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Interactive comment on "Hydrological connectivity from glaciers to rivers in the Qinghai-Tibet Plateau: roles of suprapermafrost and subpermafrost groundwater" *by* Rui Ma et al.

Anonymous Referee #1

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General Comments This study addresses an important issue of hydrological connectivity between glaciers in high mountains and river in the low plain within the alpine headwater catchment with big elevation difference and complex hydrogeological settings. The hydraulic head, temperature, and chemical and isotopic composition of groundwater, streamflow, precipitation and glacier meltwater were monitored along altitude gradient. The work has produced a remarkably rich data set that is clearly presented by the authors. The authors interpret the data to indicate that supra- and subpermafrost aquifers, as well as stream channels and slope surfaces, play an important role in transporting glacier, snow-meltwater and precipitation from the high mountains to the plain and then to the mainstem. The authors also suggest that a decline in hydro-

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logical connectivity between the piedmont plain aquifer and the downstream channel in cold seasons may be the mechanism maintaining streamflow (baseflow) in winter. It is worth pointing out that the authors present a logical and clearly illustrated conceptual model of hydrological connectivity in the alpine catchment by combining the above results. Given the wide distribution of this kind of headwater "mountain-plain-river" catchments in the Qinghai-Tibet Plateau and other cold regions, this conceptual model may contribute fundamentally to permafrost hydrology and can be more broadly utilized. The authors tentatively suggest that river icing and riverbank soil freezing may form a confining layer to reduce groundwater discharge from the plain to the stream, i.e., reduce the hydrological connectivity between the two pools. This is a very interesting hypothesis that can expand the existing mode for interpreting the slow release of stored groundwater during cold seasons, and it may be testable using field hydrometric measurement and numerical simulation. Overall the manuscript is well written and quite clear. I also have a few minor comments that I hope the authors to address before publication as listed in below.

Specific Comments P2, L5: 'surface-water' should be 'surface water'.

P2, L24 and L25: Two ';'s after 'hydrogeological' should be type errors.

P3, L6: 'Heihe Basin' should be 'Heihe River Basin'.

P3, L22: 'Qinghai-Tibet plateau' should be 'Qinghai-Tibet Plateau'.

P4, L15: Is 'the October to May cold season' a type error? 'ice covered' should be 'ice-covered'.

P6, L14: Citation is missing for the Gran titration method.

P7, L27: What value does the δ13Crech take?

P8, L22-23: This sentence is hard to understand. Please rewrite it.

P10, L15: Two 'respectively' should be removed.

P11, L9-17: These results contrast with the statements in Abstract section.

P13, L9: ‘in water’ should be ‘in water table’.

P13, L29: I don’t think that the dry sediment layer at depths between 12 m and 12.5 m is related to the subpermafrost groundwater.

P13, L29-31: Citation is missing for this statement.

P14, L24-25: Citation is missing for this statement.

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