

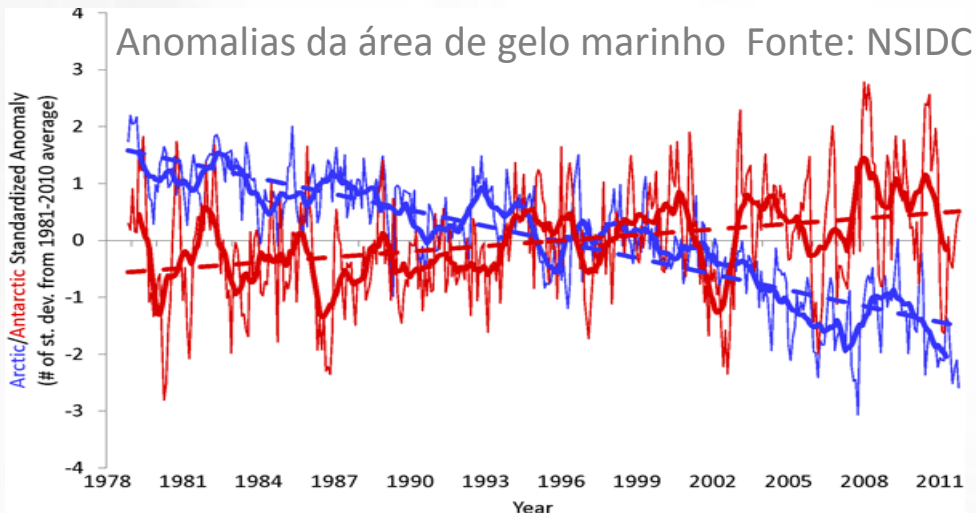
Interação Oceano-atmosfera-Gelo Marinho e Amplificação Polar das mudanças Climáticas

Fernanda Casagrande
Doutoranda CCST



Importância do gelo marinho

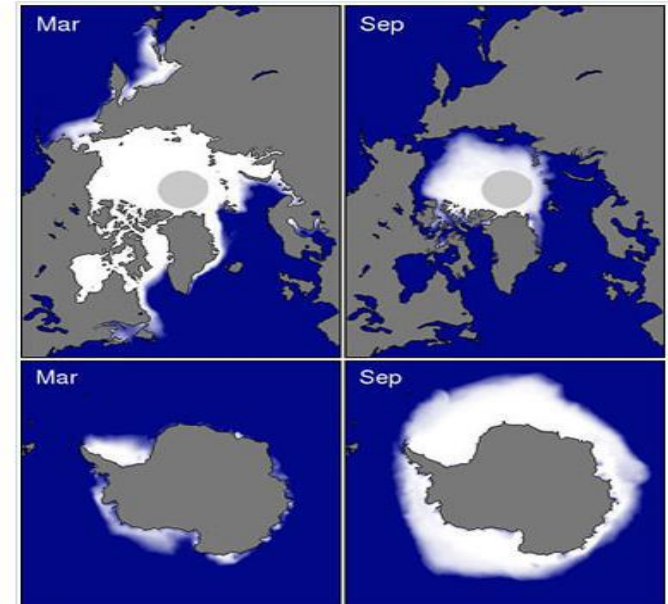
- ❖ Importante papel no equilíbrio térmico do planeta;
- ❖ Indicador sensível de mudanças climáticas;
- ❖ Potencial de afetar circulação oceânica e atmosférica
- ❖ Processos de feedback albedo – gelo marinho



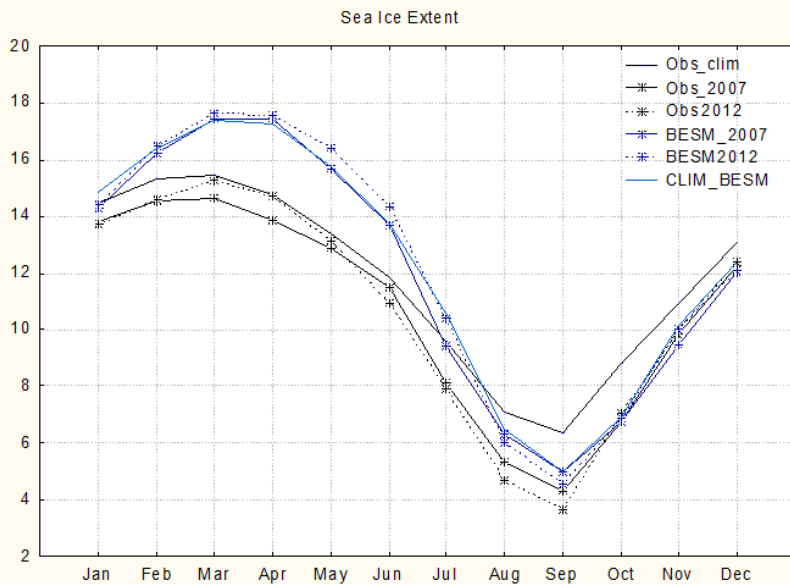
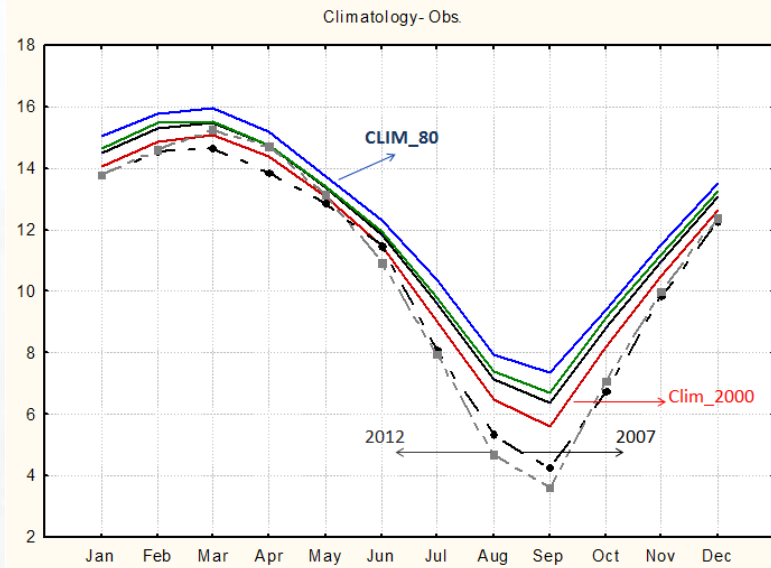
Declínio GM (ext, espessura e idade)
Causa: Fatores antropogênicos e naturais

Antártica: Aumento GM

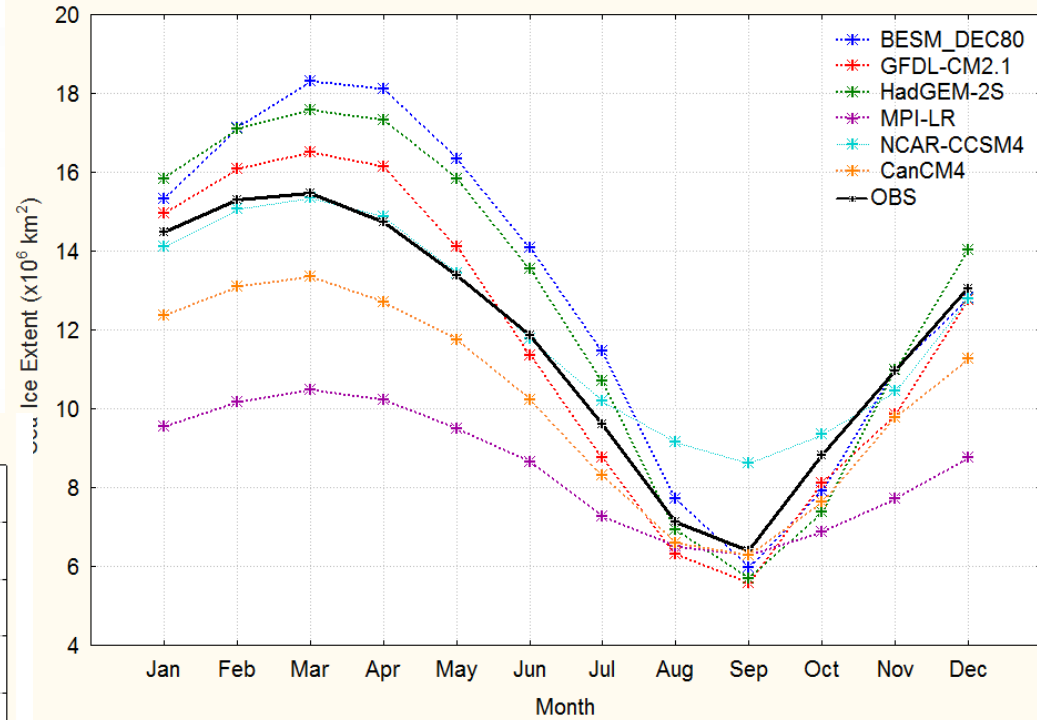
Artico diminui taxa 2x maior do que a antartica aumenta



Ciclo sazonal

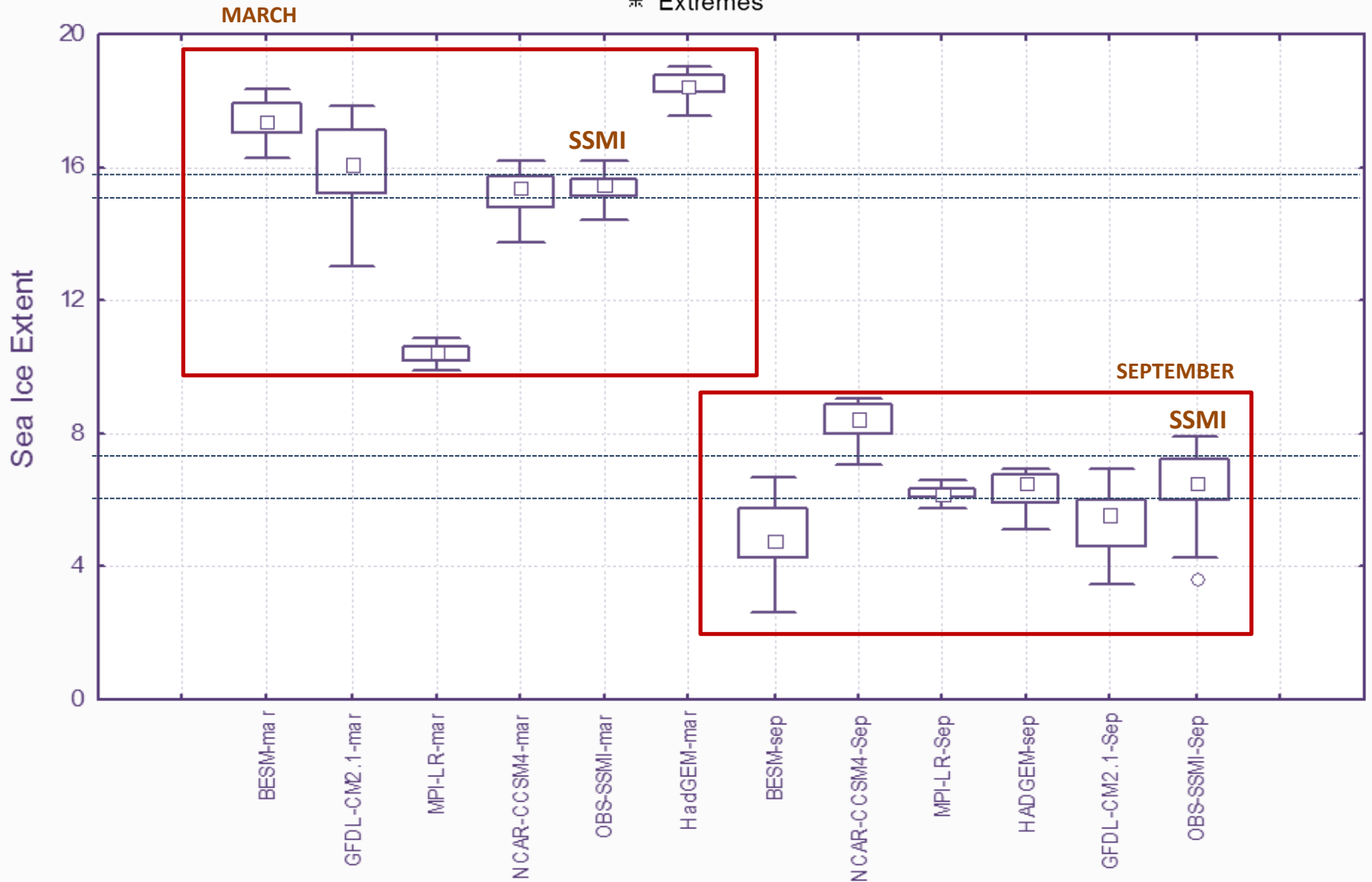


Arctic Sea Ice Extent - Climatology - CMIP5

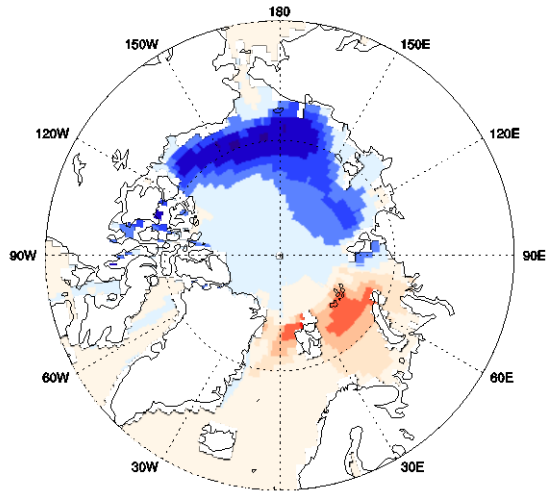


Box Plot - Arctic Sea Ice extent - CMIP5 Data set

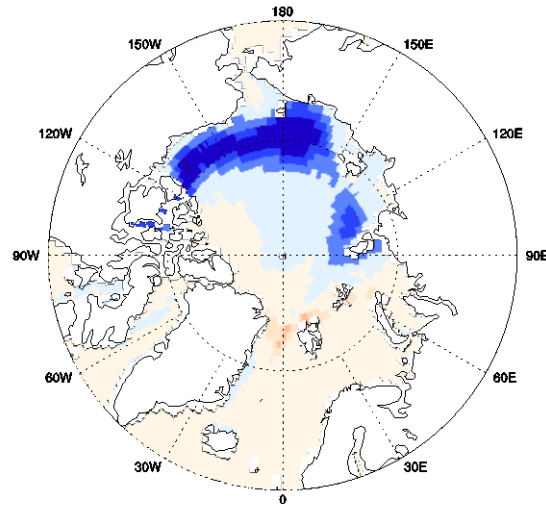
□ Median ◻ 25%-75% ▭ Non-Outlier Range ○ Outliers
‡ Extremes



BESM - SATELITE DECADAL 1980-1990 sep

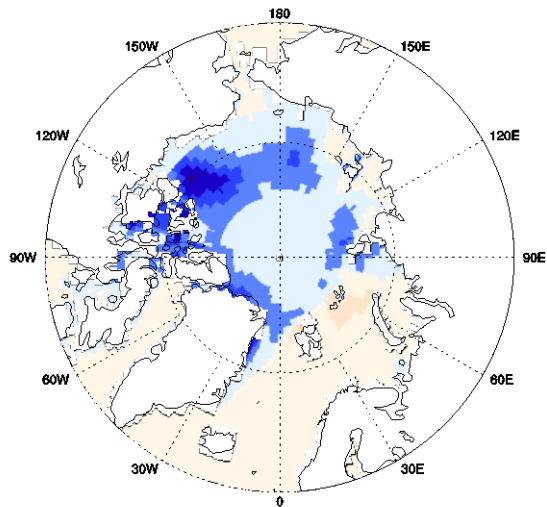


GFDL - SATELITE DECADAL 1980-1990 sep

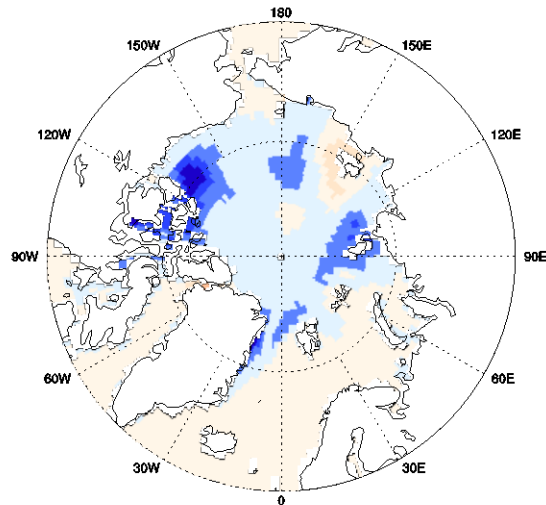


Subestima valores de SIC nas regiões dos mares de Beufort, chukchi e Leste siberia na decada 80-90.

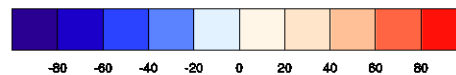
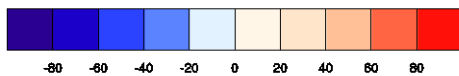
BESM - SATELITE DECADAL 2000- 2010 sep



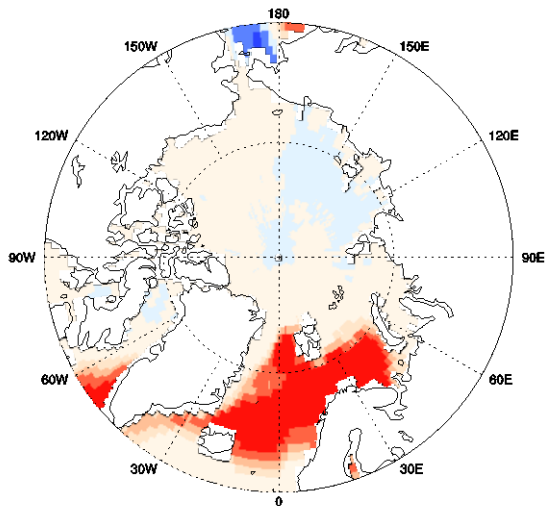
GFDL - SATELITE DECADAL 2000- 2010 sep



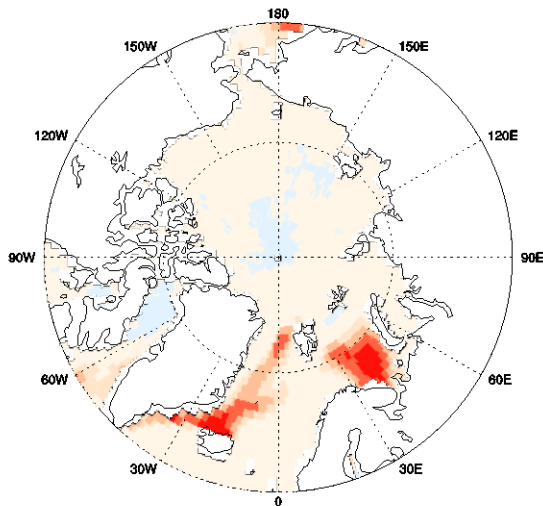
BESM- superestima na região do mar de Barents.



BESM - SATELITE DECADAL 1980-1990 march

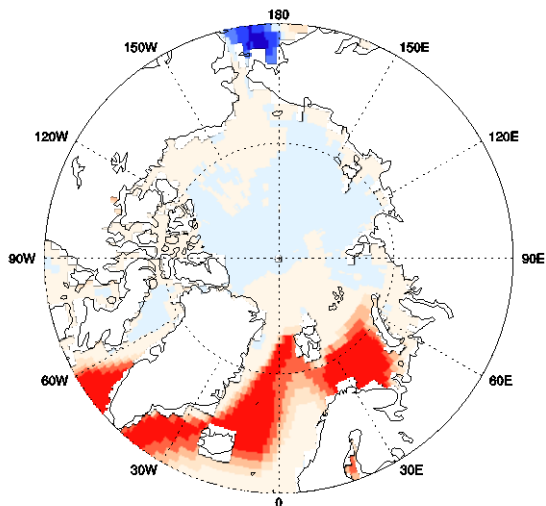


GFDL - SATELITE DECADAL 1980-1990 march

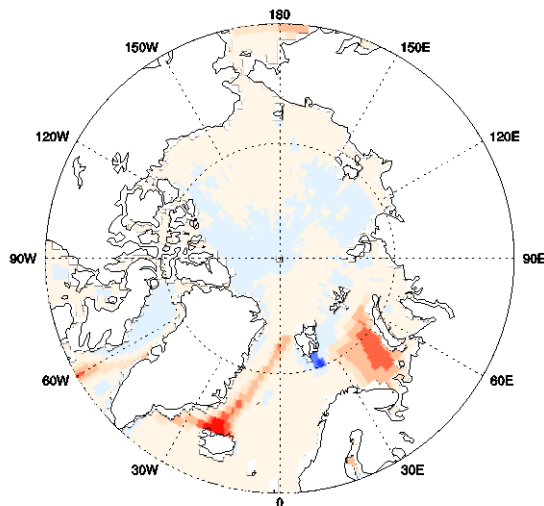


Superestima dos valores na região do mar de Barent e mar groenlandia

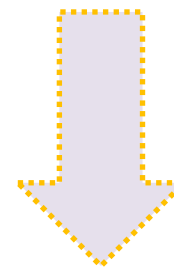
BESM - SATELITE DECADAL 2000- 2010 march



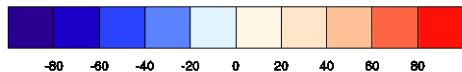
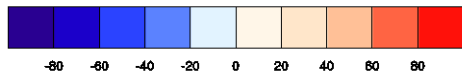
GFDL - SATELITE DECADAL 2000- 2010 march



Em andamento....



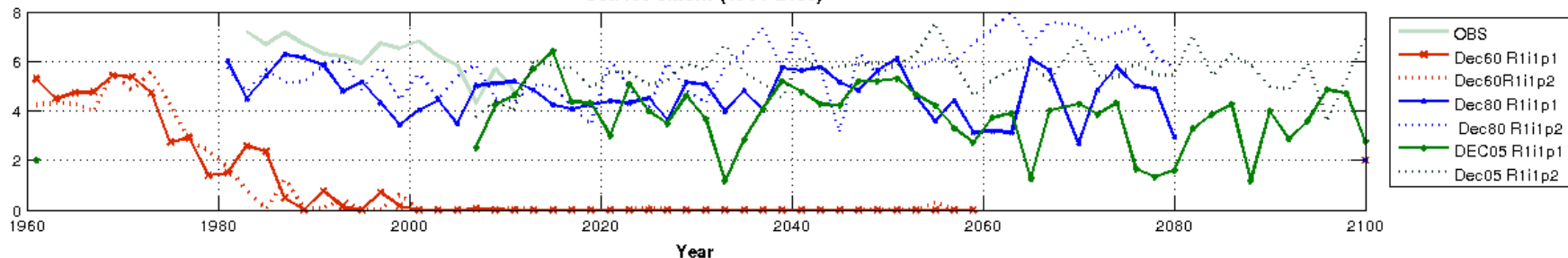
Relacionar com Conteúdo de calor no oceano e temperatura do ar



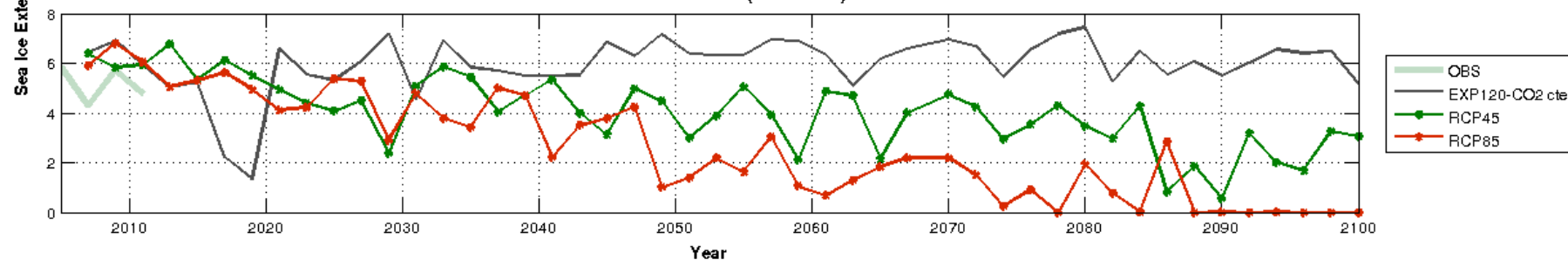
Variações do gelo marinho baseado nos resultados do BESM

Rodadas decadais e RCPs

Sea ice extent (1961-2100)



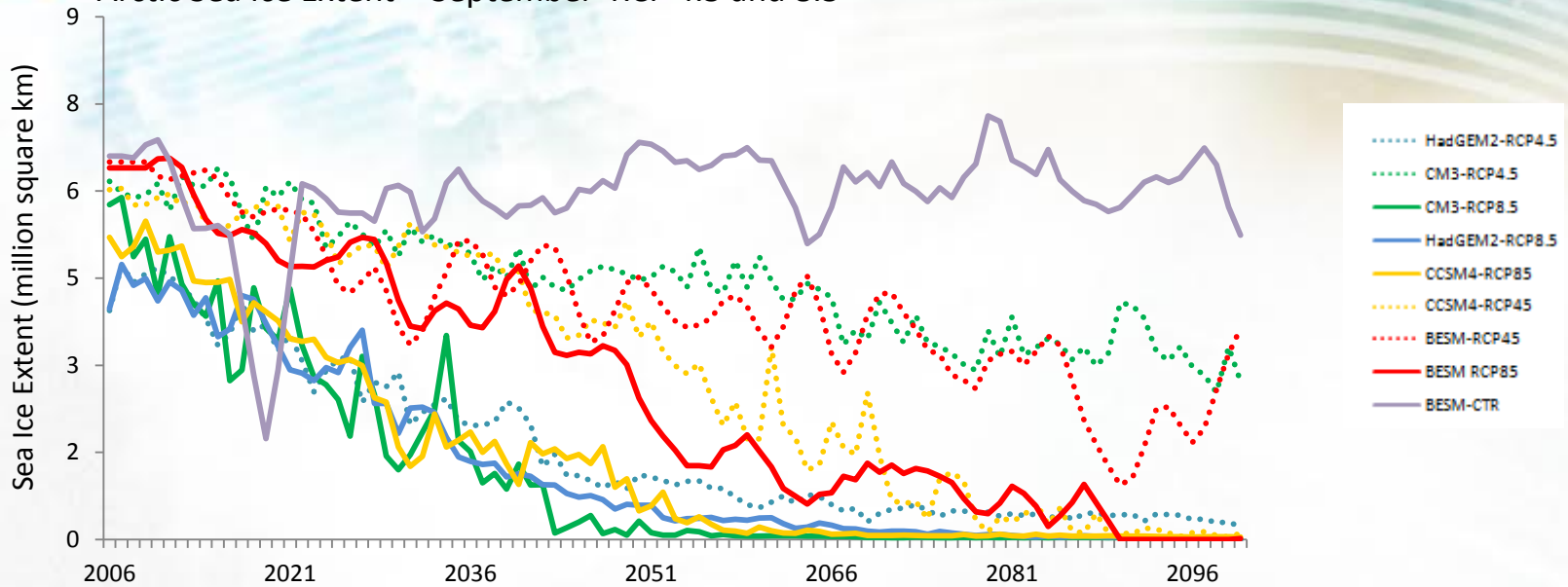
Sea ice extent RCP (2005-2100)



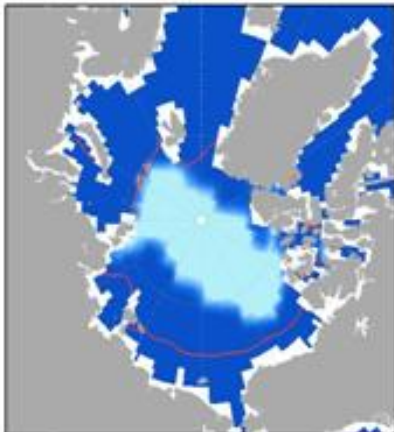
O declínio acelerado do gelo marinho nas últimas décadas sugere sensibilidade mm relação ao CO₂.



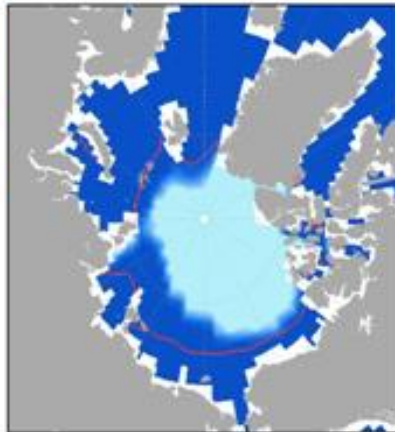
Arctic Sea Ice Extent - September RCP 4.5 and 8.5



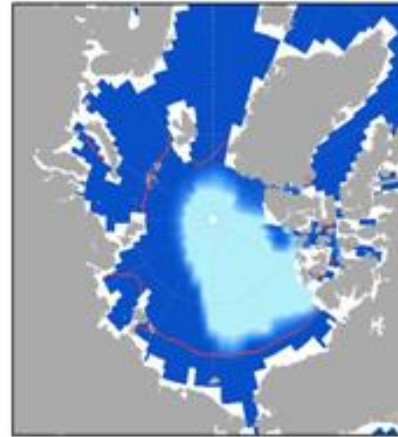
Arctic sea ice minimum 2007



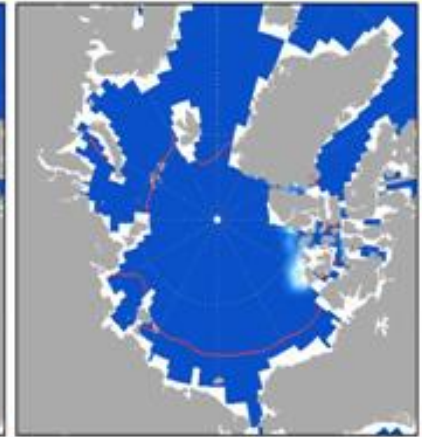
Arctic sea ice minimum 2012



Arctic sea ice minimum 2035

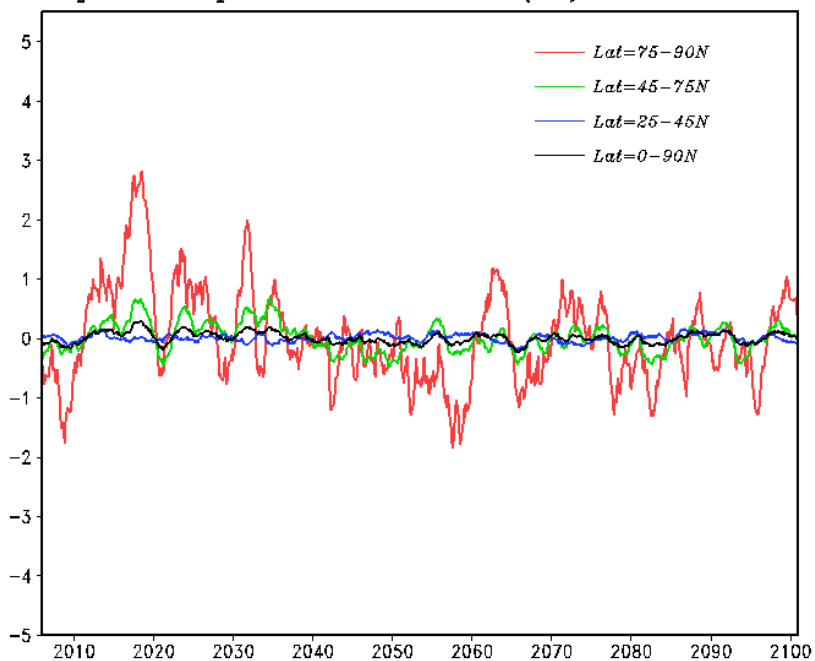


Arctic sea ice minimum 2040



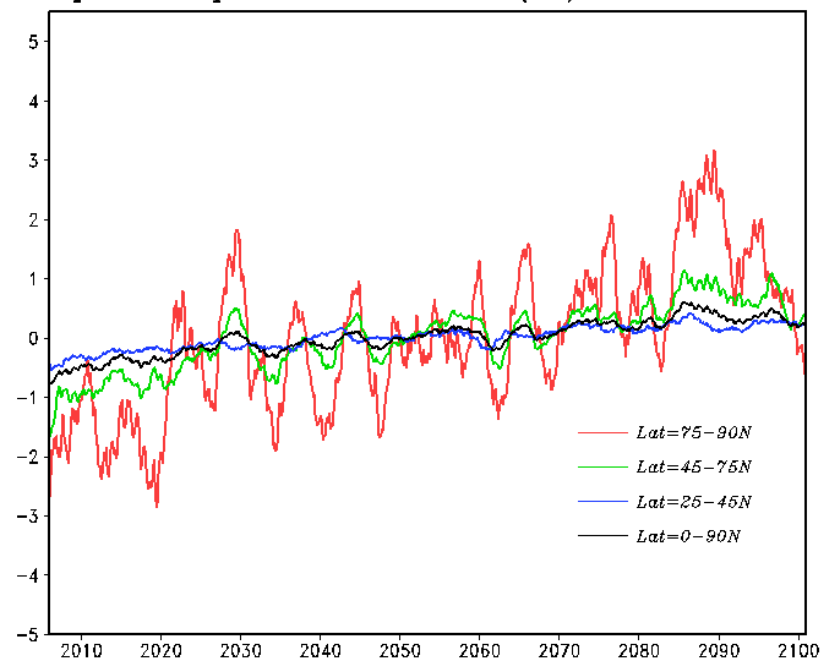
Aquecimento amplificado nas regiões polares

Surface temperature anomalies(oC) EXP120-CTRL

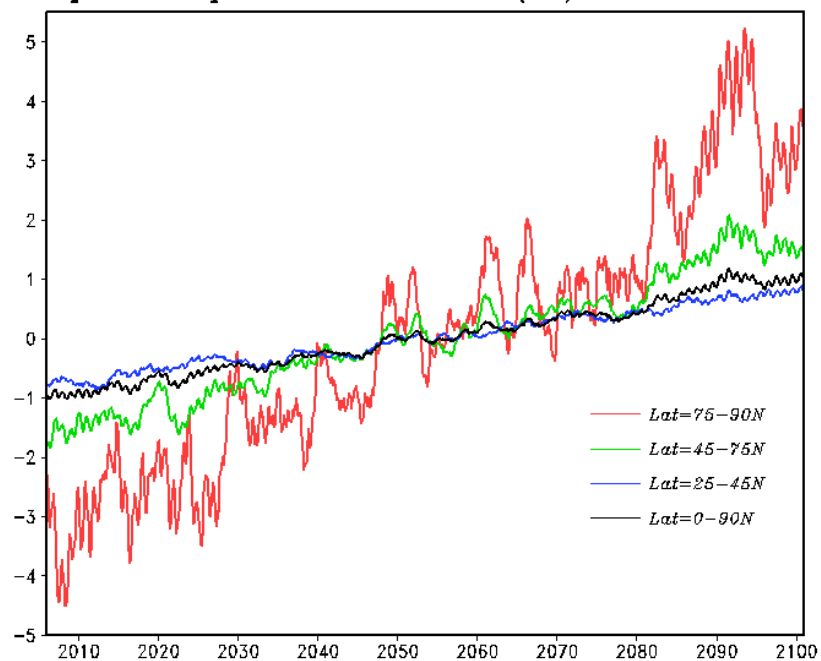


As variabilidades e as tendências da temperatura em altas latitudes tendem a ser maiores do que as variabilidades e tendências para o globo como um todo, principalmente no oceano Ártico

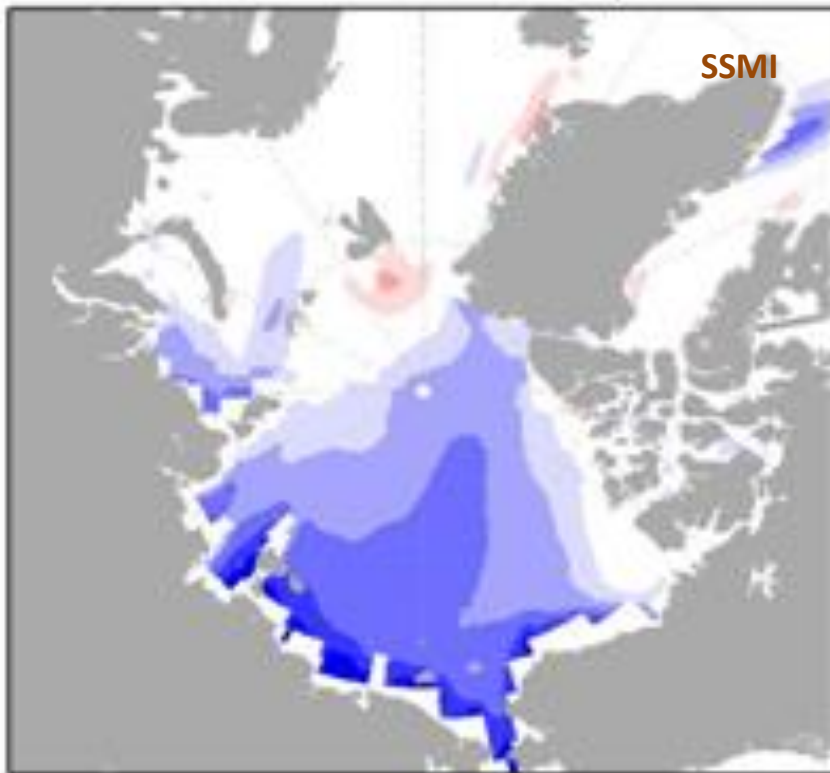
Surface temperature anomalies(oC) EXP121-RCP45



Surface temperature anomalies(oC) EXP122-RCP85



Anomalia de espessura – Março de 2040.



O gelo marinho apresenta um declínio na extensão e espessura, no entanto os resultados de modelos numéricos para variável espessura ainda necessitam de melhorias.

Próximos passos

- ❖ Finalizar conteúdo de calor nos oceanos e Temperatura do ar relacionado a variação de SIC nos modelos do CMIP5;
- ❖ Submissão paper.
- ❖ Acrescentar os dados de fluxos de calor, radiação e albedo e fazer análise da amplificação usando resultados da análise anterior.



BESM
Brazilian Earth System Model

Obrigado pela atenção



FAPESP
MUDANÇAS
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Ciência, Tecnologia
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