Appendix 5. Wind Results

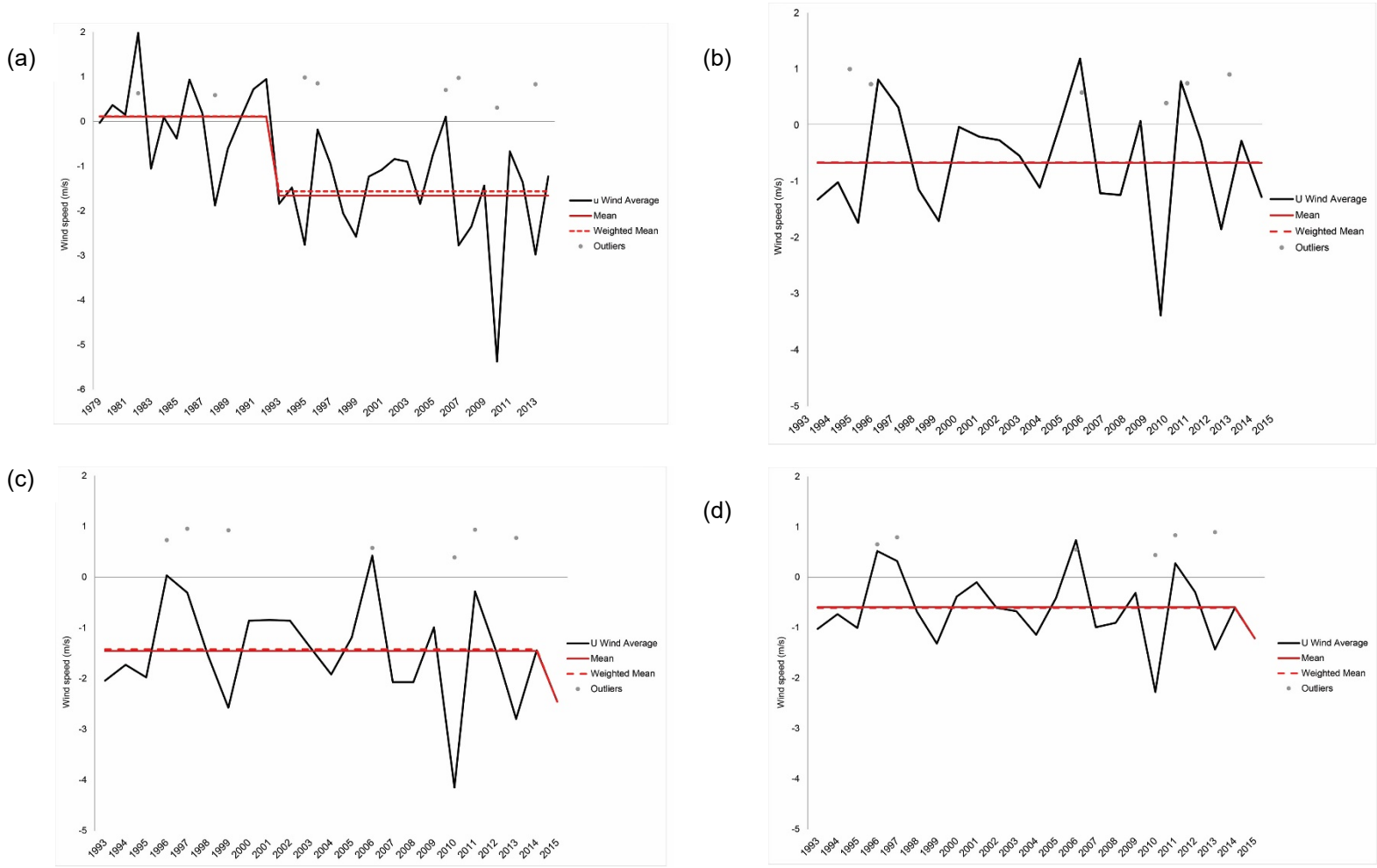

Figure A5.1: Summer mean values for U component of wind speed for (a) NCEP-DOE, (b) scatterometer aggregate, (c) Witsand and (d) Mossel Bay.

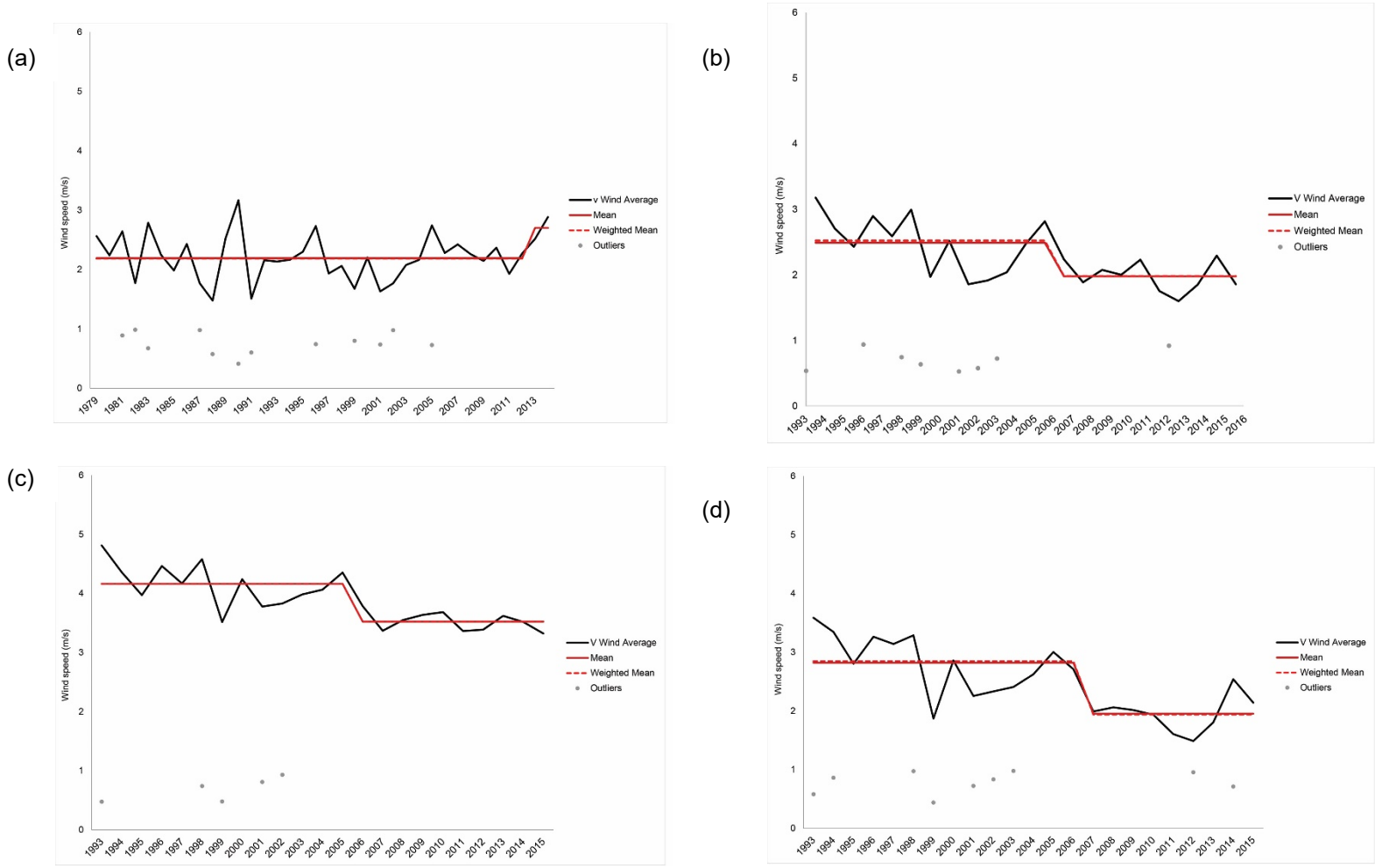

Figure A5.2: Summer mean values for V component of wind speed for (a) NCEP-DOE, (b) scatterometer aggregate, (c) Witsand and (d) Mossel Bay.

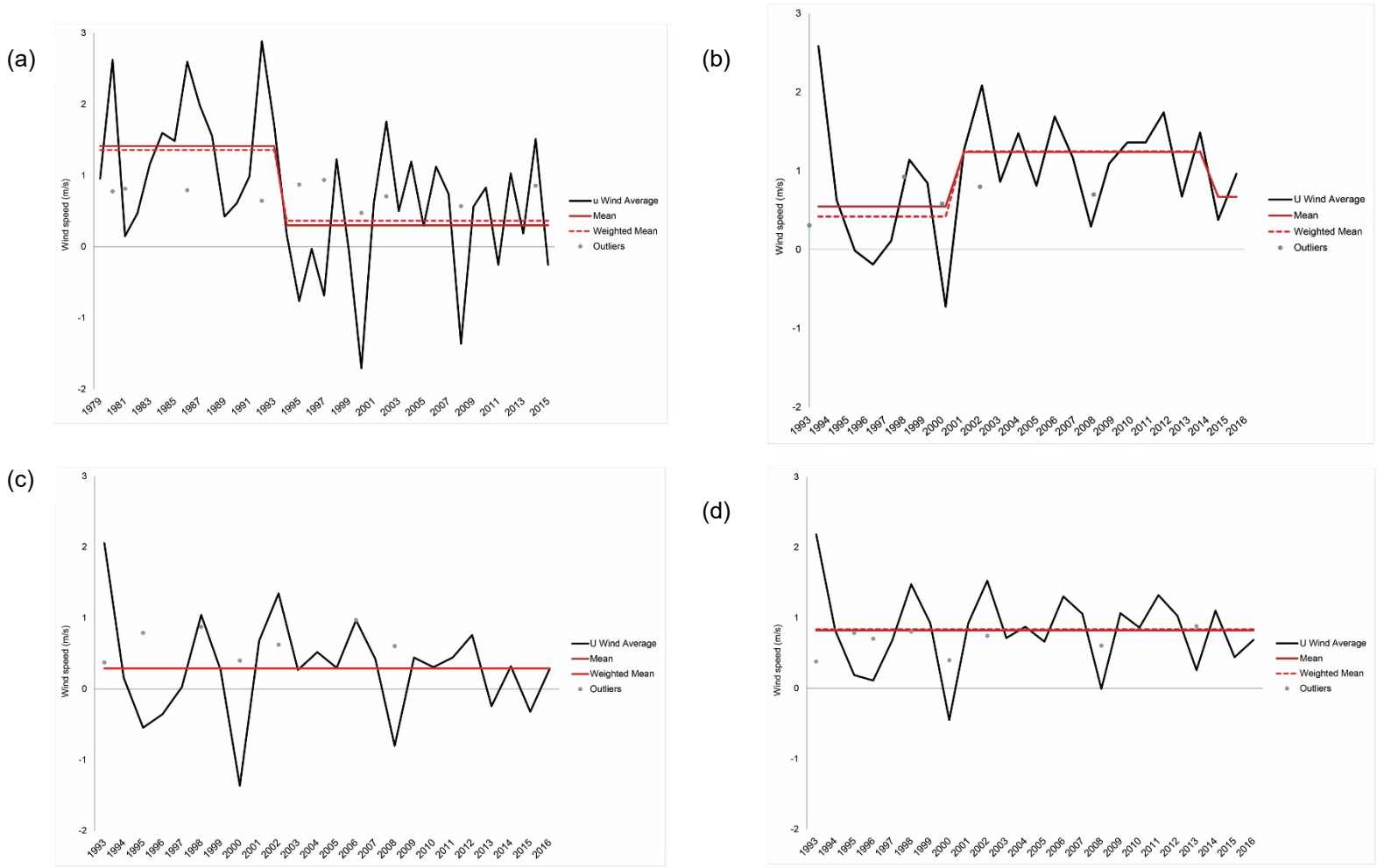

Figure A5.3: Autumn mean values for U component of wind speed for (a) NCEP-DOE, (b) scatterometer aggregate, (c) Witsand and (d) Mossel Bay.

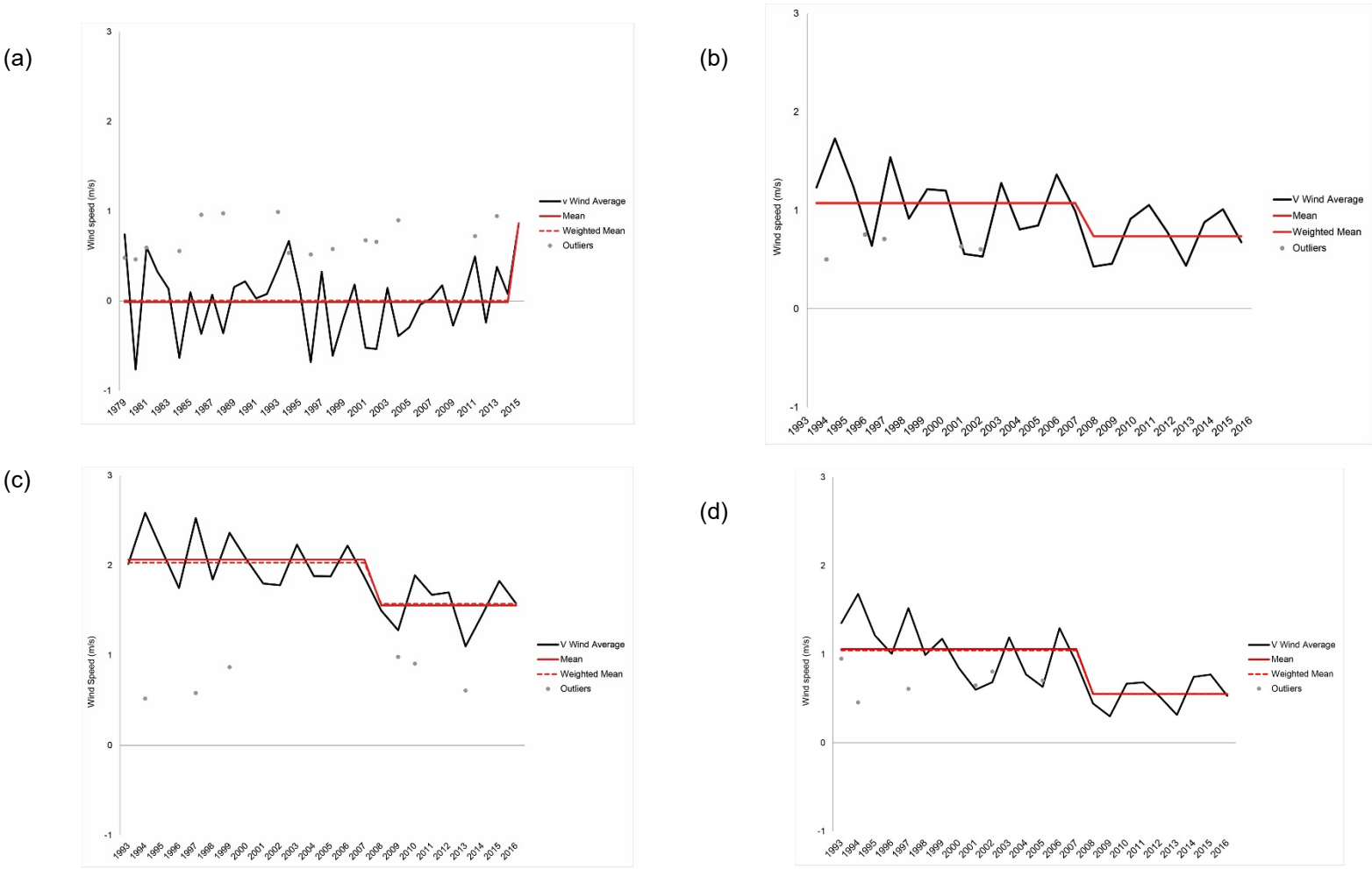

Figure A5.4: Autumn mean values for V component of wind speed for (a) NCEP-DOE, (b) scatterometer aggregate, (c) Witsand and (d) Mossel Bay.

Table A5.1: Wind regime patterns for annual and austral seasons between near- and off-shore time series analysing the mean.

	NCEP-DOE	Aggregate	Witsand	Mossel Bay	Comments
Annual U Wind	1992/1993 ↓ 2013/2014 ↓	2013/2014 ↓	2013/2014 ↓	2013/2014 ↓	**Comparable:** The peaks and toughs across all four data sets, where comparable, were consistent (for example, higher peaks in 1996 and 2005; lower toughs in 1999 and 2010).
Annual V Wind	1996/1997 ↓ 2009/2010 ↑	——	2006/2007 ↓	2006/2007 ↓	**Non-comparable:** Aggregated data were qualitatively more similar to Witsand and Mossel Bay points, despite not displaying regime shifts. Inshore dynamics were more pronounced than the aggregate point.
Austral Summer U Wind	1992/1993 ↓ 2006/2007 ↓	2006/2007 ↓	2006/2007 ↓	2006/2007 ↓	**Comparable:** Decreasing westerlies are relative to increasing easterlies, which correspond to increasing upwelling in the system and thus more productivity on the Agulhas Bank. This is consistent with findings from Blamey et al. (2012) and Lamont et al. (2017) regarding increased upwelling on the Agulhas Bank over time.
Asutral Summer V Wind	2011/2012 ↑	2008/2009 ↓	2005/2006 ↓ 2014/2015 ↓	2005/2006 ↓ 2013/2014 ↑	**Non-comparable:** Witsand and Mossel Bay points agree qualitatively with aggregated scatterometer points. Near-shore south easterly winds have appeared to have shifted to east rather than south from mid-2000s. However, southerly winds have increased off-shore towards the end of the time series according to NCEP-DOE and Mossel Bay results.
Austral Winter U Wind	2011/2012 ↑	2014/2015 ↓	2014/2015 ↓	2014/2015 ↓	**Non-comparable:** However, all four time series indicate a strong peak between 2012 and 2013, thus possibly influencing the NCEP-DOE results as the off-shore time series only runs until 2014. It is noted that all of the time series have similar peaks and toughs.
Austral Winter V Wind	1995/1996 ↓ 2009/2010 ↑	——	——	——	**Non-comparable:** Near-shore wind results suggest that there was no significant change during winter, which is contradicted by off-shore winds that show an increase in northerly winds from the mid-1990s to late 2000s.

Table A5.2: Wind regime patterns for specific seasons between near- and off-shore time series analysing the mean.

	NCEP-DOE	Aggregate	Witsand	Mossel Bay	Comments
Winter U Wind	1987/1988 ↑ 2012/2013 ↑	2014/2015 ↓	2014/2015 ↓	2014/2015 ↓	**Non-comparable:** It should be noted that the second regime shift for the NCEP-DOE time series is at the end of the time series and may have insufficient data. Both near- and off-shore time series have similar very low troughs in 2011 and all of the time series show a peak in 2012/2013 (which subsequently decreases in the more complete scatterometer series that run until 2016).
Winter V Wind	1998/1999 ↓ 2009/2010 ↑	2010/2011 ↑	2014/2015 ↑	2014/2015 ↑	**Non-comparable:** Aggregate scatterometer results show a regime shift in 2010/2011 towards increasing southerly winds. Witsand and Mossel Bay are internally consistent, but only indicate a regime shift in 2014/2015 towards increasing southerly winds. Scatterometer and NCEP-DOE time series are consistent in that they show increasing southerly winds but at different times during the 2000s.
Spring U Wind	2013/2014 ↓	2013/2014 ↓	2013/2014 ↓	2013/2014 ↓	**Comparable:** In the scatterometer data, the new regime shift has resulted in wind direction changing from west to east in Witsand, although wind speed is weak. Mossel Bay's westerly direction also decreased, but remains westerly and weak in speed.
Spring V Wind	1996/1997 ↓ 2005/2006 ↑	2015/2016 ↑	2007/2008 ↓	2007/2008 ↓	**Non-comparable:** Similarly to Autumn V Wind, NCEP-DOE and scatterometer time series give an opposite trend. Aggregate scatterometer data are qualitatively similar to Witsand and Mossel Bay. It should be noted that the regime shift for Aggregate scatterometer time series is at the end of the time series and may have insufficient data.

Table A5.3: Wind regime patterns for annual and austral seasons between near- and off-shore time series analysing variance.

	NCEP-DOE	Aggregate	Witsand	Mossel Bay	Comments
Annual U Wind	1987/1988 ↑ 2006/2007 ↑	2011/2012 ↑	2012/2013 ↑	2011/2012 ↑	Variability increased over time across all data sets where aggregated, Witsand and Mossel Bay experienced increased variability after 2010, whereas NCEP-DOE results indicated mid-2000s (consistent with Blamey et al., 2012).
Annual V Wind	——	2008/2009 ↓	2001/2002 ↓ 2014/2015 ↓	2000/2001 ↓ 2008/2009 ↓	Variability decreased over time for scatterometer points and did not show any change in the NCEP-DOE time series.
Austral Summer U Wind	1989/1990 ↓	——	——	——	No change in variability occurred for scatterometer points and variability decreased into the 1990s according to NCEP-DOE results.
Asutral Summer V Wind	——	2012/2013 ↓	——	2010/2011 ↓	Variability decreased after 2010 for the aggregate and Mossel Bay points, however did not change for NCEP-DOE and Witsand points.
Austral Winter U Wind	1988/1989 ↑ 2013/2014 ↑	2002/2003 ↓	2002/2003 ↓	2002/2003 ↓ 2014/2015 ↓	Over time, variability increased for the NCEP-DOE points and decreased for all scatterometer points.
Austral Winter V Wind	2010/2011 ↓	2001/2002 ↓	2001/2002 ↓ 2011/2012 ↓	2001/2002 ↓	Variability decreased across both NCEP-DOE and scatterometer points, with shifts taking place in the early 2000s for the scatterometer points and again after 2010 for the NCEP-DOE and Witsand points.

Table A5.4: Wind regime patterns for specific seasons between near- and off-shore time series analysing variance.

	NCEP-DOE	Aggregate	Witsand	Mossel Bay	Comments
Summer U Wind	——	——	——	——	No change in the variance was detected for both NCEP-DOE and scatterometer points.
Summer V Wind	2013/2014 ↑	——	——	——	Variability only increased at the end of the NCEP-DOE time series in the late 2000s, whereas the scatterometer points did not change.
Autumn U Wind	2014/2015 ↑	2015/2016 ↓	2014/2015 ↑	2002/2003 ↓ 2015/2016 ↓	NCEP-DOE and Witsand results showed an increase in varability after 2014, whereas the aggregate and Mossel Bay points decreased.
Autumn V Wind	——	——	2015/2016 ↓	2010/2011 ↓	Variability decreased after 2010 for Witsand and Mossel Bay points, however did not change for NCEP-DOE and aggregate points.
Winter U Wind	2013/2014 ↑	——	——	——	Variability only increased at the end of the NCEP-DOE time series and the scatterometer points did not change over time.
Winter V Wind	——	2008/2009 ↓	2001/2002 ↓	2008/2009 ↓	There was on change in variability for the NCEP-DOE point, however the scatterometer points showed a decrease in variability after 2008 for the aggregate and Mossel Bay points, and after 2001 for Witsand.
Spring U Wind	2011/2012 ↑	——	——	——	NCEP-DOE results show an increase in variability after 2011, but scatterometer points do not show any change.
Spring V Wind	——	——	——	——	No changes in variability were detected for all time series.