**REQUEST:**

Dear Madhu and Sohaib,

Attached the matric of interactions for different types of components/.processes (identified by different types of colors) in the Arctic Ocean.  The interaction is either 0l, no interaction, + (+++ for strength) or - (— for strength), and some come be both ways.  There is a legend at the bottom of the table.

In a second phase we will work on the interactive model, where the interactions will be cascading to affect the size of each node/process

**Data Details:**

Data is available in ‘interactions\_spreadsheet’ file. Inside this file, sheet 1 is the original encoded data. I assigned some numbers to each encoded sign in sheet 2 to generate the chord diagram.

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| Columns are independent variables; rows are dependent variables. This allows us to take the direction of interaction into account (e.g., sea ice affecting light vs. light affecting sea ice) |
| * + indicates that the change is in the same direction (e.g., more of A leads to more of B) |
| * - indicates that the change is in the opposite direction (e.g., more of A leads to less of B) |
| * 0 indicates that there is no effect |
| * +, ++, and +++, and -, --, and --- indicate the magnitude of the effect, relative to the dependent variable (i.e., +++ indicates a factor that has a major impact on the dependent variable, relative to other factors impacting that dependent variable) |
| * (parentheses) indicate uncertainty and where the uncertainty lies, e.g., ++(+) indicates that the effect is positive and the uncertainty is whether it is a moderate or major effect; (-) indicates that the effect is probably negative but of minor significance |
| * (0) indicates uncertainty about whether there is an effect |
| * (-+) indicates uncertainty about whether the effect is positive or negative |
| * Strengths or magnitudes are assigned relatively looking across rows, however, some rows may not have maximum strength drivers as there may be some outside diver that is a more major factor driving the response |

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**Detail about Generated Vis:**

In the visualization, I encoded the positive, negative, and uncertain interactions in terms of colors and stripes in the network visualization as discussed in our last meeting. The magnitude is represented by the width of the chord. Red chords show negative effect, green represents positive effect, and yellow is for both positive and negative effect. Uncertain chords are marked as striped.

The matrix of the network is not symmetric i.e. effect from A to B may be different from B to A.  To portray this, I used *color gradient* in the chords ( for example, if chord from A to B is positive effect and chord from B to A is negative effect then I colored the chord  A-B with green to red color gradient).

The visualization is interactive such that you can hover the mouse on each component (both nodes and chords) to see details. You can use top filter buttons to see only positive, negative, or both positive and negative effects. You can also save the visualization as PNG image.

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**Next Step:**

In the next phase, they wanted us to make an interactive tool where they can change any interaction and can see how other interactions changes in the network. We need to make a data model to calculate all the changes in the network based on the input and the visualization to display the results.