The paper is dedicated to an acute problem of development of glacio-hydrological models for the prediction of future changes in river runoff due to deglaciation. The presented study aims to develop a computationally efficient hydrological model that can be applied to large glaciated and snow-fed catchments. The paper is overall well-written and provides interesting results. However, there are few major and several minor recommendations to the authors, stated bellow:

1. The description of the DECIPHeR model needs to be extended: what hydrological processes are taken into account, how the water is routed, number of conceptual storages etc.
2. A clearer parameters calibration scheme should be added to the methods section. What is the initial and resulting range of the parameters? It is mentioned that degree day factor varies daily in the introduction – it gives the first impression that the values are calibrated for each day separately.
3. The 3.1 section provides information on the evaluation and validation period. It seems that for the evaluation the same period as for the calibration was used? It is not quite common. Authors should comment on that.
4. It is mentioned on P16 L 337 that the Nash–Sutcliffe efficiency (NSE) is used to evaluate high flows and the timing of peak discharge. Just below that a formula for mean monthly discharges evaluation using NSE metric is given
5. Analysis of model performance using the MSC method compared to ISC method for other sub-catchments should be included as well in 3.2.2
6. Compare the range of glaciated area prediction with the observed glaciated area
7. The positive trend of snow melt and negative trend of rainfall component seems to be consistent over the territory that could be better emphasized in the text
8. Discussion should be extended covering following aspects: 1) the 95th percentile simulations in all cases show an asymmetrically larger contribution of the rainfall compared to 5th and 50th percentile, 2)analysis of the importance of including new calibration parameters in the DECIPHeR model. As the model performance seems to be not very sensitive to most of the calibration parameters values (FigS15), 3) comparison of derived contributions of snow melt, glacier melt, rainfall with previous studies

Other minor suggestions and technical corrections:

P 1

L12
The model reproduces the spatial extent in seasonal snow cover well, capturing 86% of the snow extent on average (2001-2007) for the median ensemble member of the best 0.5% evaluation simulations, when evaluated against MODIS snow extent.
Better divide the sentence in 2-3 sentences to make the message clearer.

L18
At all stations snow melting is the largest component, followed by the rainfall and the glacier melt component.
Please provide estimation of shares

P2

L30
Sry Darya – Syr Darya

L32
semi-arid lows lands – semi-arid low lands

P3

L78-79
Section 3 describes the evaluation and validation of discharge.
The evaluation and validation of modelled runoff?
Section 4 describes the validation of snow extent against MODIS observations
of modelled snow extent?

P4

L96-98

A high resolution irrigation map of the catchment derived from normalized difference vegetation index (NDVI) (Meier et al., 2018) shows that the irrigated area is low, in contrast to the Ferghana valley downstream (Fig. S1).
It would be better to add the numerical estimation to the comparison

P8

L163
"*d*" symbol doesn't seem the best choice for the day of the year. As it is hard to distinguish from the first site in a formula abundant with letters *d*

P26

L428

The dotty plots show… –> The dotty plots (see Fig.S9) show..

Figure 3. Please add the transcription of the used indexes either in the caption or in the text.

Table 7. The addition of p-values would probably contribute to the informativeness of the table

S1
The colors need to be explained
S2
The color ramp is evidently different for the left and right half of the picture

S3-S4
Glacier thickness seems to differ a lot between the pictures, though the corrections only for two glaciers are mentioned.