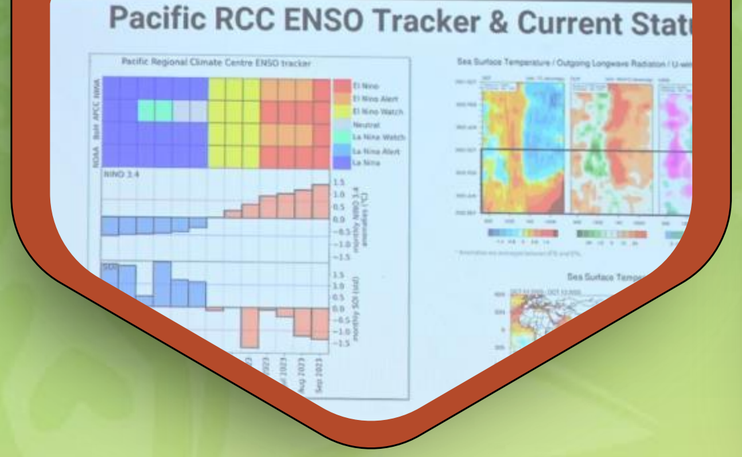

17th SESSION
PACIFIC ISLANDS CLIMATE OUTLOOK FORUM
(PICOF-17)

22 - 23 October, 2025

Port Vila, Vanuatu

Session 5: Looking back long-term

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Australian Bureau of Meteorology - COSPPac

OFFICIAL

Trends in Tropical Cyclones: Northwest Pacific Ocean

- Trends in total numbers of tropical cyclones (<995hPa), severe tropical cyclones (<970hPa) and the proportion of severe tropical cyclones are presented for the period 1981 to 2025 (current) for a sub-region of the Northwest Pacific Ocean (120°E – 180°W; 0° – 40°N).
- Trends are presented at a sub-regional scale, as the number of tropical cyclones occurring within Pacific Island EEZs is insufficient for reliable long-term trends analysis.
- The annual average TC occurrence in the Northwest Pacific Ocean is 22.5 systems from 1981 to 2025.
- The annual average Cat 3.5 TC occurrence in the Northwest Pacific Ocean is 13.4 systems from 1981 to 2025.
- There is a statistically significant decreasing trend for the average tropical cyclones (<995hPa), severe tropical cyclones (<970hPa) in the Northwest Pacific for the period 1981 to 2025.
- There is no significant trend for the proportion of severe tropical cyclones in the Northwest Pacific for the period 1981 to 2025.
- Statistical significance of trends was calculated using a non-parametric Mann-Kendall test and is very dependant on sample size. Thus, significant trend results would be non-significant with a smaller sample size (e.g. a period from 1990 -2025).

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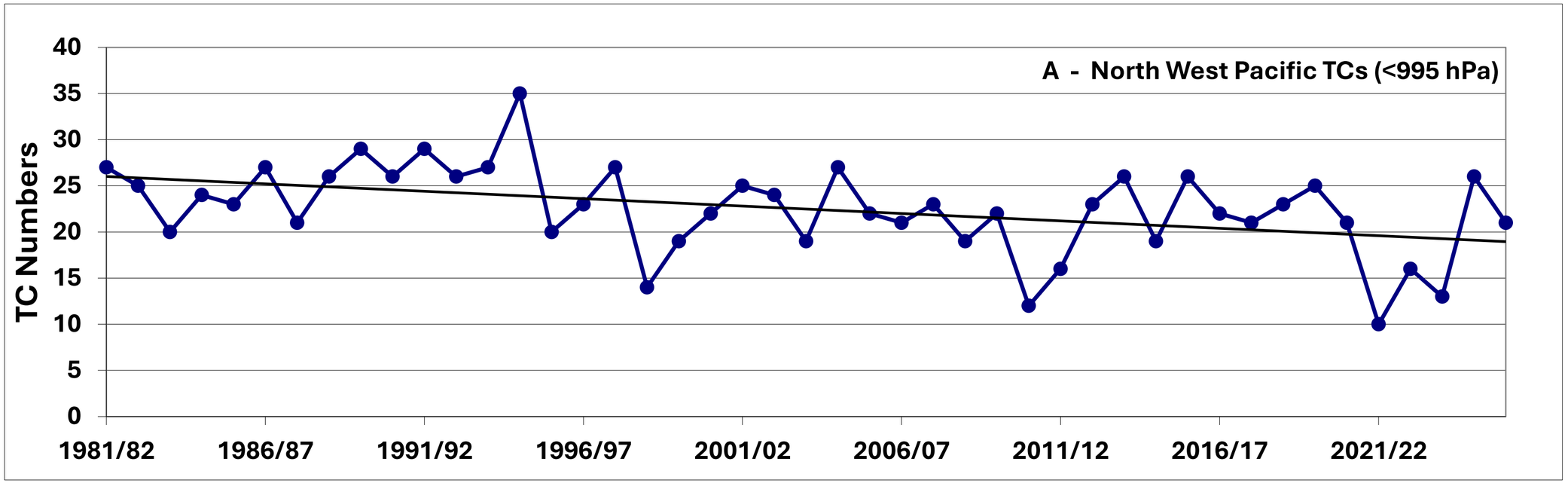
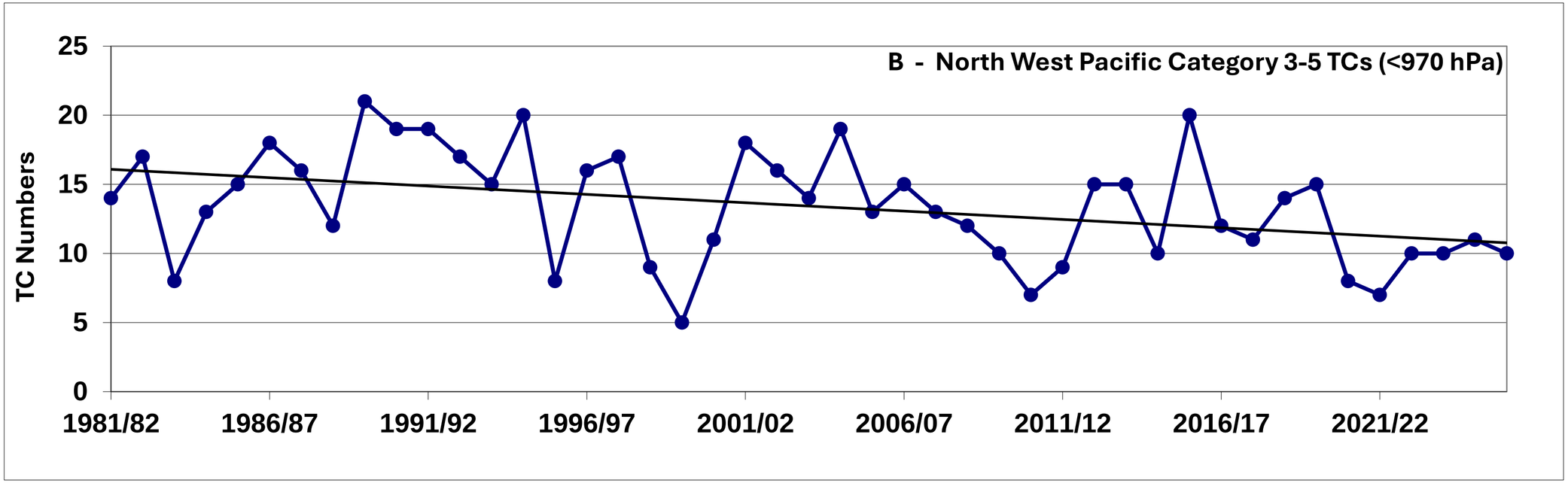
Northwest Pacific Ocean – total number of TCs



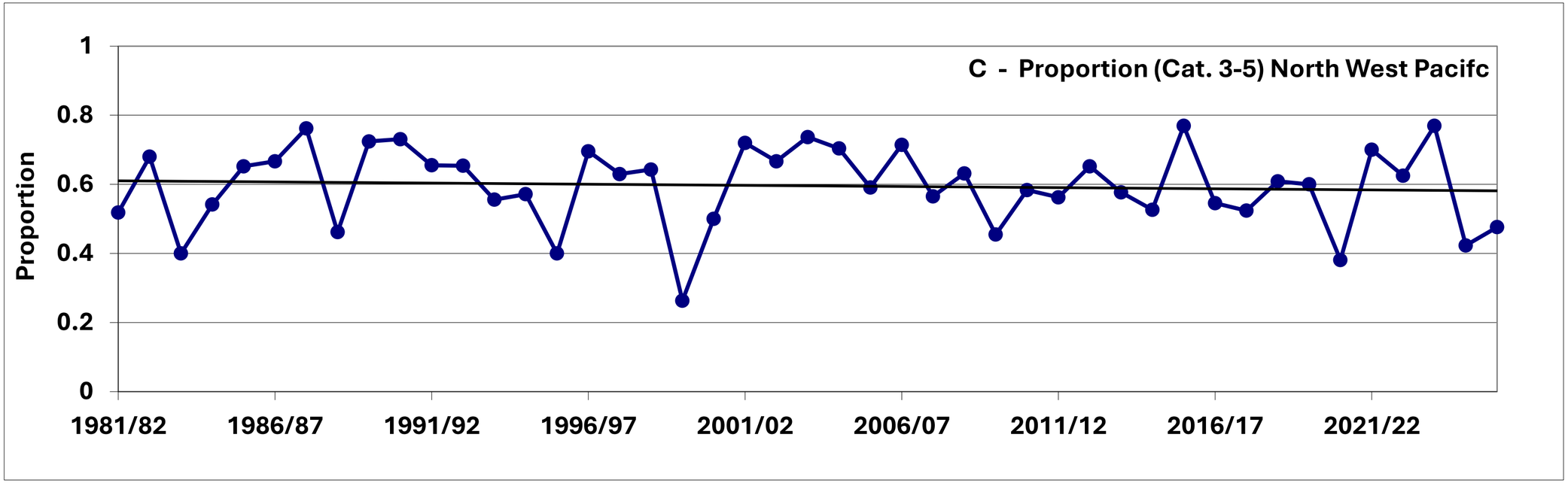
- **Average**: Annual average TC occurrence in the Northwest Pacific is 22.5 systems.
- **Trend**: Significant decreasing trend (negative slope).
- **Statistic test**: Mann-Kendall (sample size dependant).
- ***p*-value**: 0.004 α: 0.05.
- **Line equation**: y = -0.1606x + 26.183.
- R^2 = 0.1906.

Northwest Pacific Ocean – Cat. 3-5 TCs



- **Average**: Annual average Cat 3.5 TC occurrence in the Northwest Pacific is 13.4 systems.
- **Trend**: Significant decreasing trend (negative slope).
- **Statistic test**: Mann-Kendall (sample size dependant).
- ***p*-value**: 0.006 α: 0.05.
- **Line equation**: y = -0.1208x + 16.201.
- R^2 = 0.1545.

Northwest Pacific Ocean – Proportion of Cat. 3-5 TCs



- **Trend**: Non-significant decreasing (negative slope).
- **Statistic test**: Mann-Kendall (sample size dependant).
- ***p*-value**: 0.43 ***α***: 0.05.
- **Line equation**: y = -0.0007x + 0.611.
- R^2 = 0.0056.

Trends in Tropical Cyclones: Southwest Pacific Ocean

- Trends in total numbers of tropical cyclones (<995hPa), severe tropical cyclones (<970hPa) and the proportion of severe tropical cyclones are presented for the period 1981 to 2025 (current) for a sub-region of the Southwest Pacific Ocean (142°E – 120°W; 0° – 40°S).
- Trends are presented at a sub-regional scale, as the number of tropical cyclones occurring within Pacific Island EEZs is insufficient for reliable long-term trends analysis.
- The annual average TC occurrence in the Southwest Pacific Ocean is 8.5 systems from 1981 to 2025.
- The annual average for severe TC occurrence in the Southwest Pacific Ocean is 3.9 systems from 1981 to 2025.
- There is a statistically significant decreasing trend for the average tropical cyclones (<995hPa), severe tropical cyclones (<970hPa) in the Southwest Pacific for the period 1981 to 2025.
- There is no significant trend for the proportion of severe tropical cyclones in the Southwest Pacific Ocean for the period 1981 to 2025.
- Statistical significance of trends was calculated using a non-parametric Mann-Kendall test and is very dependant on sample size. Thus, significant trend results would be non-significant with a smaller sample size (e.g. a period from 1990 -2025).

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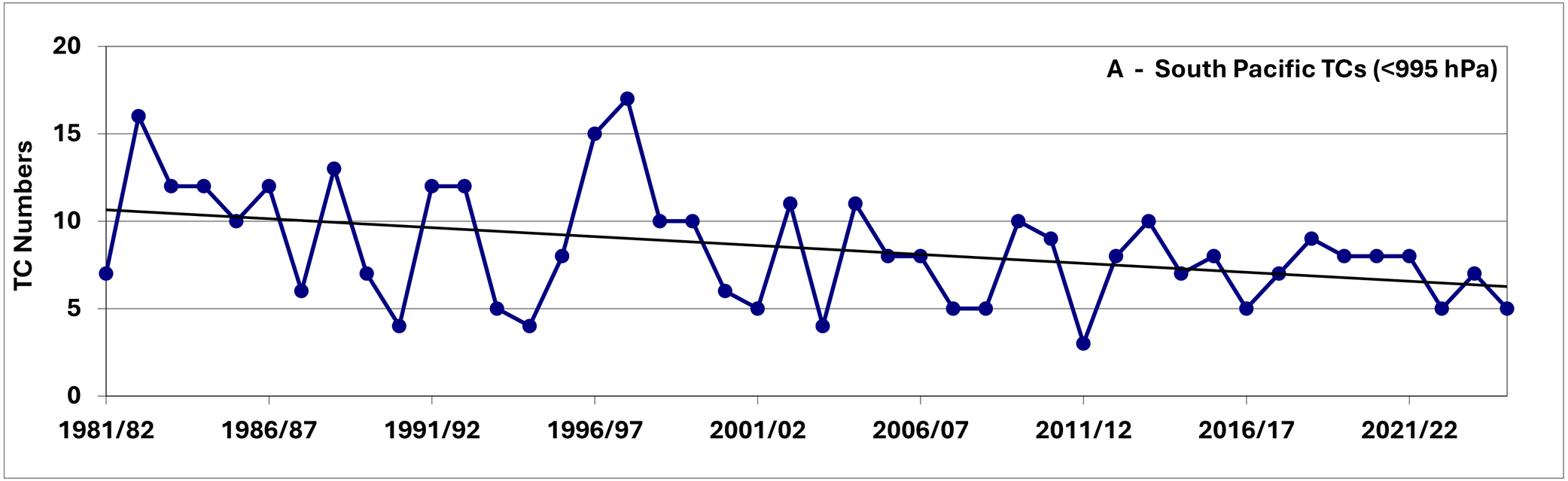
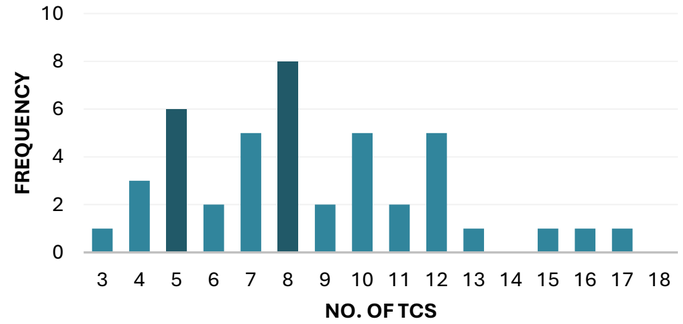
Southwest Pacific Ocean – total number of TCs



- **Average**: Annual average TC occurrence in the Southwest Pacific is 8.5.
- **Trend**: Significant decreasing trend (negative slope).
- **Statistic test**: Mann-Kendall (sample size dependant).
- ***p*-value**: 0.013 ***α***: 0.05.
- **Line equation:** y = -0.1022x + 10.754.
- R^2 = 0.1547.

Tropical cyclones in the Southwest Pacific since 1981/82



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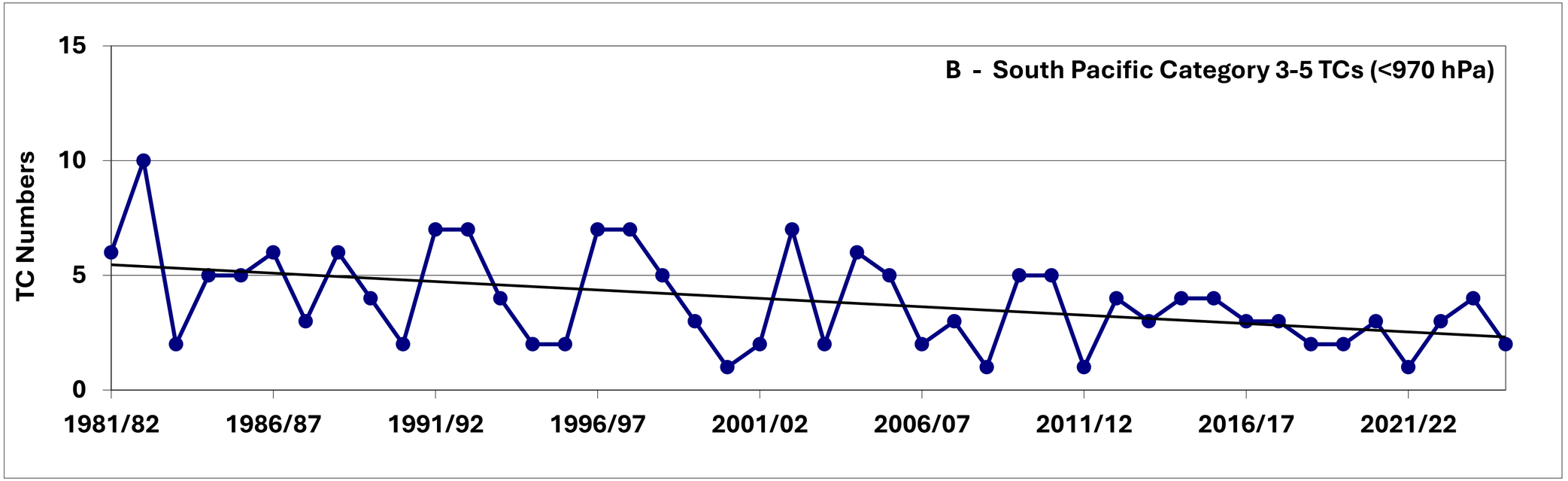
Southwest Pacific Ocean – Cat. 3-5 TCs



- **Average**: Annual average Cat 3.5 TC occurrence in the Southwest Pacific is 3.9 systems.
- **Trend**: Significant decreasing trend (negative slope).
- **Statistic Test**: Mann-Kendall (sample size dependant).
- ***p*-value**: 0.006 ***α***: 0.05.
- **Line equation**: y = -0.0732x + 5.5338.
- R^2 = 0.204.

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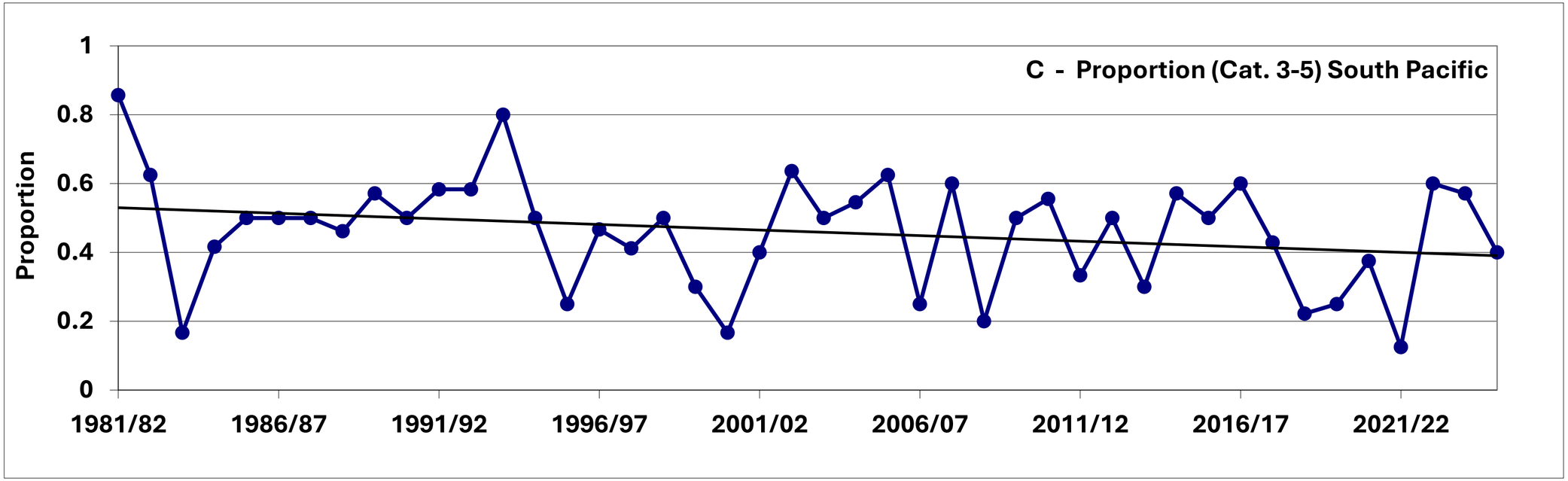
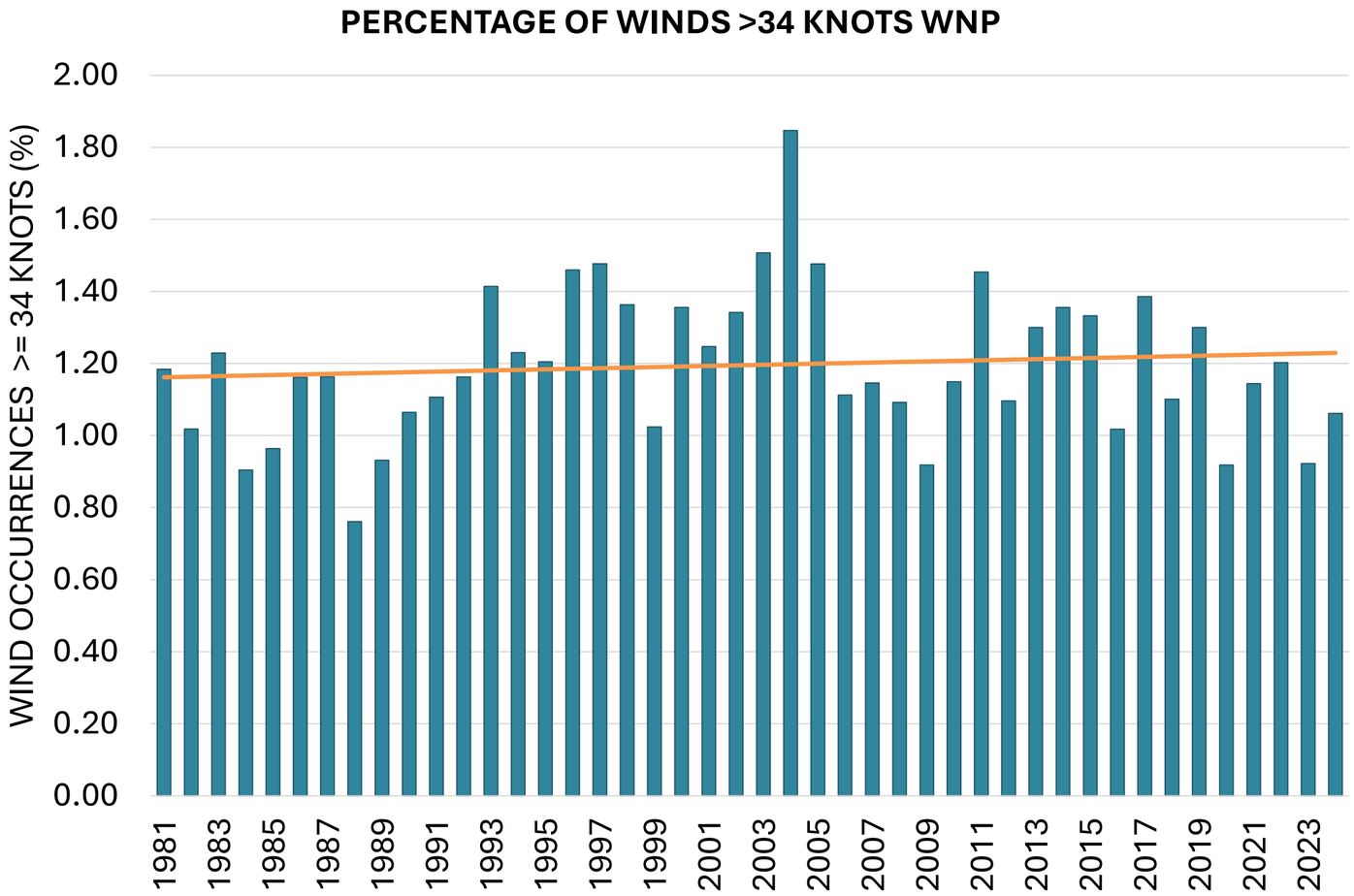
Southwest Pacific Ocean – Proportion of Cat. 3-5 TCs



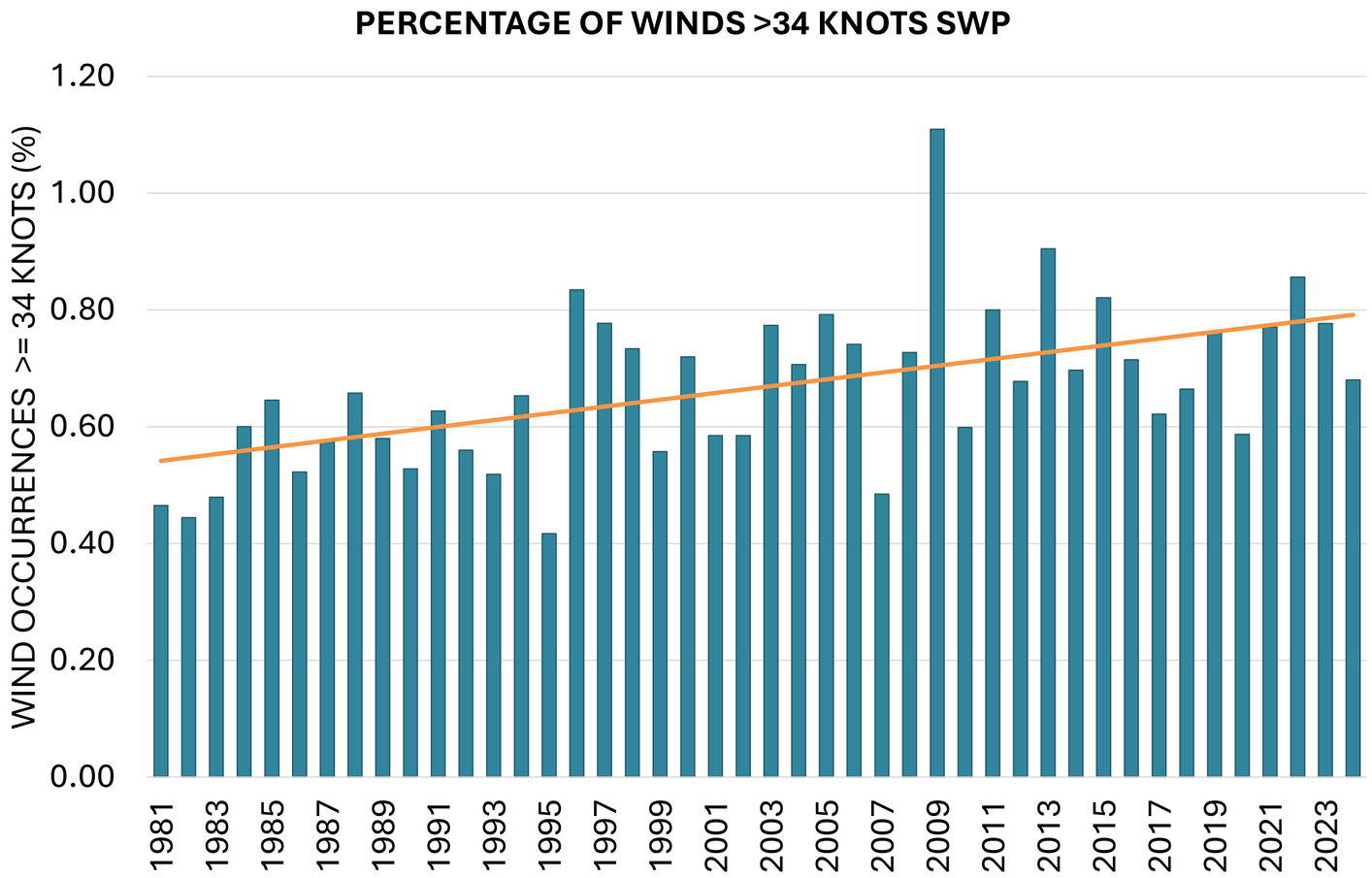
- **Trend**: Non-significant decreasing trend (negative slope).
- **Statical Test**: Mann-Kendall (sample size dependant).
- ***p*-value**: 0.199 **α**: 0.05
- **Line equation**: y = -0.0032x + 0.5333
- R^2 = 0.0654

Subtropics Western North Pacific Ocean



- **Average:** 1.20.
- **Trend**: Non-significant slight increasing trend (positive slope).
- **Statistical Test**: Mann-Kendall (sample size dependant).
- **p-value**: 0.7 **α**: 0.05.
- **Line equation**: y = 0.0016x + 1.1601.
- R^2 = 0.0095.

Subtropics Southwest Pacific Ocean



- **Average**:0.67.
- **Trend**: Significant increasing trend (positive slope).
- **Statistical Test**: Mann-Kendall (sample size dependant).
- **p-value**: 0.0001 **α**: 0.05.
- **Line equation**: y = 0.0058x + 0.5358.
- R^2 = 0.2976.

Summary

Looking back long-term – Northwest and South Pacific tropical cyclones

- Trends in total numbers of tropical cyclones (<995hPa), severe tropical cyclones (<970hPa) and the proportion of severe tropical cyclones are presented for the period 1981 to 2025 (current) for a sub-region of the Northwest (120°E – 180°W; 0° – 40°N) and Southwest Pacific Ocean (142°E – 120°W; 0° – 40°S).
- Trends are presented at a sub-regional scale, as the number of tropical cyclones occurring within Pacific Island EEZs is insufficient for reliable long-term trends analysis.
- Annual average TC occurrence in the Northwest is 22.5 systems and 8.5 systems in the Southwest Pacific Ocean from 1981 to 2025.
- Annual average for severe TC occurrence in the Northwest 13.4 systems and 3.9 systems in the Southwest Pacific Ocean from 1981 to 2025.
- There is a statistically significant decreasing trend for the average tropical cyclones (<995hPa), severe tropical cyclones (<970hPa) in the Northwest and Southwest Pacific for the period 1981 to 2025.
- There is no significant trend for the proportion of severe tropical cyclones in the Northwest and Southwest Pacific Ocean for the period 1981 to 2025.
- There has been a significant increasing trend in the percentage of winds greater than 34 knots in the Southwest Pacific for the period 1981 to 2025.
- There has been no significant trend in the percentage of winds greater than 34 knots in the Northwest Pacific for the period 1981 to 2025.
- **Statistical significance of trends was calculated using a non-parametric Mann-Kendall and is very dependent on sample size. Thus, significant trend results would be non-significant with a smaller sample size (e.g. a period from 1990 -2025).**

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THANK YOU!

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