Si et al. present a comprehensive observational and modeling study evaluating size-resolved INPs at multiple coastal locations. They found a relationship between particle diameter and fraction of INPs, indicating the larger particles were more efficient ice nucleators. Size-resolved ice nucleation studies such as this are needed to better characterize INP sources. Although this study provides valuable insight into INPs, I have outlined a few issues below that should be addressed prior to publication.

General comments:

Drying the sample flow to 2% seems quite extreme and is far below the GAW standard of 40% for the SMPS. Can the authors comment on how this dry of a sample flow may affect the ambient aerosol? I would assume these sort of conditions would remove semi-volatile species from the aerosol in addition to water, especially at these sizes. Although the authors do describe the corrections to the different diameter types and hygroscopic growth, the very large discrepancy between the APS and SMPS sampling conditions might not make them directly comparable given the possibility of other semi-volatile species that may have been removed.

I realize n_s has been commonly used to represent INP data, but how representative is n_s of the actual INP surface sites? The equation takes into account the surface area of *all* aerosols within a given size range, but if only 1 in 10^6 particles are INPs as the authors define for 0.2 um particles, is n_s realistic for the INP fraction? The authors should discuss any potential biases. Also, how was a definite size of INPs determined, given the MOUDI measures size ranges? In this case, shouldn't the aerosol surface area be defined by the same range of sizes from the SMPS and APS?

There seems to be disagreement between the air mass sources (especially at Amphitrite Point) and the source apportionment results (i.e., Fig 7). Can the authors comment on why the INPs appear to be of a more terrestrial origin yet air masses were predominantly from over the ocean? What sort of very localized sources could influence the samples?

Minor comments:

P2 l 39-43: The -35 C statement is redundant from the sentence above. Also, this statement should be reworded since INPs can initiate ice formation below -35 C (e.g., glassy organics, soot, sea salt).

P2 l 44-45: Please provide a reference for this statement.

P4, l104: Which 2 stages were analyzed?

P4, l125: How many droplets? What was the spacing? Were any neighboring droplet freezing effects apparent? For example, if droplets are too close, they can induce freezing in neighboring droplets.

P7, l188 and P8 l 222-223: Was there any issues with artifacts from storing the dishes at room temperature as opposed to freezing the samples? Also, could the authors comment on how there could be issues comparing samples from the different locations given the different storage conditions and duration?

P9, l264 on: Since the measurements were conducted at coastal locations, there is a likelihood that terrestrial sources of INPs may also influence the air sampled, especially given air mass trajectories show not all air masses originated from over the ocean. Can the authors comment on how this possible interference may have been dealt with, aside from the brief statement on the end of section 3.1?

P11, l 313: These concentrations seem fairly high for an Arctic marine atmosphere. What was the error or standard deviation of these averages? Were they just from when air masses originated over the ocean? Was new particle formation observed?

P12, l 349: Please provide equation for n_s.

P14, l 409: How was "marine biological activities" defined?

P14, l411: But air masses originated from over the ocean 94% of the time, so how would terrestrial sources be a dominant source of INPs? There seems to be some inconsistency between air mass sources in this manuscript as compared to the results from Mason et al. (2015a).

Figure 2: Given the MBL can often be quite low, especially in the Arctic, the color scale should be adjusted so that the 0 – 600 m range is easier to differentiate in the figure.