2005 Mt. Qomolangma Height Survey

• National Geomatics Centre of China
• zhangjiangqi
1717: It was named “Qomolangma alin” on Chinese map in Qing Dynasty, the name is Tibet local name.

1847: 8778 m was surveyed by English-India from 322km and 70m height, (trigonometric height), to know it was the highest Mt. and named Mt. Everest.

1849–1850: 8840m was surveyed by English-India from 177km and 250m height, (used air refractive effects on trigonometric height).

1880–1883: 8882m was surveyed by English-India from 145km and 3000m height, (levelling height on control stations).

1946–1953: 8848m was surveyed by India, from 56 km and 4500m height (Astronomical Observations + levelling height on control network).
The history of Mt. Qomolangma height

- 1966–1968: 8850.32m was surveyed by China from 8.5 km and 5700–6242m height stations, (Astronomical Observations + gravity + levelling height on trigonometric control network)
- 1975: 8848.13m (on rock) was surveyed by China from 8.5 km away and 5700–6242m height stations, first set up tripod target and measured snow depth (92cm) on summit, the gravity was at 7100m height and 1.9km to summit
- 1992: 8846.27m (on rock) was surveyed by China and Italy from China and Nepal twos sides (set up tripod with prism and GPS, measured snow depth (255cm) with a pole on summit,
- 1998–1999: 8850m (on snow) was surveyed by USA and China from China and Nepal sides, the GPS and radar on top, the two crustal movement points set up on 7000–8000m height rock.
- 2004: 8848.5m (on rock) surveyed from China by Italy with GPS/GPR, have had a tripod on top.
- 2005: 8844.43m (on rock) surveyed from China side by SBSM,
GPS monitor network covered levelling network in large area (48points)

- GPS+levelling+gravity control network around and closed the Mt. (96points)
- Mt.surveying network (6points)
The control network in Mt.Qomolangma area

- GPS network

- Gravity points

- Gravity data distribution

- Leveling network

- GRAVITY DATA
The survey technical
- GPS+Prisms on tripod
- GPS+Radar and timemark
- meteorological meter+Beidou
- meteorological balloon
- Special power supply
- Gravity gradient
- To used relative gravity for high precise gravity model or gravity geoid
- To used GPS+levelling network, to control the Geoid
- To used Vertical deviation for trigonometric height
- To get the approximate Geoid height
- used gravity gradient to get the orthometric height
2005/05/22, 11h08m-12h20m
setup tripod, clamber worked on summit

1975/5/27, 14h30m
the Geoid and topography on summit

- Mt. Qm approximate Geoid
- GPR track and topography on summit
Mt. Qomolangma new height in 2005

• 8844.43m ± 0.21m (height on summit rock, relative to China yellow sea)
• 3.50m ± 0.09m (snow depth by radar)
• 86° 55′30.7517″E ± 0.21m (top tripod)
• 27° 59′17.0828″N ± 0.11m (top tripod)
the geoid accuracy ±9cm (2005), checked by 40 points
the Instruments

with prisms and GPS on the tripod

meteorological meter + Beidou Communicater

Beidou Communicater

Total station

Level

GPS + Radar

GPS + Gravimeter
snow surface change and vertical movement

Height changed reason:
- snow surface changed on top
- rock weathering
- no tripod on the top by trigonometric
- long distance trigonometric
- air refractive effects
- GPR sound speed in ice-snow correct
- Gravity gradient correct
- Geoid accuracy
- crustal movement
- different level system
2005 review: Different height camp
Physical test
Technical Training

• get the radar ice-speed at 7100 camp and training
Equipment transport
Ceremony before the summit
on the way to summit
5月22日 11: 08-12: 20 on the summit
total 47 surveyors for three month
Build a monument