



SCAR 2014. S9. ANTARCTIC CLIMATE & METEOROLOGY



Analysis of blizzard cases in January 2013 observed at the King Sejong Station, Antarctic Peninsula

25th August 2014

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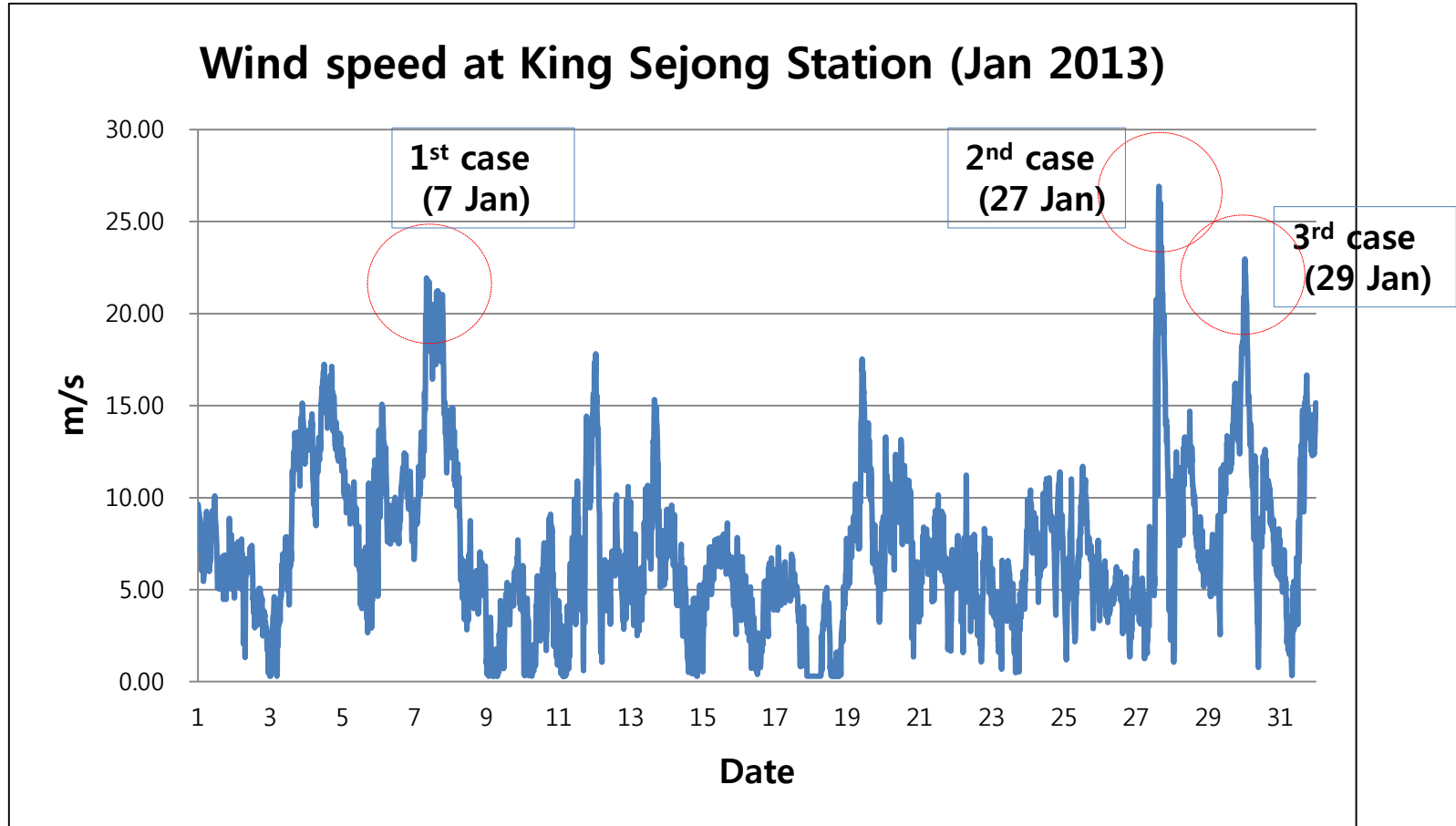
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INCHEON, KOREA

King Sejong Station

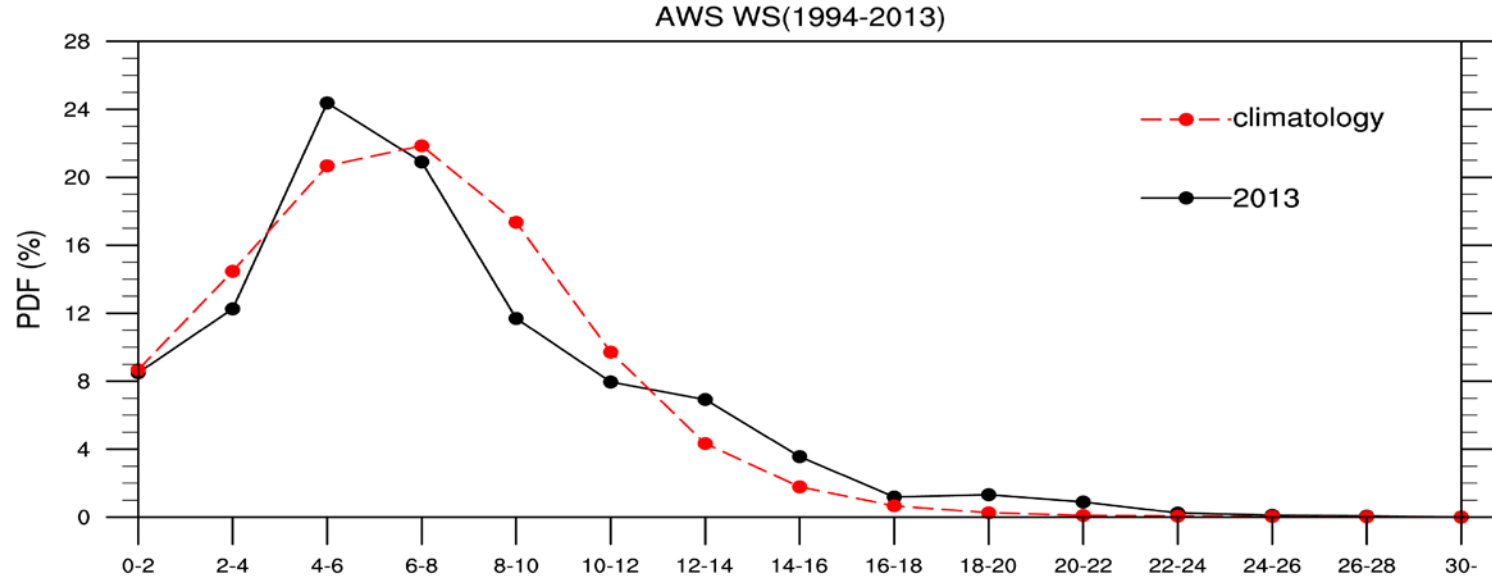
- Since 1988. 02
- King George Island of South Shetland Islands (62° 13'S, 58° 47'W): circumpolar trough
- -5.7°C (Jul) ~ 2.0°C (Jan); 8.0 ms⁻¹



Strong wind cases in January 2013 at King Sejong Station



More frequent strong wind in January 2013 at Sejong Station



Strong wind at King Sejong Station

2000

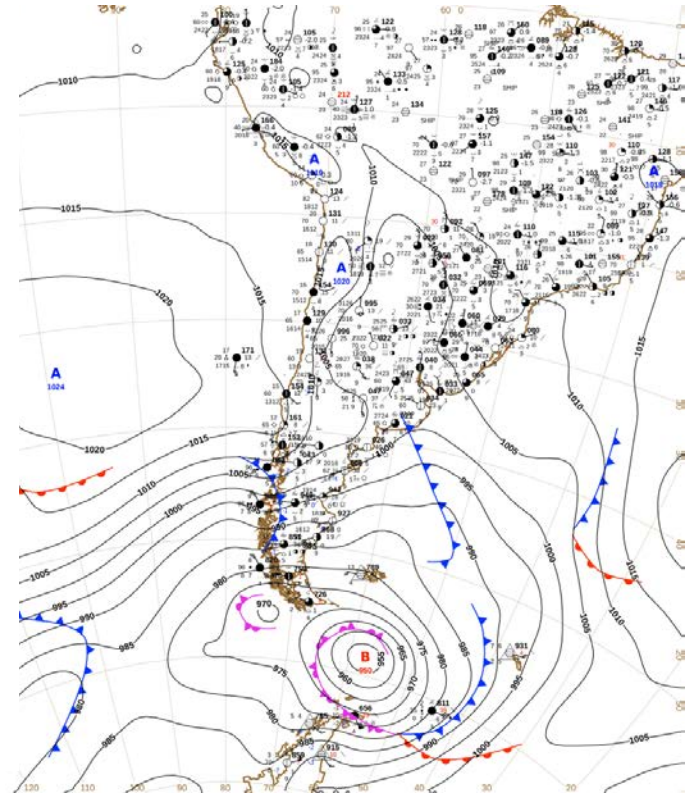
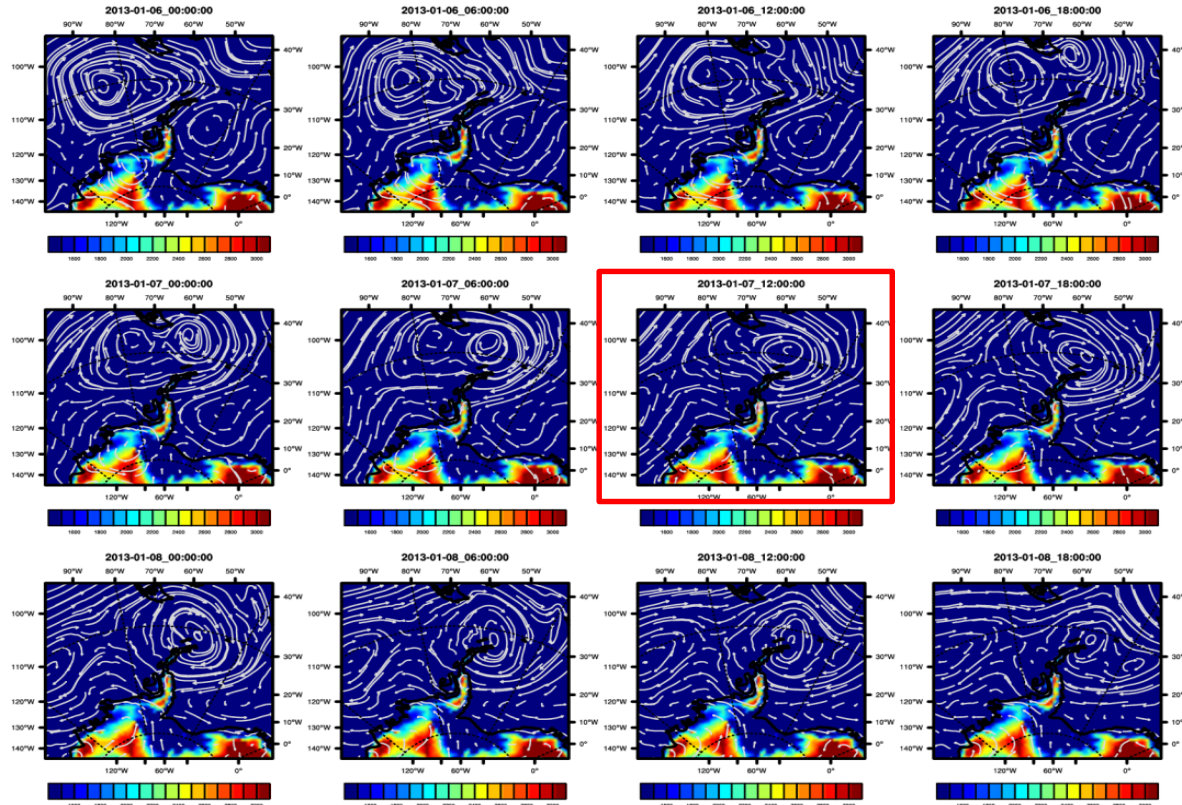
Year	Month	1	2	3	4	5	6	7	8	9	10	11	12	Avg	High	Ext Date
2000	Avg	7.1	6.4	7.4	8.8	7.8	8.8	7.1	8.8	9.1	8.7	6.0	7.1	7.8	46.5	6/7
	High	22.9	29.3	31.1	32.2	27.3	46.5	39.7	37.7	33.1	35.8	28.9	38.8			
	Date	7	3	8	25	14	7	31	29	25	29	2	16			
2001	Avg	6.3	7.9	7.8	8.1	8.3	8.8	7.2	10.6	10.0	11.4	9.5	9.7	8.8	41.4	9/20
	High	29.9	31.5	29.3	30.6	30.7	35.0	29.4	39.7	41.4	33.8	35.4	36.9			
	Date	30	21	8	6	22	2	30	20	20	17	29	4			
2002	Avg	7.2	8.5	6.2	8.1	8.1	8.1	8.0	8.0	7.6	9.4	5.9	7.1	7.7	41.2	10/10
	High	33.1	35.5	31.3	30.3	30.1	33.4	40.8	31.2	37.4	41.2	34.7	33.9			
	Date	1	11	31	18	19	15	1	14	24	10	5	11			
2003	Avg	5.2	7.3	7.6	8.0	8.4	9.6	8.6	10.4	9.7	9.6	6.6	6.5	8.1	49.5	8/16
	High	37.4	30.7	37.7	29.8	30.2	41.6	37.3	49.5	35.1	33.8	31.8	28.3			
	Date	1	11	31	18	19	15	1	14	24	10	5	11			
2004	Avg	6.6	6.4	7.8	8	8.2	7.7	10.2	10.3	9.4	8.7	8.3	7.5	8.3	40.2	9/17
	High	24.6	35.5	27.3	35.4	38.8	26.6	36.8	37.7	40.2	27.3	33.2	30.4			
	Date	3	8	4	12	24	16	28	24	17	13	30	30			
2005	Avg	5.9	8.9	8.5	6	5.6	7.8	7.4	7.2	6.3	8.3	7.6	6.1	7.1	37.6	4/20
	High	25.1	28.2	30.4	37.6	26.5	34.3	29.9	32.7	35.6	25.6	29.4	21.1			
	Date	14	15	30	20	16	29	21	5	23	7	3	2			
2006	Avg	5.9	7.2	8.7	7.5	9.9	8.1	9.1	7.7	8.7	8.7	7.6	7.2	8.0	41.9	6/30
	High	27.2	31.4	37.5	35.5	34.8	41.3	30	37.7	41.3	35.8	31	34			
	Date	22	27	7	7	3	30	20	12	9	31	11	17			
2007	Avg	6.0	5.9	7.6	8.2	8.1	7.2	6.9	9.1	7.4	7.7	5.9	6.1	7.2	40.1	8/10
	High	25.9	27.4	31.6	39.3	37.0	34.9	39.6	40.1	30.9	29.5	25.0	24.8			
	Date	31	20	18	5	19	19	3	10	24	22	30	28			
2008	Avg	7.6	7.5	8.5	8.6	9.3	9	9.2	9	8.5	7.5	9.1		8.4	50.0	4/20
	High	30.9	33.3	38.6	50	32.7	36.7	44.6	32.3	29	32.2	29.1	29.7			
	Date	9	24	1	20	23	16	4	21	12	22	26	22			
2009	Avg	7.4	7.2	7.7	7.1	9.0	8.7	6.8	7.9	8.9	9.9	7.0	7.7	7.9	37.8	5/17
	High	27.4	36.8	34.9	31.5	37.8	35.6	36	37.2	36.9	33.3	34	28			
	Date	8	17	29	30	17	14	14	3	8	9	1	16			
2010	avg	7.0	7.2	8.4	9.7	9.3	10.0	9.7	9.0	9.0	9.4	8.1	7.6	8.7	41.4	5/15
	high	33.2	33.9	31.4	36.6	41.4	36.3	38.9	39.4	29.3	37.2	31.1	32.5			
	date	17	28	17	16	15	2	7	10	30	19	3	13			
2011	avg	7.5	8.9	8.6	8.6	8.5	8.6	7.1	5.7	9.2	8.5	8.6	8	8.2	41.2	9/16
	high	27.2	34	34.3	36.6	34.6	31.3	38	30.3	41.2	33.3	35.9	33.3			
	date	3	25	1	23	17	20	23	17	16	19	4	16			
2012	Avg	6.5	7.1	7	9.5	8.2	11.3	8.6	9	9.1	8.5	7.4	4.7	8.1	49.4	6/20
	High	22.9	28.4	29.1	39.5	41.9	49.4	42.8	32.1	37.5	33	31.9	24.1			
	Date	17	18	4	11	15	20	3	16	9	19	21	1			
2013	Avg	7.2	7	7.5	10.3	9.3	8.6	9	9.6	7.5	8.7	8.2	5.5	8.2	50.8	8/19
	High	45.8	39.2	38.9	38.3	42	37.5	45.2	50.8	45.8	36.9	44.6	34.8			
	Date	27	15	21	14	23	2	19	19	21	29	2	9			
Total	Avg	6.7	7.3	7.9	8.2	8.1	8.6	8.4	8.7	8.7	8.8	7.6	6.9	8.0	50.8	13/8/19
	High	45.9	39.2	45.2	50.0	42.0	49.4	45.2	50.8	46.6	41.2	44.6	43.3			
	Year	2013	2013	1990	2008	2013	2012	2013	2013	1991	2002	2013	1988			

2013

Yellow: Monthly WS > 9.0 m/s
Red: Instant WS > 40.0 m/s

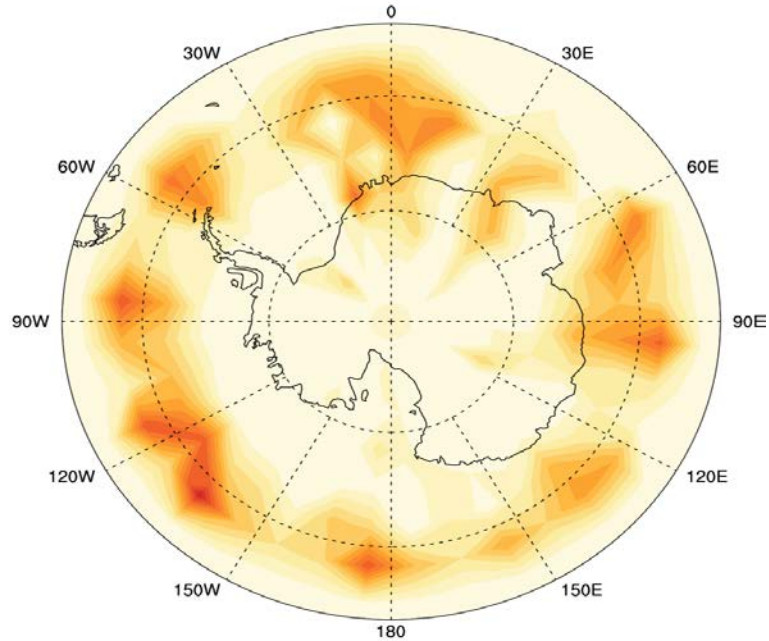
Usually at KSJ, austral winter is windy season.
 Very strong wind cases in recent years.
 Over 40 m/s in summer, for the first time.

Case #1 (7 Jan 12UTC)

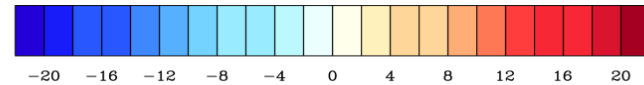
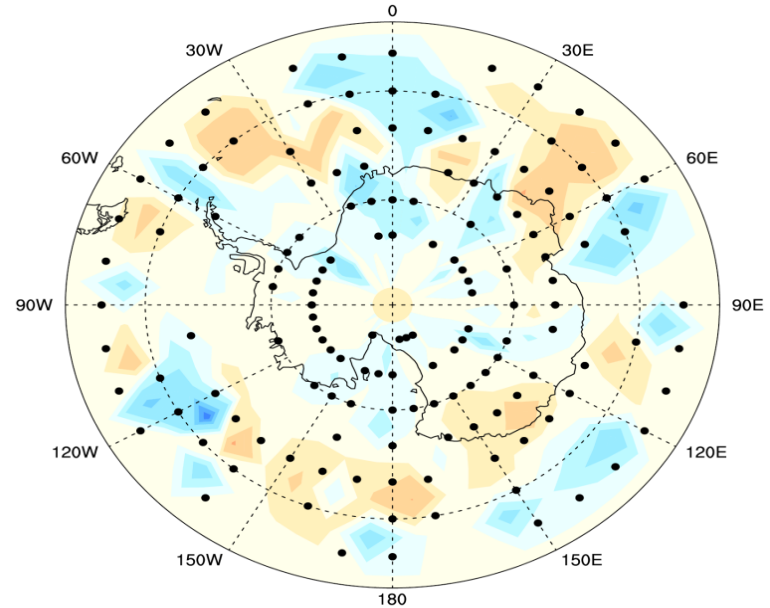


Storm density (ERA Interim data)

2013 Jan storm density

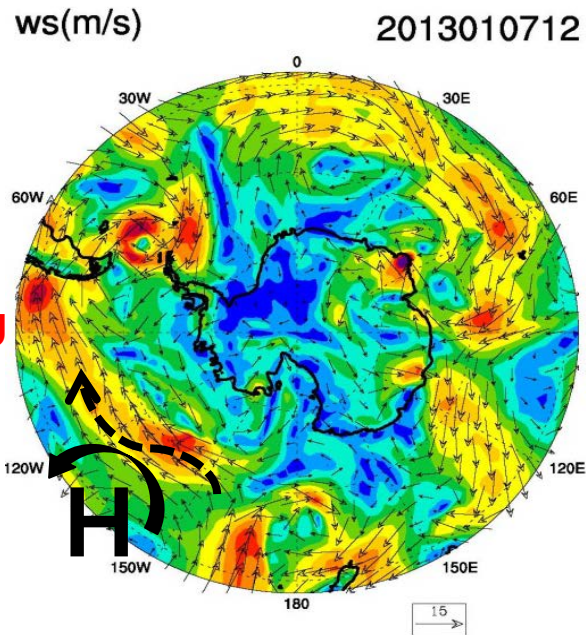
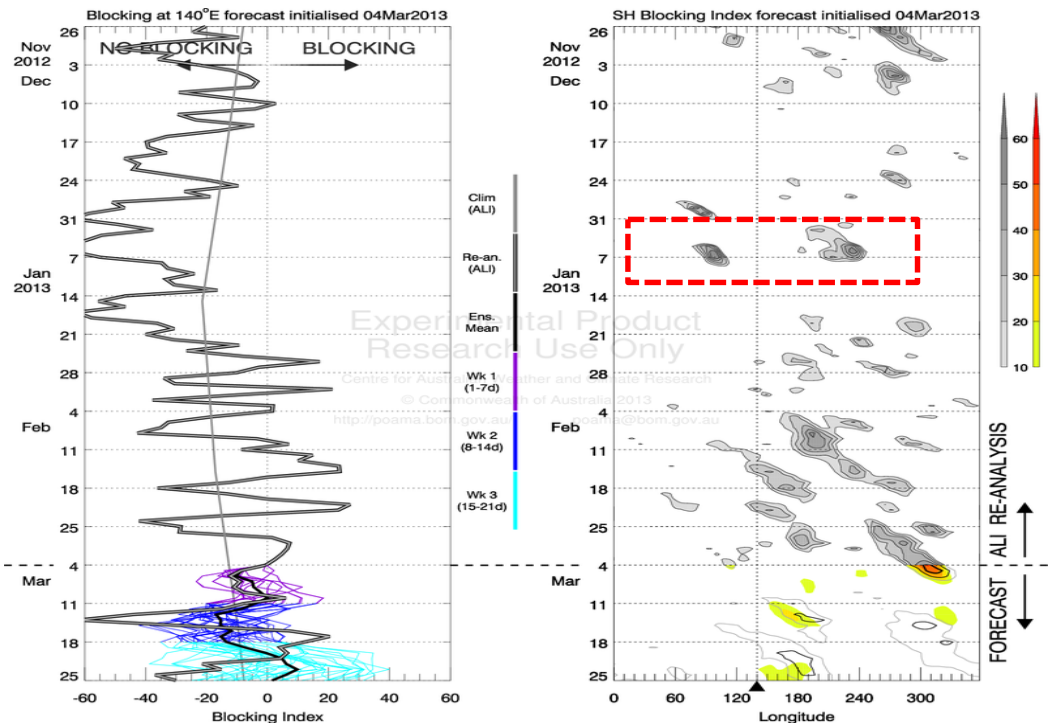


2013 Jan storm density anomaly & t-test



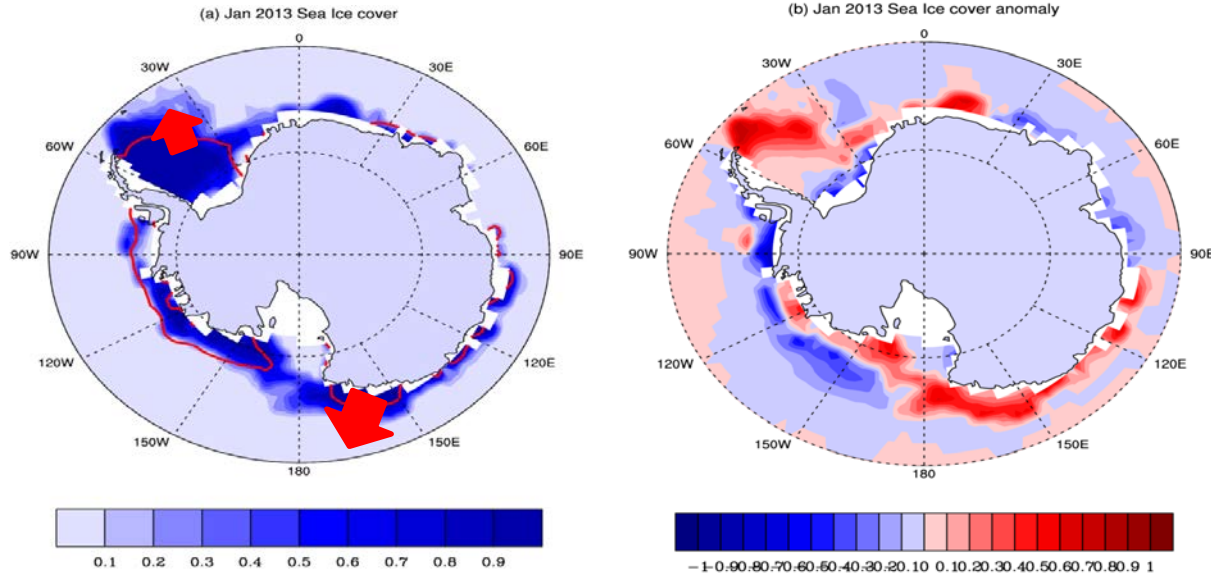
1st case (7 Jan)

- ▶ Strong blocking at 120~140°W
- anticyclones
- Enhanced westerly wind at downwind regions



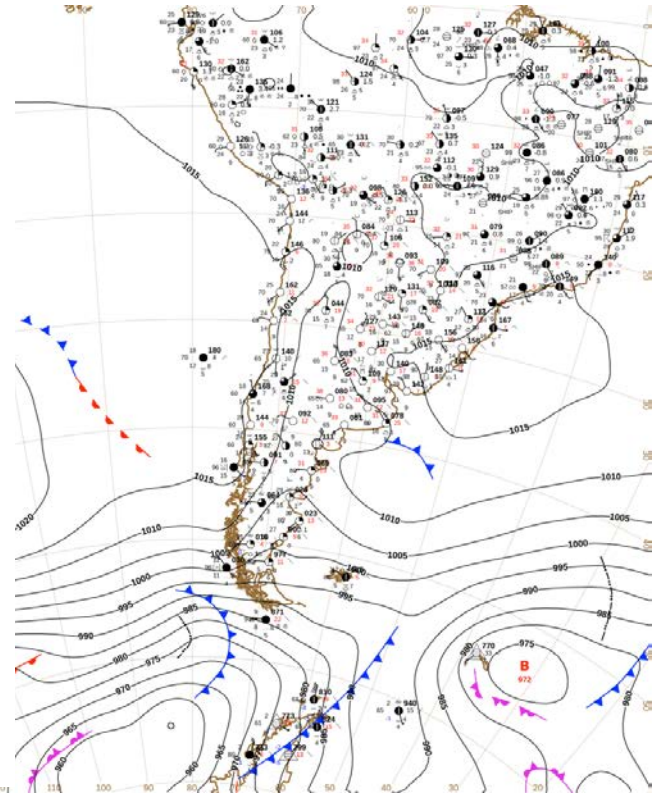
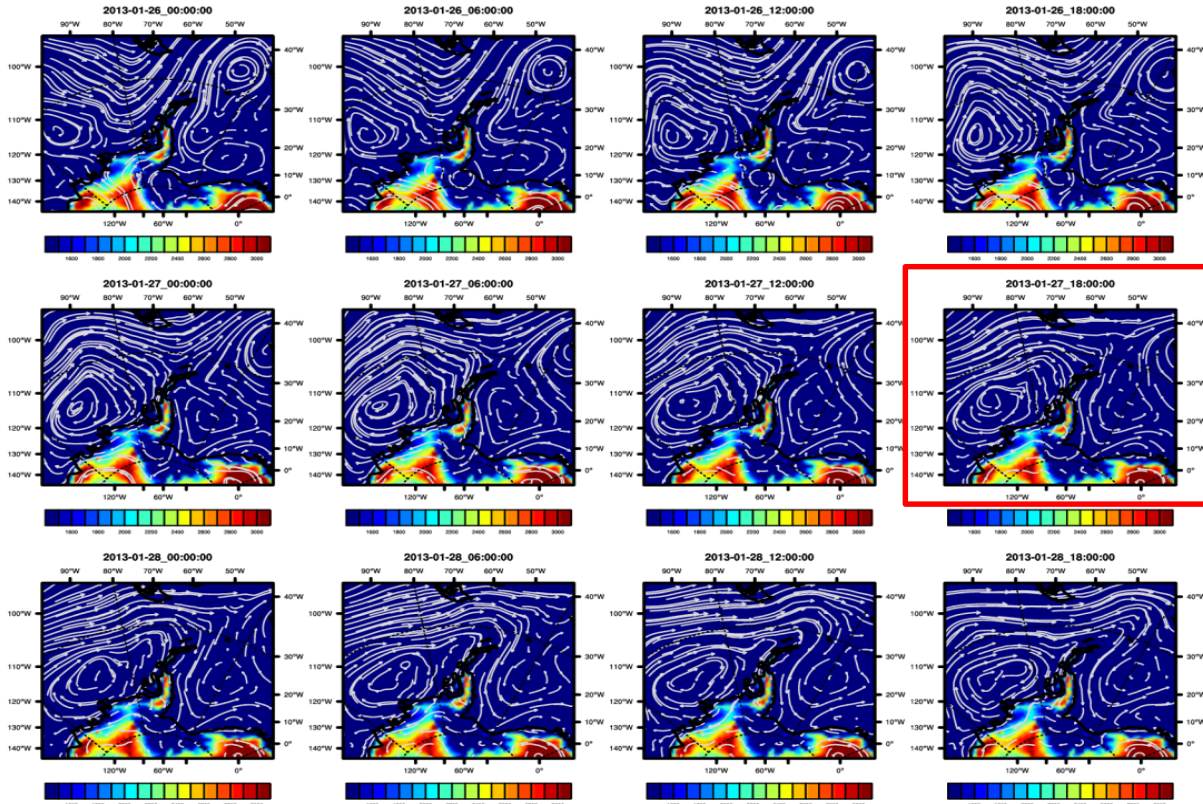
Provided by Dr. Andrew Marshall from <http://poama.bom.gov.au/>

1st case (7 Jan)

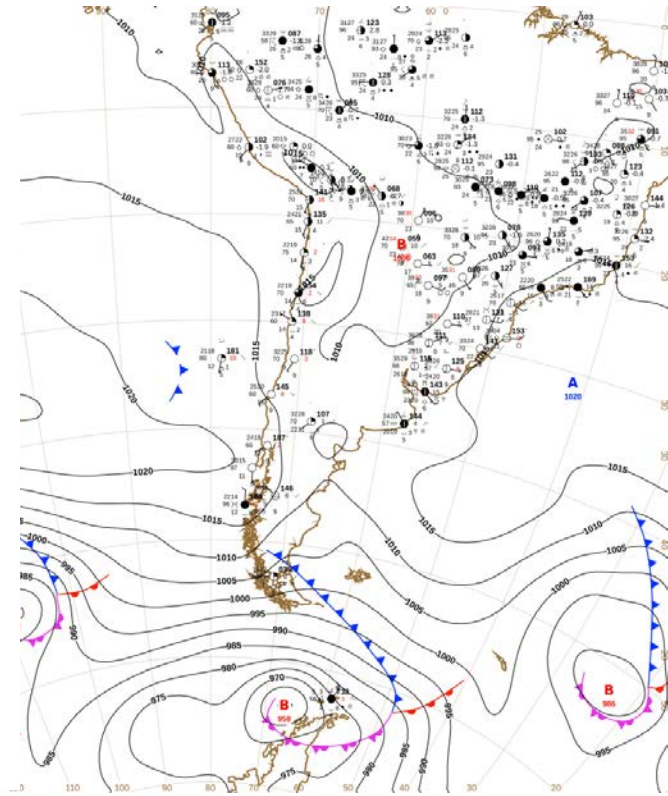
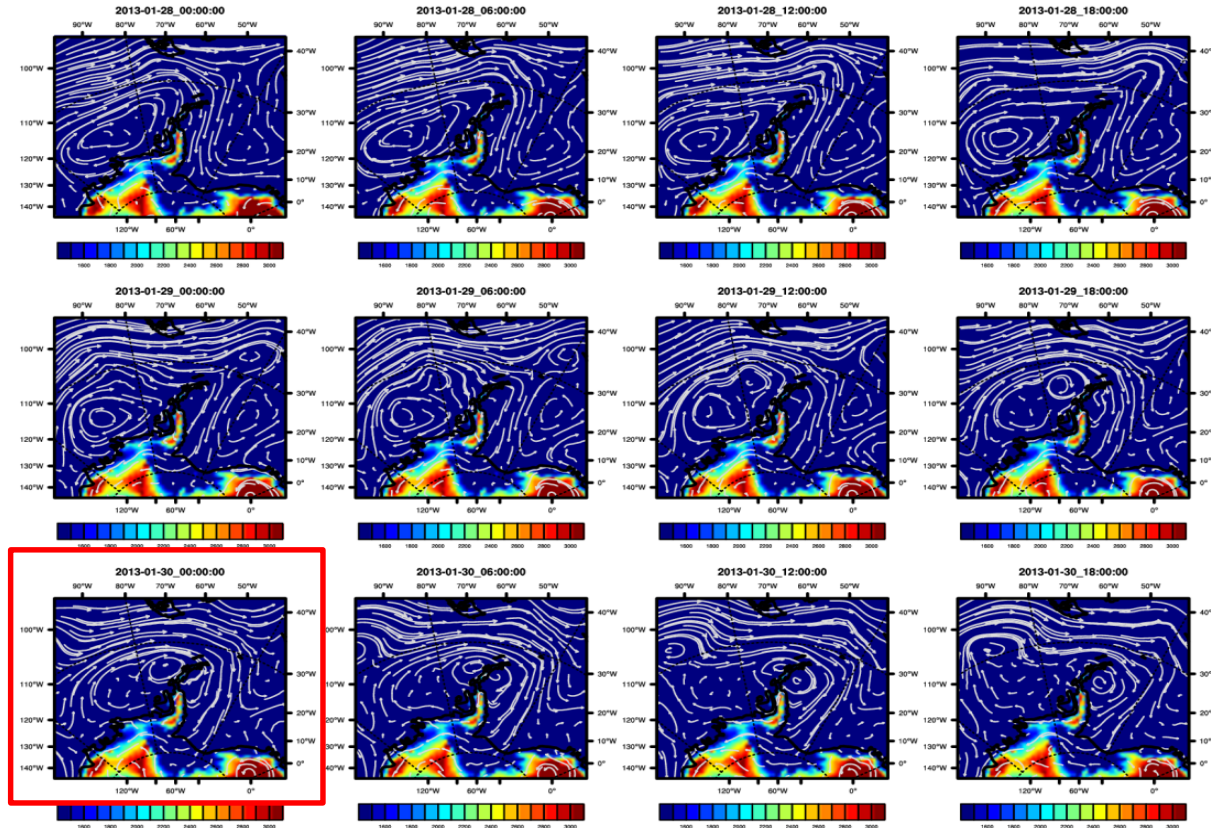


- Sea ice extent increase at Weddell sea
- stronger SST gradient ?
- stronger cyclogenesis and persistence ?

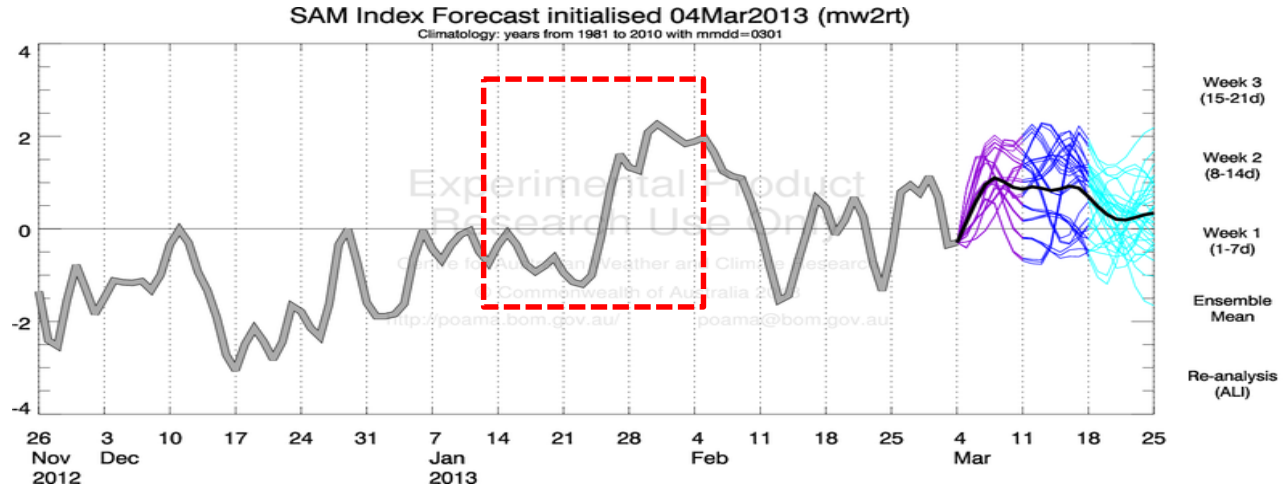
Case #2 (27 Jan 18UTC)



Case #3 (30 Jan 00UTC)



2nd and 3rd case (27 and 29 Jan)



Provided by Dr. Andrew Marshall from <http://poama.bom.gov.au/>

► January 27 and 29 case

SAM index change from negative to positive

→ Enhance pressure gradient ?

→ Stronger wind ?



Summary

- ✓ 1st case (07 Jan): Blocking case
- ✓ 2nd, 3rd case (27 and 29 Jan): Variation of jet stream by pressure field (SAM)

Climate change

- Variations of sea ice extent/concentration
as well as large scale phenomena such as ENSO, SAM, PSA
- More extreme wind at Circumpolar Trough regions (incl. KSJ)

Thank you

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Supported by 'Investigation of Climate Change Mechanism by Observation and Simulation of Polar Climate for the Past and Present(PE14010)' of KOPRI

WS and Tair in January 2013 at King Sejong Station

