

Ant-Plane による南極での探査飛行について 桜島・鳥海山での磁場探査

Ant-Plane 計画:

南極の夏期間、沿岸地域で使用する自律小型
無人機と搭載観測装置の開発

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Mar. 4, 2005
極地研・船木 實

Ant-Plane 機体

製作：日本飛行機 kk プロペラ 型

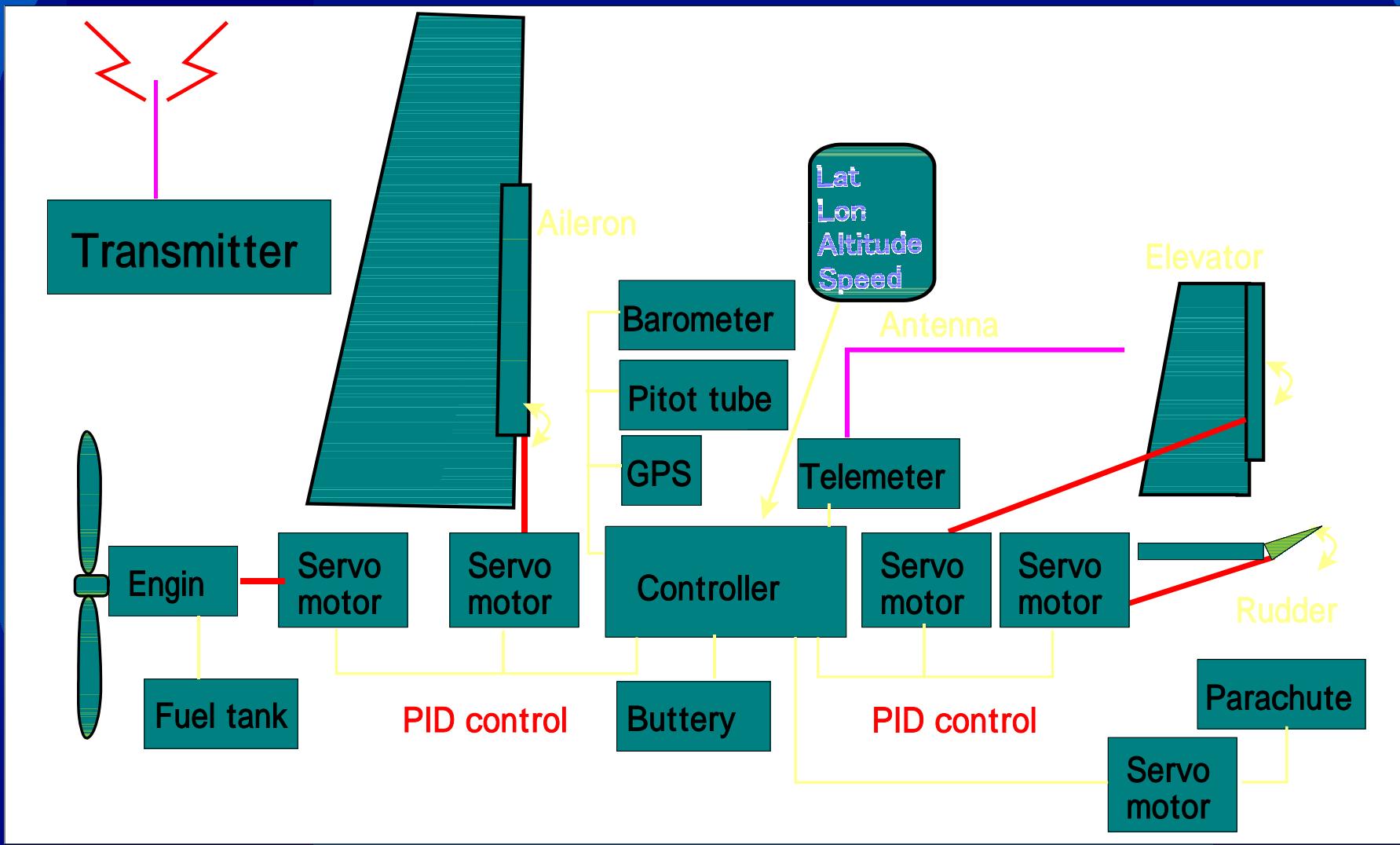
Autonomous continuous flight up to 100km
auto-navigation by GPS

span: 2m

engin: gasoline, 86cc, 2 cycle 2 cylinder

cruising speed: 150km/h, cruising range: 1 hour

Principle of the control



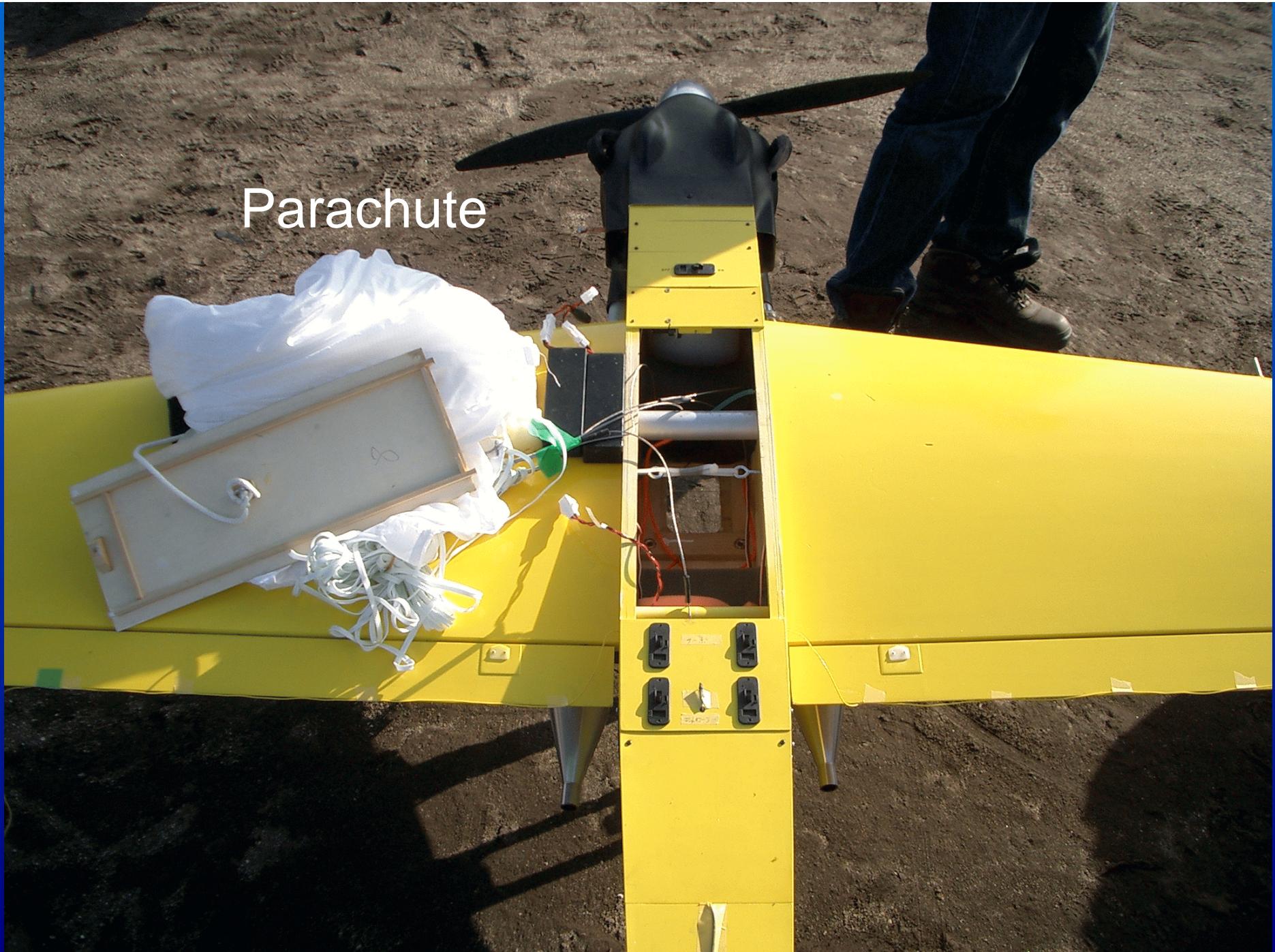
Sakurajima Volcano (1117m)

The first flight of Ant-Plane #1 for magnetic survey

2003, 11, 17 • 18



Parachute



磁力計の開発

Magnetometer system (442g)

P A three-component magneto-resistant magnetometer (Honeywell HMR-3000)
▶ Sensitivity 7 nT, 80g

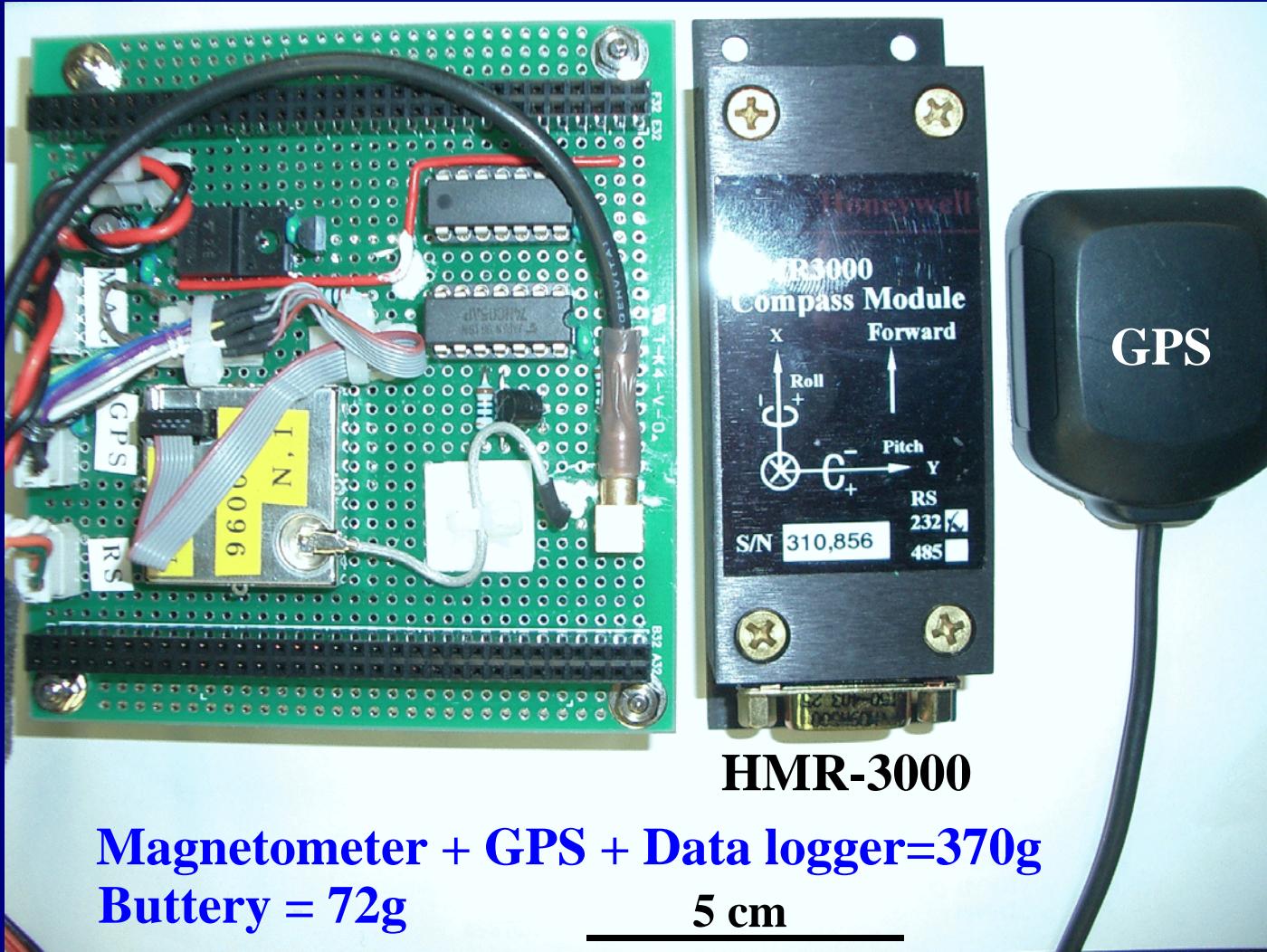
P Magnetometer+GPS+Data Logger
▶ Magnetic field (x,y,z), latitude, longitude, altitude, number of satellite
▶ Every second recording during 3 hours

P Buttery: lithium polymar dry buttery

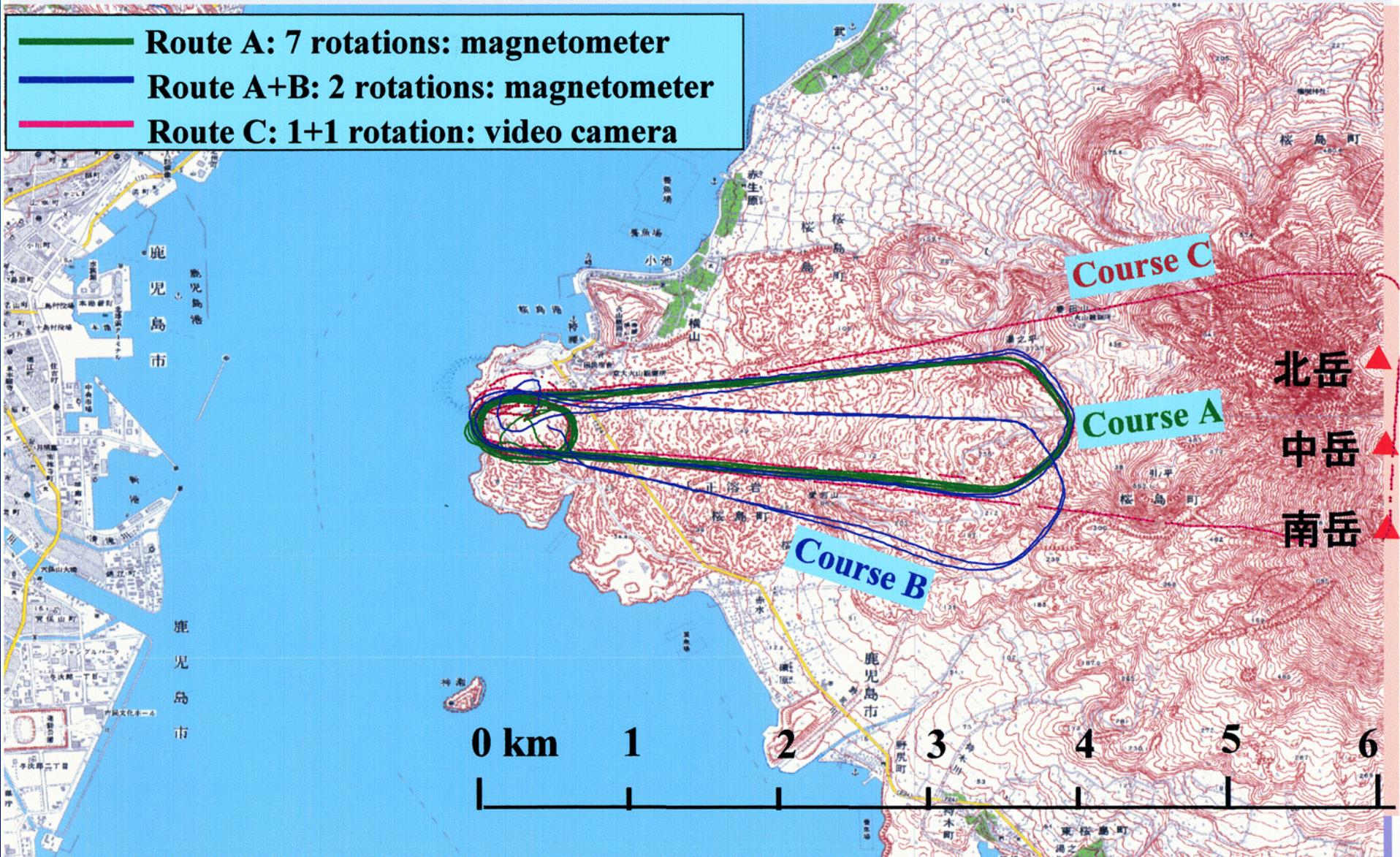
P Power Consumption : 1.35 W (9V, 0.15A)

System of the magnetometer

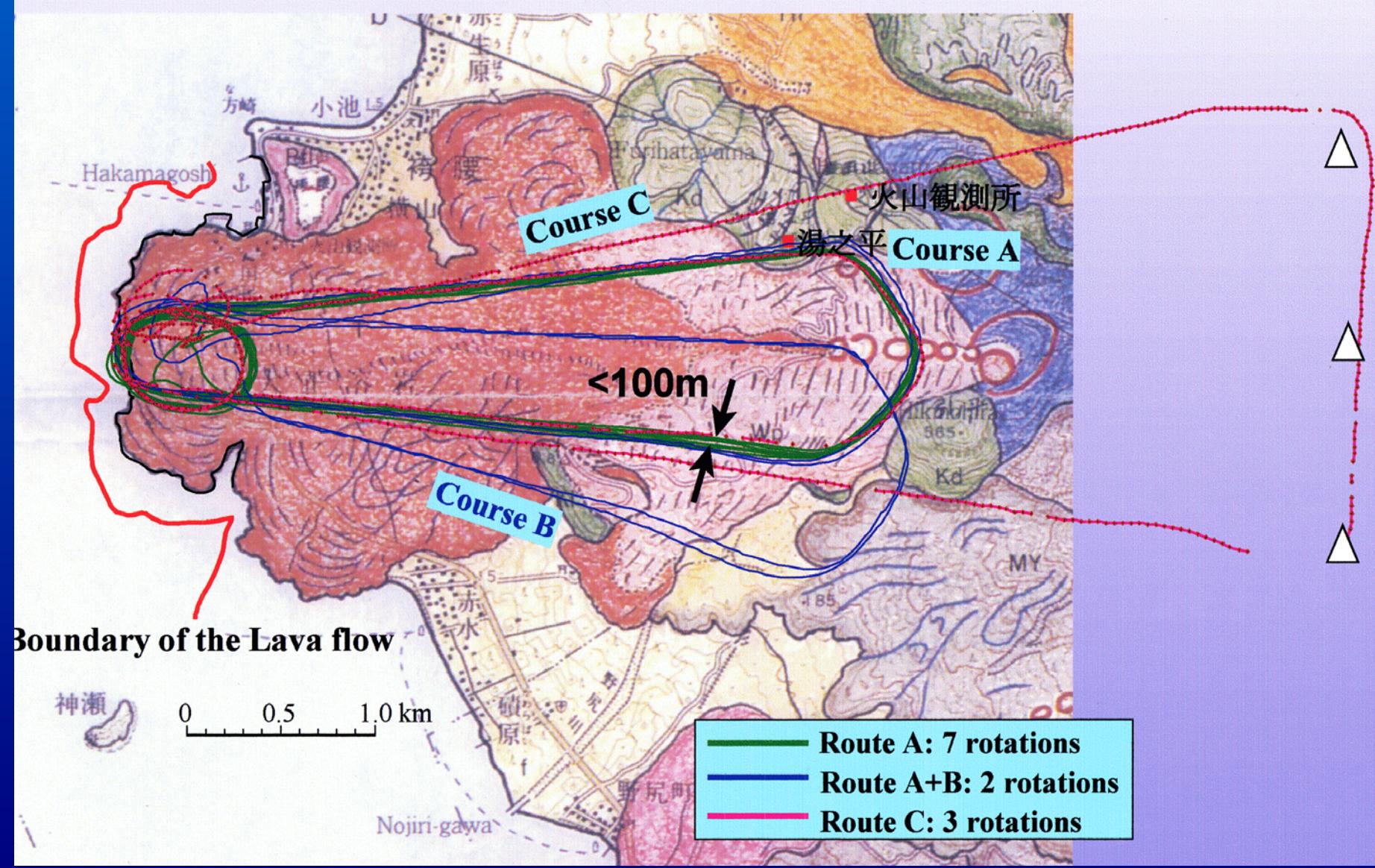
MR magnetometer, GPS, data logger



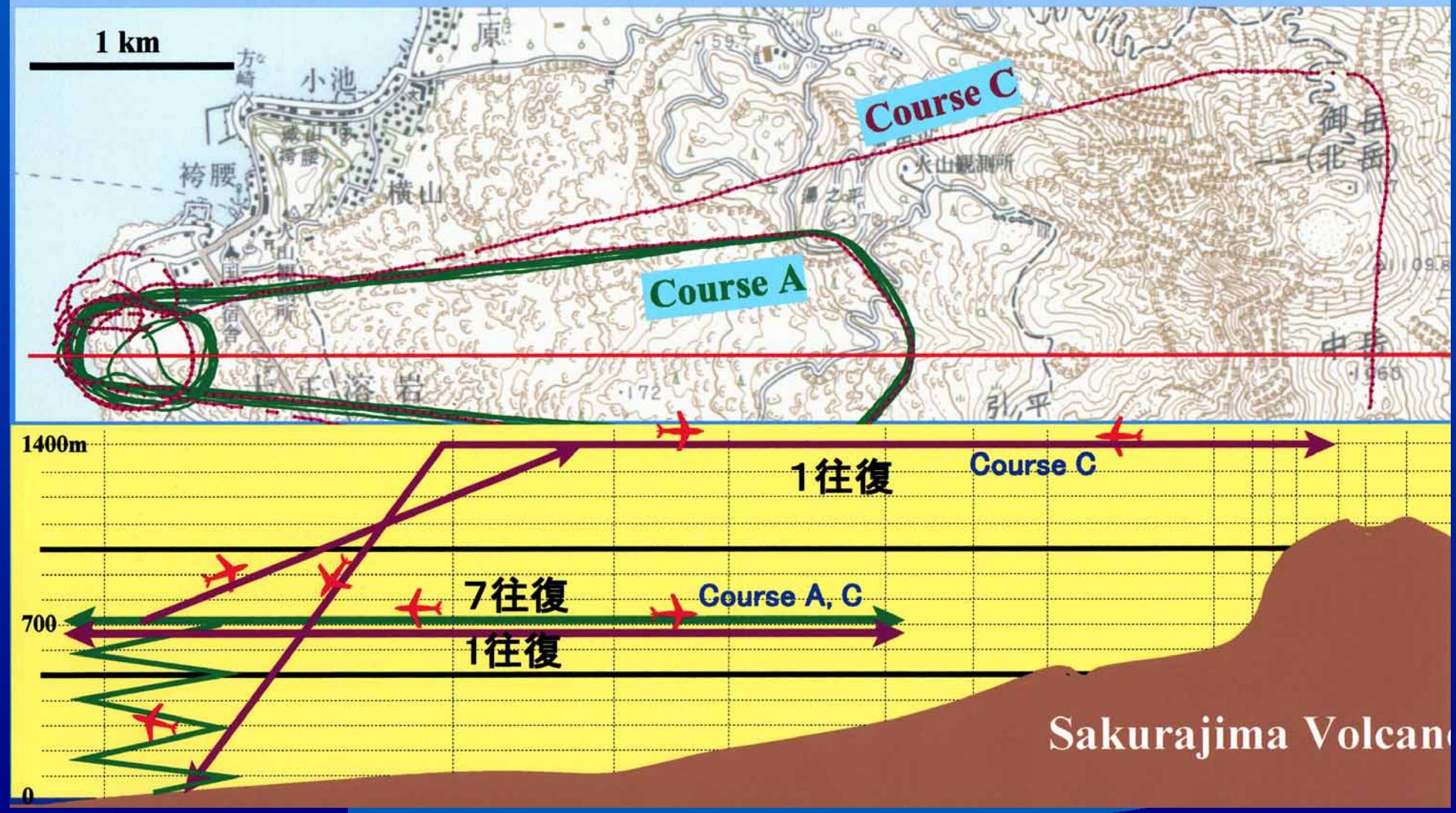
The result of the flights



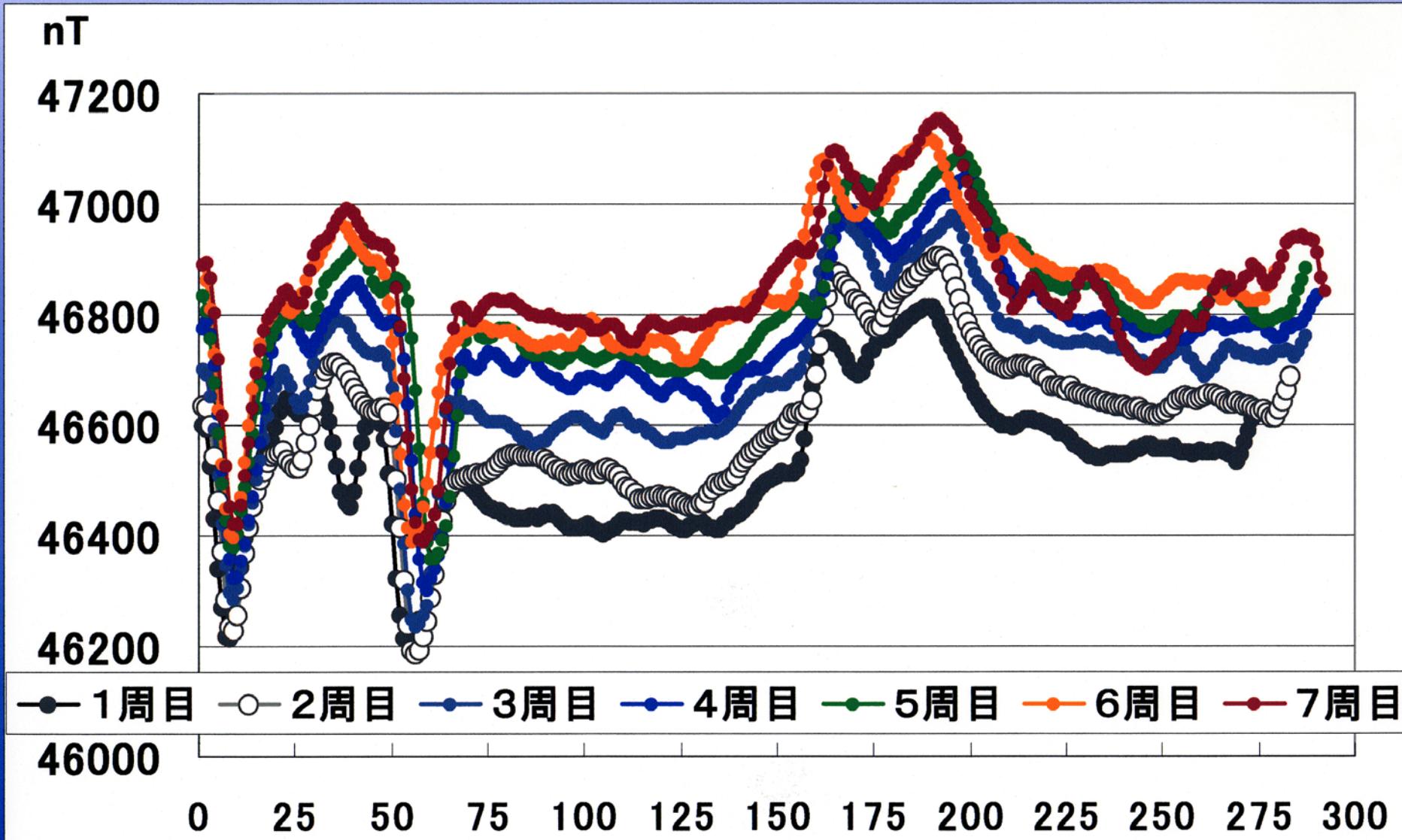
Flight course on a geological map



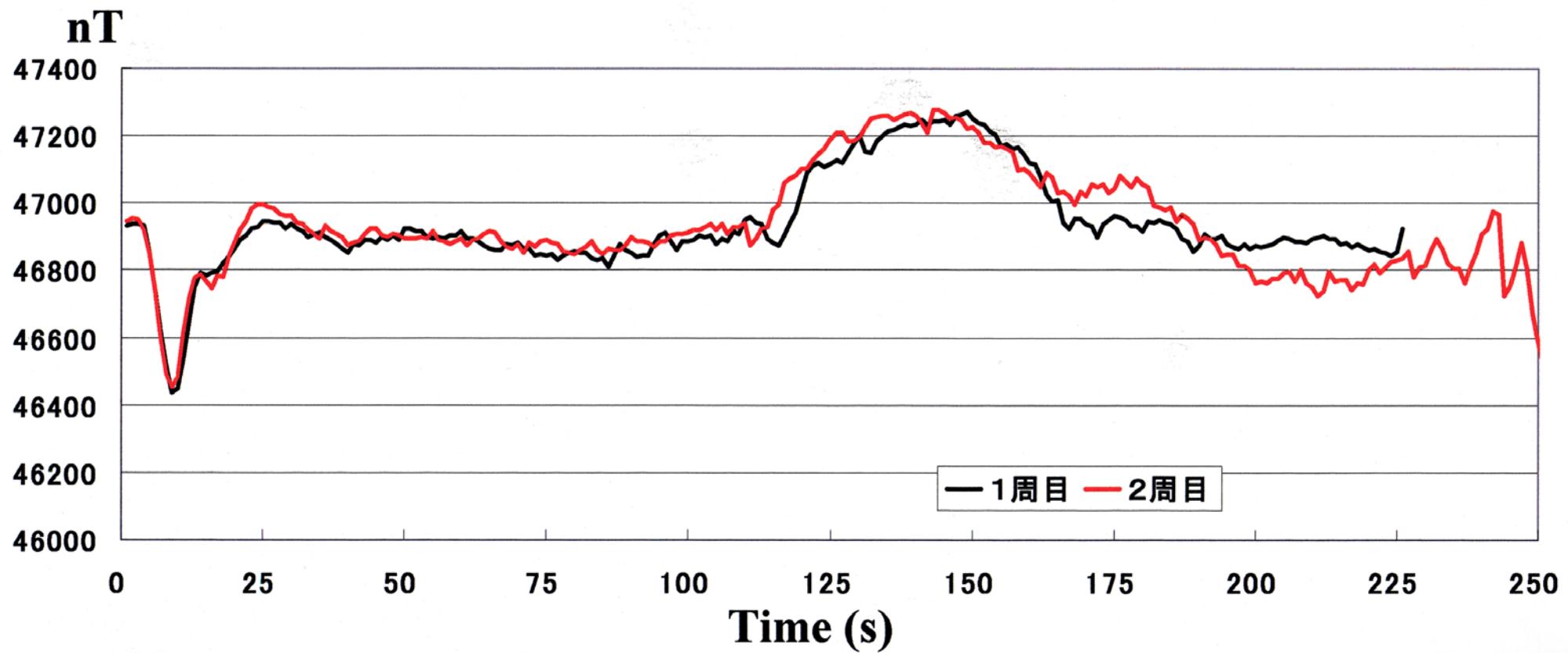
A flight image toward Sakurajima Volcano with magnetometer and camera



空中磁場探査結果 (course A)



Profile of the total intensity: course B



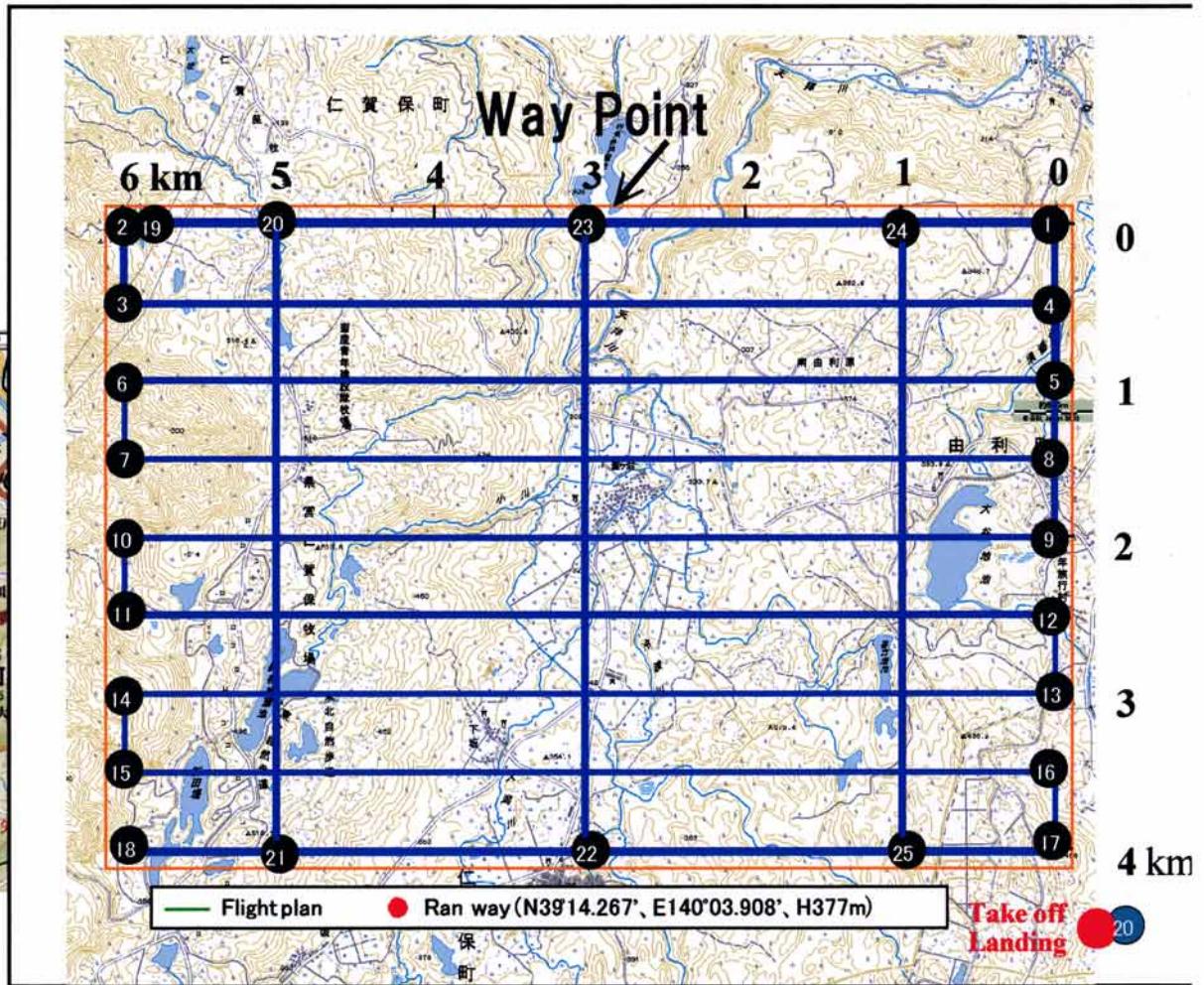
鳥海山 (2236m)での空中磁場探査

2004年9月13日

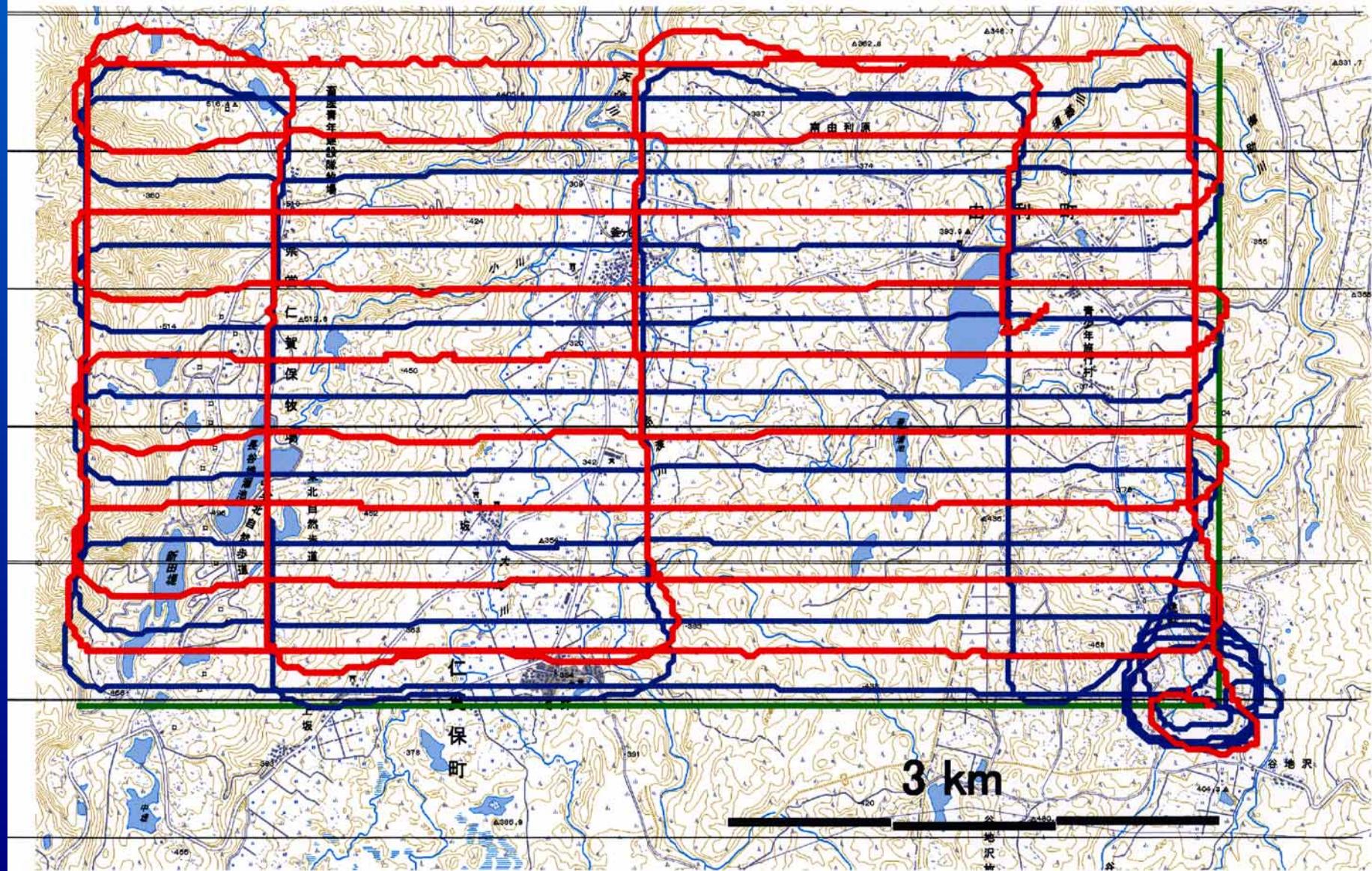


鳥海山飛行計画 (高度800m)

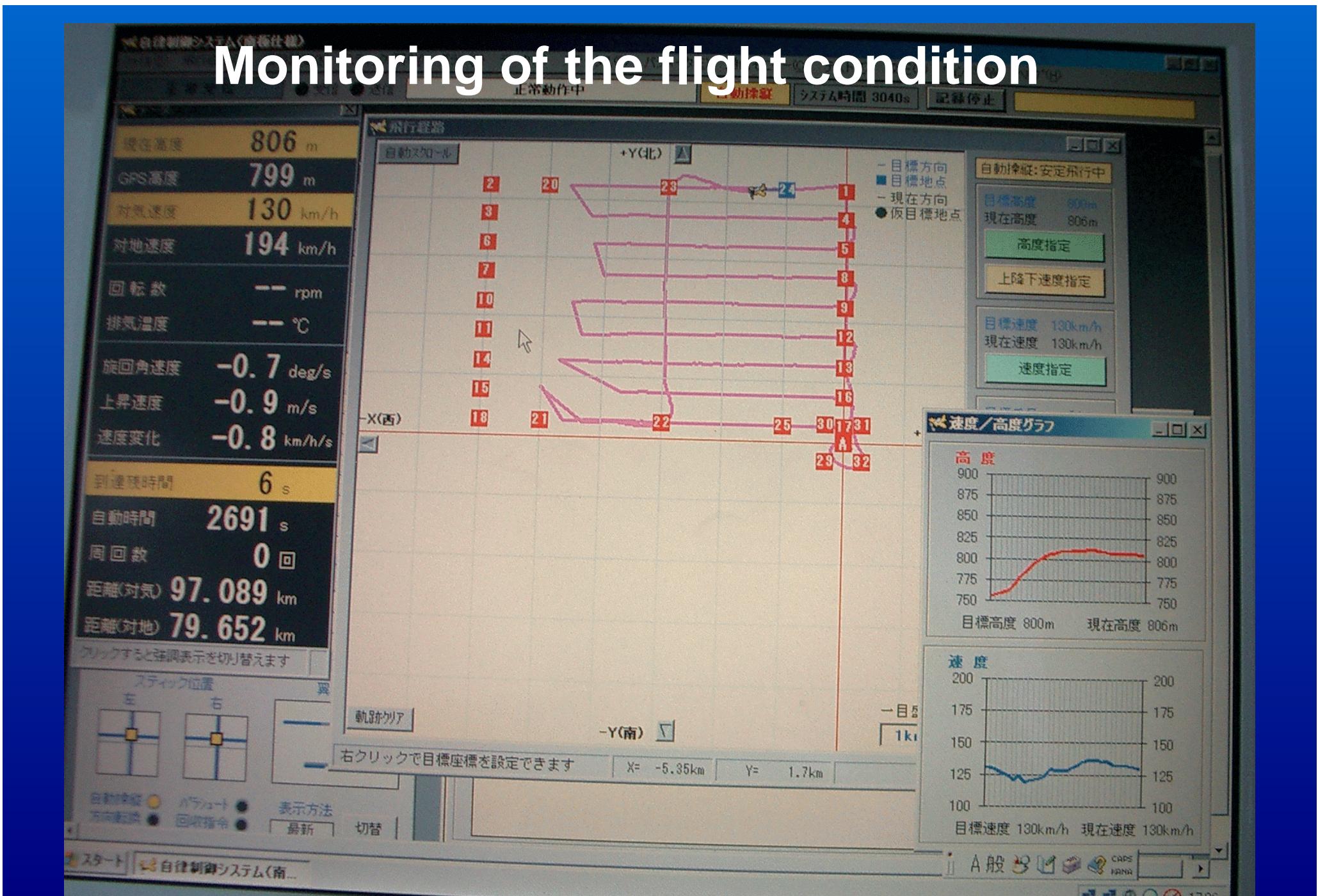
Sep. 13, 2004



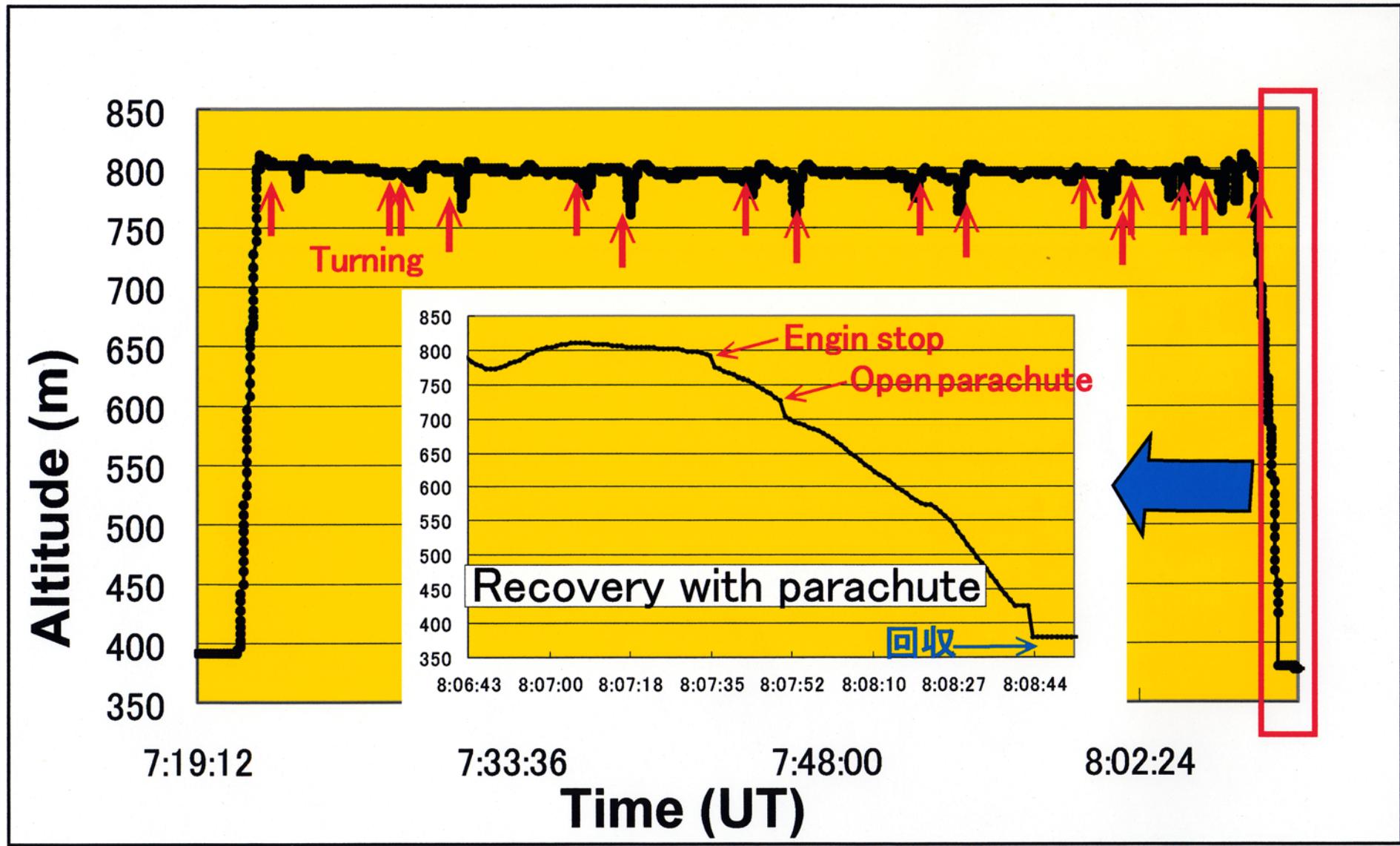
鳥海山由利原高原 4. 6回目フライト



Monitoring of the flight condition

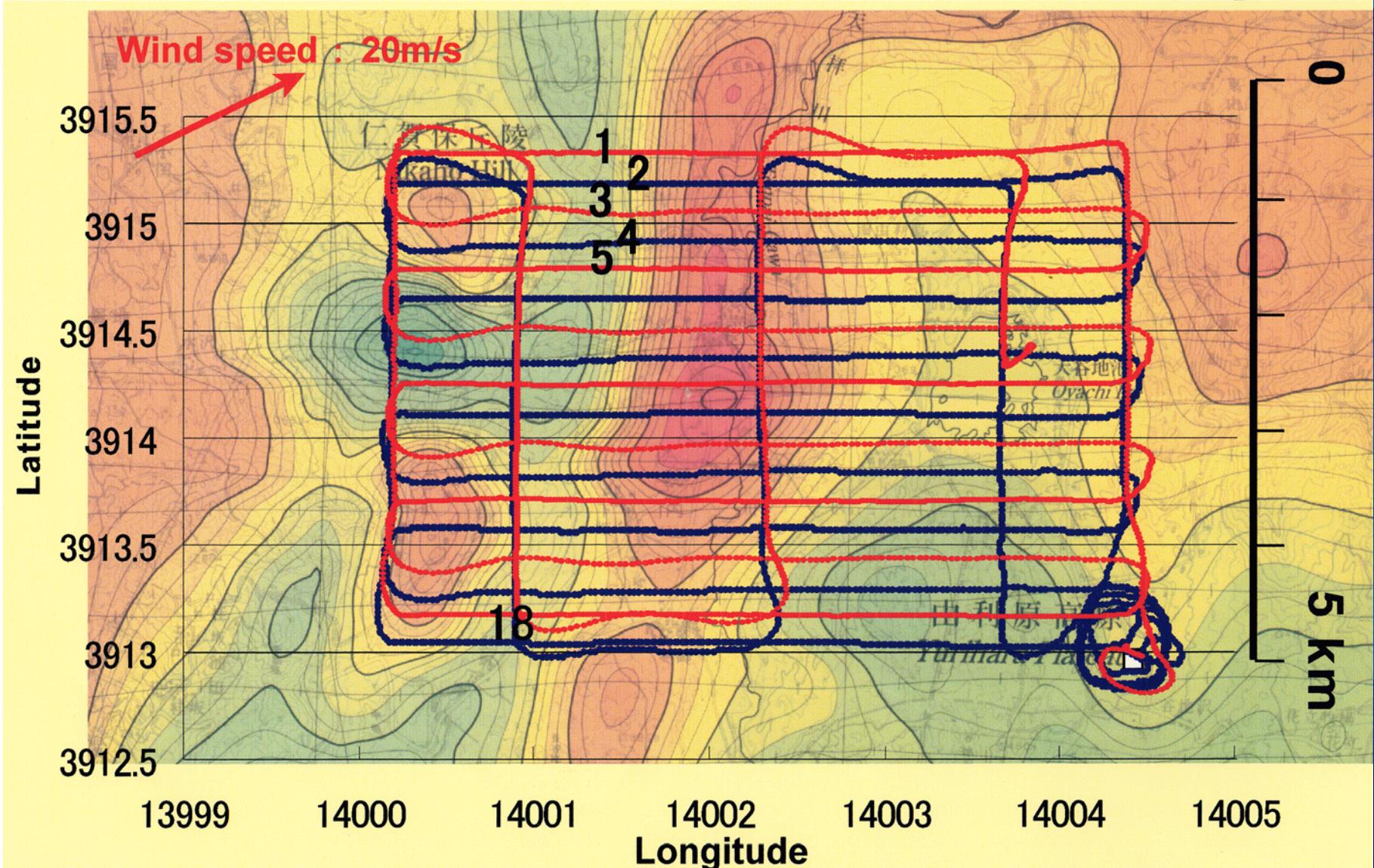


Variation of altitude, programmed altitude 800m



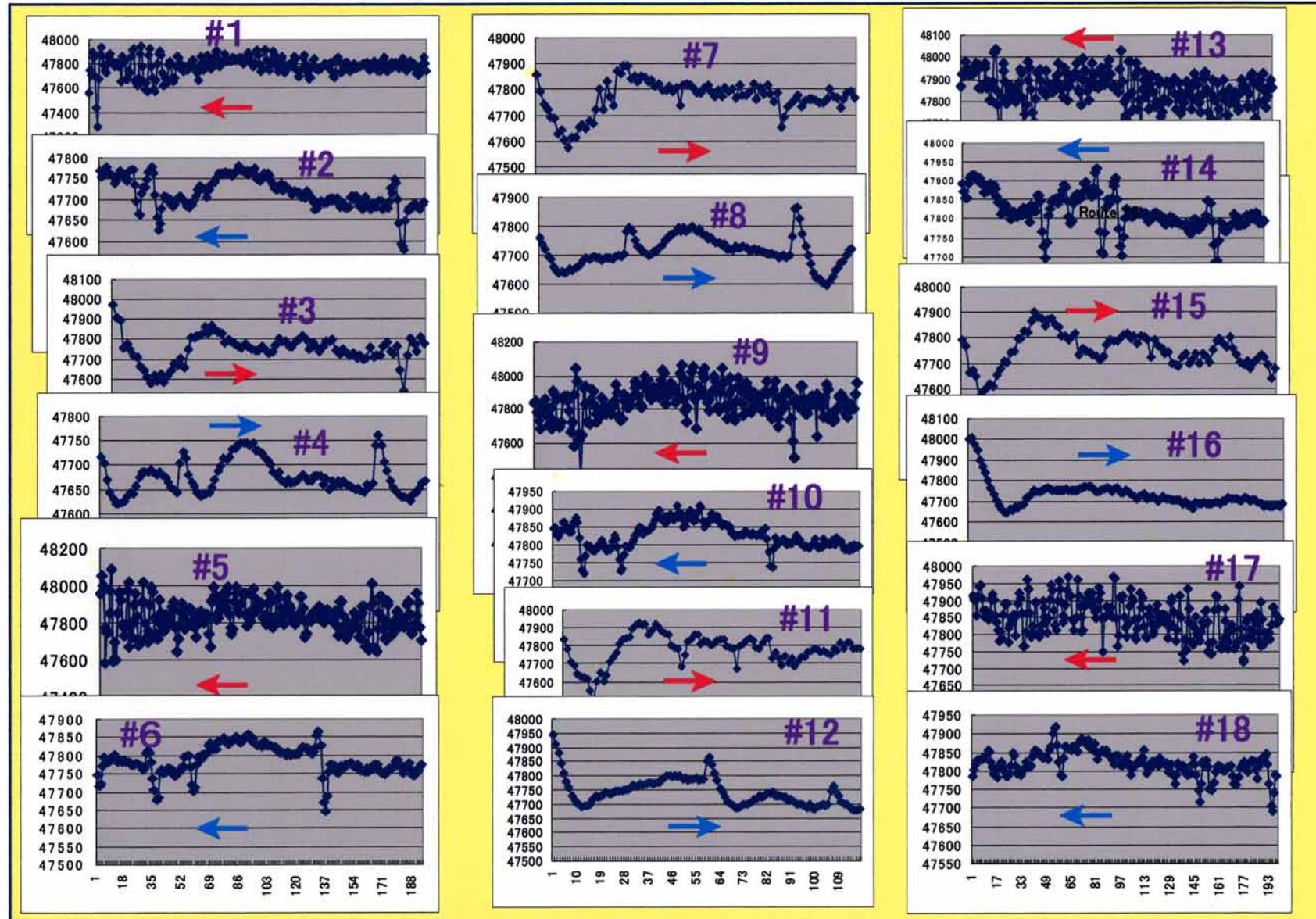
Expected magnetic anomaly and flight course #4 (blue) and #6 (red)

Sep.13,200



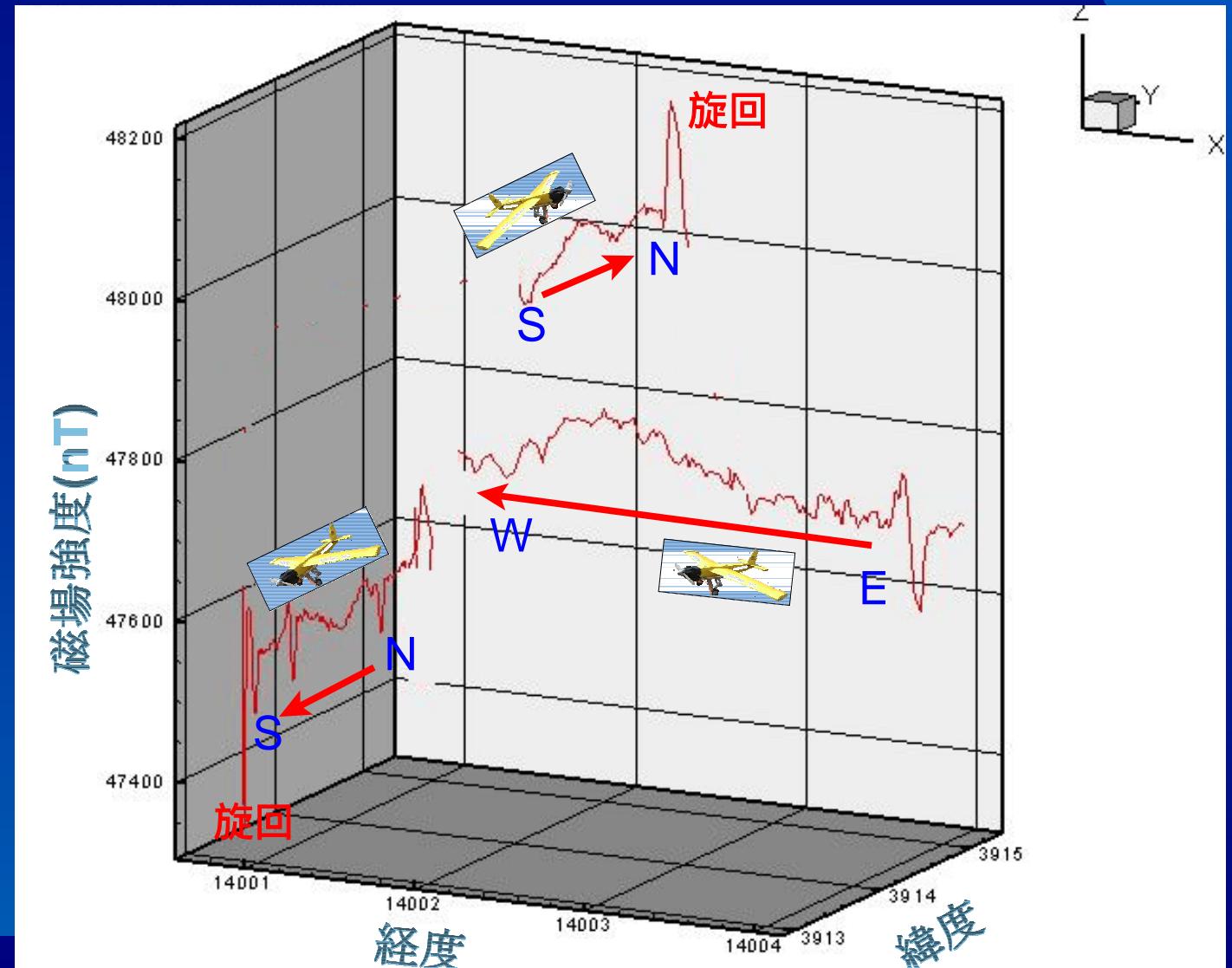
Total magnetic filed of the Yurihara area, Mt. Chokai Volcano

Sep. 13, 2004



機体磁気

P 約200nTの機体磁
気が機首の方向
に付いている



結論

磁気抵抗型三成分磁力計で空中磁場探査が可能

▶ 風が弱いときはMR磁力計により
10nTで空中磁場探査が可能

▶ 風が強い時は磁気ノイズが大きい

▶ 約200nT 機体磁気が機首方向に