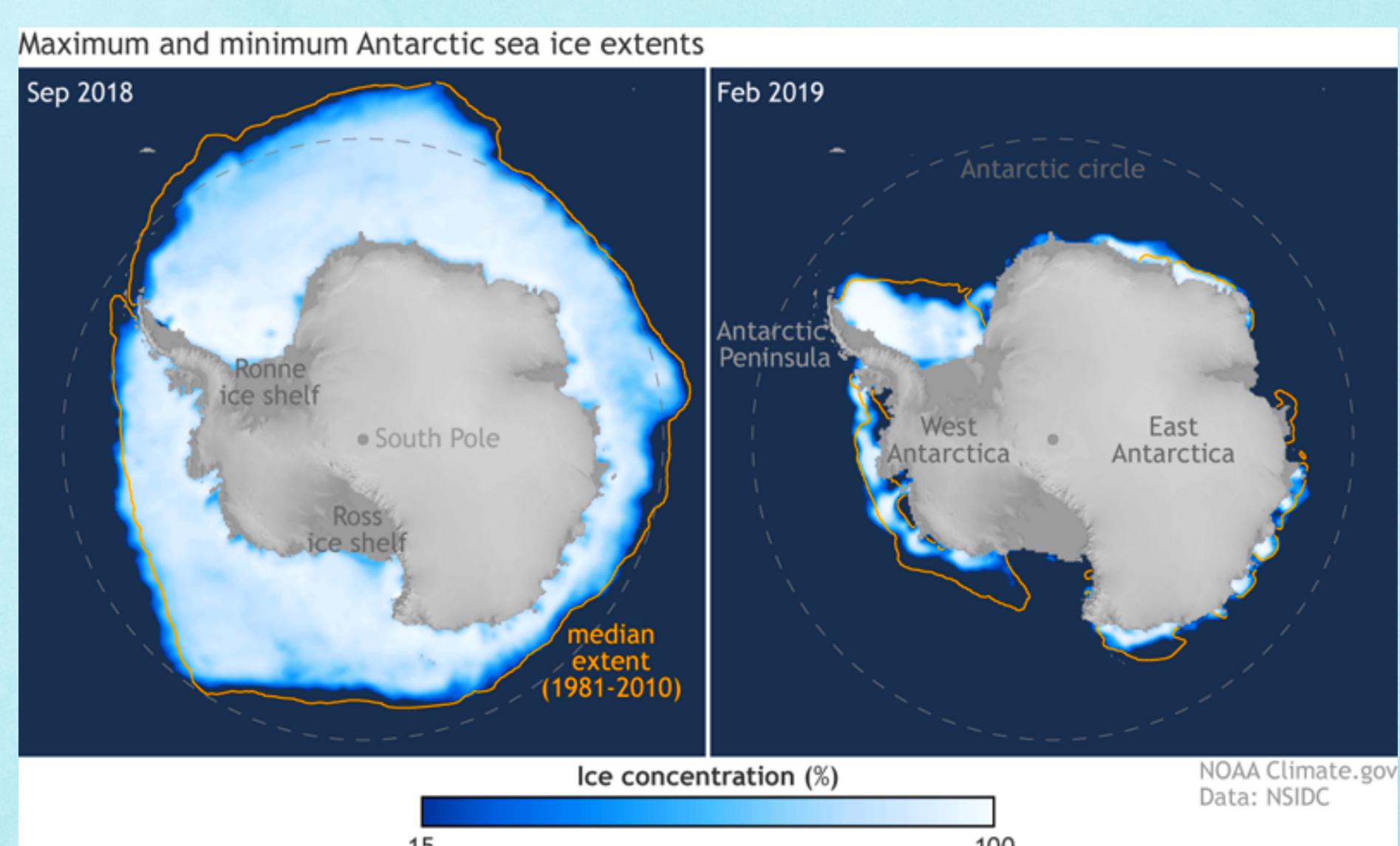


SEA ICE CONCENTRATION ESTIMATION USING MACHINE LEARNING

A Research Poster by Muneeb Bray

1 BACKGROUND

Due to the minimal amount of data in Southern **Antarctic** regions, specifically in regard to **sea ice concentrations (SIC)**, a machine learning approach was implemented to solve this issue with its pattern recognition capabilities. This is a result of the high water vapour content in the atmosphere of the Southern region, which inhibits the **Passive Microwaves (PMW)** instrumentation from acquiring the SIC data. **Synthetic Aperture Radar (SAR)** has the capability to penetrate the atmosphere and provide image data that can be used in a machine learning model to produce SIC estimates.

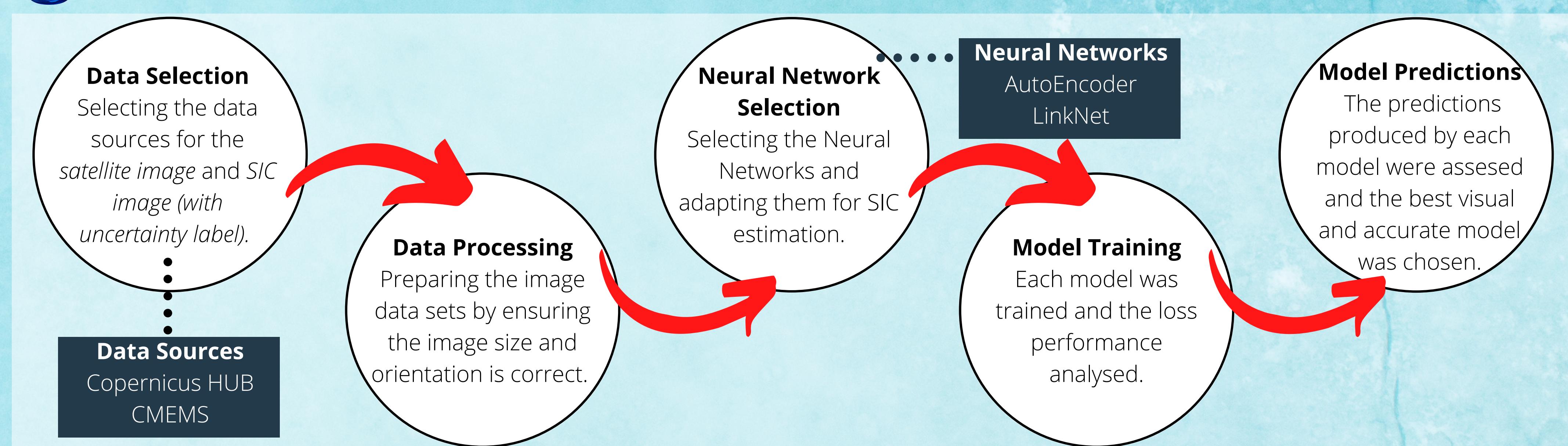


2 SEA ICE INFORMATION

The **Antarctic** region has the largest variation of any landmass in the cryosphere. As seen in the picture on the left, the maximum **sea ice extent (SIE)** occurs during the winter seasons (**FREEZING PERIOD**) and the minimum SIE occurs during the summer seasons (**MELTING PERIOD**). The change observed here is drastically larger than the change in the **Arctic** region, which is likely attributed to the differences present in each environment that shapes the landscape of these large ice landmasses through time.

This information of the **seasonal cycles** present in the **Antarctic region** poses a potential means of providing a machine learning model with "**hidden" features**" that may have been overlooked in the past.

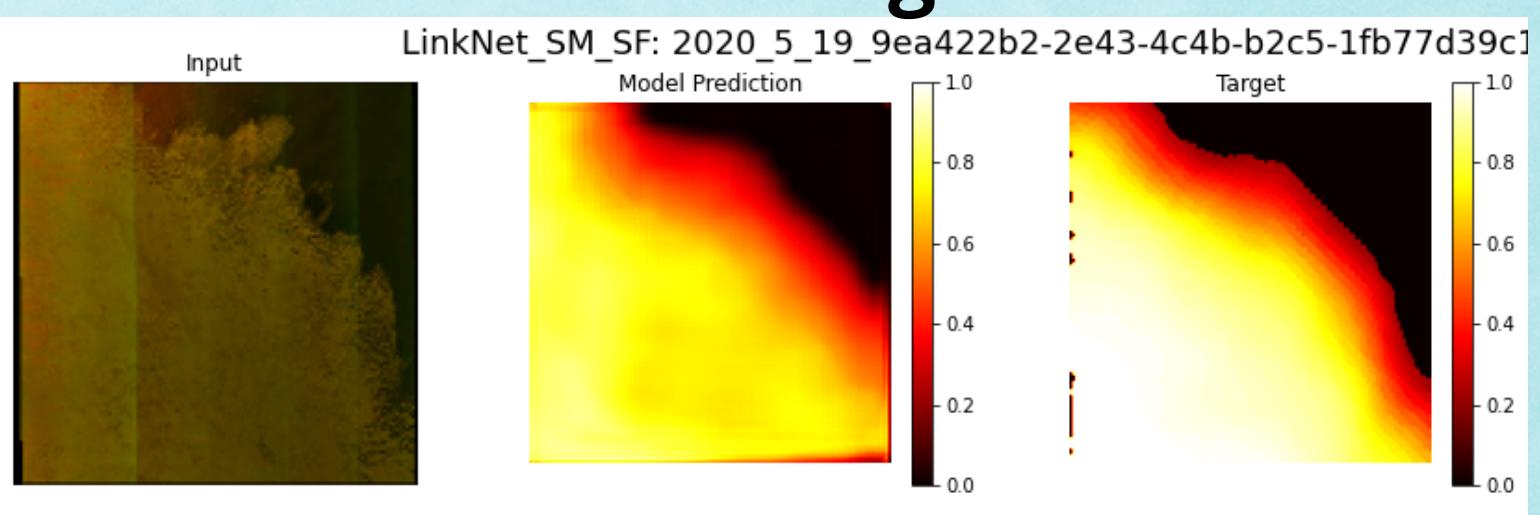
3 DESIGN APPROACH



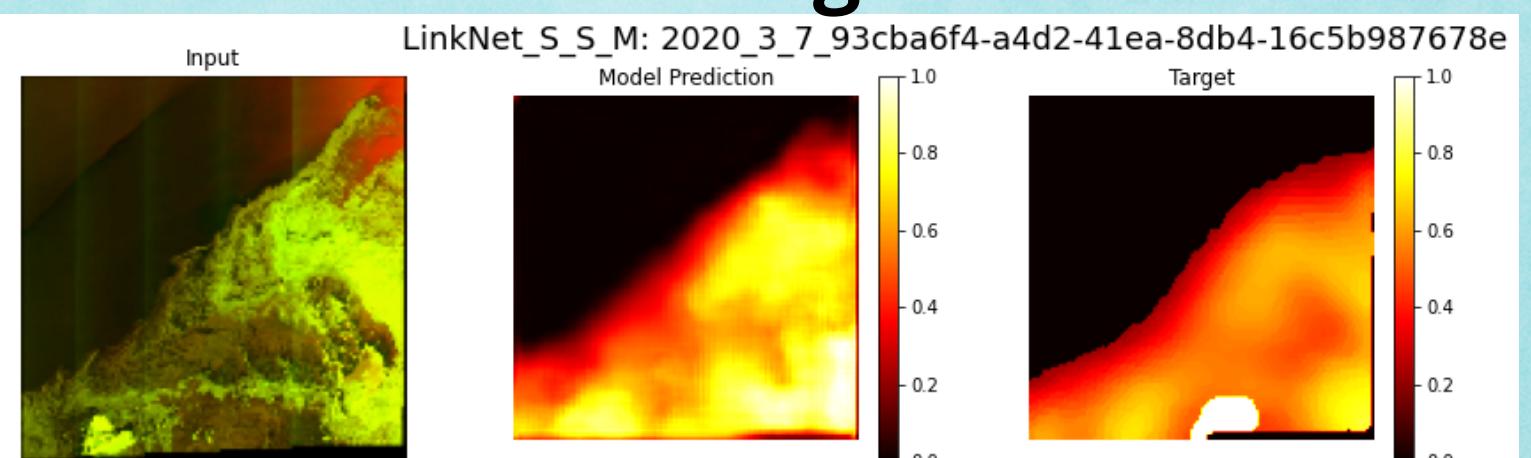
4 PREDICTION RESULTS

The results obtained from this investigation sought out to find the best models for sea ices regions in the Southern hemisphere.

Southern Freezing Period:



Southern Melting Period:



Conclusions
The **models** trained on the **Southern** hemisphere during its **melting period** provided the best results in terms of **visual and pixel accuracy**. This is likely due to the increased number of data available in this period compared to the freezing period.

5 RECOMENDATIONS

Apply this data set to Neural Networks **similar** to LinkNet, i.e. **PSPNet**, **DeepLabV3** and **FPN** etc.

If implementing a Neural Network based on **dense layers**, **transfer learning** is able to improve performance.

Increasing the **image dimension** would give the models more information and in turn produce **better** results.

Combining this SIC data with/using an **alternative data source** could bypass errors in the ground truth labels.

