A Short Report of the Tibet Excursion 14-A, Part of the XIII INQUA Congress 1991 in Beijing

Kuhle, Matthias, Prof. Dr., University of Göttingen, Institute of Geography, Goldschmidtstraße 5, 3400 Göttingen, Germany

This excursion was concerned with the extent of the Pleistocene glaciation of the greatest upland and its associated mountain systems. Because of the international interest it was the best attended excursion of the Congress. This interest was put to the test, despite some previous warnings in reports of pre-Congress excursions, by the relatively high-costs, rather poor travel conditions on shaky buses, several overnight stays in military stations at over 4500 m, and very variable meals.

The discussions were spirited, and since on some of the days crossing the plateau the weather was extraordinarily fine, it was possible to make scientific observations even from the road. It is necessary to note first that opinions were divided on the theory of a former Tibetian ice-sheet advanced by the author on the basis of the findings of numerous previous expeditions. In particular some of the German participants, for example L. Eissman (Altenburg) and K. Heine (Regensburg) spoke clearly, indeed vehemently, against the theory of a wide-spread ice-sheet. Against this, Quaternary geologists and geomorphologists from Scandinavia, Canada and the USA eg R.H. Lagerbäck (Uppsala), R.W. Barendregt (Alberta), probably J. Linquist (Stockholm) and others, showed themselves convinced in the discussion of the former existence of a Tibetian ice-sheet. Subsequently certain of them, eg T.H. Huges (Maine), R.H. Lagerbäck and R.W. Barendregt, have confirmed their views in writing.

During the first part of the excursion form Xining (2000 m asl) to Koko Nor (Qinghai Hu, 3000 m asl) a high pass was crossed (3520 m asl) at the summit of which erratic material was seen. Here, on the north face of Riyue Shan (36°21'N, 101°12'E) the former valley glacier descended to at least 3100 m asl. Some of the Scandinavian and Canadian participants were of the opinion that the trough-shaped cross-profile and the accumulation of coarse block material indicated the lowest glacial terminal at 2800 m asl. Subsequently the route followed the S slopes of the Koko Nor, from were to be seen the granitic remnants of the old denudation surface of the 4500 m asl Koko Nor Shan (Qinghai Nanshan) with incised cirques (Bottner type) and short troughs. The Koko Nor Shan (Qinghai Nanshan) were crossed by a pass cut in schist at well over 4000 m, leading to the basin of Carka. Although the phyllite surface was frost-roughened in many places, the glacial character remained widely clear. Because of loudly-expressed questioning, emanating from the first bus, about glacial thrusting of the fluvioglacial gravels, the contiguous southerly-exposed terminal basin (=Zungenbecken) was visited. Evidence of glacial thrusting was confirmed by two American participants (from Alaska) and also the origin of the gravels as fluvioglacial. Because of the misty wet weather the ice marginal ramps (IMR= Bortensander) north of the Carka saltlake (35°53'N/99°41') were visible from the road only occasionally in cutline. The terminal trough W of the U-valley exit to Hoerhkuo Shan (35°47'N/99°33'E) was traversed in the twilight, and the military station of Qagan Us on the E margin of the Tsaidam depression reached in darkness.

On the following day the excursion buses followed the S margin of the Tsaidam basin, which is over 400 km long, to Golmud. With improved visibility they followed the Kuen Lun mountains, which form the N flanks of the central Tibetan plateau, but because of a shortage of time, and relative inaccessibility, no visits were possible to the numerous end-moraines, the roots of outwash sheets, and beginnings of gravelplains in the outlets of the Kuen Lun valleys. Nevertheless glacial landforms were present the whole way, with rounded and polished remnants of the old surface, dotted with cirques, some containing end-moraines, at the levels 3500–3800 m asl, very reminiscent of a Scandinavian fjell landscape. Below this level, periglacial as it is today, was a zone of linear erosion and rill wash, independent of lithology, very sharply separated from the glacially polished landforms. The deposit-filled Tsaidam depression revealed along the road gravel fans which interdigitated with the limnic sediments. The shore line of the Pleistocene Tsaidam lake was marked over long stretches by a wall of windblownsand, fixed by tamarisk bushes. Their growth is dependent on the restriction of water percolation due to the onset of the limnic sediments. Further away barchan fields were observed, with scattered dwarf shrubs, and blown-sand plains back to the mountain foot. An excursion to the N from the transport settlement Golmud reached the saltworks basin in the centre of the Tsaidam depression. Because of the unusually fine weather an excursion was made south from Golmud to the Tibetan plateau, here at altitudes of 4600–4900 m, as far as the Tou Tou river, some 400 km. The author's interpretation of a clearly marked cirque level at the edge of the plateau, and the clear divide separating the glacially rounded peaks and slopes from the lower fluvial level were accepted by the other participants. A polymictic moraine deposit by the settlement of Nachitai (3560 m asl) possibly of Late Glacial origin, led to controversy, it being alternatively interpreted as a mudflow fan. A clear proof of glacial transport mechanism by a great thickness of ice was seen in the erratic-bearing moraine deposit at 5300 m asl near the Kuen Lun pass (above the collapsed pingo). It consisted of far-travelled moraine, the granite blocks of which originated in the central Tibetan range of Tanggula Shan, transported here with the fall of the plateau over 450–750 km, and deposited here by an outflow glacier at the convex breakpoint on the N rim of the ice sheet (35°30'N/94°10'E). The moraine showed that the ice thickness had been at least 600 m. Several German participants accepted nevertheless the explanation proposed by Chinese colleagues (Prof. Zheng Benxing et al.) for these widespread moraines with their erratic content, overlying the slate bedrock. They (the Chinese colleagues) suggested alternatively that the moraines came not from Central Tibet, but from nearby lower-lying granite mountains, and relative to those mountains have been subsequently uplifted 1000 m. One is presented therefore with the concept that the whole slope-system has been subsequently reversed, the former N-S fall, that is towards the high plateau, being replaced by a S-N fall, away from the high plateau. – On the plateau itself some participants recognised, in the rounded rock ridges, classical glaciogenic roches moutonnées and polished thresholds with all the typical modifications of the bedrock, as well as ice-polished basins with typical moraine deposits. Some Austrian and German participants were unable to accept this interpretation, but without being able to suggest an alternative explanation for the shaping of this type of landscape. Presumed dead-ice depressions were individually interpreted by some colleagues as deflation basins or permafrost pools. But the attempt to recognise again a normal fluvial relief met with the difficulty that the characteristics of that type of relief were completely absent. Neither the numerous overdeepenings nor the widespread thin cover of diamictic (unsorted) material, rich in fines, would accord with the fluvial interpretation. In particular, except in incised alluvial fans in the mouths of local tributary valleys, terraces are absent from this undulating hilly landscape. In this context it is worth mentioning that American and Scandinavian colleagues, familiar with areas of former inland ice-sheets, had no intellectual difficulty in accepting as of glacial origin the high Tibetan relief, and in seeing its 'cleanliness', that is the poverty of detritus and gravels, as an indirect indicator of inland ice. – The stage from Tou Tou river (4500 m asl) to Nagqu led over the E part of the central Tibetan Tanggula Shan (6621 m high mountain group) with the watershed on this N-S alignment at 5300 m. The Chinese leaders of the excursion argued from radiometric age determinations of end-moraines, which were visible to the E of the route and directly marked the forefields of the valley glaciers, that these moraines were of High Glacial age, and showed only a slightly greater glaciation than at present. In contrast the present author placed the alignment of erratic granite blocks, 200 to 300 m over the Tangguala Shan pass (32°50'N/91°50'E) in the deglaciation phase. That would entail the presence of an ice-sheet, covering the relief, with nearly smooth upper surface, reaching across the fluvial and ice divide. Much more discussion took place about the origins of the wide-spread granitic boulder clay. Some of the participants interpreted it as classic ground-moraine; others held it to be of periglacial origin, despite the depth of the largest blocks in the fine substrate, and the lack of slope. – Between Nagqu 4550 m asl) and Lhasa the first part of the journey was accomplished in a blizzard. Snow lies here, above the permafrost boundary, several decimeters thick even in summer. By midday, ground moraine with very large granite blocks was observed south-east of Nyainquentaglha (30°N/90°15'E), and also west from there, reaching some 1500 m over the over 10 km wide valley floor, triangular slopes (just as described by W. M. Davis at the turn of the century in the previously glaciated areas of the Rocky Mountains). A part of the High Glacial boulder clay in this floodplain region SE of Nyainquentaglha is

covered with slighty sorted Late Glacial gravel sheets, rich in coarse debris, as well with glacial diamictic material, outwashed on its upper surface. The last stopping place in a confluence area was devoted to the former glacial relief forms of three U-shaped valleys with lofty polished sides (30°N/90°40'E), 4100-3900 m asl.) With practically complete agreement it was good to identify in this locality a classical roche moutonnée on the valley floor, in a rock bar position, with gentler stoss side and steeper lee side, as well as two generations of lateral moraines at the exit of a tributary valley coming from the south, identified by the author as of Late Glacial. - Shortly before Lhasa there was lively discussion concerning the convergence of desquamation, particularly effective in granite, with glacial polishing. - It was very refreshing to visit the bazaars and the Potala itself in Lhasa, as one could be sure not to be distracted by any glacial-geological discussion. Nevertheless, even on that occasion, it was impossible to avoid an argument over the possibility of anthropogenic origins of glacial pot holes.

References

Kuhle, M.: Observations Supporting the Pleistocene Inland Glaciation of High Asia. Tibet and High Asia. GeoJournal 25, 2/3, 133-233 (1991)

Zheng Benxing and Li Jijun: Quaternary glaciation of the Qinghai-Xizang Plateau. Geological and Ecological Studies of the Qinghai-Xizang Plateau. Vol. II, 1631-1640. Science Press, Beijing 1991.

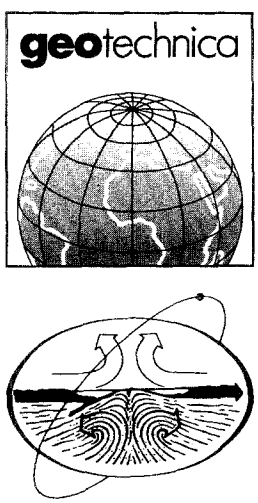
Zhen Bexing and Shi Yafeng: Glacial variation since Late Glaciation on the Qinghai-Xizang (Tibet) Plateau of China. Quaternary Geology and Environment of China, 161-166. China Ocean Press, Beijing 1982.

---

geotechnica, Germany 1993:

In Cologne the focus is on the map

International Cartographic Conference and German Cartography Congress



Alfred-Wegener-Stiftung, Bonn

geotechnica - International Trade Fair and Congress for Geo-sciences and Technology - from 5th to 8th May 1993 in Cologne represents a special event for cartographers from all over the world: because the first week in May is also the date of the 16th International Cartographic Conference (ICC), which will be held from 3rd to 9th May, as well as the 42nd German Cartography Congress (DKT) from 3rd to 6th May 1993. Both events will be held at KölnMesse's Congress Centre East and thus in the direct proximity of geotechnica.

"Maps for Knowledge, Action and Development" is the ICC's general theme, with which the medium of the map, its increasingly varied contents and forms is characterized as the basis of knowledge of facts relating to the Earth's surface. With the key theme "German cartography in a European environment", the German Cartography Congress wishes to document its close relationship with the International Cartographic Conference.

Joint International Cartographic Congress

The organizers, the International Cartographic Association (JCA) and the German Society for Cartography (DGfK), have scheduled both events so that they can present themselves to the total of between 1,500 and 2,000 delegates who are expected to attend, as a joint International Cartographic Congress. This is also underlined by the joint opening ceremony, the focal point of which will be the official address by Professor Dr. David Rhind, general director of the Ordnance Survey on the subject of „Mapping for the new Millenium".

During the congress over 100 papers on the international programme and eight lectures at the German Cartography Congress will concern themselves with selected topics from topographical and thematic cartography, tourism and atlas cartography, from geo-information, navigation and environmental cartography. In addition, 16 commissions of the JCA and 11 working groups of the DGfK will report on their work in public meetings, accept contributions from the auditorium and stimulate a professional discussion.

geotechnica with over 500 suppliers

The congress delegates are entitled to visit geotechnica in exhibition halls 5 to 8 on all days without any further costs. In 25,000 sq.m. of exhibition space, more than 500 suppliers, including around 30% from abroad, will be presenting systems, equipment and processes, service and know-how for practically all geoscientific disciplines and geotechnical areas of application. They will cover a broad spectrum from the exploration and the preservation to the restoration of the biosphere Earth. Cartography will constitute a special focal point of the trade fair.

International Map Exhibition

The geotechnica visitors are, however, also invited to visit the international map exhibition of the International Cartographic Congress free of charge. Situated in the first floor foyer of the Congress Centre East, it will provide a wide overview of publications and the publishing of cartographic products from more than 40 of the world's countries. Over 50 cartographic publishing houses, public agencies and scientific institutes will be showing a representative cross-section of production and research.

Establishing the status quo in cartography

The professional background of both congresses is also the establishment of the status quo in cartography. Its modern function is to prepare maps as a means of information and communication, of orientation and planning for the varied requirements of our society and to make their use simpler. Cartography covers all stages of graphic information processing with a focus on the visualization of geo-spatial information. This is achieved through functional cartographic representation both in printed form and on the monitor. Cartography is thus a key part of the geo-information systems which are also among the most important sectors of the product range at geotechnica.

Typical cartographic products are topographical, national and city maps, maps for national defence, road and hiking maps, school and reference atlases as well as geoscientific maps and atlases. Most recently aerial and satellite photo maps, planning and environmental protection maps as well as disaster control and prevention maps have been added. Space-related digital information systems and computer-based vehicle locating and navigation systems are topical and trend-setting cartographic documentation and presentation forms.

Excursions and supporting programme

The International Cartographic Congress will be accompanied by an extensive programme of excursions and supporting events which will professionally augment the lecture programmes of the ICC and DKT and take delegates to cartographically interesting destinations in and around Cologne, for example, the open-cast mines of the Rheinische Braunkohlenwerke, to the State Geological Office and the North Rhine-Westphalia State Surveying Office and to the radio telescope in Effelsberg in the Eifel.

Further information, in particular, the leaflet "Invitation and programme" can be obtained from AKM Congress Service, Clarastr. 57, CH-4005 Basle, Switzerland Tel.: 4161/69 18 888. The season ticket costs DM 650,- (students: DM 200,-); the day ticket DM 250,- (students: DM 50,-).