

Effects of disturbance wind on equatorial regions recorded by the Fabry-Perot Interferometer network over Peru

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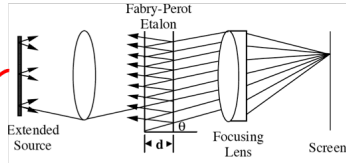
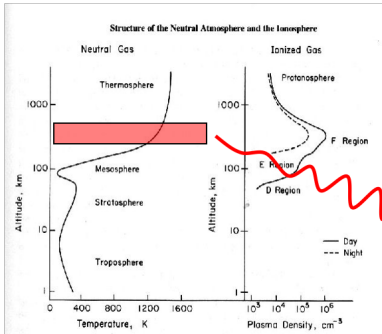
Introduction

Fabry-Perot interferometer (FPI) measurements have been made from Arequipa ($16^{\circ}27'56.60''\text{S}$, $71^{\circ}29'35.66''\text{W}$), Peru since 1983.

FPI measurements over Peru made from Jicamarca ($11^{\circ}57'29.72''\text{S}$, $76^{\circ}51'32.44''\text{W}$), and from Nazca ($14^{\circ}58'21.72''\text{S}$, $74^{\circ}53'29.01''\text{W}$) since 2011 and were used in numerous more recent studies.

We present our initial results on the response of nighttime thermospheric neutral winds to enhanced geomagnetic activity using data during and after the May 2016 geomagnetic storms analyzed with the using the Harding et al. [2015] technique.

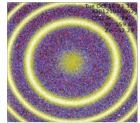
Instrumentation



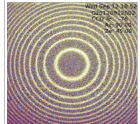
Technique used: Doppler shift and broadening of Fabry-Perot of 630nm oxygen line.

Devices used: Optical Filters, etalon, CCD cameras.

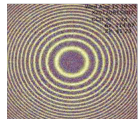
Arequipa



Jicamarca



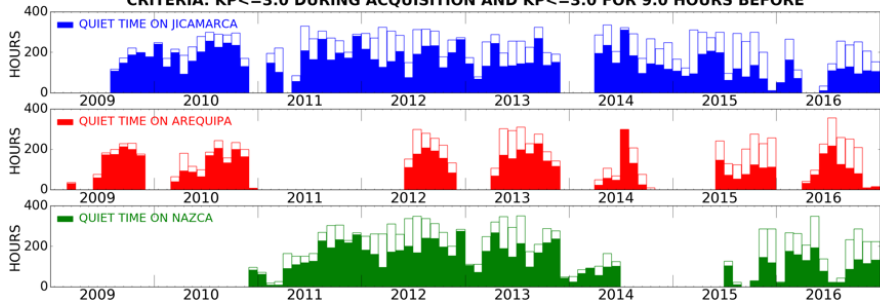
Nazca



Database

QUIET TIME HOURS FOR NEUTRAL WINDS

CRITERIA: $KP \leq 3.0$ DURING ACQUISITION AND $KP \leq 3.0$ FOR 9.0 HOURS BEFORE



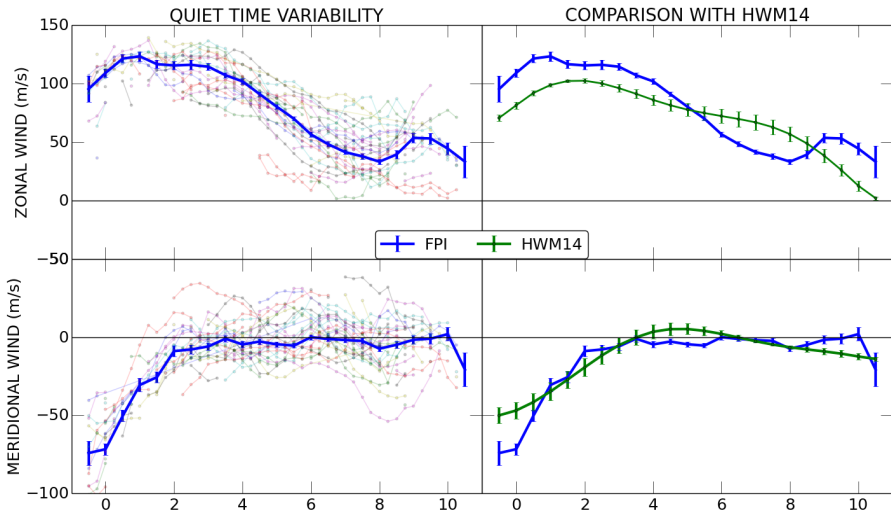
	Hours per year									Total
	<2009	2009	2010	2011	2012	2013	2014	2015	2016	
JRO	-	888	2664	2425	3272	2438	2343	2624	1711	18365
A3O	7547	1130	1490	-	1337	1846	818	1457	1465	17090
NZK	-	-	96	2119	3434	2780	619	753	2279	12080

Wind map estimation: Nazca 5th June 2016

Using Harding et al. [2014], Harding et al. [2015]

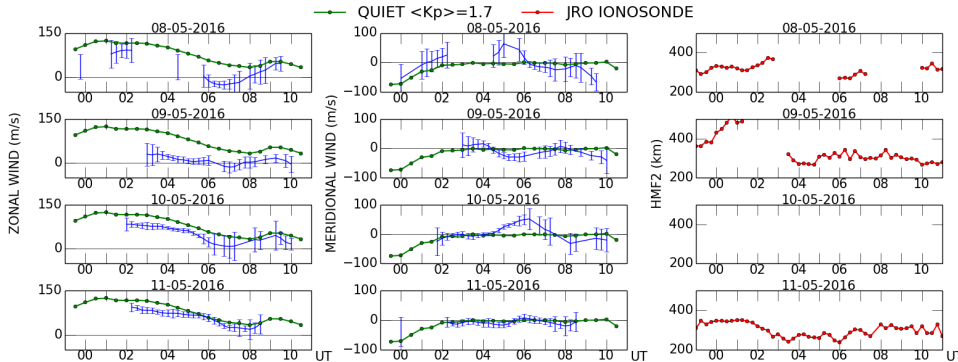
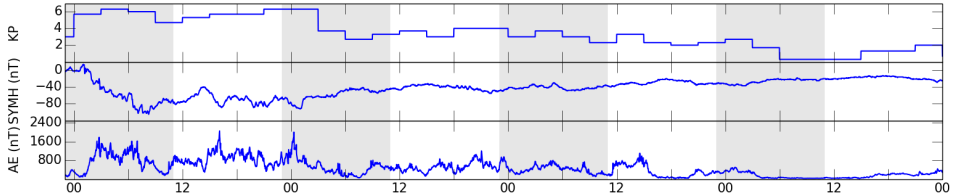
QUIET TIME VARIABILITY

$\langle Kp \rangle = 1.6$ while & 9-hours before for months of May from 2010 to 2016

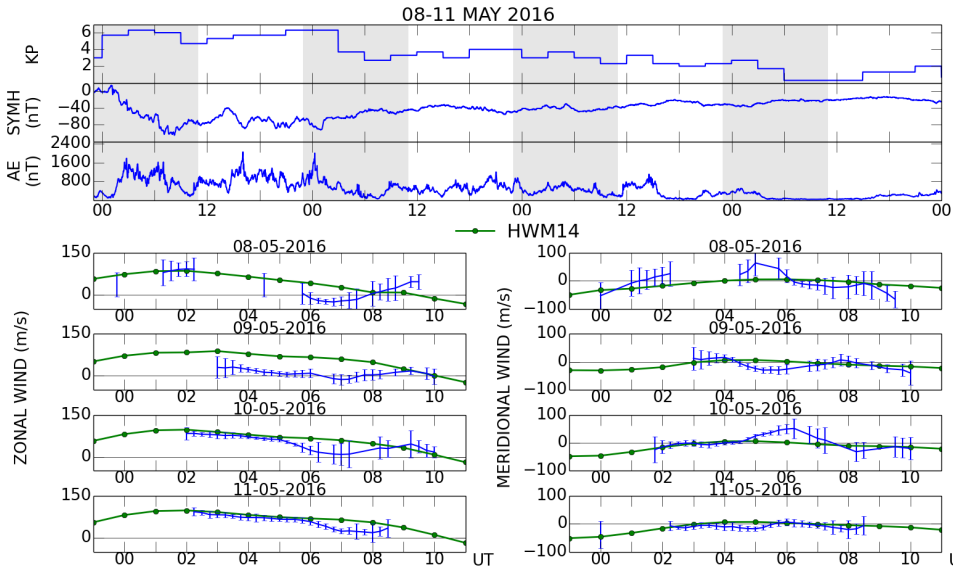


Storm and Post-storm periods for May 2016

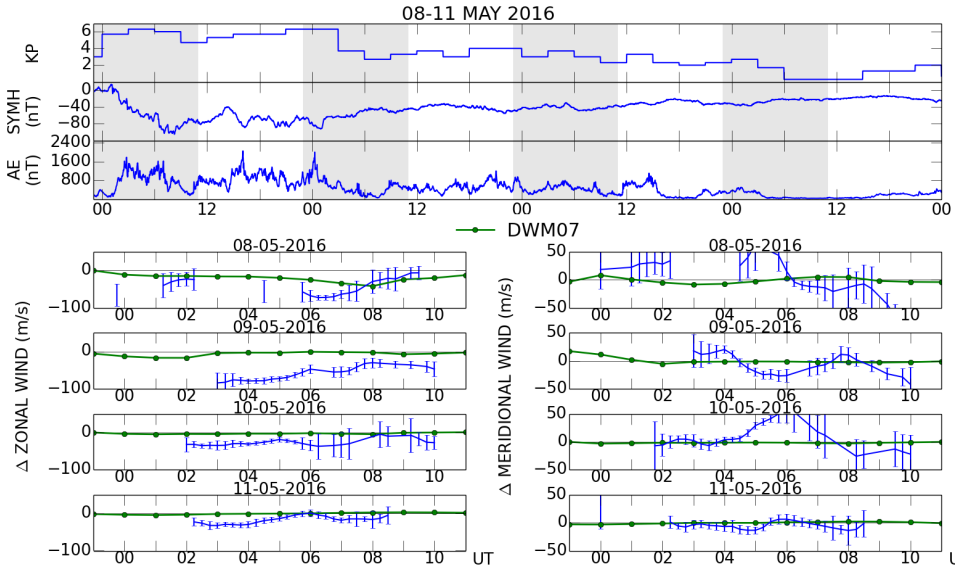
08-11 MAY 2016



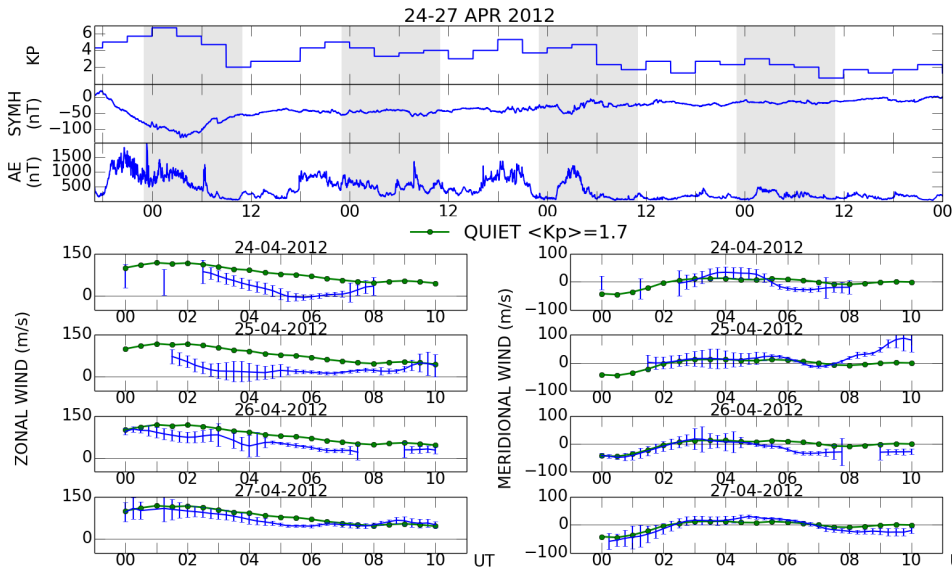
Comparisons with HWM14



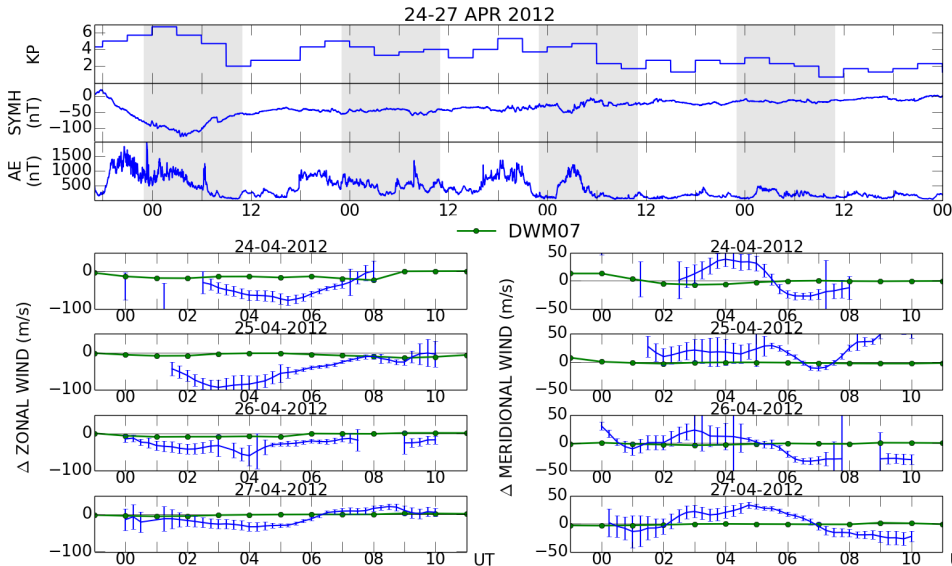
Comparison of residuals with DWM07



Storm and Post-storm periods for April 2012



Comparison of residuals with DWM07



Summary

- We have presented equatorial FPI wind measurement during the large May 2016 and April 2012 geomagnetic.
- The wind map estimator brings a better smooth field estimation over noisy measurements. HmF2 proves to be a good method way to monitor the quality of FPI wind estimations.
- Our data show large (up to about 80 m/s) nighttime westward disturbances lasting for about 3 days and short-lived northward/southward perturbations with faster recovery.
- Empirical model HWM14 [Drob et al. 2015] shows a general agreement for quiet period but does not reproduce the disturbed periods.
- Empirical model DWM07 [Emmert et al. 2008] underestimates the disturbance winds and their lifetimes.
- We are carrying out extensive studies on the seasonal and solar cycle of the disturbance winds and on their relationship to storm time plasma drifts measured by the Jicamarca radar.