How Well Did Measurements of Surface Winds in the 2015 El Niño Match Similar Observations Recorded in the Four Previous El Niño Events?

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Data Sets Produced by

- Remote Sensing Systems (Lucrezia Ricciardulli)
  - ASCAT-A
  - QuikSCAT
- MISR
- NOAA NCEP CPC

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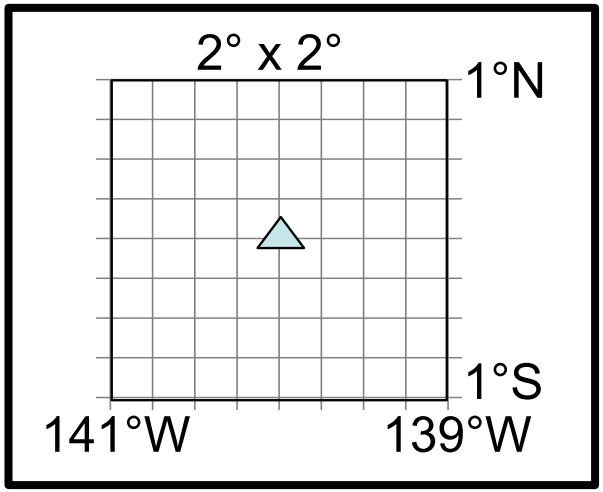
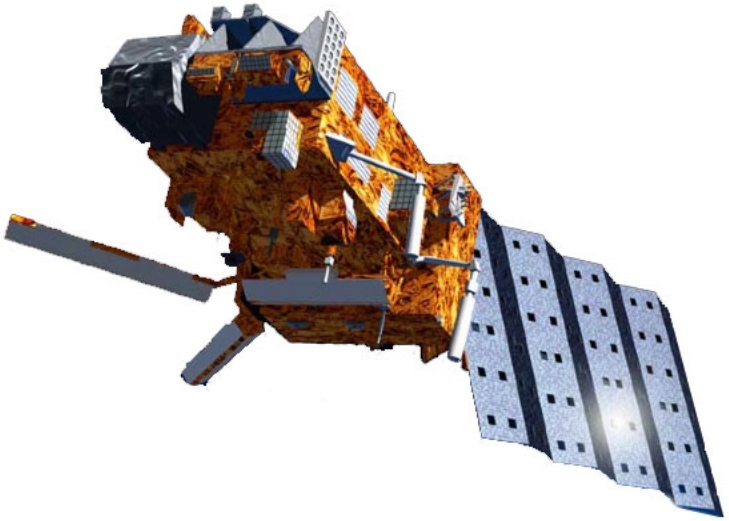
Satellite Ocean Surface Wind Vector Measurements and Analysis-Grid Design

NASA SeaWinds Instrument on NASA QuikSCAT Satellite
19 Jun 1999 – 23 Nov 2009

https://winds.jpl.nasa.gov/missions/quikscat/





ESA ASCAT-A Instrument
on EUMETSAT METOP-A Satellite
19 Oct 2006

http://www.russianspaceweb.com/metop.html

Comparisons of QuikSCAT and ASCAT-A Monthly East-West (U) Wind Component

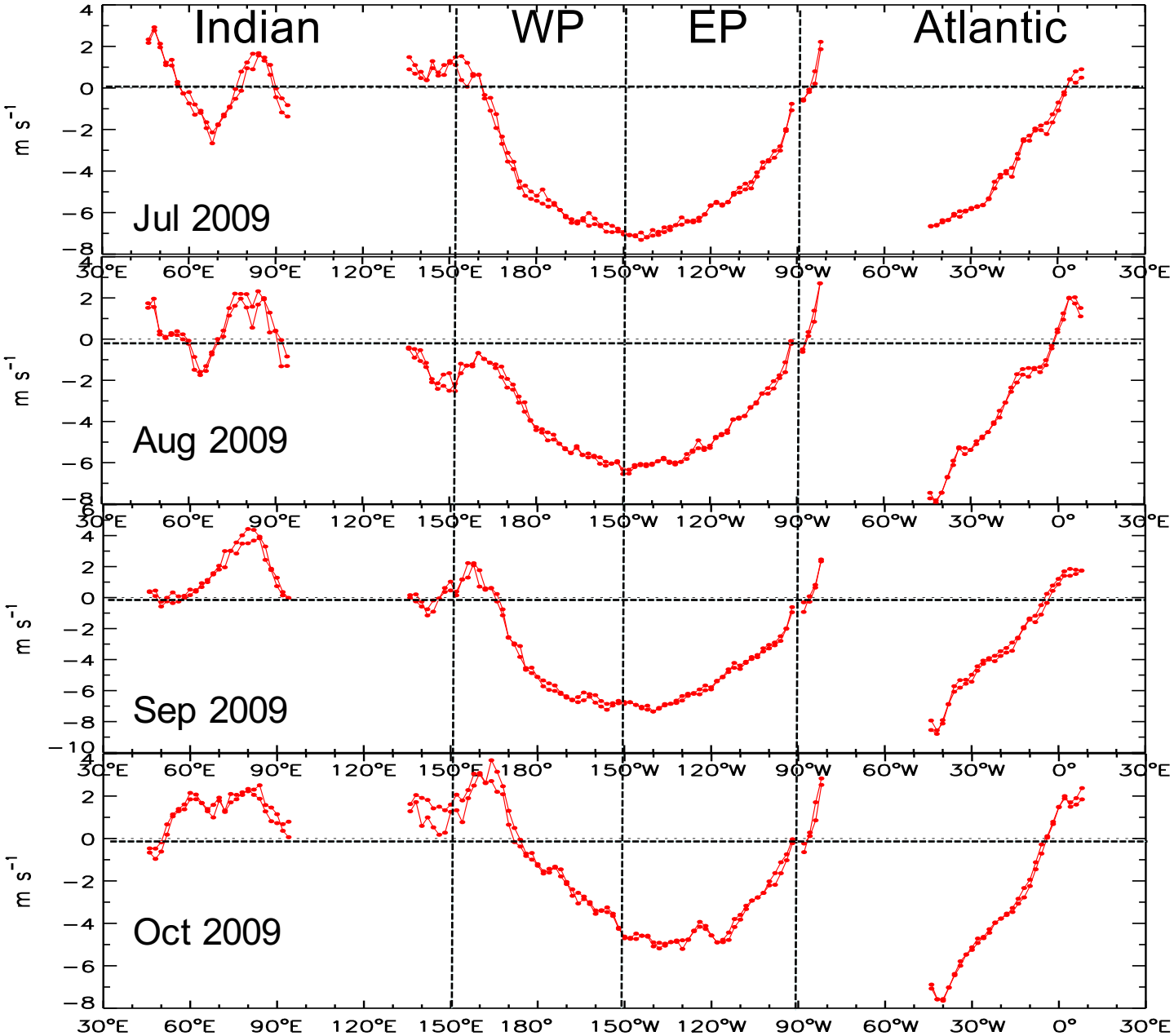
Absolute Mean Diff, m s^{-1}

0.01

0.04

0.08

0.10



RMSD, m s^{-1}

0.34

0.31

0.36

0.40

El Niño, La Niña and Normal SST Time Intervals

NOAA Oceanic Niño Index for Niño Region 3.4 (5˚S-5˚N, 170˚W-120˚W)

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ	
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
2010	1.3	1.1	0.8	0.5	0	-0.4	-0.8	-1.1	-1.3	-1.4	-1.3	-1.4	
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	1.7				El Niño #5

Version 4

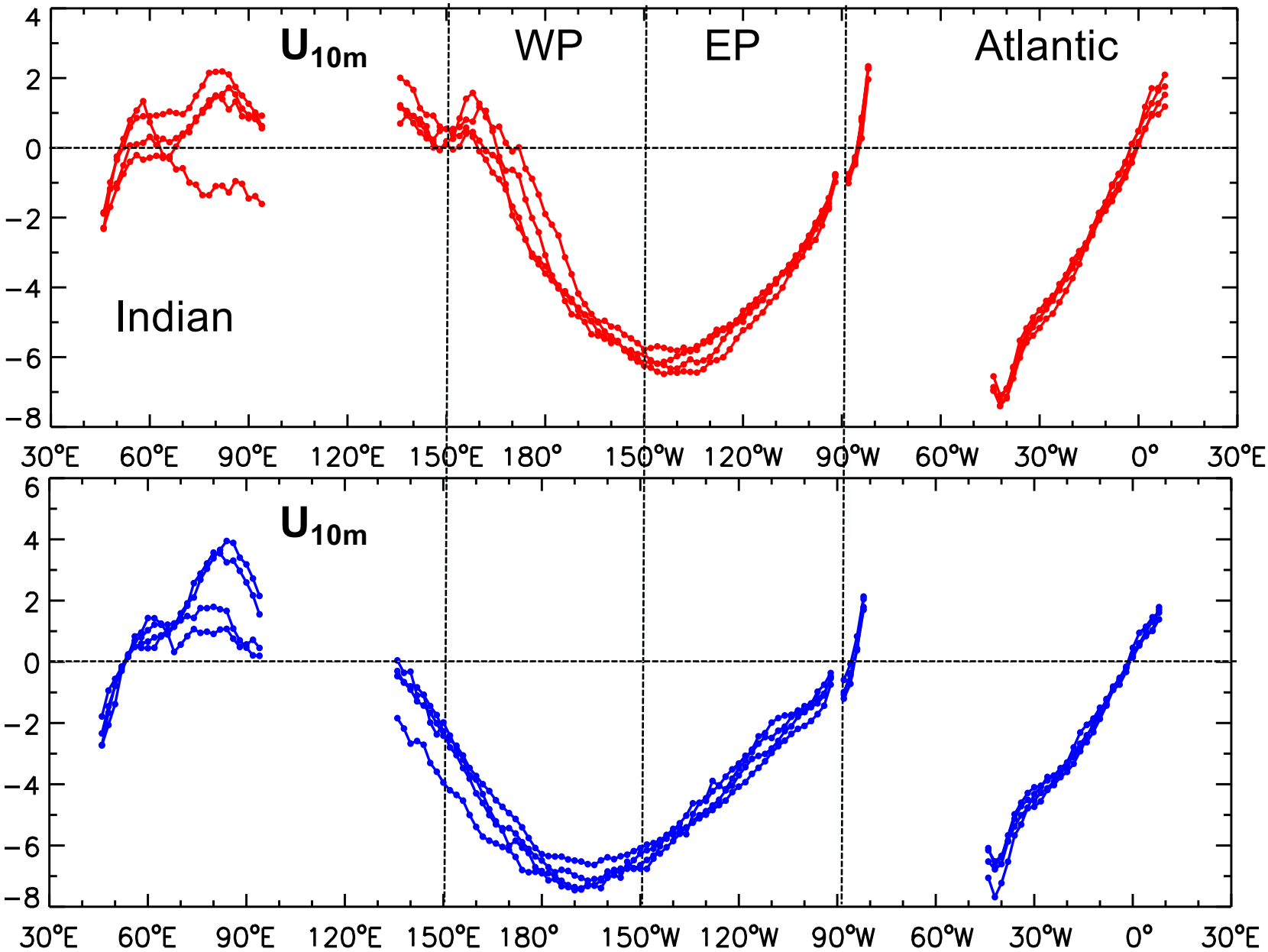
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.shtml

Reference SST = 1981-2010

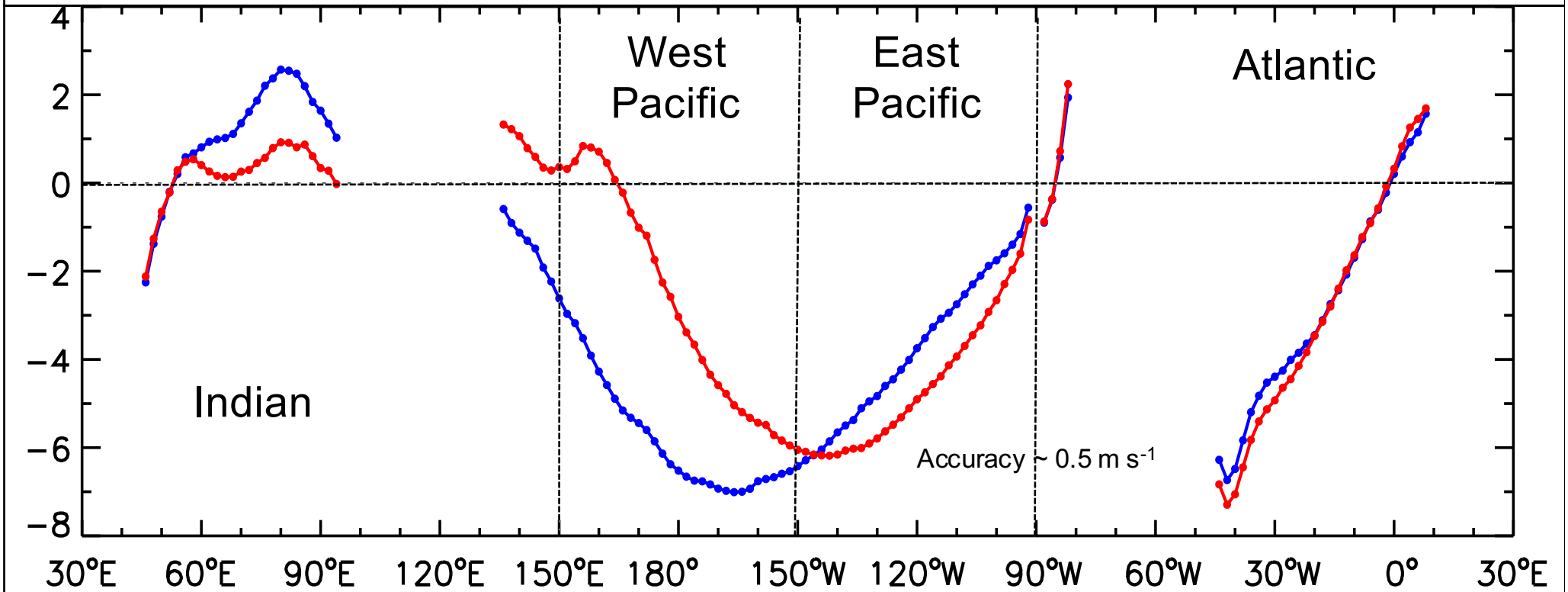
An **El Niño** event occurs when the SST anomaly in each of five consecutive 3-month average **≥ 0.5** ˚C.

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

Four El Niño Events and Four La Niña Events
Mar 2000 – Dec 2014

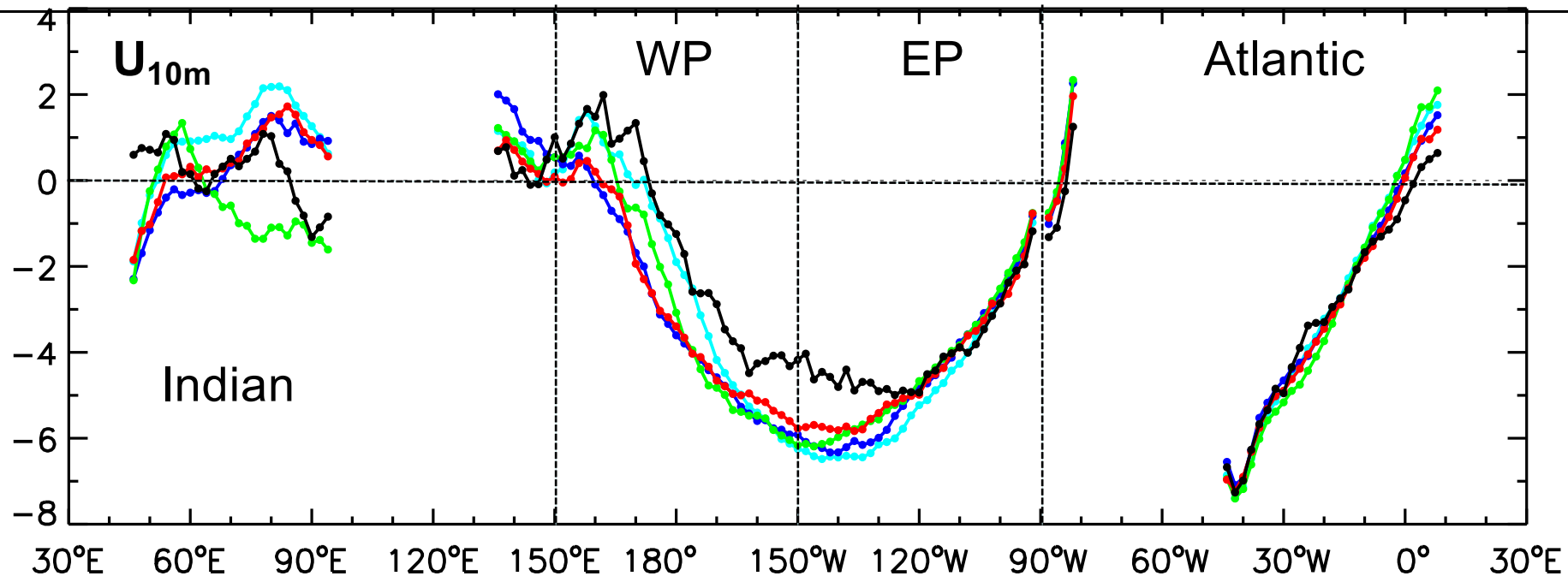


10-m Zonal Wind: <4 El Niño> and <4 La Niña> in Mar 2000 – Dec 2014



- Indian
  - 60˚E-92˚E: weaker eastward wind in <El Niño> compared to <La Niña>
- Pacific:
  - 135˚E-140˚W: weaker westward wind in <El Niño> vis-a-vis <La Niña>
  - 135˚W-100˚W: stronger westward wind in <El Niño> than in <La Niña>
- Atlantic
  - westward/eastward wind the same in <El Niño> and <La Niña>

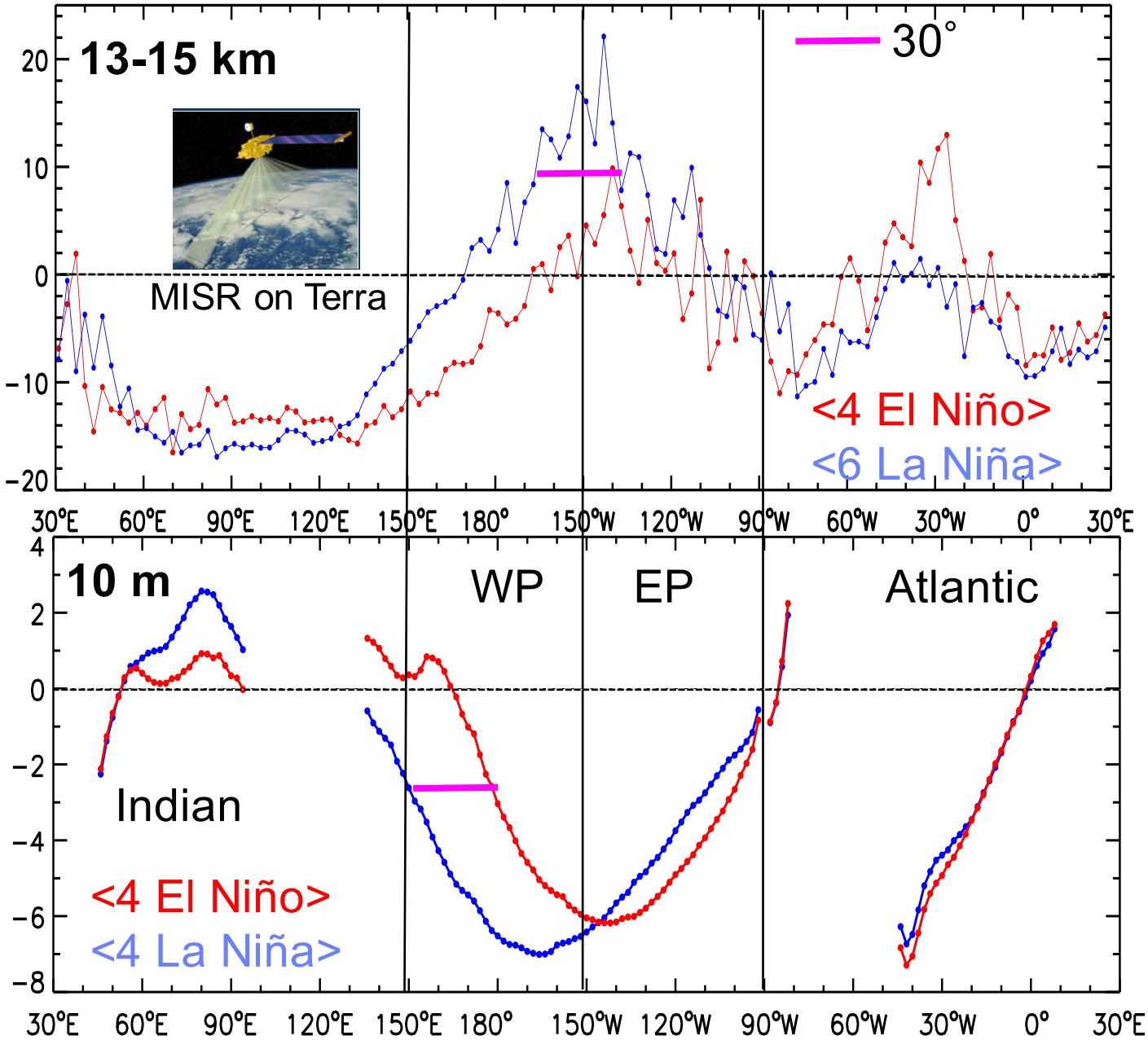
Will 2015 El Niño Be A Super Event?
Will Easterly Tradewind Collapse?



- Indian Ocean: Highly variable zonal pattern associated with El Niño
- Pacific: Similar bell-shaped zonal pattern in each El Niño
- Atlantic: Virtual identical zonal distribution

	Max ONI 3.4 SSTA, °C
QuikSCAT 10 m Jun2002–Feb2003 (9 months)	1.3
QuikSCAT 10 m Jul2004–Apr2005 (10 months)	0.7
QuikSCAT 10 m Sep2006–Jan2007 (5 months)	1.0
ASCAT–A 10 m Jul2009–Apr2010 (10 months)	1.3
ASCAT–A 10 m Mar2015–Sep2015 (7 months)	1.7 +

Zonal Wind
10-m (Surface) and 14-km (Upper Troposphere)



- **Indian**
  - Greater diff. at 10 m
- **Pacific**
  - **14 km** – eastward wind in El Niño was weaker than La Niña by 5 m s^{-1}
  - **10-m to 14-km layer** – reduced (increased) vertical shears through the troposphere in El Niño (La Niña) promote (suppress) generation of typhoons
- **Atlantic**
  - **14 km** – eastward wind speed was larger in El Niño than in La Niña
  - **10-m to 14-km layer** – increased vertical shear through the troposphere in El Niño suppresses generation of hurricane

Thank You

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