Report on revised manuscript "*An investigation of the thermo-mechanical features of Laohugou Glacier No.12 in Mt. Qilian Shan, western China, using a two-dimensional first-order flow-band ice flow model*" by Wang et al.

I congratulate the authors for the effort they made to take into account transient climate effect on the thermal regime. This significantly improves the manuscript quality. Everything is now present in the paper but one step is missing: the author have now to use their transient model to calibrate correctly the diagnostic run. Again, it makes no sense to fit the entire measured **UNSTEADY** temperature profile with a diagnostic run. The authors even nicely show in the paper that the profile is affected by a strong surface cooling between 1970 and 2011. So, as I describe in the "General comment" the correct approach would be to fit the measured deep borehole with the transient model only. The diagnostic run has to be calibrated as **an initial condition of the transient run**.

I think that the author made a great effort to improve the paper but one crucial point is still not addressed and this require to be done before publication in The Cryosphere. The model is now complete and this should not be too hard. This is just concerning the way the surface parameter of the diagnostic run are calibrated. This is important because the presented modeled thermal regime depend strongly on this. The current diagnostic run likely underestimates the amount of temperate ice because of a too high ELA.

General comments

The authors do not specify the initial condition in the transient run which is crucial for such short simulation. Even with the 10 years spin-up, results are still dependent of the initial condition for a glacier of this size. It would make more sense to initialize the transient simulation from a diagnostic run.

The authors still calibrate the diagnostic run by fitting the complete measured deep profile. Again, this is not the good approach! Your work on mass balance and ELA reconstruction show a significant change in ELA elevation leading to significant cooling in the deep borehole during the recent years. This cooling very likely did not reach steady state yet, you cannot constrain your diagnostic run on this. However, you have now everything to do it properly:

Find $(ELA, Tdep, c)_{steady}$ in a way that your model fits the measurement **AFTER** running the transient model using the diagnostic run as initial condition.

So :

1- Run the diagnostic model with $(ELA,Tdep,c)_{steady}$
2- Run the transient model until 2011 with the diagnostic model as an initial condition
3- Compare the result of the transient model with measurement to adjust $(ELA,Tdep,c)_{steady}$

Specific comments

Line 17 p7 – I would remove “result in lower velocity values (Sugiyama et al., 2014)”, this is an indirect consequence of the cold bias. Better to focus on temperature only here

Line 26 p7 – Use other symbol (*c* is already used in eq. 15)

Line 11 p13 – “The transient model appears to bring more heat from the accumulation basin to downtream over the past decades.” Unclear plus typo (downstream). Also, this is because of the 10 years spin up with the 1960-1970 climate condition that give wider accumulation area… this not link to the transient climate that actually tend to cool the glacier...