2021 Summer Virtual Research Symposium

Studying Global Lakes Surface Temperature Variability using Satellite and In-Situ Observations

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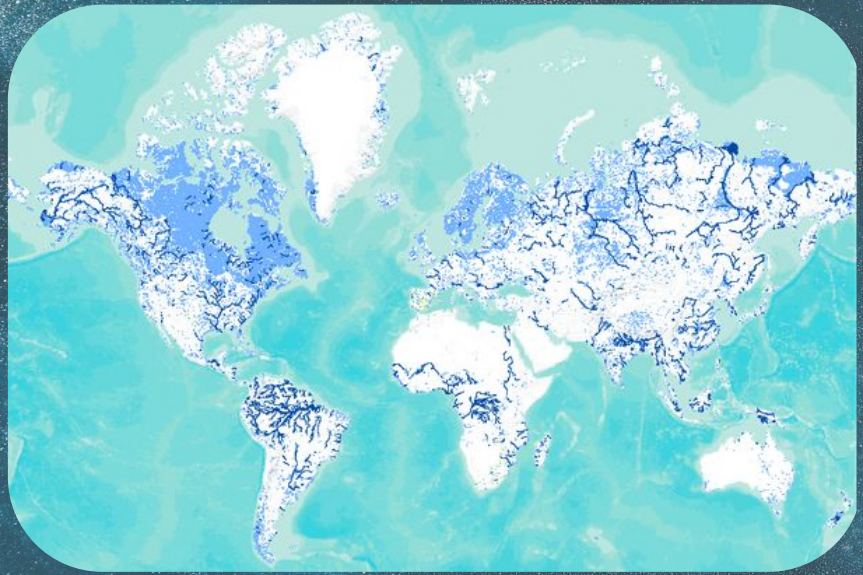
Presenting our topic and the data we collected

Abstract - Introduction & Background



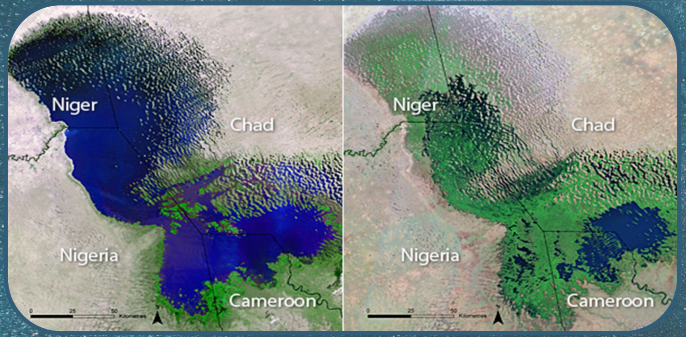
Main Points

- **Lakes globally play critical role in providing essential resources and habitats for both terrestrial and aquatic ecosystems, providing freshwater and recreation resources.**
- **Lake Surface Water Temperature (LSWT) is a critical indicator and proxy of climate change in lakes.**
- **The changes in water and the surrounding terrestrial regions' temperatures may be an indicator of climate variability if there is consistency between changes in both temperatures.**

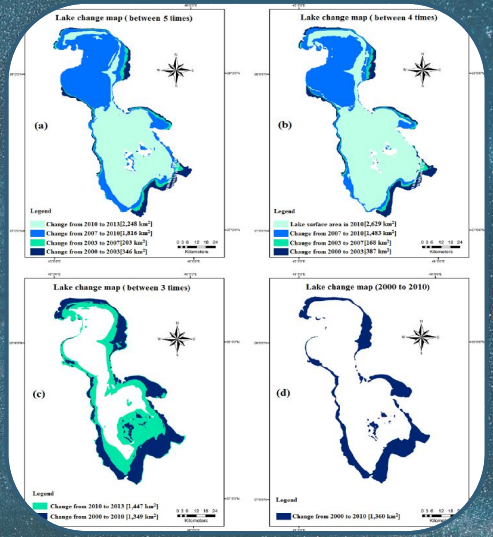
02 Motivation

Our motivation for researching and investigating this topic

Motivation

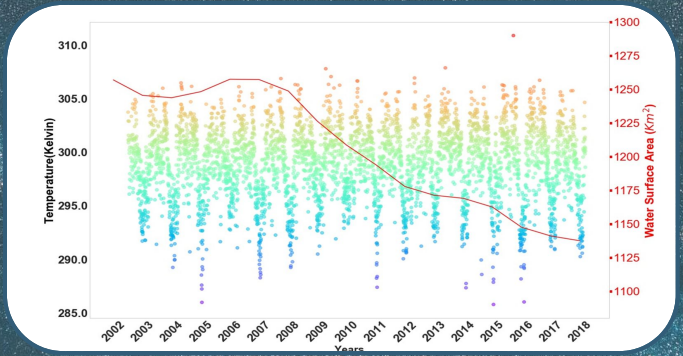


Lake Chad Changes Over Time



Lake Urmia Changes Over Time

From June 1995 to May 2009, lake Urmia decreased in depth by 6 m (Eimanifar and Mohebbi, 2007).



Lake Chad Surface Water Temp. & Surface Area Time Series

Lake Chad has decreased by more than 90 % in area over the last 40 years (Gao et al., 2011).

03 Methods

The methods in which we implemented to accomplish our tasks

Methods

1st

Obtained daily MODIS/Aqua Land Surface Temperature/Emissivity and yearly MODIS Landcover datasets from 2002 to 2020 over the lakes using NASA EarthData Search over 12 lakes

2nd

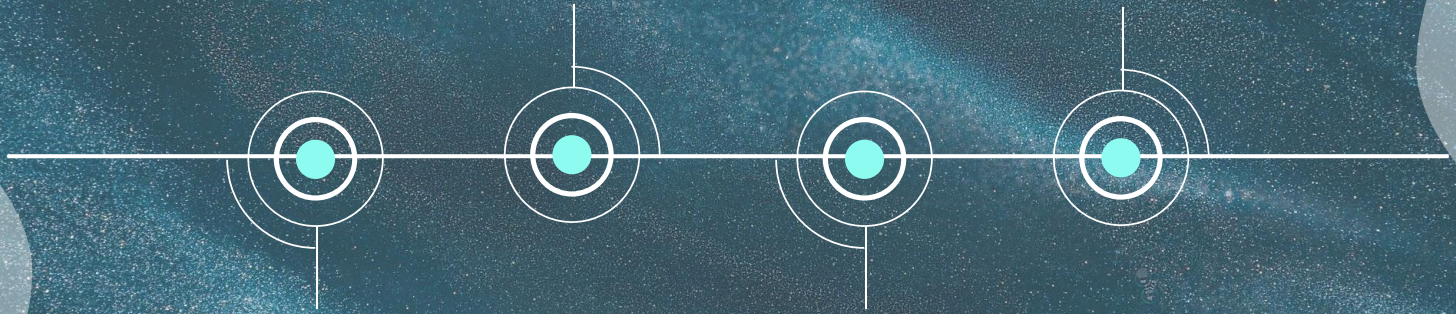
Upscaled the Landcover data from 500m to 1km spatial resolution to match w/ LST Water data

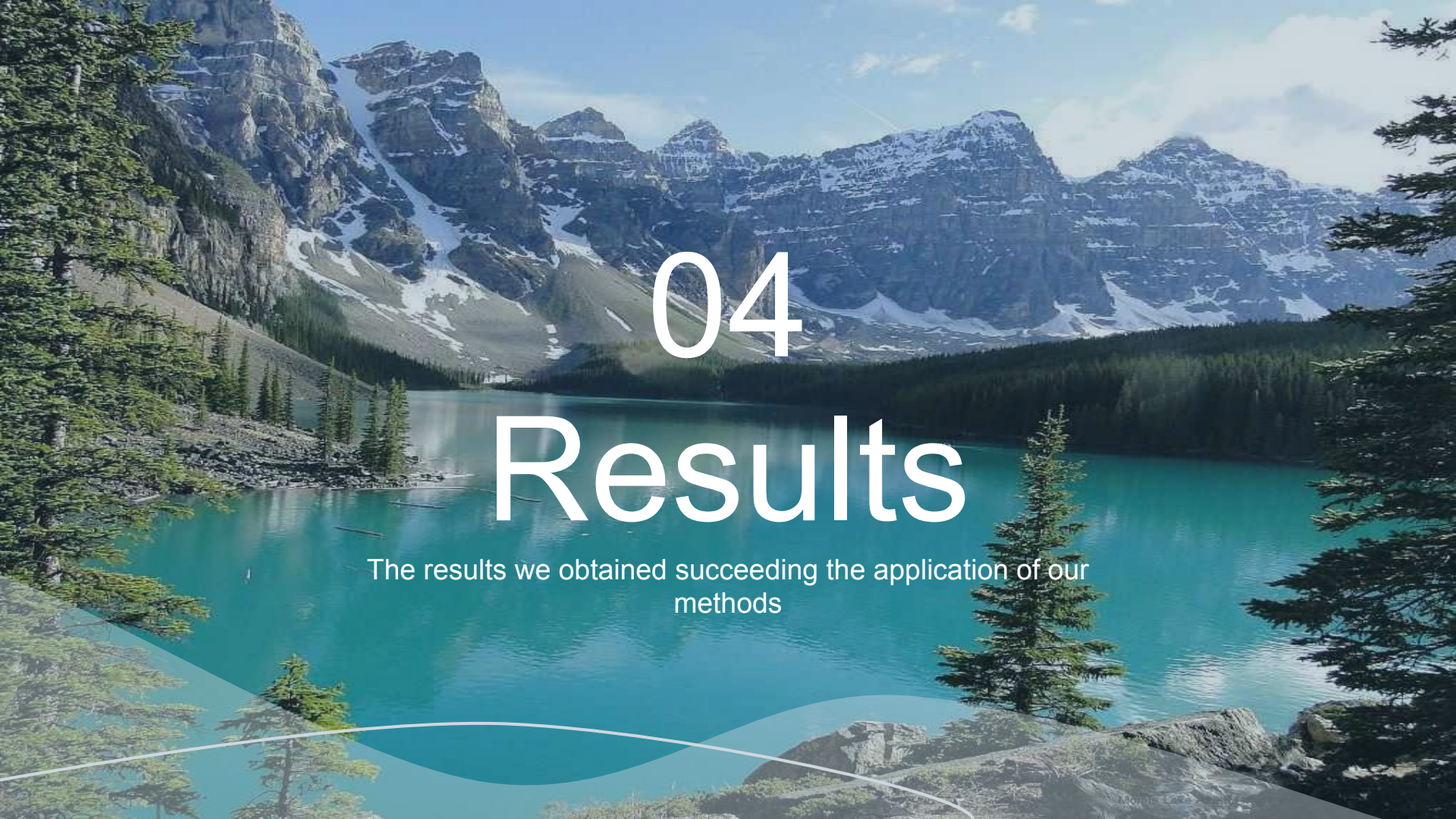
3rd

Used MATLAB to process time series of LST data. Then the linear regression approach to process the time series, and extract the slope of the temp changes of water, land, and air.

4th

Finally, we used GeoDa to calculate and make the regression scatter plot.

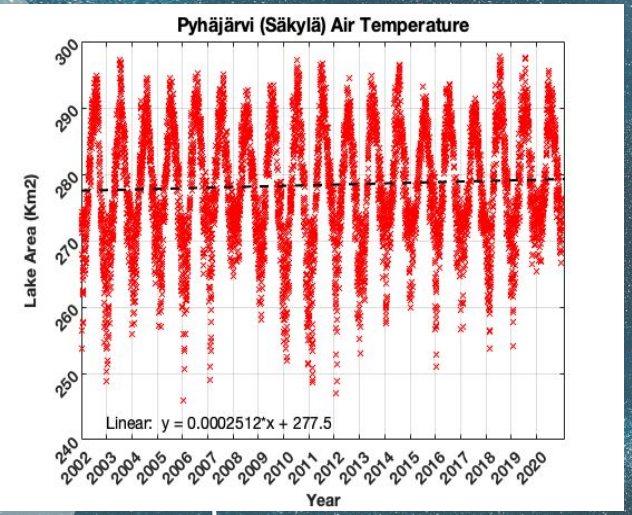


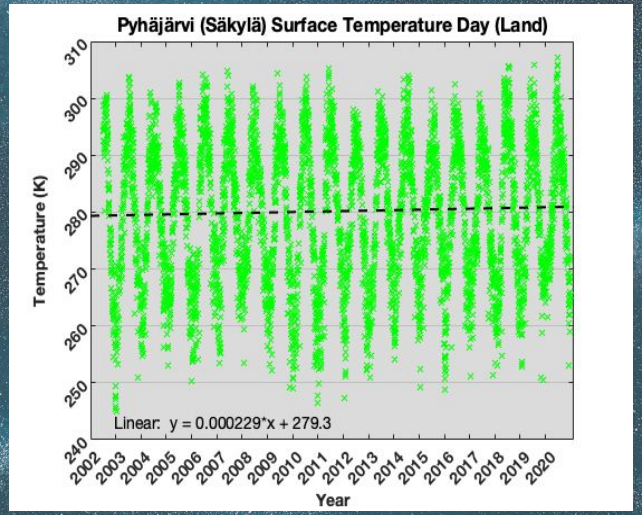


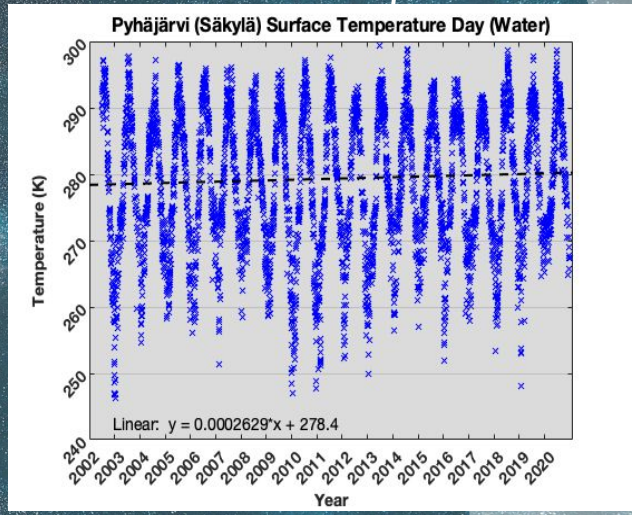
04 Results

The results we obtained succeeding the application of our methods

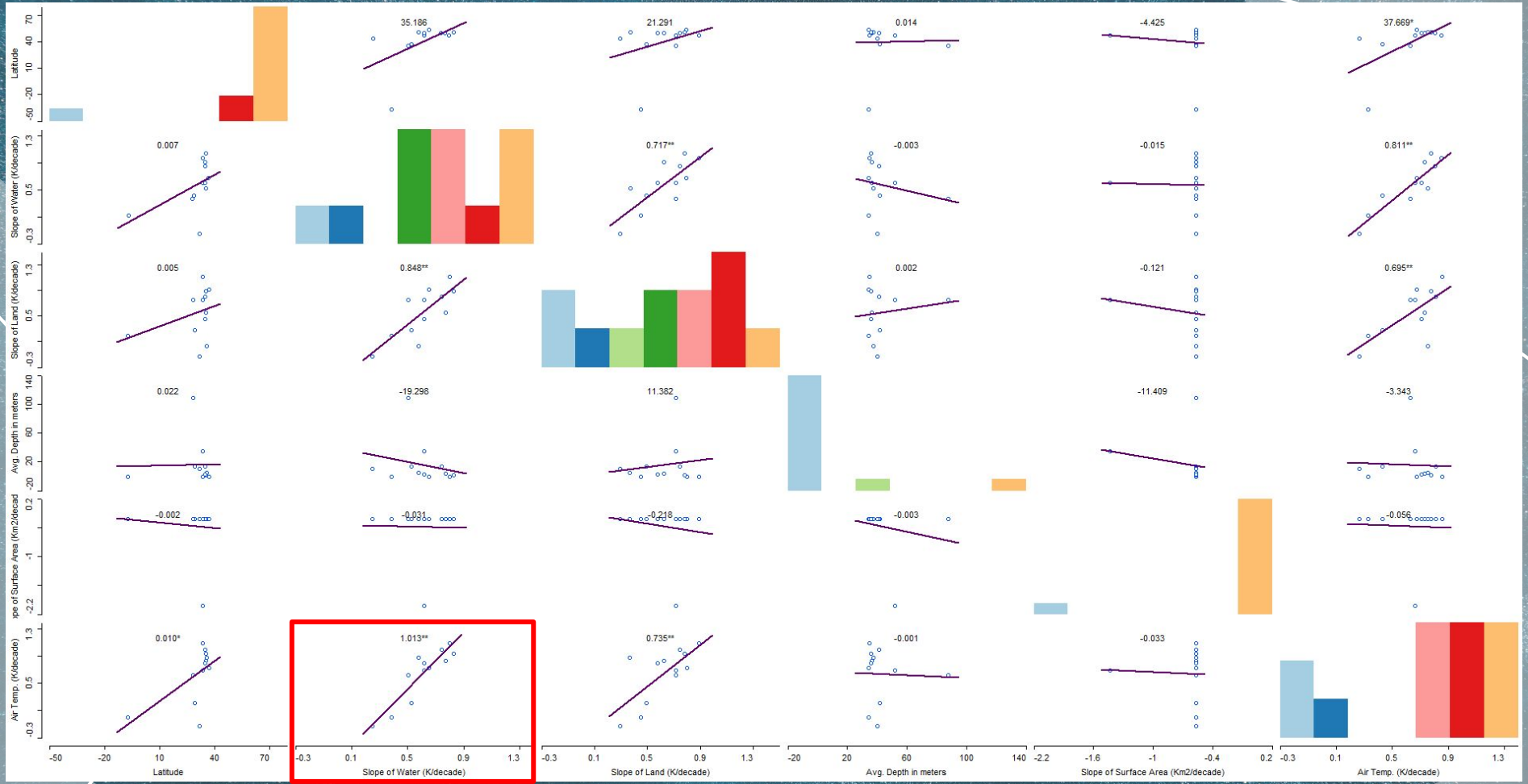
Results - Graphical Representation





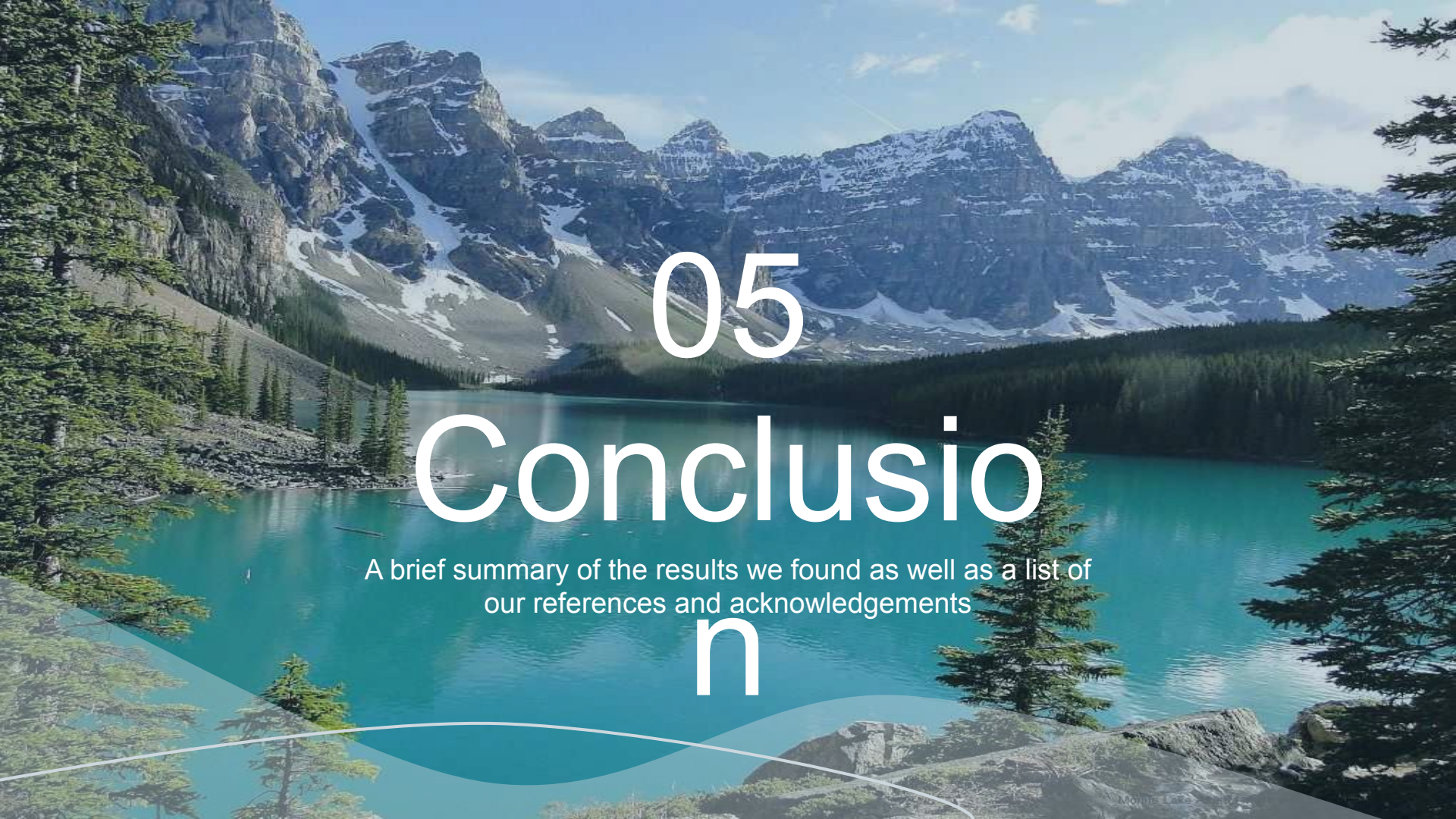


Results - Visual Representation



Results - Visual Representation

Variable	Coefficient	Std. Error	T-Statistic	Probability
Constant	0.0932921	0.110037	0.847821	0.42906
Slope Water (K/decade)	0.332062	0.168773	1.96751	0.09668
Avg. Depth (meters)	-0.0027563	0.0014427	-1.91059	0.10462
Slope Surf. Area (Km2/dec.)	0.0131291	0.0855293	0.153504	0.88303
Air Temp. (K/dec.)	**0.567457**	**0.191034**	**2.97046**	**0.02494**
Latitude	0.000107	0.0022102	0.0483966	0.96297



05

Conclusion

A brief summary of the results we found as well as a list of our references and acknowledgements

Conclusion - findings from the 12 lakes

- **The lakes' water temps are warming faster than their surrounding land temps.**
  - **Shallow lakes are warming faster than deeper lakes.**
- **As latitude increases, the difference between the water temp and the air temp increases and vice versa.**

8.33%

Lakes cooling.

16.667% lakes remained the same

16.67%

Lakes growing.

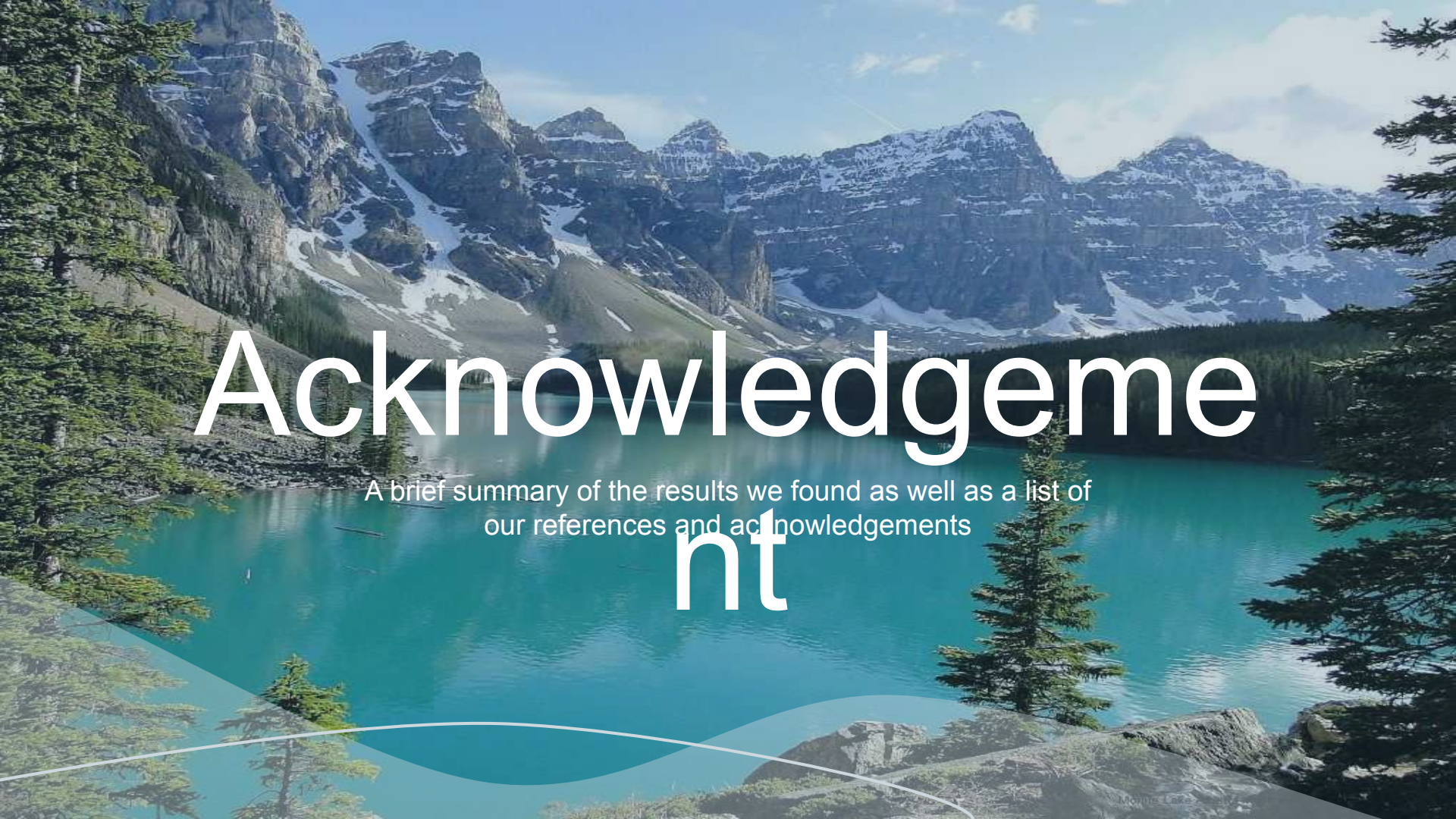
66.67%

Lakes shrinking.

91.67%

Lakes warming.

Continued studies of lake surface temperature trends of global lakes are imperative for communities that depend on them for survival, as well as the entirety of Earth.



Acknowledgement

A brief summary of the results we found as well as a list of our references and acknowledgements

Acknowledgement

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Resources

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Thank You!

Do you have any questions?