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The Cryosphere Discussions

Interactive comment on "InSAR time series analysis of seasonal surface displacement dynamics on the Tibetan Plateau" *by* Eike Reinosch et al.

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Thank you very much for your incredibly detailed and insightful comment to our manuscript. Due to the large amount of comments, we will not reply to each individual comment but instead will focus on the major comments and topics.

Major comments:

1. We agree that the terminology we use in the manuscript is at times confusing and does not differentiate well between displacements detected with InSAR and the underlying processes. We will adapt the terminology in our manuscript (based on your

suggestions) to make this clearer.

2. We will adapt the descriptions of our three models and their names to make it clearer where each model is applied, what their respective focus is, which processes are covered by each model and go into greater depth to assess their limitations in the discussion as you suggest.

a. Regarding your comment about "rock slope instabilities" and the value of submitting a supplement alongside our manuscript: We acknowledge that not discussing rock slope instabilities and solifluction in our manuscript was a grave oversight and we will adapt our manuscript to include them as potential causes of the observed displacement. The landforms with a high linear velocities are mainly rock glaciers, protalus ramparts and collapsing moraines. Rock slope instabilities are present throughout the study sites but in those areas we observe mainly seasonally accelerated sliding.

b. We agree that supplementary material would be very helpful to assess the quality of our data. Data we plan to include in the supplement are: - coherence and interferogram percentage maps of both study sites and both orbits (including the locations of the reference points) - baseline plots of our data sets, the maps of the seasonal sliding model of the Niyaqu basin - a map with the location of the time series shown in Figure 6 of our manuscript and their velocity time series (Fig. 1 of this reply) - maps showing the spatial distribution of the disparity between the "day of maximum subsidence" of ascending and descending data sets.

c. As you suggested we plotted the velocity time series of the locations shown in Figure 6 of our manuscript (Fig. 1 of this reply). You are correct, that the landforms shown in 6B of our manuscript (shown in black in Fig 1 of this reply) also show variations in their velocity. The seasonal variations of the velocity of the landforms shown in 6C of our manuscript (shown in grey in Fig. 1 of this reply) are however much larger. In our opinion plotting the cumulative displacements shows this seasonal behavior better than the velocity time series. We agree that it is important to acknowledge in our

manuscript, that the landforms we describe as moving linearly also show variations in their velocities, albeit smaller than other landforms. We will also add the velocity time series to our supplement.

3. The majority of this comment has been answered in the reply to the previous referee comment so we will summarize our reply. We will provide coherence maps and baseline plots in the supplement as you suggested and we added the additional information (multilook factors, incidence angle etc.) to our manuscript. We agree that the maximum detectable velocity is an important point do discuss and we added a paragraph to the discussion of our manuscript. We agree that increased soil moisture in summer could explain the supposed uplift in the valley of Qugaqie basin. We will explore that option in our discussion. We added a paragraph discussing the reliability of the day of maximum subsidence and address the disparity between ascending and descending results. We will also add a map of the spatial distribution of this disparity to the supplement.

4. Thank you very much for your assessment and very helpful comments of the discussion section of our manuscript. We adapted the discussion according to your suggestions.

Complementary comments:

1. Introduction: We agree that our manuscript will benefit from presenting studies of other regions besides the Tibetan Plateau in the introduction. We will update our manuscript accordingly.

2. Minor comments of our study areas, data and methods: We made the suggested changes.

3. Results: The reason why the slopes of Niyaqu basin are not covered in such great detail compared to Qugaqie basin (not included in Figures 3 and 6 of our manuscript) is that the spatial coverage of our InSAR data on the periglacial slopes of Niyaqu basin is much poorer. We added a paragraph to our manuscript to explain this. We will include

the map of the seasonal sliding model of Niyaqu basin in our supplement.

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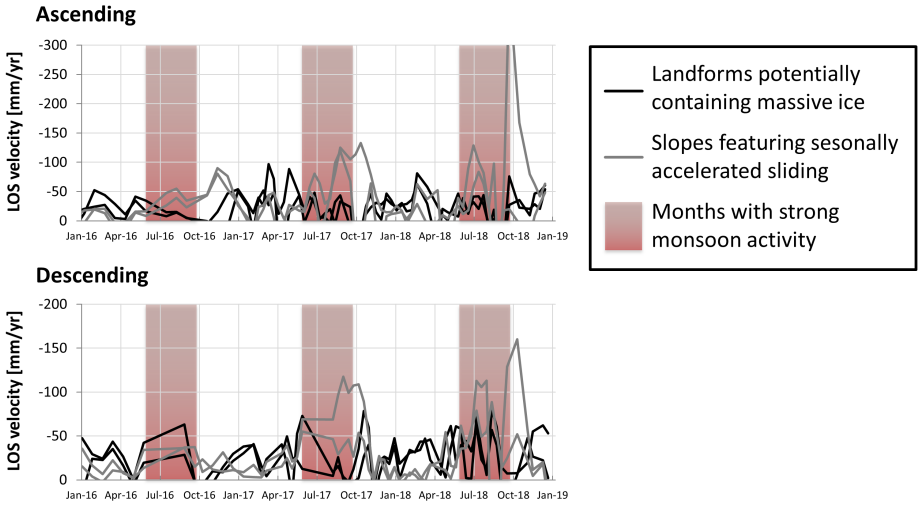

Figure 1: *Timeseries of LOS velocities of landforms shown in Fig. 6 of the manuscript. Negative velocity values indicate motion away from the satellite. Black time series refer to landforms with linear velocity (Fig. 6B in the manuscript) and grey time series refer to landforms with seasonally accelerated velocities (Fig. 6C in the manuscript). All timeseries represent moving averages of the 2 nearest values forwards and backwards in time.*

Fig. 1.