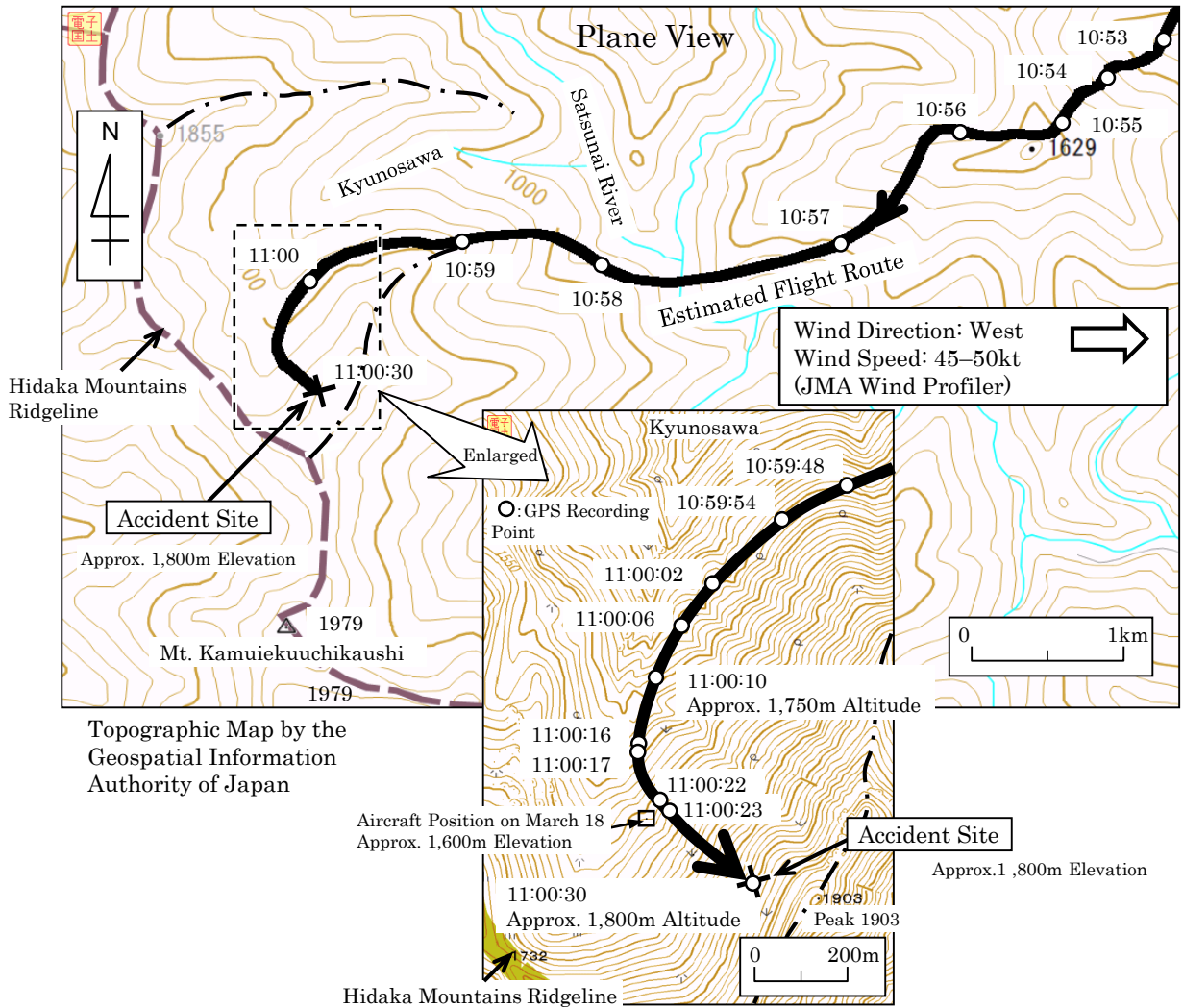
It is highly probable that this accident occurred when the Aircraft, flying over the Hidaka Mountains, encountered a downdraft that was blowing down from the ridgeline of the mountains which made the Aircraft descend below the altitude needed to safely pass over the ridgeline and crash into a slope on 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 Aircraft decreased its ground speed against the downdraft, the pilot judged that the Aircraft would be able to maintain the altitude to safely pass over the ridgeline and the Aircraft 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 Aircraft.

Figure 1: Estimated Flight Route (1)

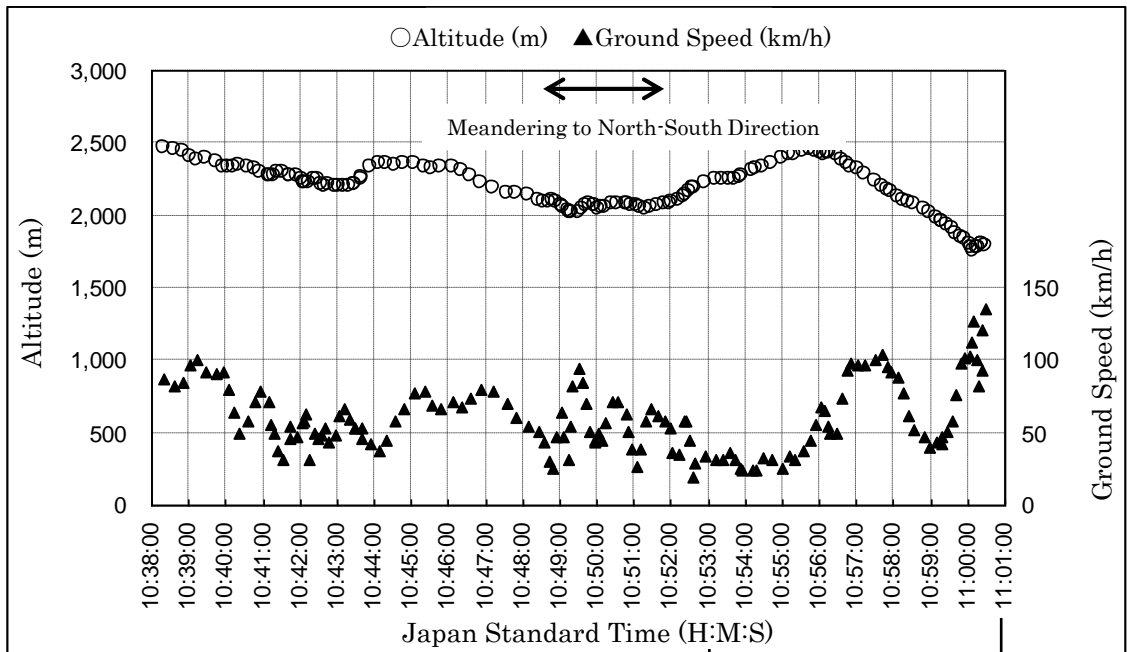


# Figure 2: Estimated Flight Route (2)

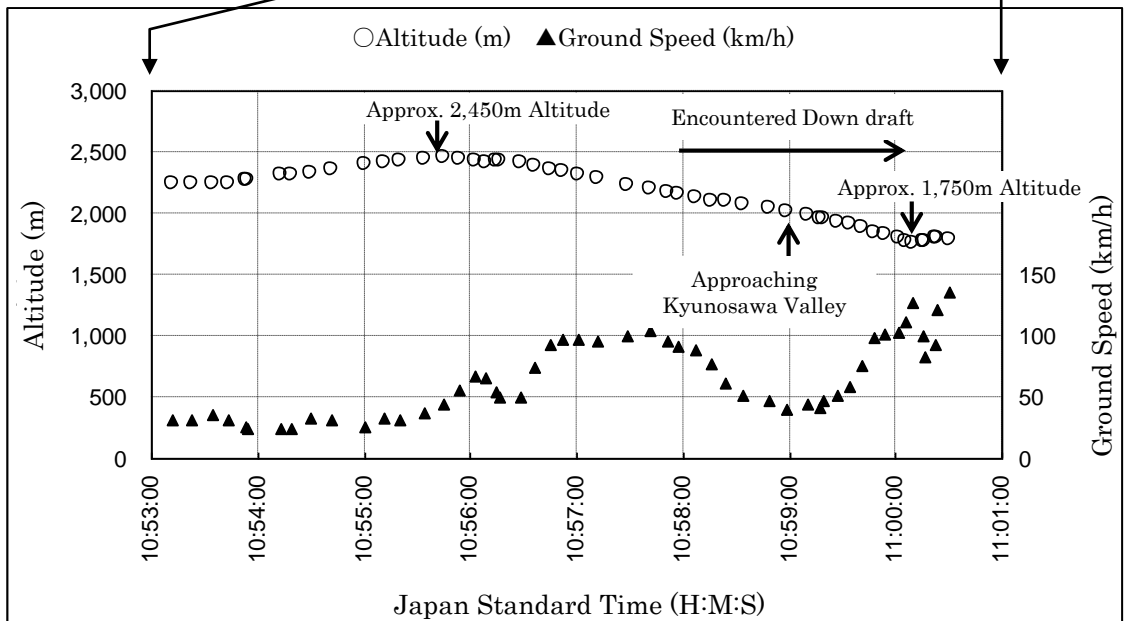


Flight Altitudes Recorded in GPS

# Figure 3: Flight Altitudes and Ground Speeds



Enlarged 8 Minutes



- “Altitude (m)” is an altitude recorded in GPS.
- “Ground Speed (km/h)” is a ground speed estimated from the position recorded in the GPS (latitude and longitude) and elapsed time.

# Figure 4: Accident Site

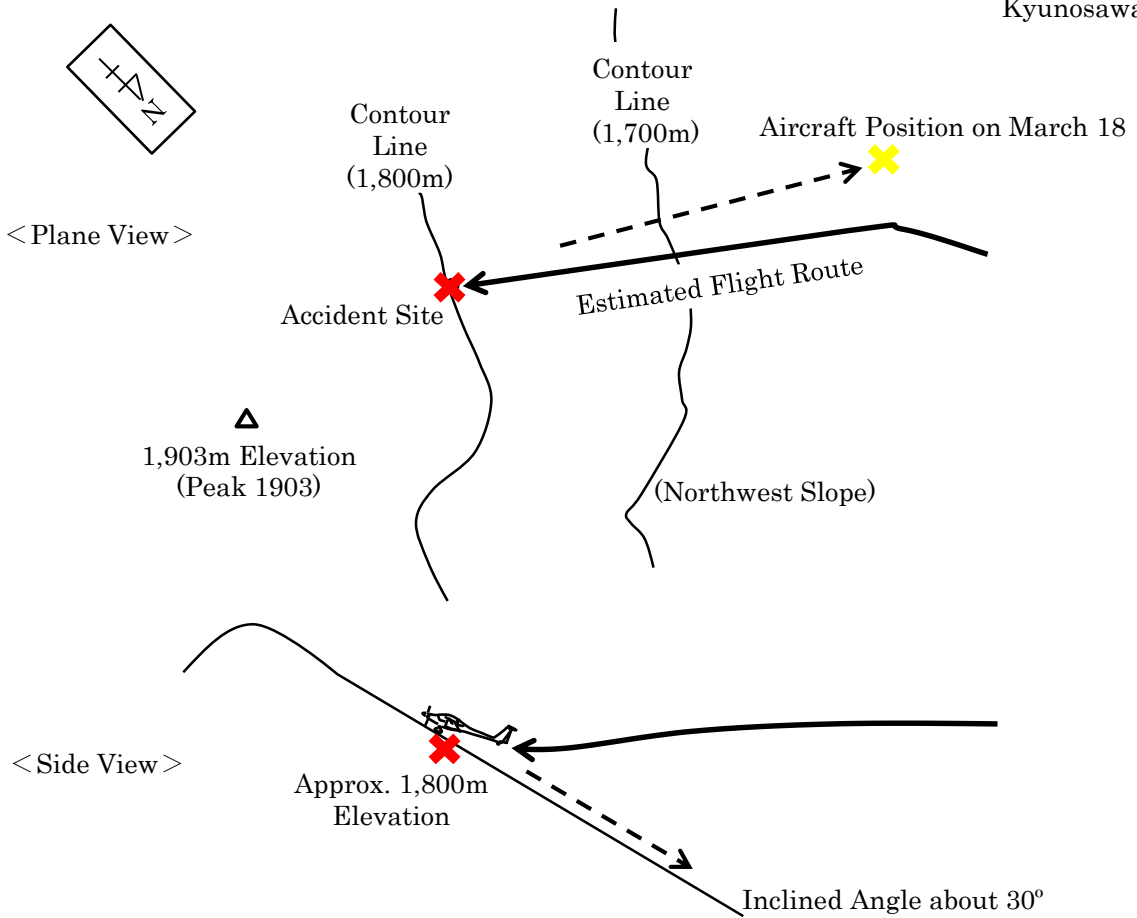
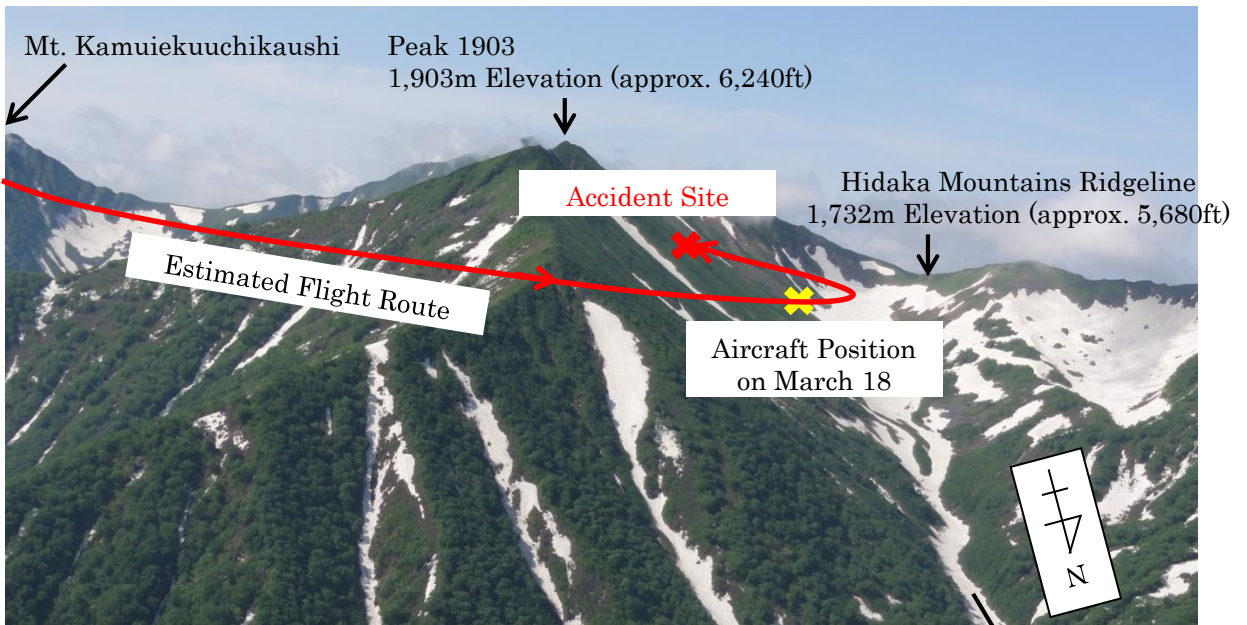
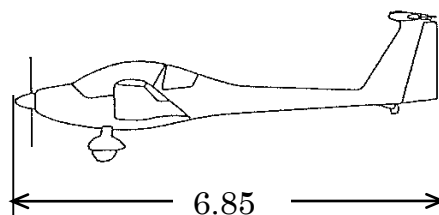
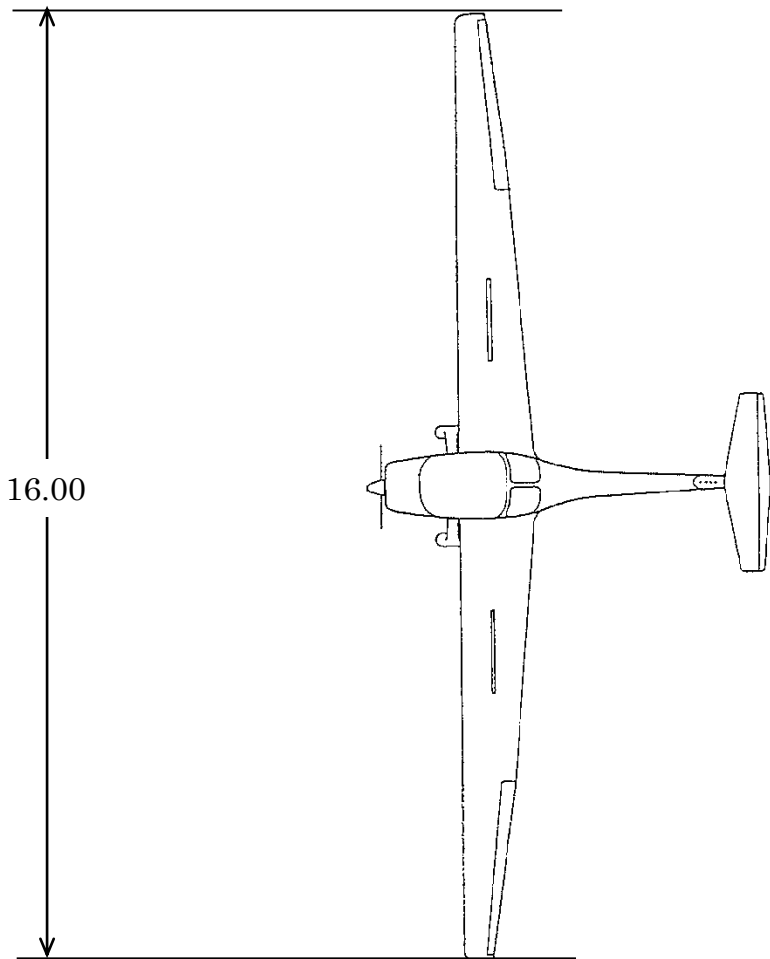
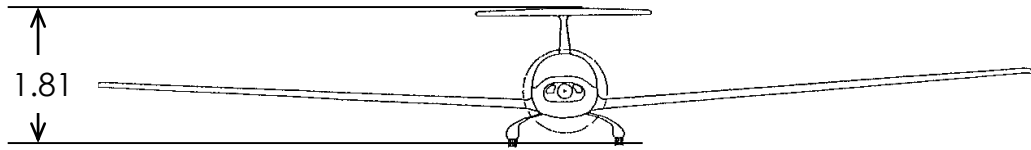


Figure 5: Three Angle View of Hoffmann H-36 Dimona

Unit: m





# Photo: Accident Aircraft



Engine, Propeller and Spinner



Cockpit



Vertical stabilizer



Right main wing

