MISR Winds Along the Equator During Five El Niño and Four La Niña Events in 2000-2016

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Definitions: El Niño and La Niña

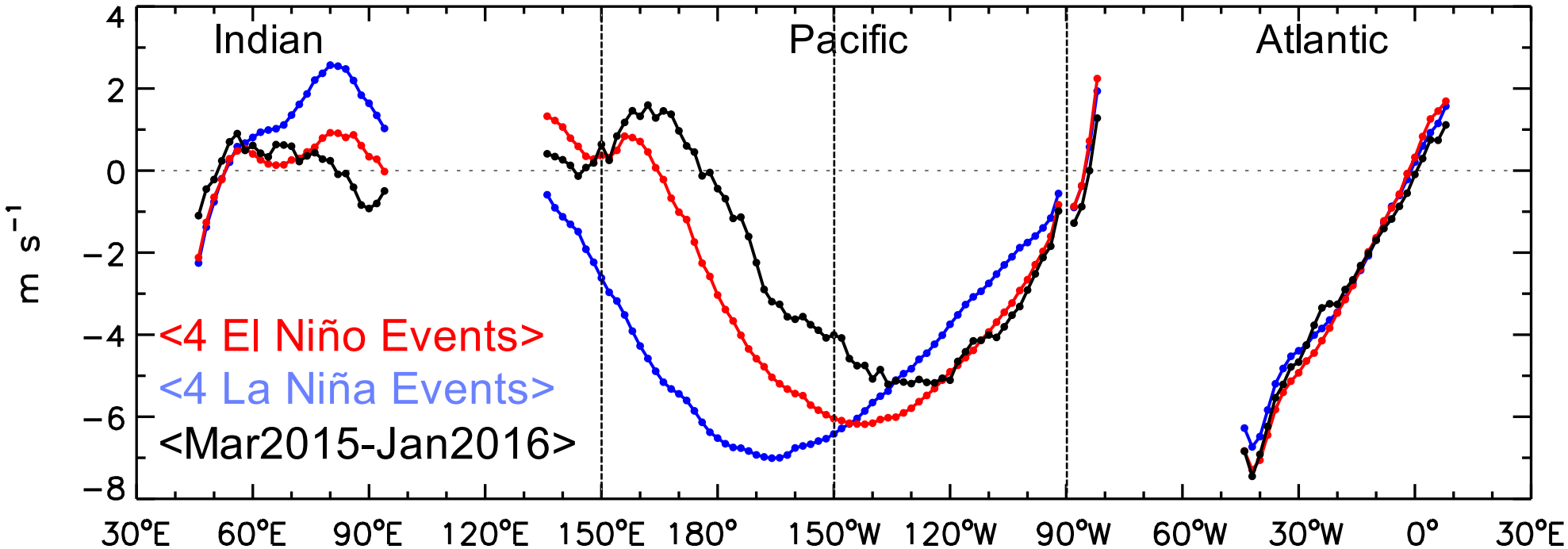
	J	F	M	A	M	J	J	A	S	O	N	D	
2000	-1.6	-1.4	-1.1	-0.9	-0.7	-0.7	-0.6	-0.5	-0.6	-0.7	-0.8	-0.8	La Niña 1
2001	-0.7	-0.6	-0.5	-0.3	-0.2	-0.1	0	-0.1	-0.1	-0.2	-0.3	-0.3	
2002	-0.2	-0.1	0.1	0.2	0.4	0.7	0.8	0.9	1.0	1.2	1.3	1.1	El Niño 1
2003	0.9	0.6	0.4	0	-0.2	-0.1	0.1	0.2	0.3	0.4	0.4	0.4	
2004	0.3	0.2	0.1	0.1	0.2	0.3	0.5	0.7	0.7	0.7	0.7	0.7	El Niño 2
2005	0.6	0.6	0.5	0.5	0.4	0.2	0.1	0	0	-0.1	-0.4	-0.7	
2006	-0.7	-0.6	-0.4	-0.2	0.0	0.1	0.2	0.3	0.5	0.8	0.9	1.0	El Niño 3
2007	0.7	0.3	0	-0.1	-0.2	-0.2	-0.3	-0.6	-0.8	-1.1	-1.2	-1.3	La Niña 2
2008	-1.4	-1.3	-1.1	-0.9	-0.7	-0.5	-0.3	-0.2	-0.2	-0.3	-0.5	-0.7	
2009	-0.8	-0.7	-0.4	-0.1	0.2	0.4	0.5	0.6	0.7	1.0	1.2	1.3	El Niño 4
2010	1.3	1.1	0.8	0.5	0	-0.4	-0.8	-1.1	-1.3	-1.4	-1.3	-1.4	La Niña 3
2011	-1.3	-1.1	-0.8	-0.6	-0.3	-0.2	-0.3	-0.5	-0.7	-0.9	-0.9	-0.8	La Niña 4
2012	-0.7	-0.6	-0.5	-0.4	-0.3	-0.1	0.1	0.3	0.4	0.4	0.2	-0.2	
2013	-0.4	-0.5	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	
2014	-0.5	-0.6	-0.4	-0.2	0	0	0	0	0.2	0.4	0.6	0.6	
2015	0.5	0.4	0.5	0.7	0.9	1.0	1.2	1.5	1.8	2.1	2.2	2.3	El Niño 5

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.shtml

An El Niño event occurs when the SST anomaly in each of five consecutive 3-month average ≥ 0.5 ˚C.

A La Niña event occurs when the SST anomaly in each of five consecutive 3-month average ≤ - 0.5 ˚C.

10-m (Surface) Zonal Wind Component

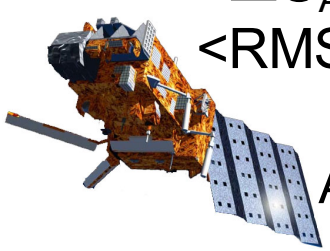


SeaWinds on QuikSCAT

Mar2000-Oct2009

$\langle \triangle U_{A\text{-}Q} \rangle = -0.03$ m s^{-1}

$\langle RMSD \rangle = 0.38$ m s^{-1}



ASCAT-A on METOP-A

Jun2007-present

West Pacific (150˚E-150˚W) [westward]

U < U and U < U

East Pacific (150˚W-90˚W) [westward]

U > U and U = U

Atlantic [westward]

U = U = U

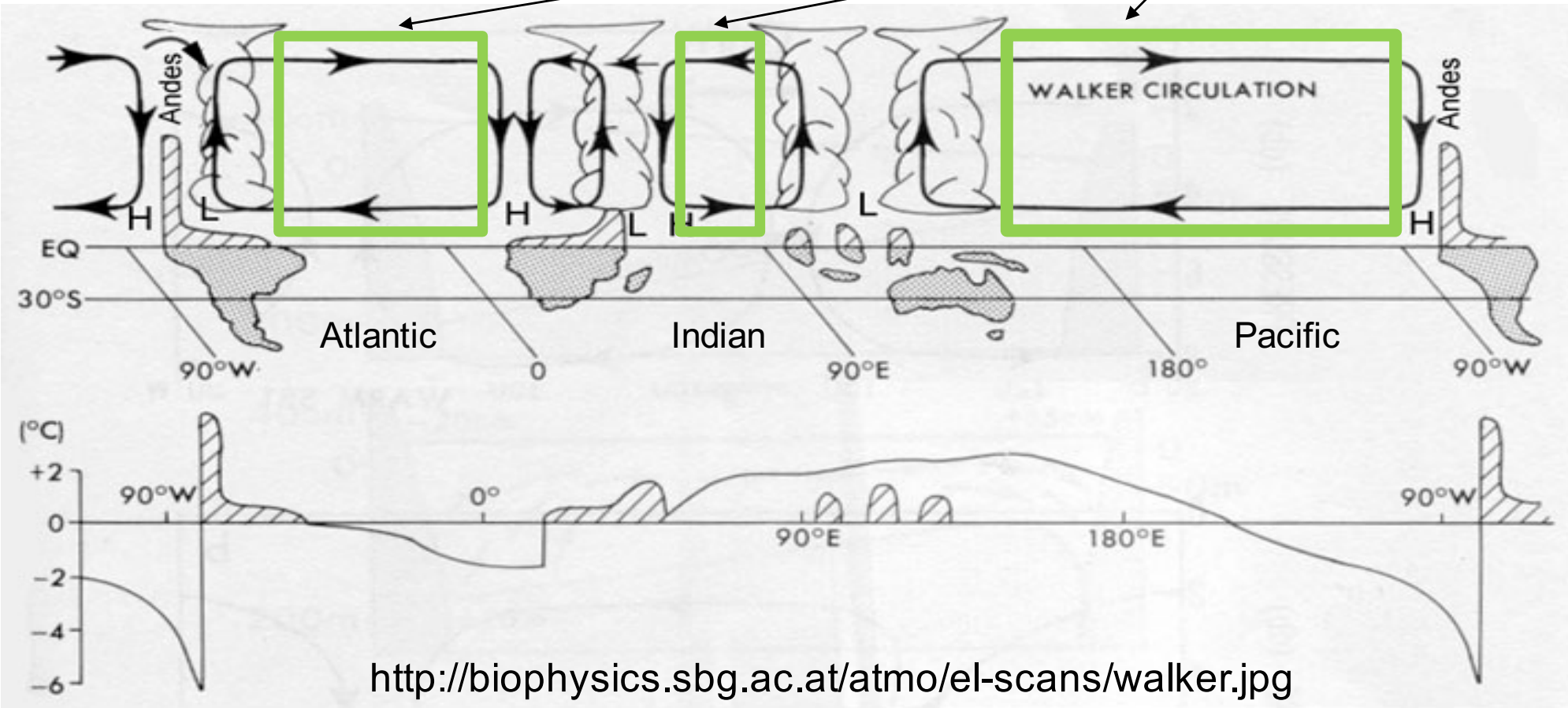
Indian [eastward]

U < U and U > U

Walker Circulation, El Niño and La Niña

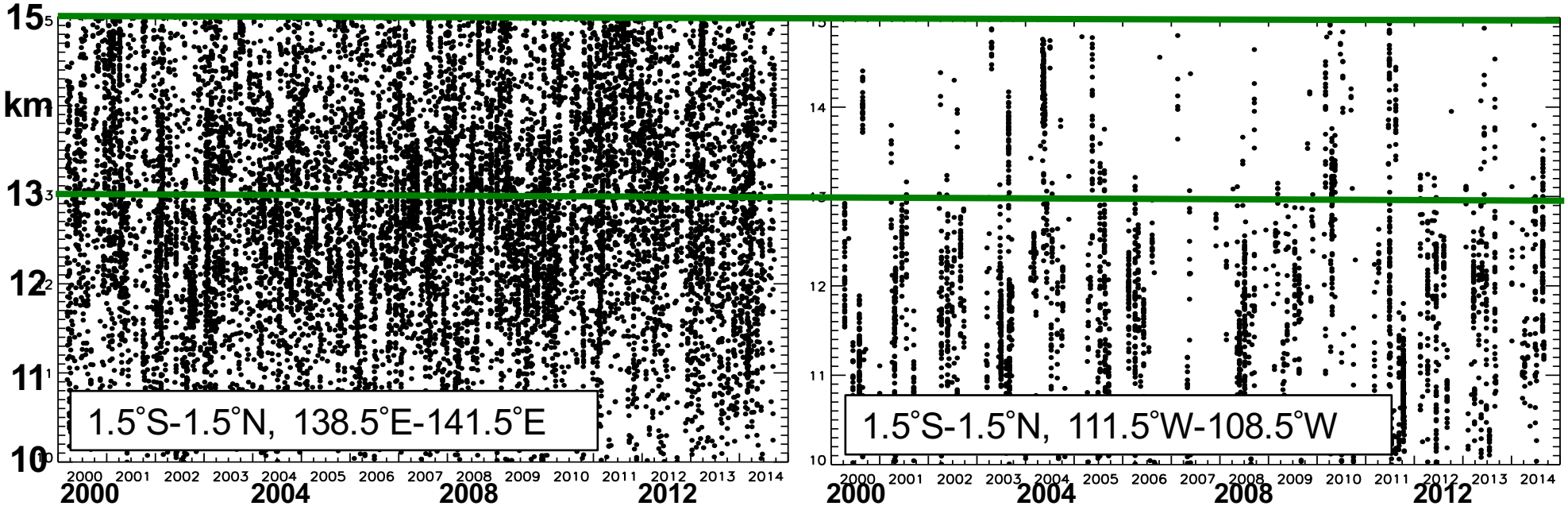
OBJECTIVE

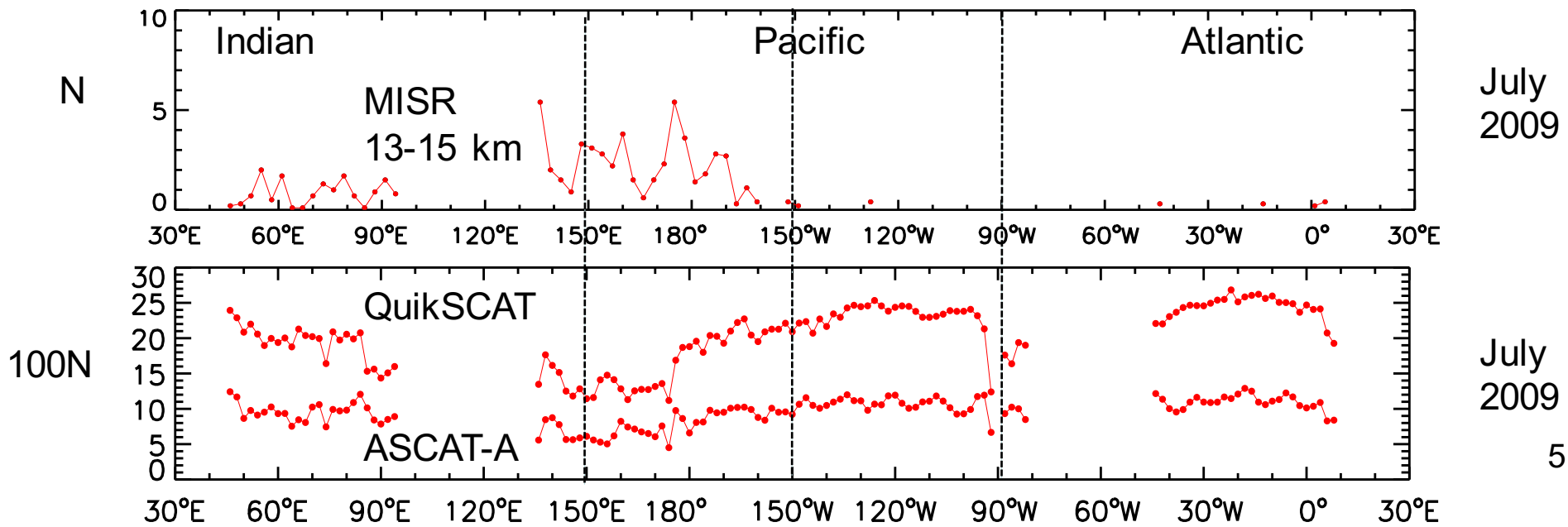
What happened to the intensity of the eastward (Atlantic, Pacific) or westward (Indian) wind in the upper troposphere in the 2015-2016 El Nino event?



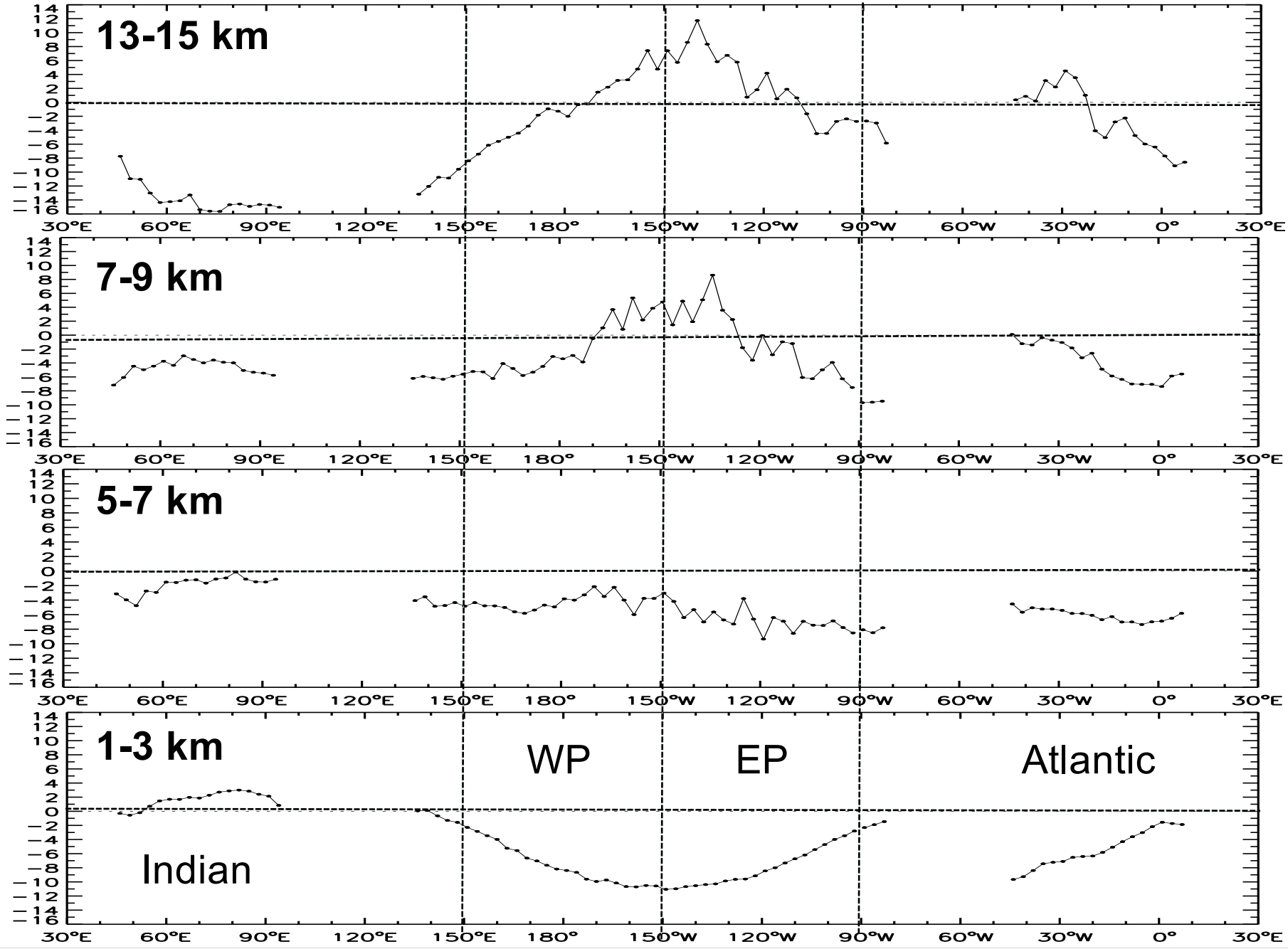
http://biophysics.sbg.ac.at/atmo/el-scans/walker.jpg

MISR Data Distribution

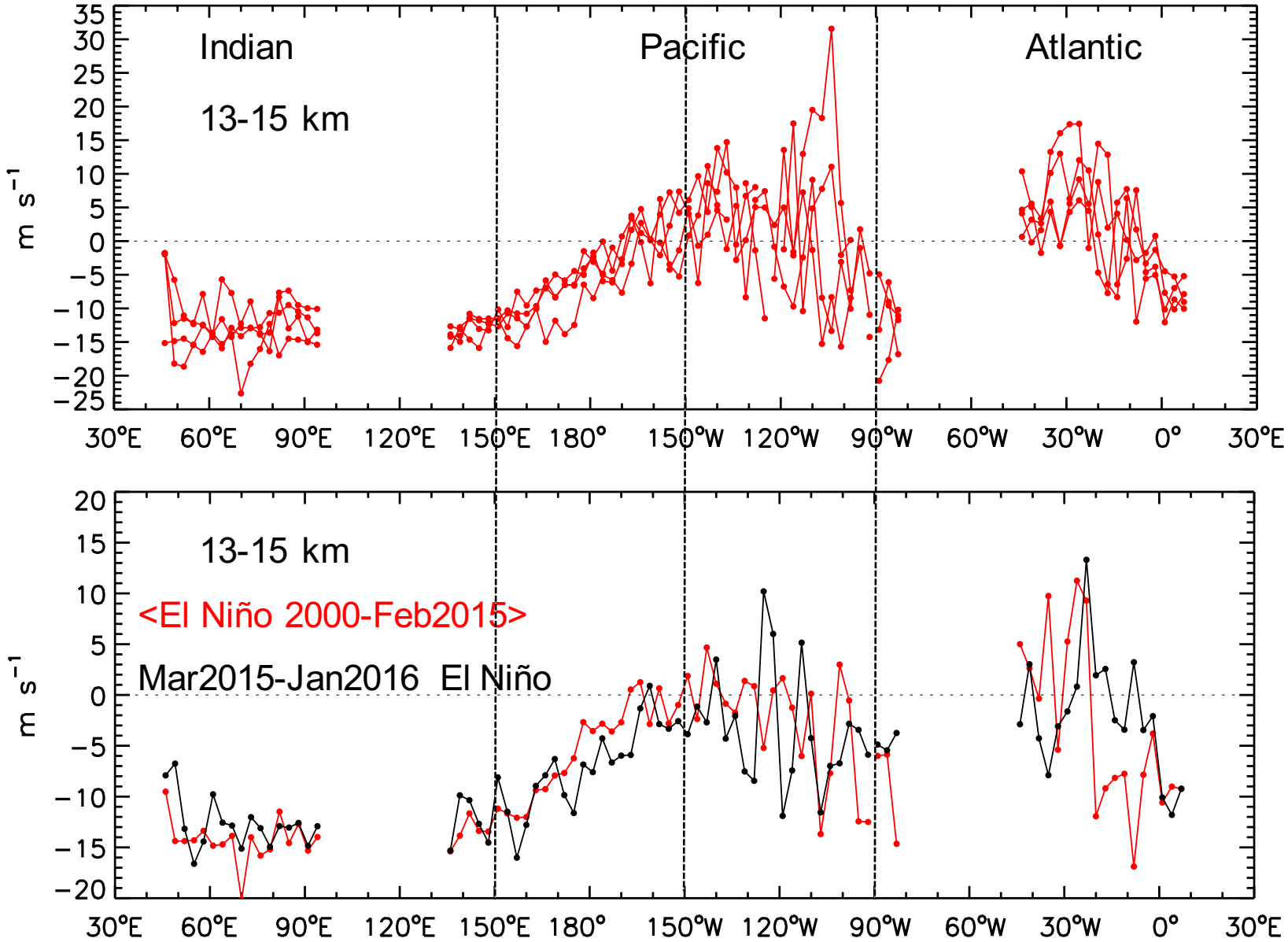




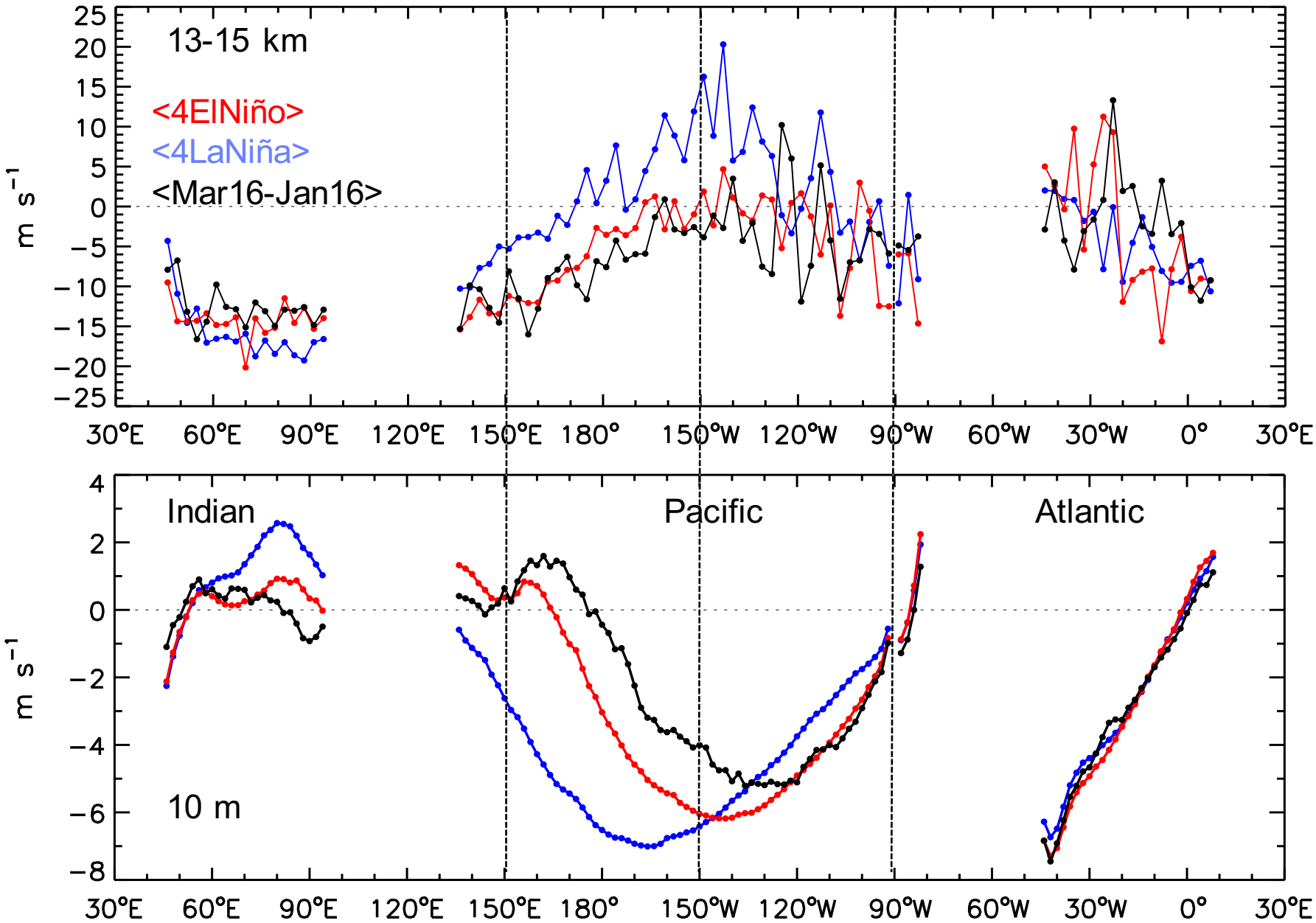
Vertical Distribution of Zonal Wind (m s^{-1})
Jan 2001 – Dec 2014, 1.5°S – 1.5°N



Four El Niño Events, <El Niño> and Mar2015-Jan2016 El Niño



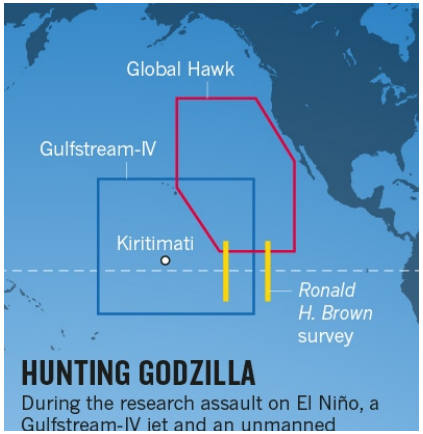
Summary and Conclusions

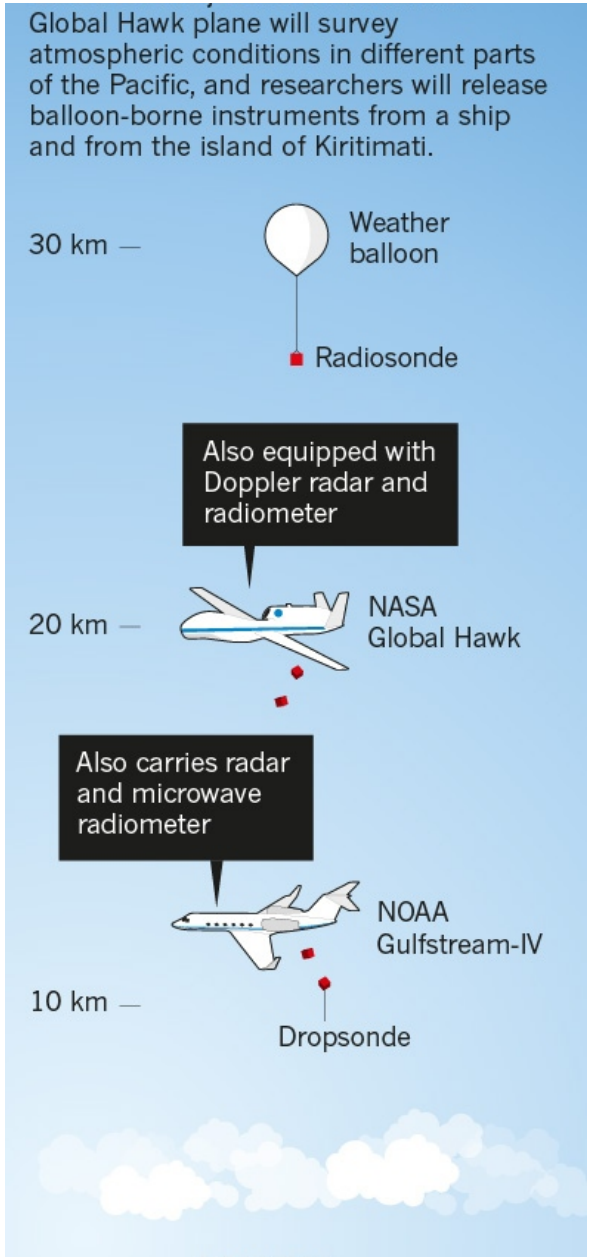


Summary and Conclusions

- West and Central Pacific (150˚E-140˚W)
  - At 10 m, 2015-2016 El Niño westward wind speeds were 2 m s^{-1} less than <El Niño> and 5 m s^{-1} less than <La Niña>
  - At 14 km, 2015-2016 El Niño zonal wind speeds were very similar to <El Niño> and 10 m s^{-1} less than <La Niña>
- East Pacific (130˚W-90˚W)
  - At 10 m, 2015-2016 El Niño westward wind speeds were very similar to <El Niño> and 1 m s^{-1} greater than <La Niña>
  - At 14 km, 2015-2016 El Niño zonal wind speeds were very similar to <El Niño> and similar to <La Niña>
- Atlantic
  - At 10 m, zonal wind speeds in 2015-2016 El Niño were similar to <El Niño> and <La Niña>
  - At 14 km, zonal wind speeds in 2015-2016 El Niño were similar and different with <El Niño> and <La Niña>
- Indian
  - At 14 km, 2015-2016 El Niño westward wind speeds were very similar to <El Niño>

Evaluation of MISR Winds





http://www.nature.com/news/monster-el-niño-probed-by-meteorologists-1.19194

Thank You

http://theaposition.com/robertfagan/wp-content/uploads/sites/33/2013/04/QuestionsPic.jpg