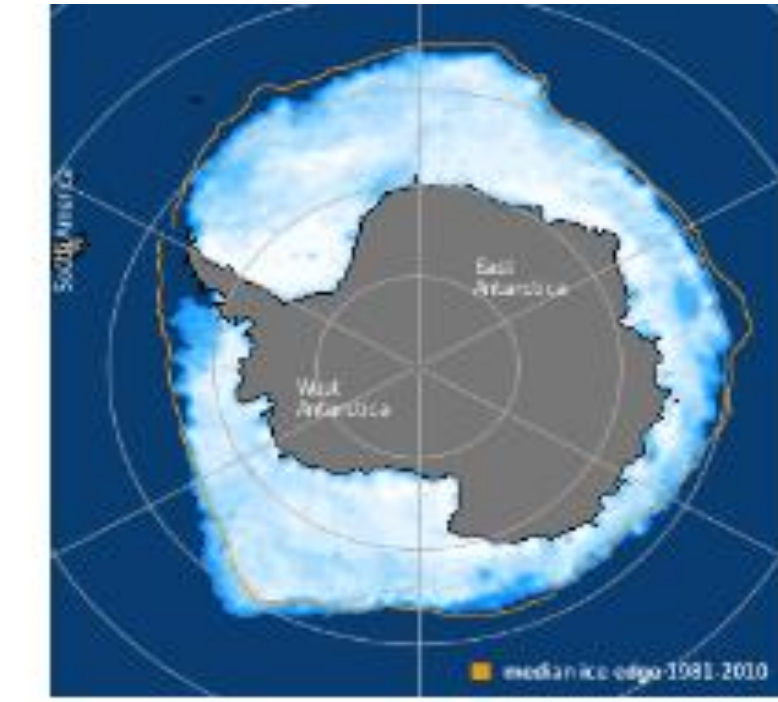
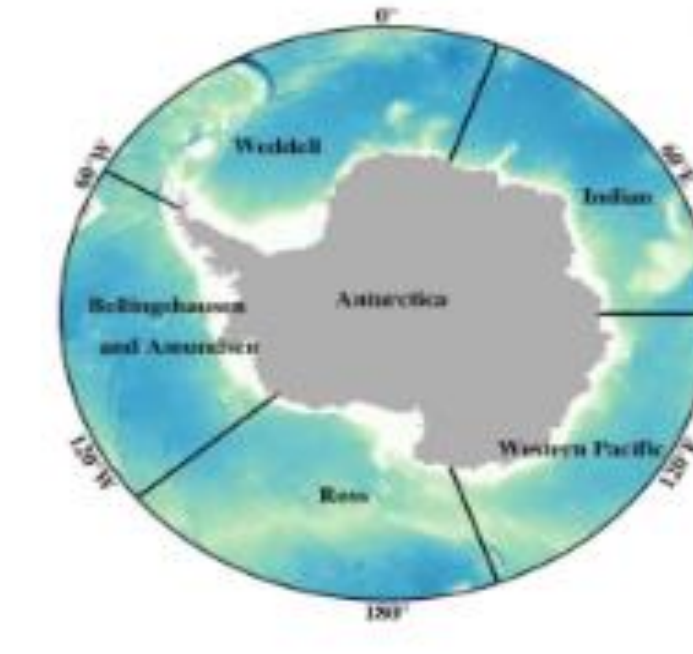
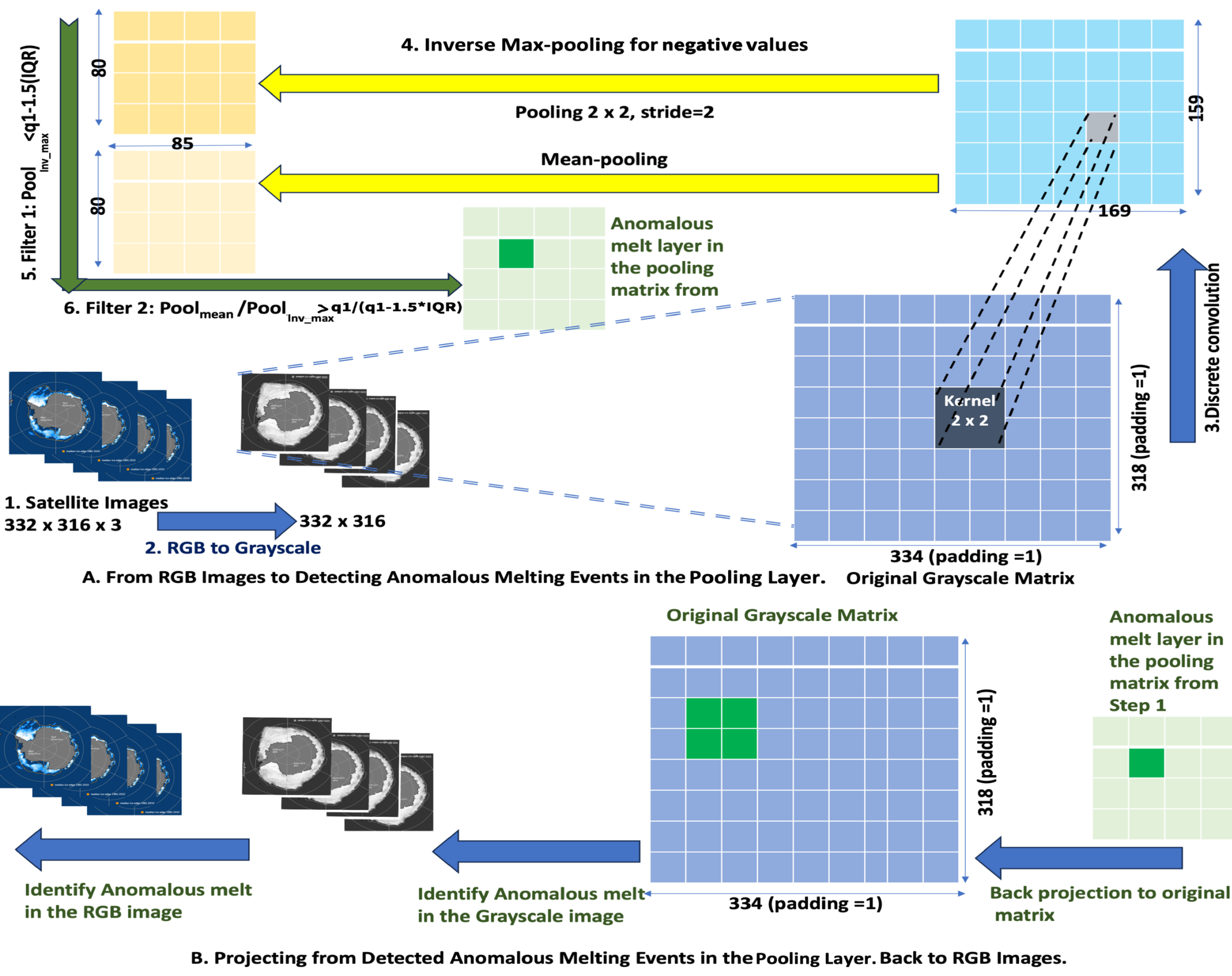


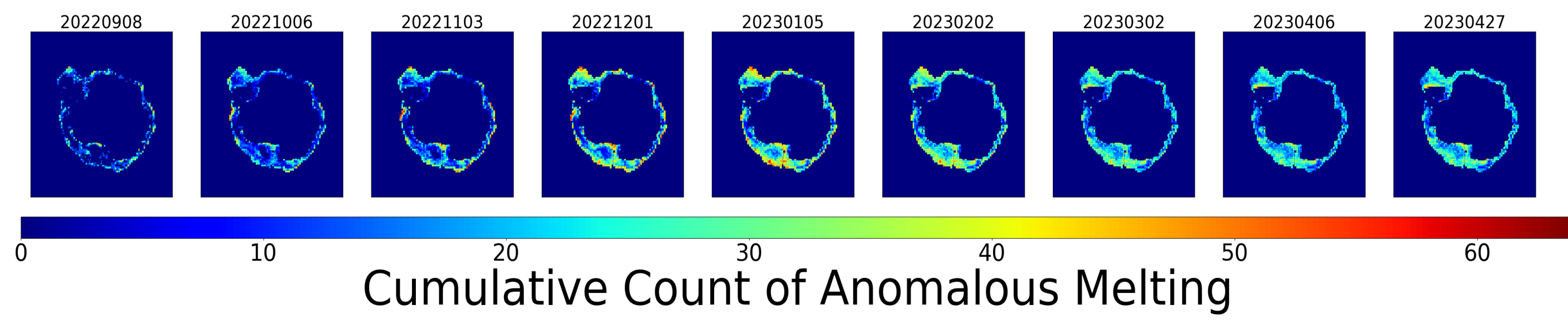
- ❑ Antarctic Sea ice extent reached a new record low of 1.965 million km² on 23rd February 2023 (~ 32% below climatological values).
- We need to understand how the melting occurred during the August 2022 to February 2023.
- Did anomalous melting occur over there?
- Where did they originate and how did they propagate?

❖ **Image Processing by CMAD to detect Anomalous Melt.**



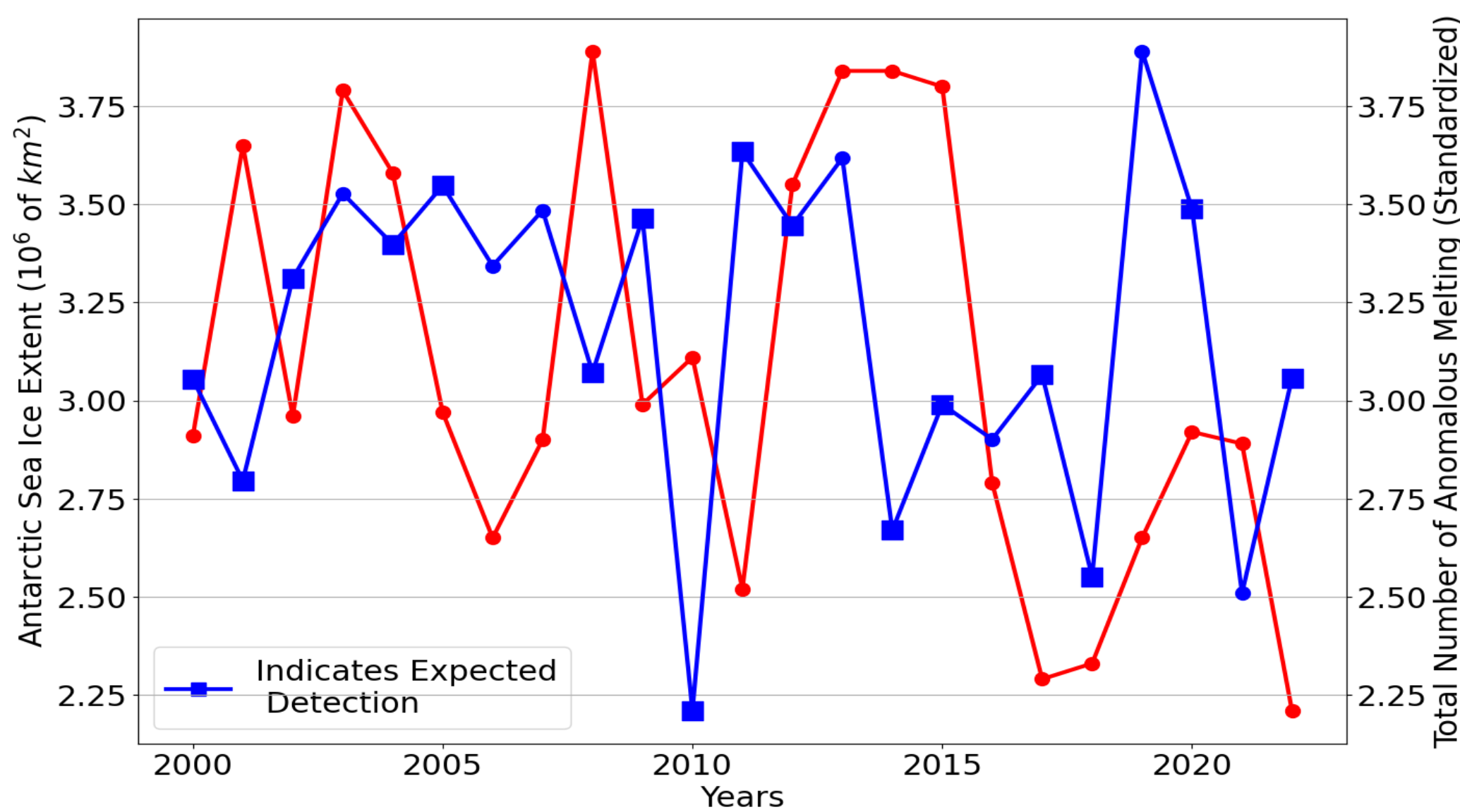
A. Five Regions of Antarctica B. Example: Sea Ice concentration RGB Image 09012022

❖ **The anomalous melting onset and progress are calculated every 7 days starting from 09082022 to 04272023.**

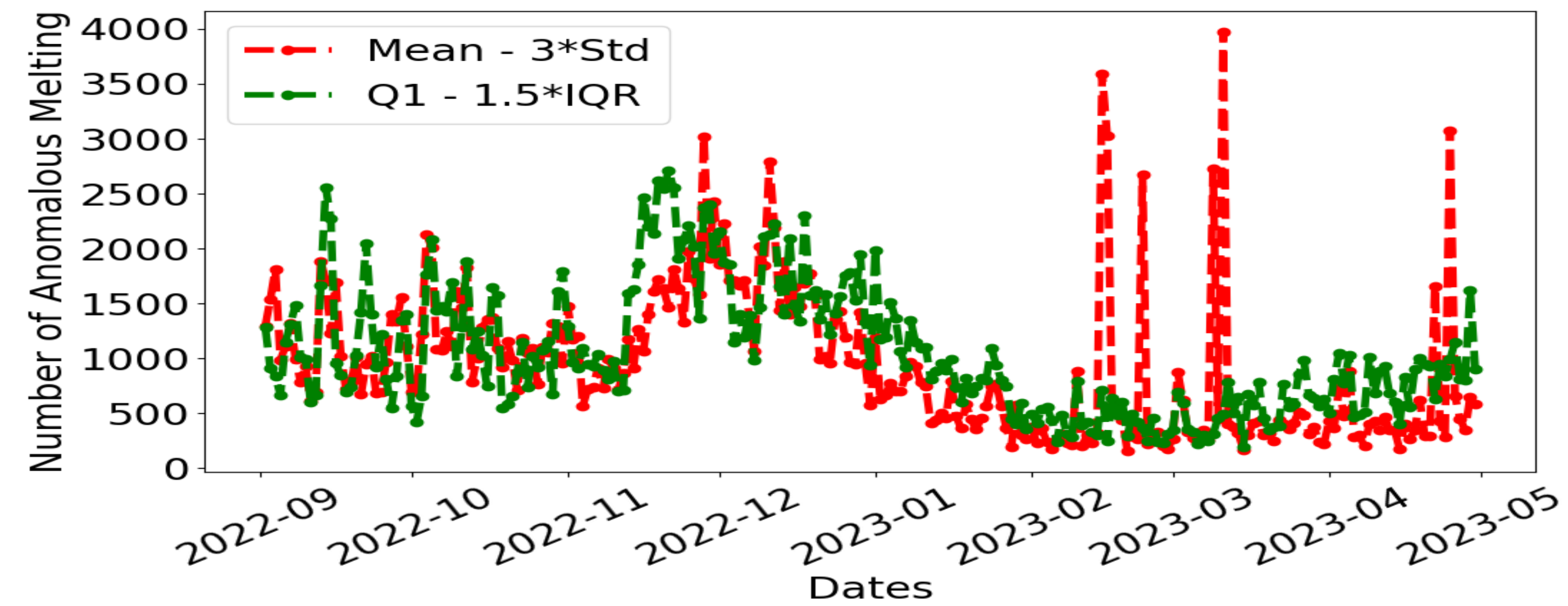


- ✓ CMAD detects the onset of the Anomalous melting patterns.
- ✓ The Weddell and the Ross Sea regions are heavily affected by the anomalous events.

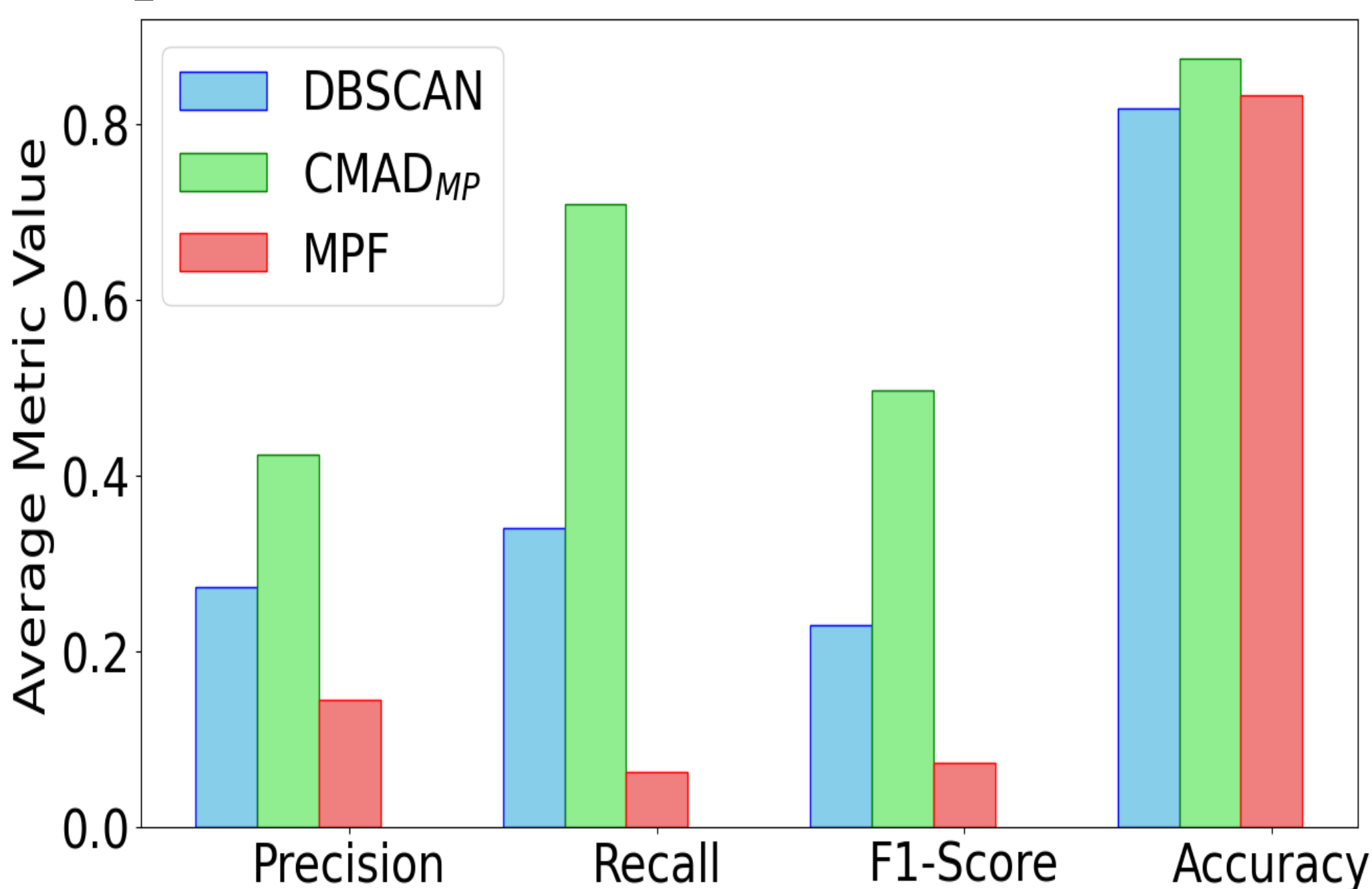
❖ **CMAD analysis shown in the blue line and blue box indicates the correct identification of CMAD.**



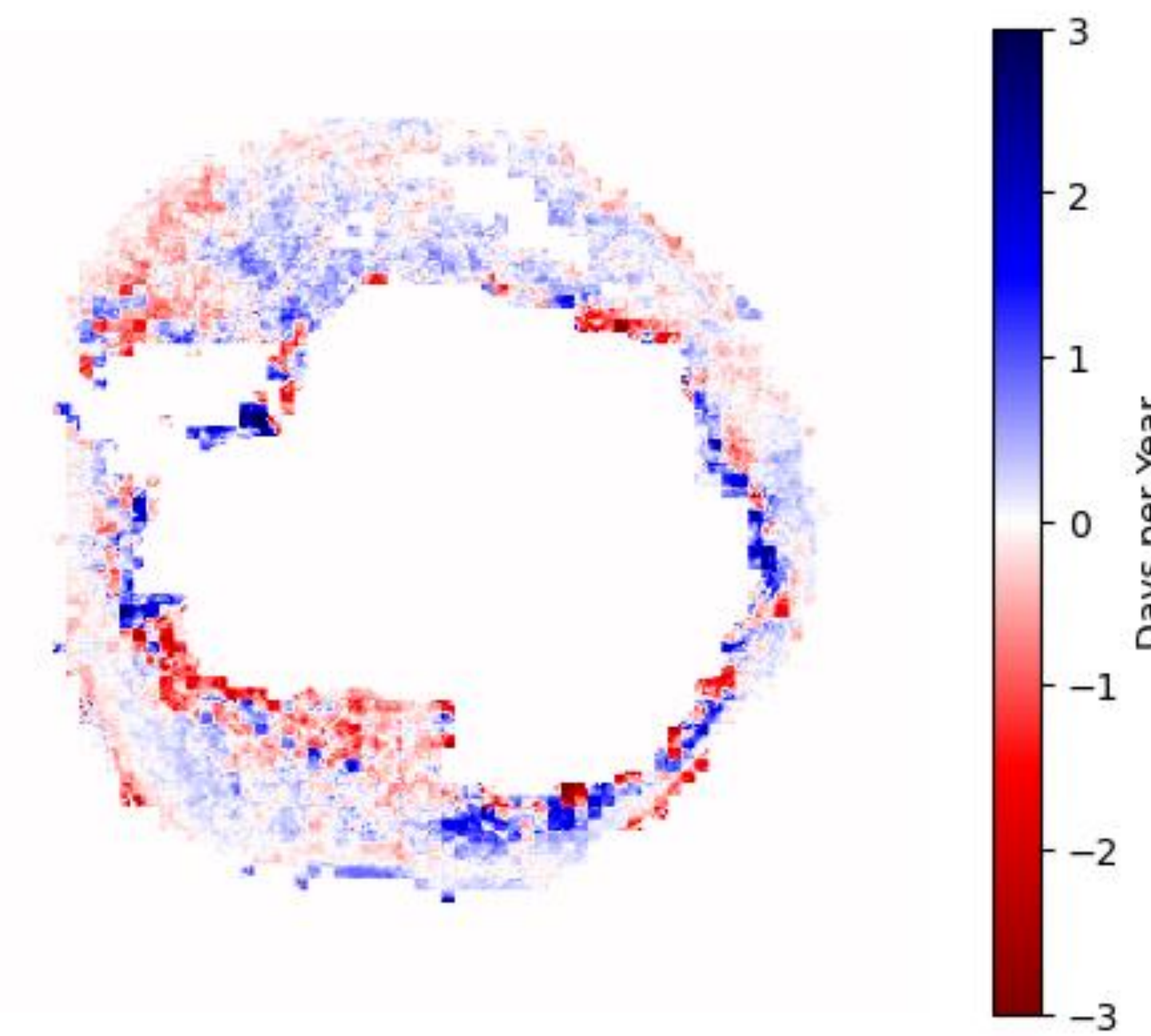
❖ **Mean minus 3 times standard deviation based CMAD (depicted in red) and the Q1 minus 1.5 times IQR based CMAD (depicted in green) methods.**



❖ **CMAD_{MP} shows best performance for effectively capturing changes in extreme values over time in comparison to other methods.**



❖ **Exploring changes in first day anomalous melt timing over the years in Antarctic Sea ice.**



- **Conclusion:** Inverse max-pooling in CMAD can be used to detect the spatial distributions and sub-regional variations in anomalous events.
- **Significance:** Sea ice acts as a protective blanket to the land ice that is equivalent to a sea level rise of 200 feet.
- **Future study:** A future study will be conducted to apply inverse max pooling to encompass full CNN. We plan to improve the CMAD method to better estimate anomalous melting and steady state melting.

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