

Comments on "Automatic Delineation of Cracks with Sentinel-1 Interferometry for Monitoring Ice Shelf Damages and Calving".

Overall a well-written paper, which is generally easy to follow, although there are some minor points that should be clarified.

P.5, L116: "*cracks at the scale of the pixel resolution*". I think "spatial resolution" is a better term, as this is a lower limit (pixel size is often smaller).

P5, L116 to L123: Please provide numbers for the resolution, wavelength, and revisit time of the sensor, as this helps in interpreting the results and may not be known by everyone.

P5, L131, "*we assume the phase noise is negligible*". Although it is not relevant exactly for the discussion here, the temporal decorrelation should be briefly discussed somewhere in the introduction or theory section.

P6, L139: The sign of D_{tides}^{ij} used in equation (3) is not defined – is it positive for an upwards motion? In that case, the sign in the equation seems wrong. Since it is a purely vertical motion, perhaps it would be better to define it as a scalar.

P8, L193 "*The wrapped interferogram is geocoded*". Would it not be easier and more precise to calculate the gradients and edge detection in the original radar geometry, where the resolution in each dimension is known and can be accounted for, and no geocoding of a wrapped phase is required? Then just the final result could be geocoded. Please comment on this.

P8, L201: "*The discrete phase derivatives are computed by averaging the phase differences between adjacent pixels along the x- and y-directions over a square window*". The windows applied in eq 6 and 7 are not square, they are one-dimensional.

P10, L224: "*we neglect the phase gradient direction*". Of course, the gradient direction is not meaningful when the magnitude is low and should not be used in this case, but could it not be useful in a situation where the magnitudes on two sides are equal, but the directions differ? Please comment on this.

P11, L254 "*uncompensated tidal displacements*". These have no component in the along-track direction so they should not lead to phase jumps at the burst overlaps?

P13, L291 "*all areas above 50 m height*". Is this a general rule or does it only apply to this dataset?

P17, Section 6.4: Could the interferometric coherence perhaps show some of the fractures more clearly than just the backscatter image? Please comment on this, and maybe provide an example if this is so. Maybe also comment on whether the interferometric coherence could add some value to the processing, other than just the thresholding.

P19: Figure 12: The figure comes before it is referenced in the text. The same goes for Figure 13.

P20, L398 and 402: "*Differentiation*" implies finding a derivative. Please use the word "differencing" or "difference between"

P20, L411: *“This number of fringes corresponds to a displacement of about 35 cm in the direction of the line-of-sight”*. Isn't it technically a change in LOS displacement, changing along the fringe belt? What is the direction of the change (negative or positive in LOS)?

Some minor typos:

P1, L.10: “These unprecedented ... enable” should be “The unprecedented ... enables”

P2, L.33 “results into” should be “results in”

P2, L.43 “iceshelves is” should be “iceshelves are”

P2. L.56 “wide SAR images” should be “wide swath SAR images”

P5, L105 “November 2021” should be “November 2020”

P5, L120 “deramping or burst stitching” should be “deramping and burst stitching”

P7, L180: “hence” should be deleted

P7, L184 “account for” should be “accounting for”

P12, L274 “REMA DEM” should be “the REMA DEM”

P21, L417: “opposite”, please use another word, like. Opposite suggest a 180° change of the LOS direction.