

some cases, where a meteorological station of known altitude was situated not too far from Dr. Hedin's station I found it more convenient to calculate the altitude by comparing directly the simultaneous meteorological observations at the two stations. Thus the altitudes of most stations of Pamir have been calculated from the meteorological observations made at Margelan, Osch or Pamirski Post and those of some stations in Tibet from observations made at Leh. But this method is only advantageous when the two stations are so near together that the barometric pressures at those stations vary simultaneously in a similar manner.

Also as I found it nearly impossible to draw distinct isobars for the altitude of 3000 meters in Tibet, it seemed more convenient to calculate the altitudes from the average monthly barometric pressures at Leh and in some cases at Darjeeling, than from the isobars constructed for the altitude of 3000 meters.

As the barometric pressure varies not only with the height above sea-level but also with the weather, the error of the altitude, when calculated from only one or a few observations by means of the monthly average pressure at a known altitude in the same vertical line, may accidentally amount to 50 or 100 meters and even more. In order that the explorer might obtain results in which the error does not exceed 10 meters, it would be necessary for him to stay weeks or even months at every place, the altitude of which is to be determined, and to make daily observations during the whole of that time. In this case the average pressure found would give the desired result by means of the method of calculation explained above.

But as the explorer obviously could not stay so long at each place, Dr. Hedin, during his last journey, established several permanent stations, where the meteorological observations were obtained by means of self-recording instruments and with the aid of his attendants. The most important of those stations are: the headquarters at *Jangi-köl* ( $40^{\circ} 52'$  Lat. N.,  $86^{\circ} 51'$  Long. E. from Greenwich, 881 meters above sea-level), where tri-daily observations and continuous records were taken from the 7th Dec. 1899 to the 19th May 1900; *Mandarlik* ( $37^{\circ} 47'$  Lat. N.,  $90^{\circ} 47'$  Long. E. fr. Gr., 3437 meters above sea-level) ditto from the 13th July to the 3rd Aug. 1900; *Kasch-otak* ( $38^{\circ} 3'$  Lat. N.,  $90^{\circ} 47'$  Long. E. fr. Gr., 2916 meters above sea-level) ditto from the 3rd to the 20th Aug. 1900; *Temirlik* ( $38^{\circ} 11'$  Lat. N.,  $90^{\circ} 19'$  Long. E. fr. Gr., 2961 meters above sea-level) ditto from the 21st Aug. to the 20th Dec. 1900; and *Tscharklik* ( $39^{\circ} 2'$  Lat. N.,  $88^{\circ} 0'$  Long. E. fr. Gr., 925 meters above sea-level) ditto from the 1st Jan. to the 17th May 1901.

The altitudes above sea-level given above for those stations have been calculated by means of the monthly isobaric maps in the manner explained. Then the altitudes of Dr. Hedin's stations during the journeys he was simultaneously making have been calculated by comparing the observations taken by himself and those taken at the permanent station.

In this way the error due to accidental variations of the barometric pressure, caused by weather changes, is much diminished, and so much the more, the less the distance is between the two stations. But as the distance has in some cases been considerable, the error of the calculated altitudes has amounted accidentally to 30 meters and even more, as shown by the methods of calculating differences of altitudes, that I will now explain.