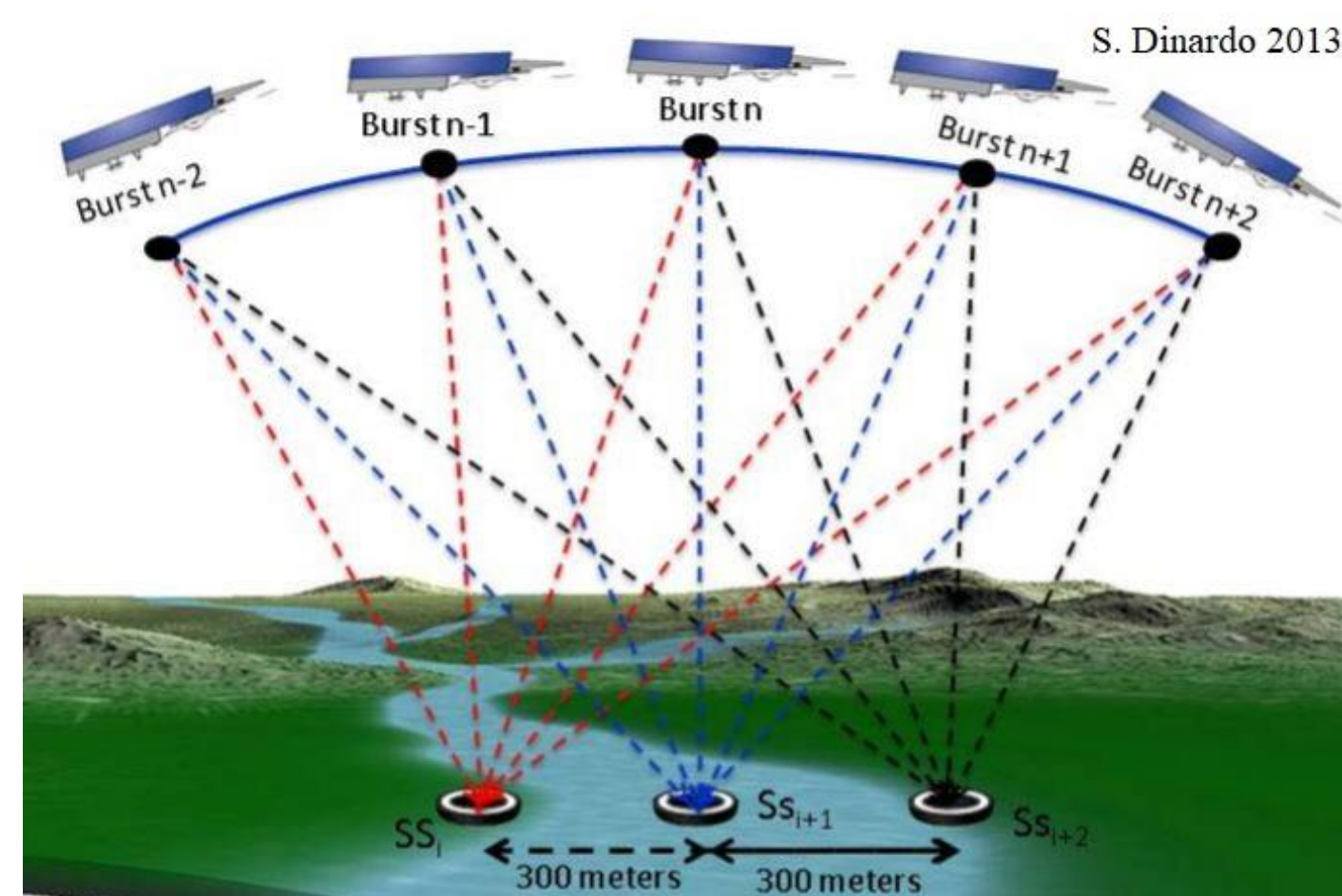


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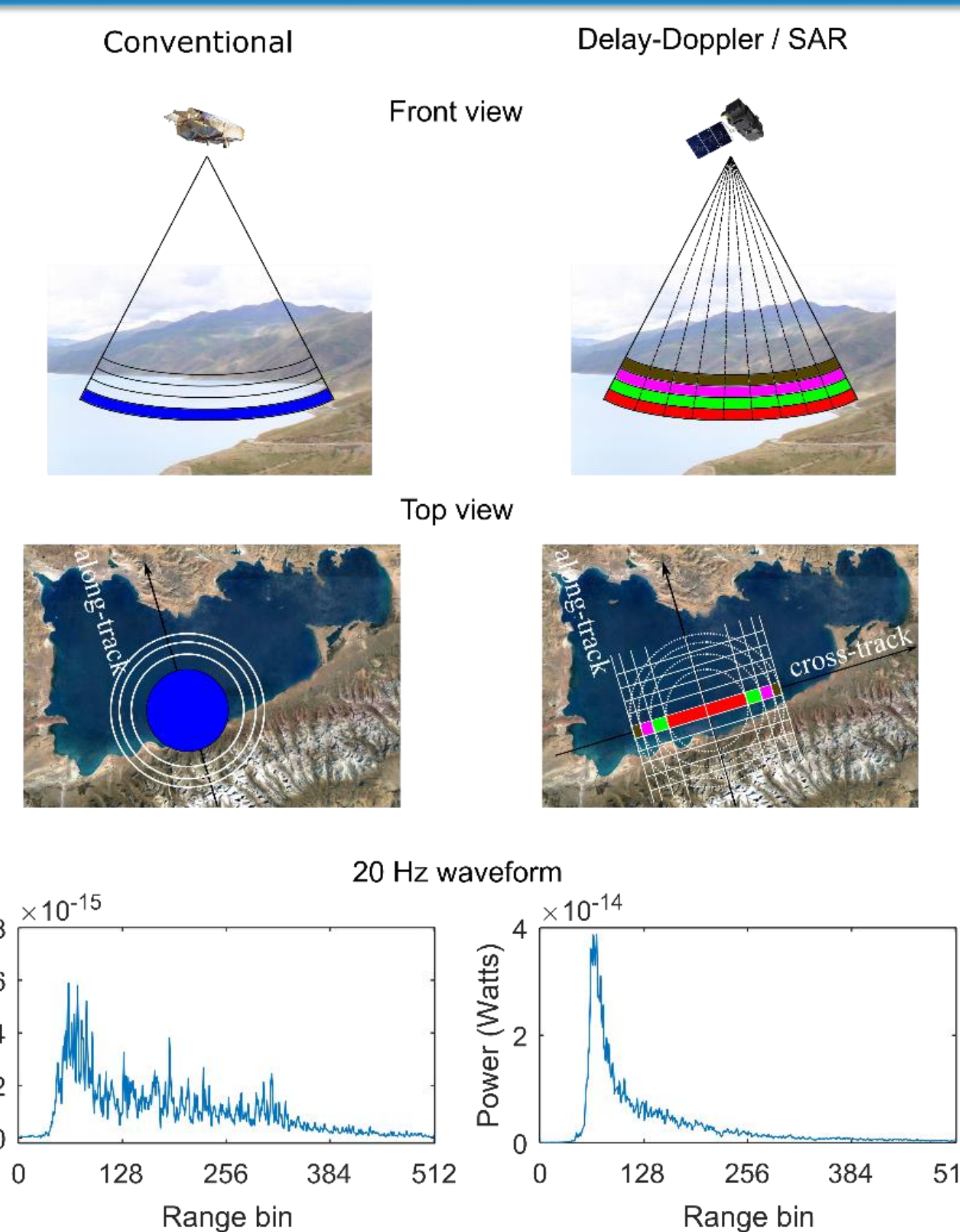
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Introduction

- SAR altimetry is a new technique to process altimetry data
- ESA CryoSat-2 is the first altimetry mission able to operate in SAR mode, followed by Sentinel-3
- Radar pulses are emitted at a higher rate to ensure that these pulses are phase coherent
- A Fast Fourier Transform is applied to a burst of consecutive reflected pulses to discriminate the surface sampled on different Doppler strips on ground

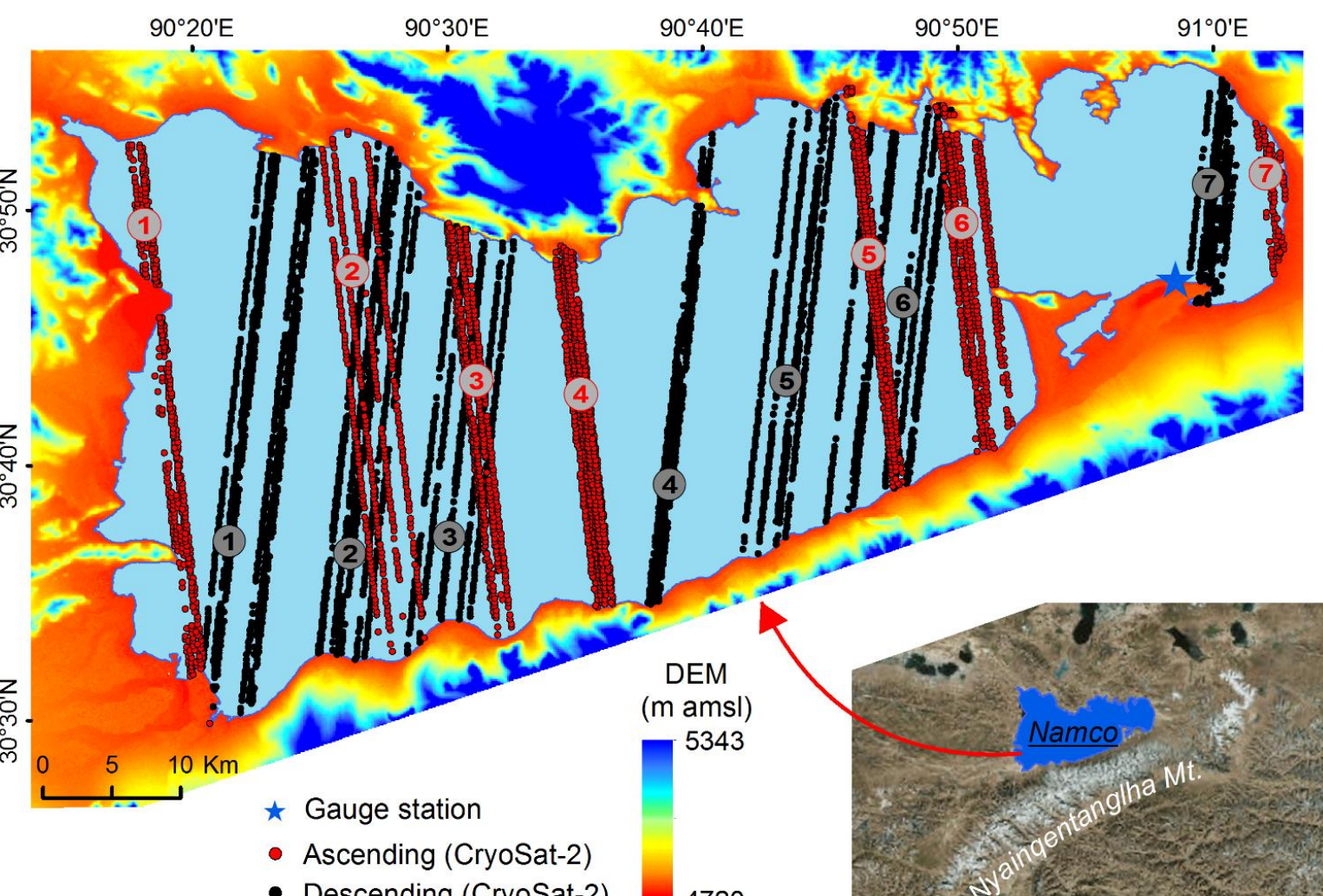


Traditional vs SAR altimetry



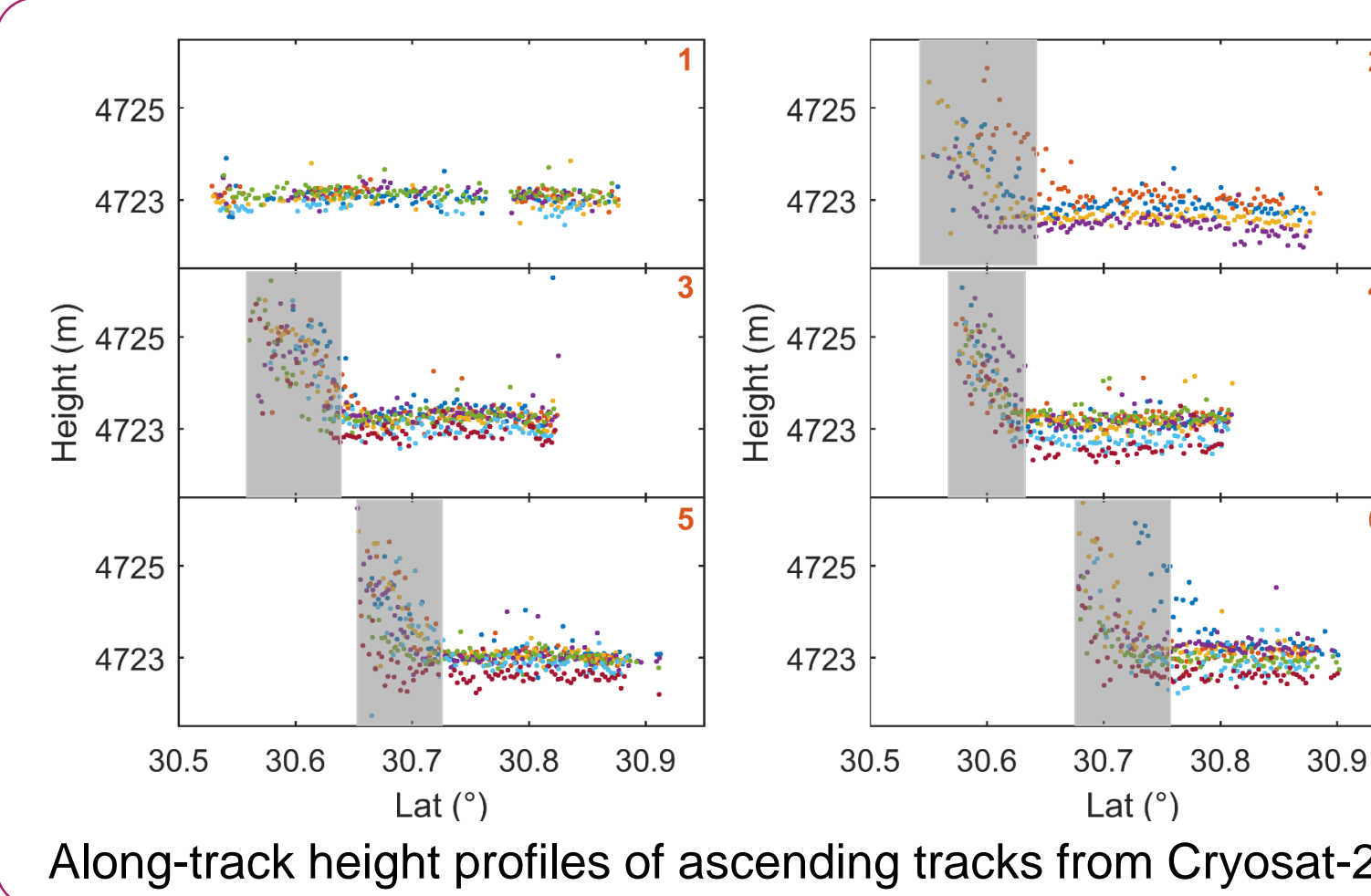
- Increased along-track resolution (~300 m) reduces land contamination
- Small footprint increases the capability of monitoring small water bodies
- Multi-look processing – better speckle reduction
- Peak waveform

Lake Namco, Tibet

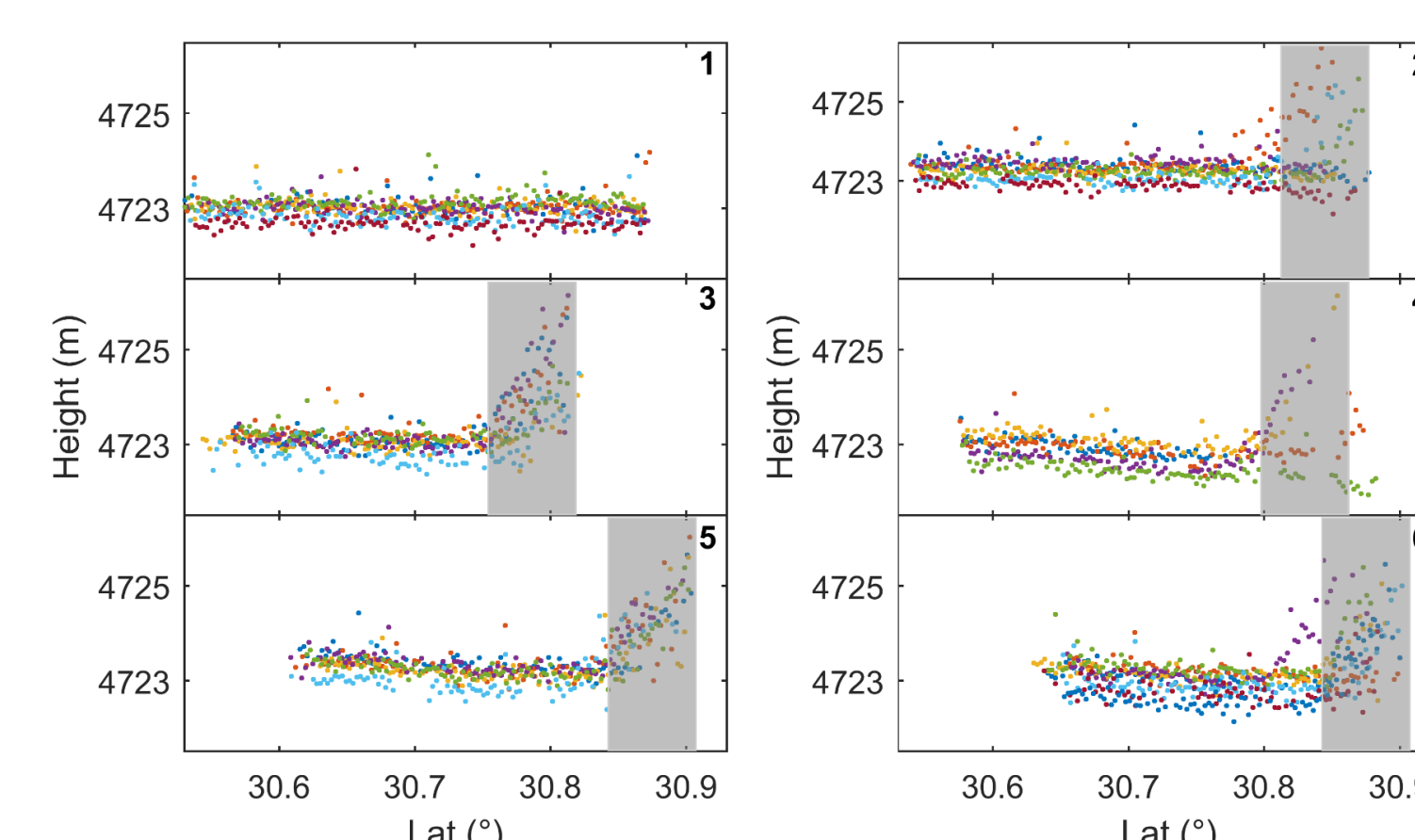


Lake Namco is located on the northeast flank of Nyainqentanglha Mountains. The lake generally stretches from west to east with a length of over 70 km. The lake level has risen rapidly over the last two decades.

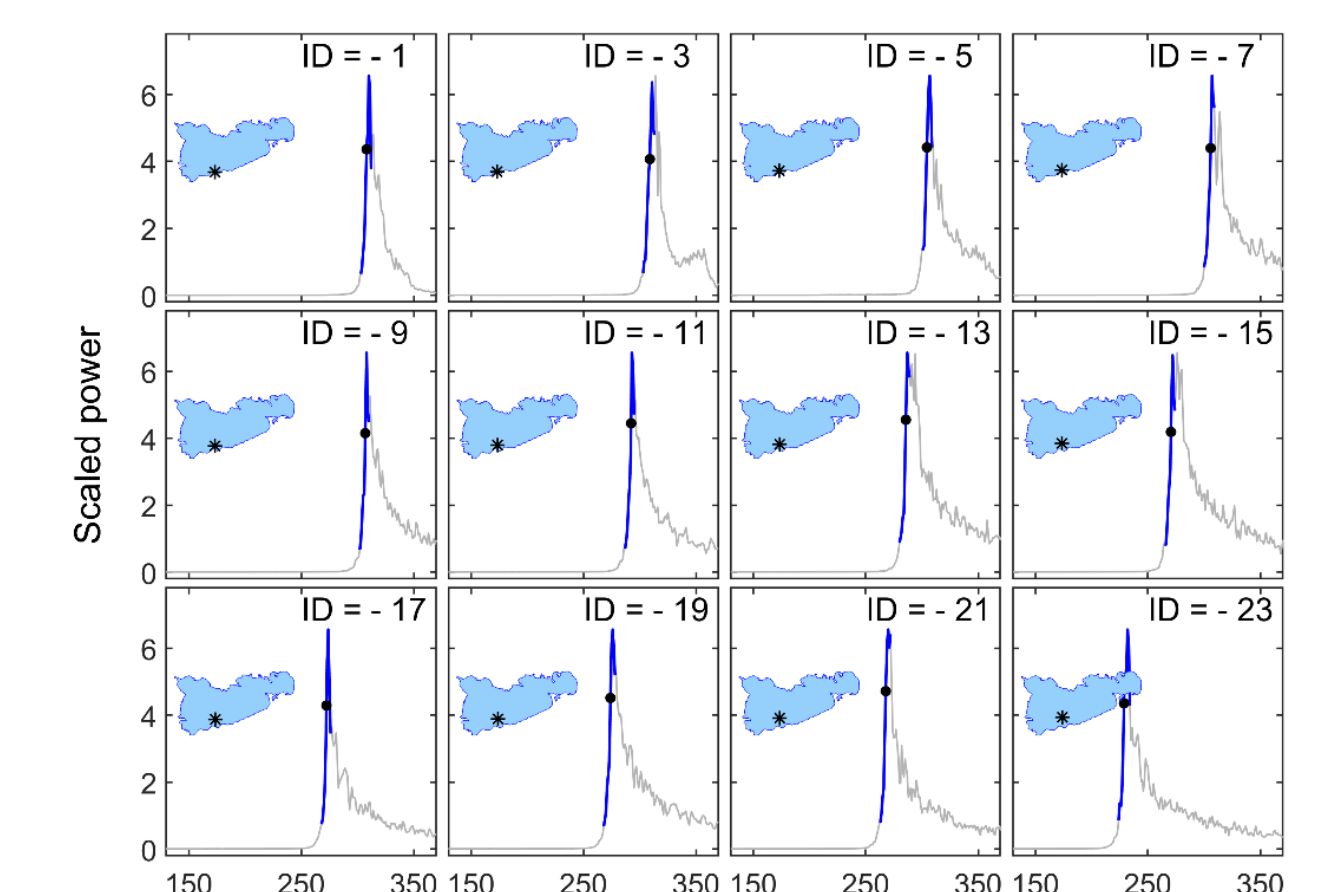
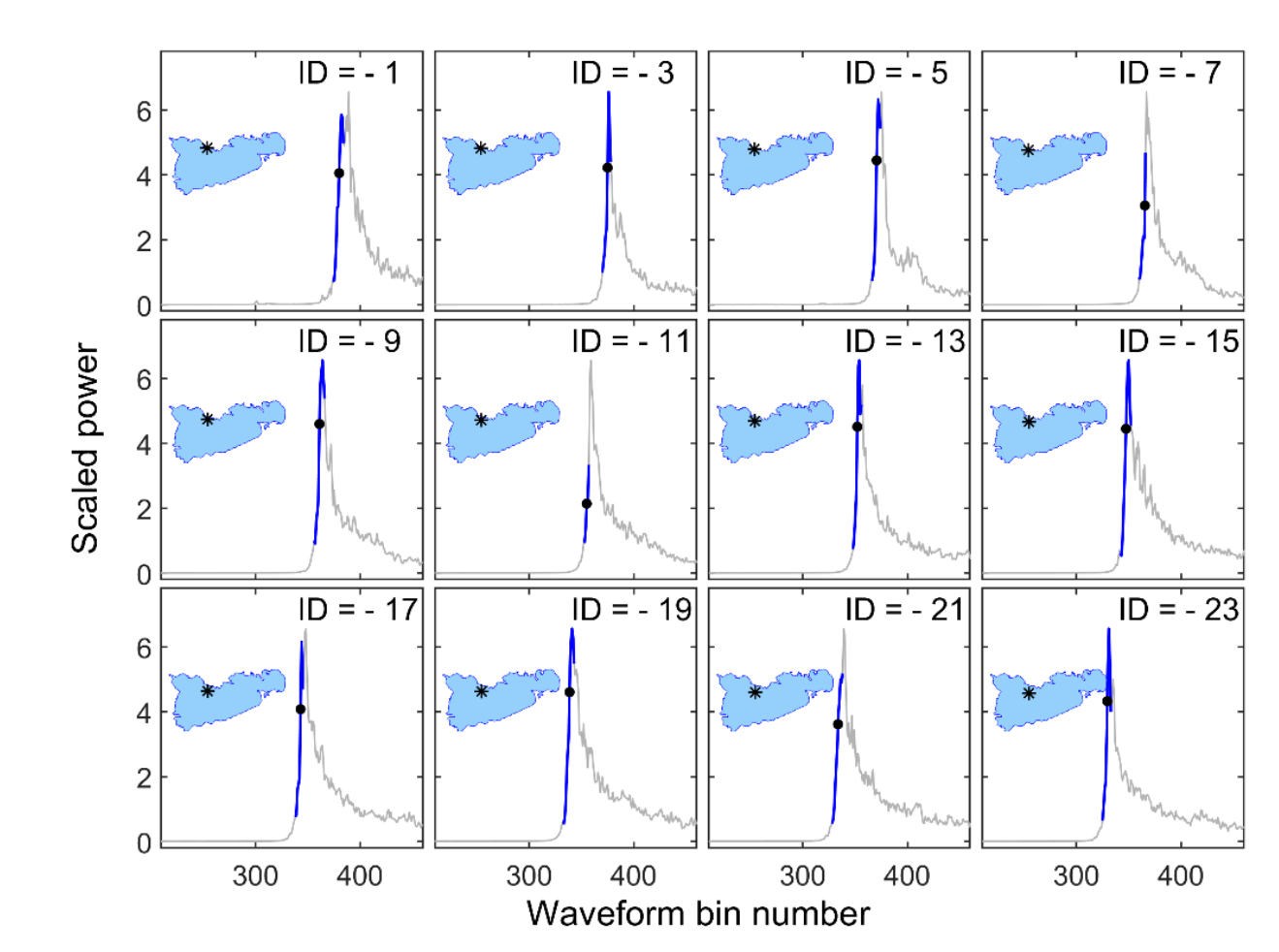
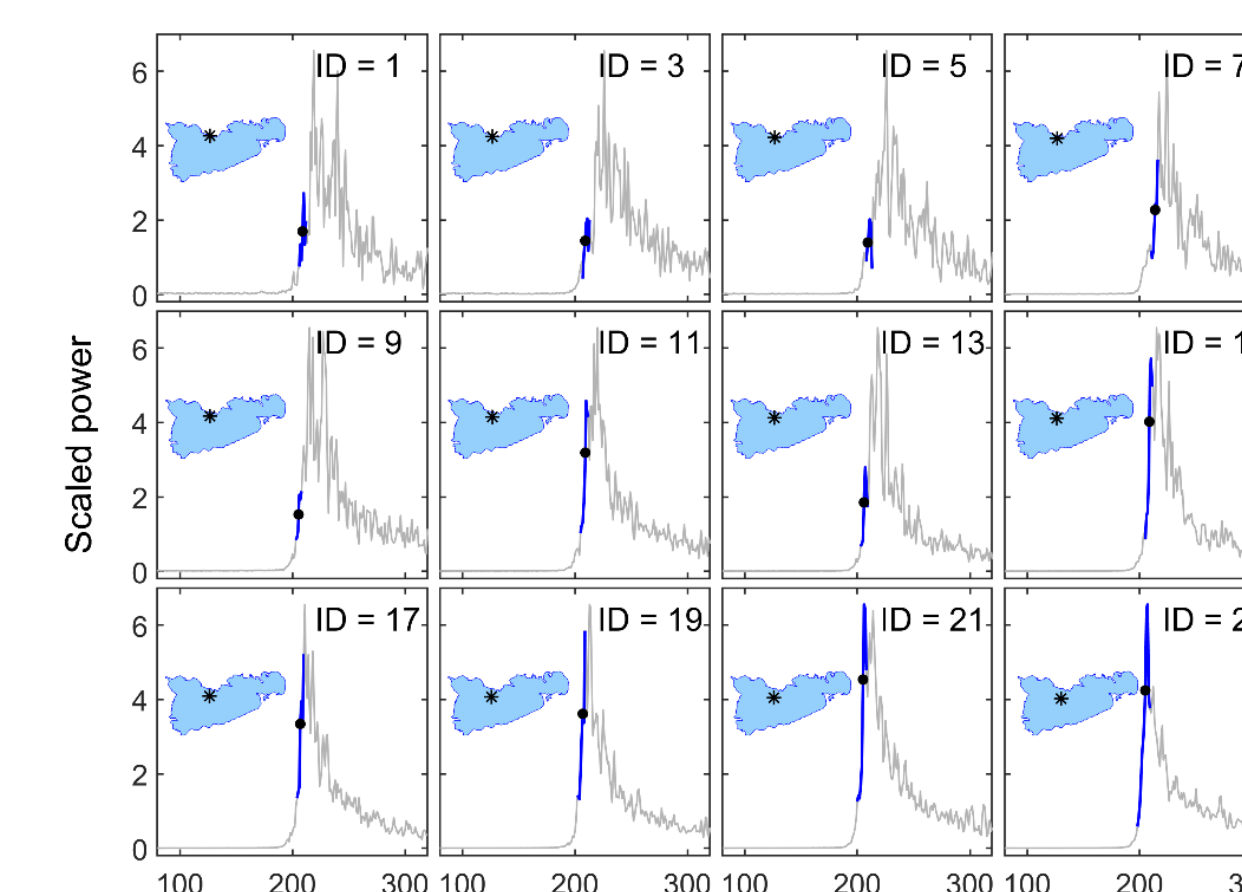
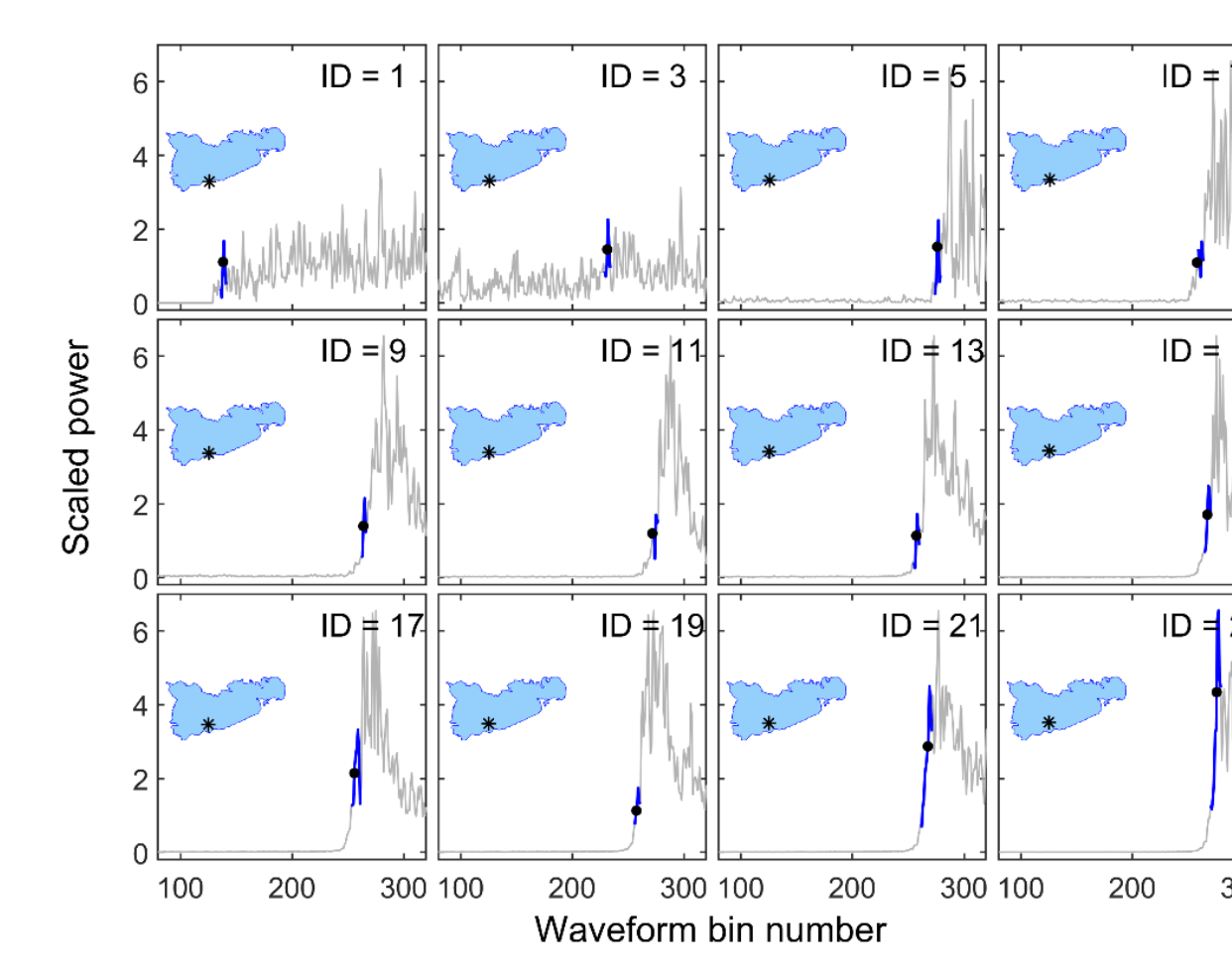
CryoSat-2 performance



Along-track height profiles of ascending tracks from Cryosat-2

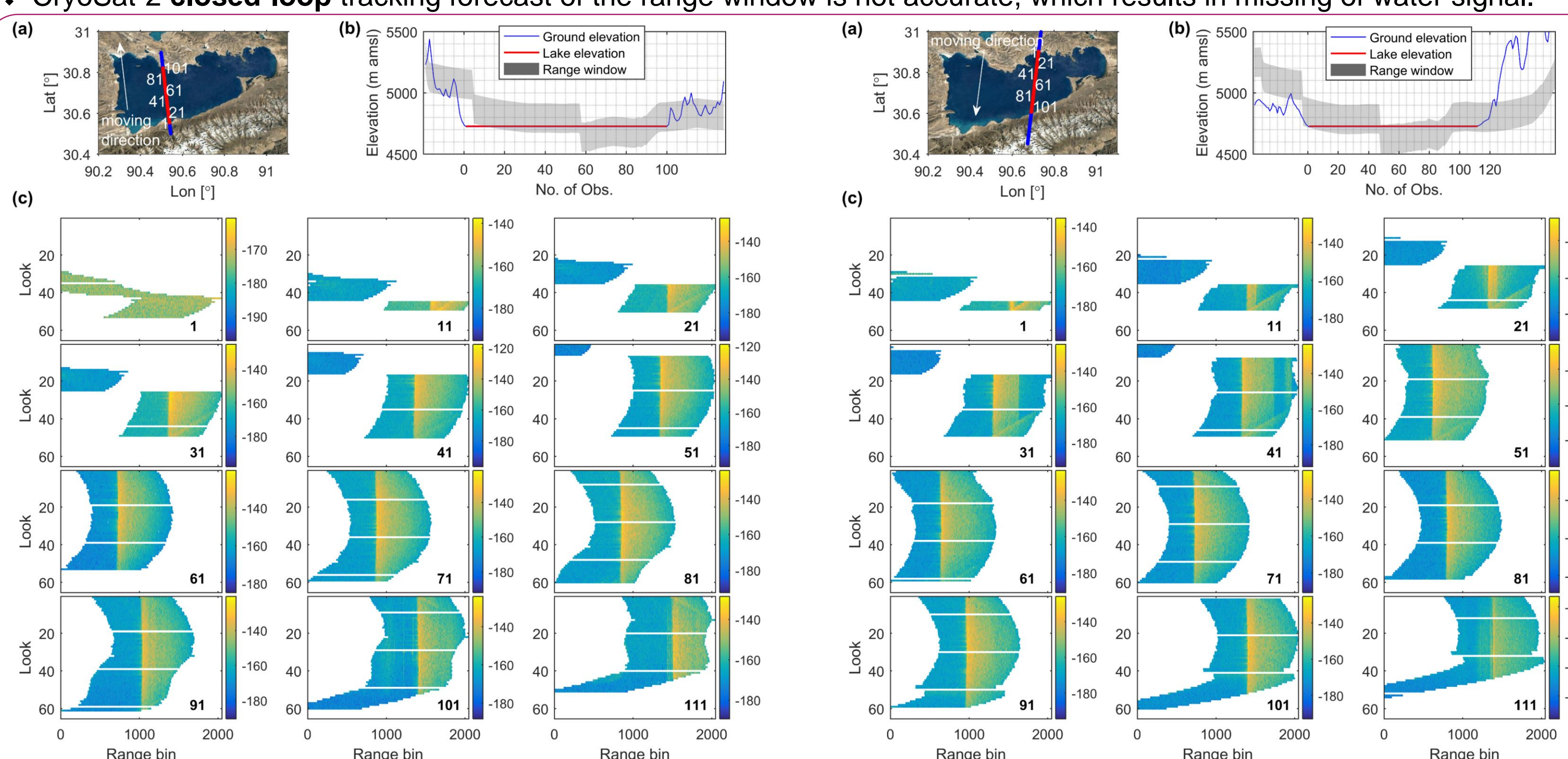


Along-track height profiles of descending tracks from Cryosat-2

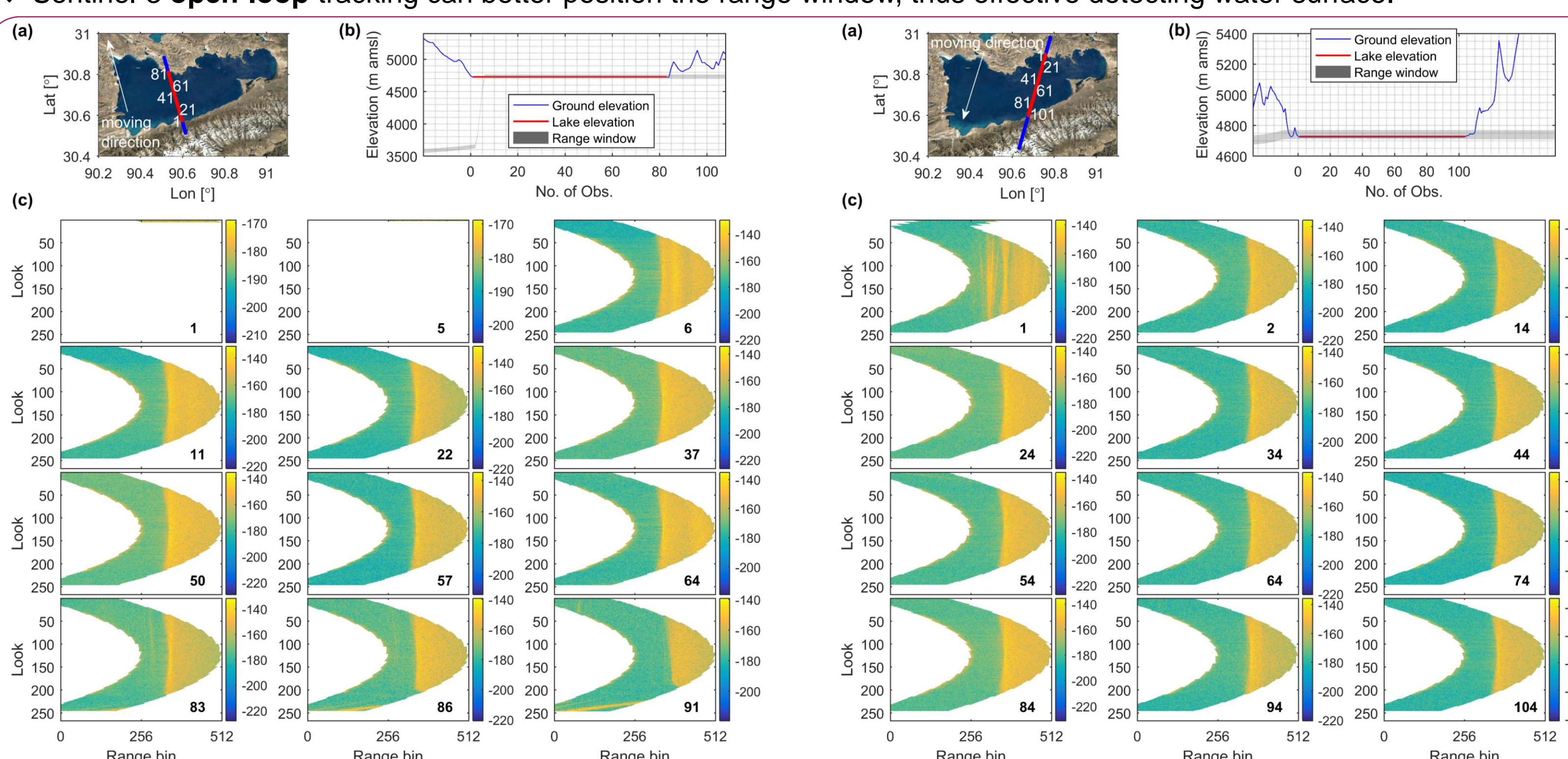


Tracking problem over rugged topography

❖ CryoSat-2 closed-loop tracking forecast of the range window is not accurate, which results in missing of water signal.



❖ Sentinel-3 open-loop tracking can better position the range window, thus effective detecting water surface.



Summary

- CryoSat-2 can better monitor the lake
- CryoSat-2 overestimates WSE nearshore when the satellite is flying over mountains towards the lake, due to the noisy waveforms
- CryoSat-2 stack data shows that only a few looks capture the water surface probably due to the wrongly positioned range window due to the on-board tracking system (slow adjustment?)
- Caution should be taken when processing CryoSat-2 data, e.g. excluding those measurements close to lake shore
- Sentinel-3 open-loop tracking is promising especially at lake shore areas

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EOForChina project website: <http://www.eoforchina.env.dtu.dk/>

