Analysis of the ISEST/MiniMax24 WG4 campaign events on the linkage between CMEs and solar wind disturbances

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The ISEST/MiniMax24 is one of the four projects of VarSITI. Its objectives and goals are to understand the propagation of solar transients through the space between the Sun and the Earth, and develop space weather prediction capability. Toward the goals the ISEST/MiniMax24 Working Group 4 organized a campaign study by selecting 11 solar-terrestrial events. We examined the solar wind data during each period of the campaign events and identified flux rope structure in 9 cases. Then geometries of 9 interplanetary flux ropes (IFRs) were determined by a model-fitting method and compared them with magnetic structures in their solar source regions. As a result, we could confirm the general coincidence between the IFR orientations and the orientations of the polarity inversion lines (PILs) in the corresponding solar source regions. The results are summarized in Table 1. This analysis result suggests a possibility for predicting variations of solar wind magnetic fields associated with flux ropes basically by observing the causative solar eruptions. However, we found several cases in which prediction needs the precise knowledge about the flux rope structure and where the Earth encounters it with a flux rope. We report the relationships between the IFRs and the corresponding PILs with emphasis upon how the observed magnetic fields are determined by the encountering geometries.

Keywords: magnetic flux rope, coronal mass ejection, polarity inversion line

Table 1

Event ID	model	IP Flux Rope		Solar Source		S/C
		R/L	IFR tilt	N/S	PIL tilt	
1. 2012 Jul 12-14	cylinder	R	320°	S	325°	WIND
2. 2012 Oct 04-08	torus	R	323°	S	330°	WIND
3. 2013 Mar 15-17	torus	L	227°	N	230°	ACE
4. 2013 Jun 01	torus	L	272°	N	---	ACE
5. 2015 Mar 15-17	torus	R	173°	S	165°	ACE
6. 2015 Jun 22-24	Special Analysis underway					A/W
7. 2012 Mar 07-09	torus	L	37°	N	42°	WIND
8. 2012 Jul 23-24	cylinder	R	258°	S	(260°)	STEREO-A
9. 2014 Jan 06	No flux rope signature (Limb event)					A/W
10. 2014 Jan 07-09	No flux rope signature (Deflected, Möstl)					A/W
11. 2014 Sep 10-13	torus	L	247°	N	245°	

