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## ABSTRACT

This research aims to apply Principal Component Analysis (PCA) to classify variables or groups of variables of atmospheric conditions at the Springbrook Observatory, Coonabarabran, New South Wales, Australia, using data from the COK700 telescope. The data collected from January 1, 2018, to October 8, 2024, consists of 1,606 daily entries. The PCA analysis, along with in-depth analysis through Varimax rotation, helps clarify the interpretation of the principal components. The results show that the first three principal components account for 72.1% of the data variance. The first principal component (RC1, 33.1%) represents the "sky and atmospheric condition component," which reflects the weather patterns that influence the changes in the sky and atmosphere in the area. The second principal component (RC2, 20.9%) refers to the "temperature, humidity, and wind component," highlighting the correlation between temperature, humidity, and wind that affects weather changes. The third principal component (RC3, 18.1%) is the "dew point and rainfall component," which shows the relationship between atmospheric moisture and rainfall. External temperature is a factor that influences these changes. PCA helps to understand weather changes in the area in detail and can be used as a basis for weather forecasting or studying long-term factors influencing weather patterns.

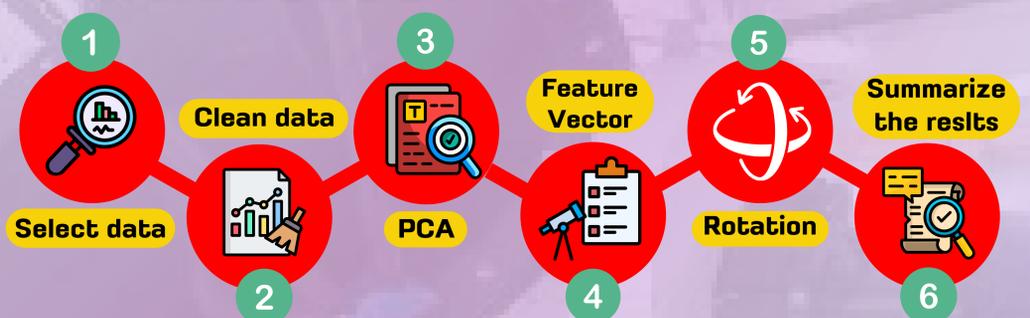
## INTRODUCTION

The study of atmospheric conditions is a crucial factor in astronomical research, as accurate data regarding the various components of the atmosphere can significantly impact the quality of observations and data collection through telescopes. By applying Principal Component Analysis (PCA), this research aims to extract key information and identify the factors that influence the quality of astronomical observations. This study will enhance the understanding of atmospheric environments and assist in planning for future usage of the observatory.

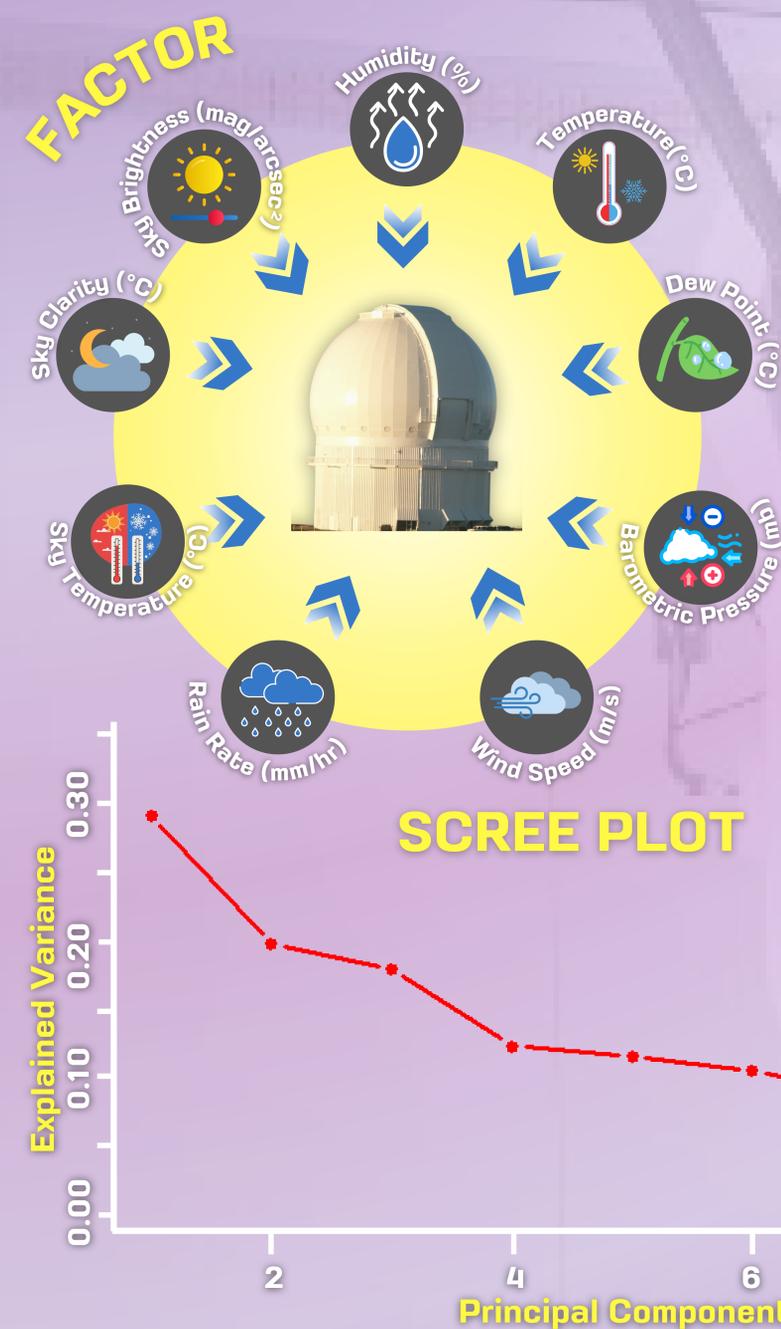
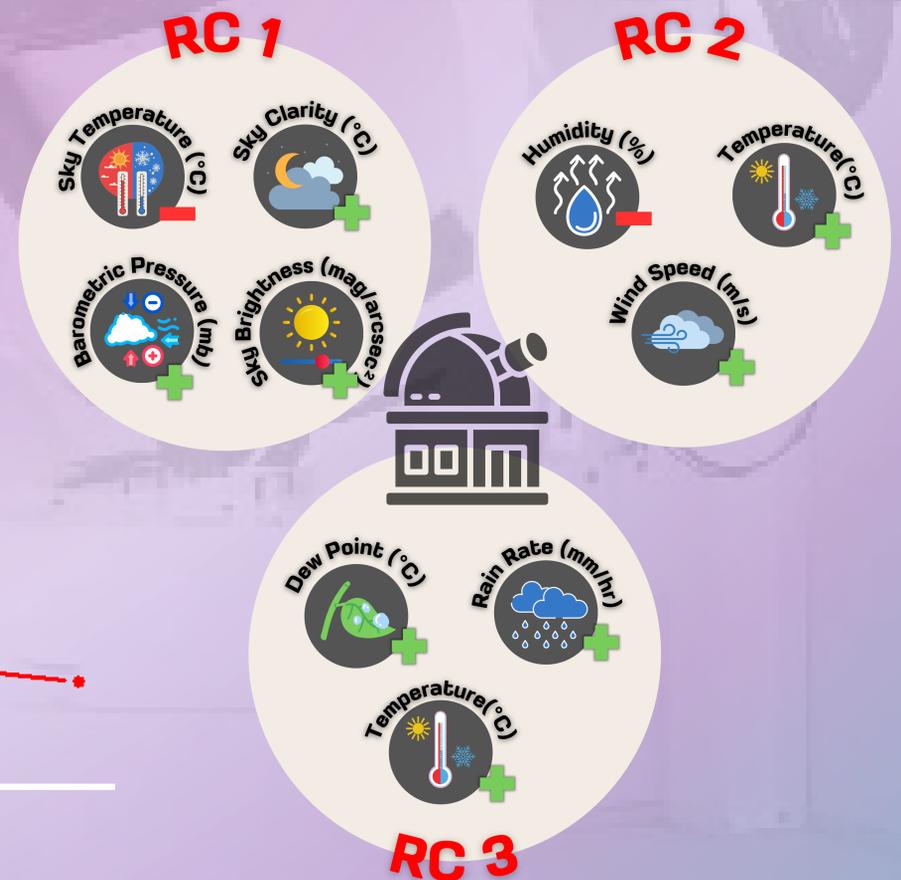
## OBJECTIVES

To apply Principal Component Analysis (PCA) in classifying variables or groups of variables related to the atmospheric environment from the COK700 telescope at Springbrook, Coonabarabran Observatory, New South Wales, Australia.

## METHODOLOGY



## RESULT



## CONCLUSION

In this study, Principal Component Analysis (PCA) was applied to atmospheric environmental data collected from the Springbrook Coonabarabran Observatory in New South Wales, Australia, using data from the COK700 telescope. The analysis helped identify significant factors affecting the atmospheric environment and reduce the dimensionality of the variables influencing changes in the collected data. The analysis revealed three key principal components: RC1, RC2, and RC3, each representing distinct factors with different influences. RC1 reflects the atmospheric and sky conditions, highlighting the environmental factors that affect visibility and observation at different times. RC2 is associated with external temperature, relative humidity, and wind speed, showing how changes in temperature and humidity can impact the local weather. RC3 focuses on dew point, rainfall rate, and external temperature, explaining conditions of high humidity and rainfall that may influence the observatory's environment. These findings are in line with the study by Unawong et al. (2019), which found that principal components were strongly related to temperature, humidity, and rainfall, factors that significantly affect the environment and weather forecasting. Their study identified groups of provinces with similar weather characteristics, such as regions with high temperatures, high humidity, or specific rainfall patterns during certain periods. This PCA analysis helps in understanding the relationships between various weather variables affecting the environment at the Springbrook Coonabarabran Observatory, offering insights for weather forecasting or studying the impacts of environmental conditions on astronomical observations from the COK700 telescope. Additionally, it provides valuable guidance for planning future climate and astronomical research studies.

## REFERENCES

Unawong, P., Jermjitpornchi, S., Wichitchan, S., & Suraphee, S. (2019). \*Clustering of provinces in Thailand according to weather factors.\* Veridian E-Journal, Science and Technology Silpakorn University, 6(3), May – June 2019. ISSN 2408-1248.