RESEARCH OUTLOOK

Research Questions (Could be asked at the end of the Introduction part)

1. Is there any relationship between the Autumn Arctic Sea Ice Area decline trend and the Atmospheric Fields in Turkey between the years of 1979-2019?

2. If there is, can we also express this relationship by decomposing 40 years range into four decadal years respectively.

3. Which Atmospheric Field has more appearing connection with the variability in the Autumnal Arctic Sea Ice Area?

4. Are the ongoing changes in Atmospheric Field's Spring Values significant, following the Winter season?

5. In other words, do the trend in Autumn Arctic Sea Ice Area cause Atmospheric Field's seasonal linkages in Turkey? (i.e. The increase of Snow Cover in winter triggers an increase in precipitation in Spring.)

Background Information (Citations that possibly could be in the article)

According to Liu, a dramatic decline in Arctic Sea Ice Area over the past 30 years has a significant impact on Snow Cover, resulting in more intense Snowfall in Europe linked to the excessive amount of moisture given to the atmosphere(1). This decline in Sea Ice, peaks and becomes apparent in Late Autumn, mostly in September(1). One of the record low in the minimum extent of Arctic Sea Ice Area was in Autumn, 2007, with the following several years near record along which the atmospheric conditions in Winter were severe unprecedentedly(2). Atmospheric fields in Europe in early winter following the preceding Autumn tend to respond to this decrease in Sea Ice. To illustrate it, Liu showed that a seasonal decrease up to 1 million km2 in the Autumnal Arctic Sea Ice Area may result in a 3% to 12% increase in Snow Cover in Europe in the months of Winter(1). Along with the Snow Cover variability connected to the decline in Arctic Sea Ice Area, which was the utmost concern in Liu's study, other Atmospheric Fields such as Mean Sea Level Pressure(MSLP) and Specific Humidity may respond to this decadal variability of Arctic Sea Ice considerably. MSLP and Specific Humidity, for example, are notably increased in winter in the regions in mid-latitude and Northeastern Europe in response to an anomalously low Autumnal Arctic Sea Ice extent.(1)

Citations Used in Background Information

(1) *Proceedings of the National Academy of Sciences*, 2012. Correction for Liu et al., Impact of declining Arctic sea ice on winter snowfall. 109(17), pp.6781-6783.

(2) Cohen, J., Screen, J., Furtado, J., Barlow, M., Whittleston, D., Coumou, D., Francis, J., Dethloff, K., Entekhabi, D., Overland, J. and Jones, J., 2014. Recent Arctic amplification and extreme mid-latitude weather. *Nature Geoscience*, 7(9), pp.627-637.

Variables to be Used in the Research

- Arctic Sea Ice Area **(Autumn)**
- Mean Sea Level Pressure **(Winter, Spring)**
- 1000 mb Temperature **(Winter, Spring)**
- Snow Cover **(Winter, Spring)**
- Precipitable Water **(Winter, Spring)**

Time Range

Years between 1980 and 2010 were chosen at first, but to see up-to-date variations in the Arctic Sea Ice decline trend, reanalysis datasets of the last decade(2010-2020) are also added and presented.

Data

CFSR Data : https://rda.ucar.edu/datasets/ds093.2/

Sea Ice Area Data : ftp://sidads.colorado.edu/DATASETS/NOAA/G02135/north/monthly/data/

CFSV2 Data : https://rda.ucar.edu/datasets/ds094.2/

NOTES :

Primarily citation candidate sentences can be found in the following file **;**

PRIMARILY_CITATION_CANDIDATES_Arctic.pdf

Figures and Graphics about the research can be found in the following directory ;

FIGURES_Arctic

Articles that contain highlighted sentences within for the use of citations can be found in our **DROPBOX** account**;**