Integral

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Integral Operations Coordination Meeting

Earth Observation 2 Preparation

IUG Agreed Strategy

- Operations to be performed as in 2006 as far as possible.
  - Aim for STR constraint time about 30ks (8.5hours)
  - Start of STR constraint shortly after start of Instrument window
  - Exact timing is dependent on orbital evolution and belts exit seasonal and long term evolution
- Total of 16 earth observations to be performed
  - To be executed over a period of 2 years
  - Starting in Mid 2012

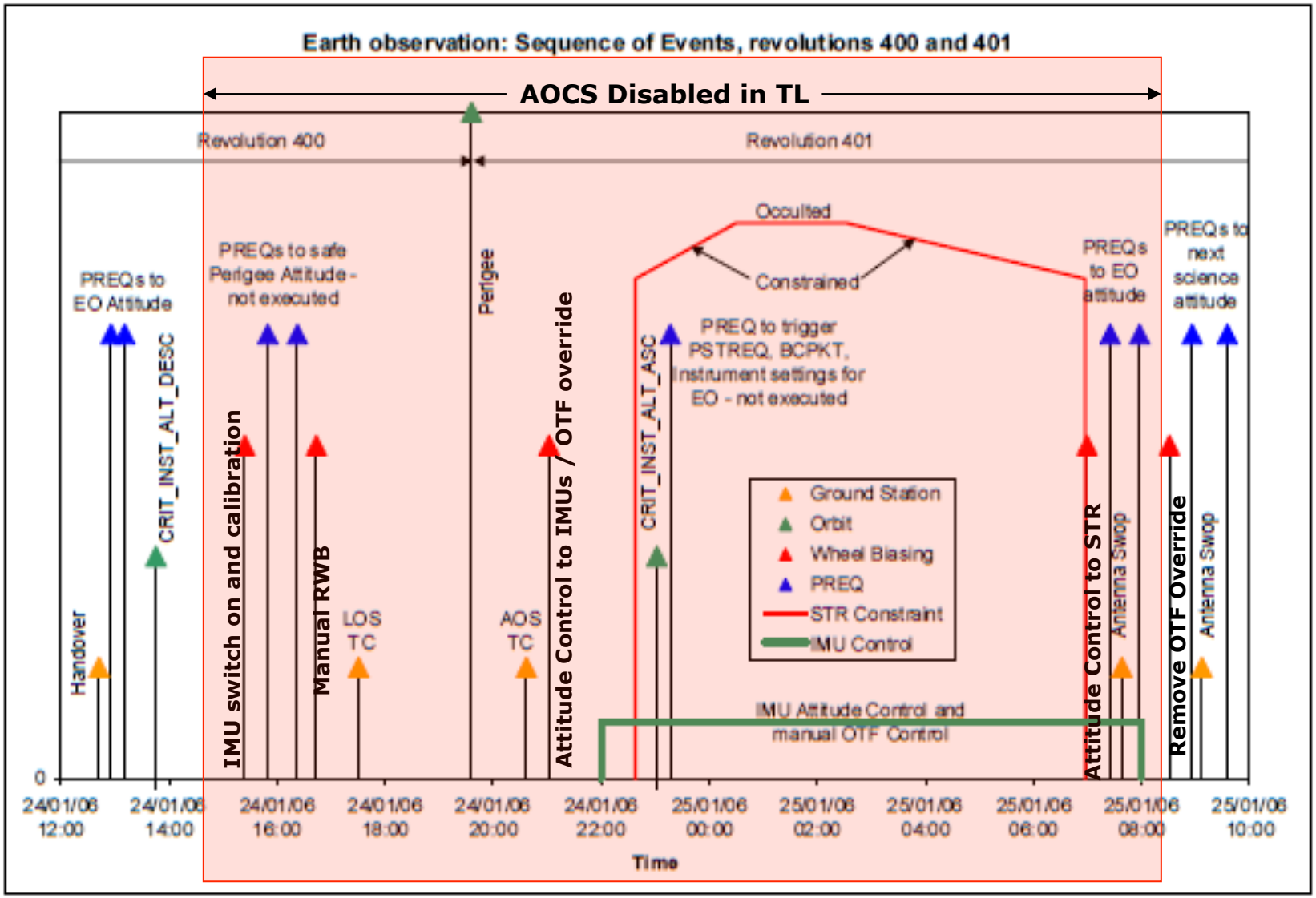
Requirements Assumed by MOC

- STR Boresight to be aligned with earth centre at some point in the observation
  - Time is to be chosen by SOC, once all MOC constraints are fulfilled
  - Based on this all other parameters can be calculated
- The following are not taken into account as requirements:
  - STR Blinding duration
  - Apparent earth radius during blinding
  - Inertial pointing direction
  - Earth illumination conditions
  - The path of the STR boresight across the earth surface
  - OFF Target observation time
  - (note that once the observation revolution and time has been chosen, the above information can be determined)

Recap – how we did it in 2006

- Slew to EO Attitude pre perigee
  - Escape manoeuvre to be included in EPOS pre perigee, not normally executed
  - TL RWB not executed, manual RWB executed instead with profile excluding last PREQ of revolution and 1st PREQ of next revolution.
- Manual Control of OTF by BCP reprogrammation
- Post EO: slew back to EO attitude - not normally executed
- Details in INT-OPS-TN-1002-OPS-OFO, TN: INTEGRAL EARTH OBSERVATION
- See also: INT-FD-TN-1001-OPS-GFT, Escape Scenario for Integral Earth Observations in Revolutions 0404, 0405, 0406

Recap – how we did it in 2006

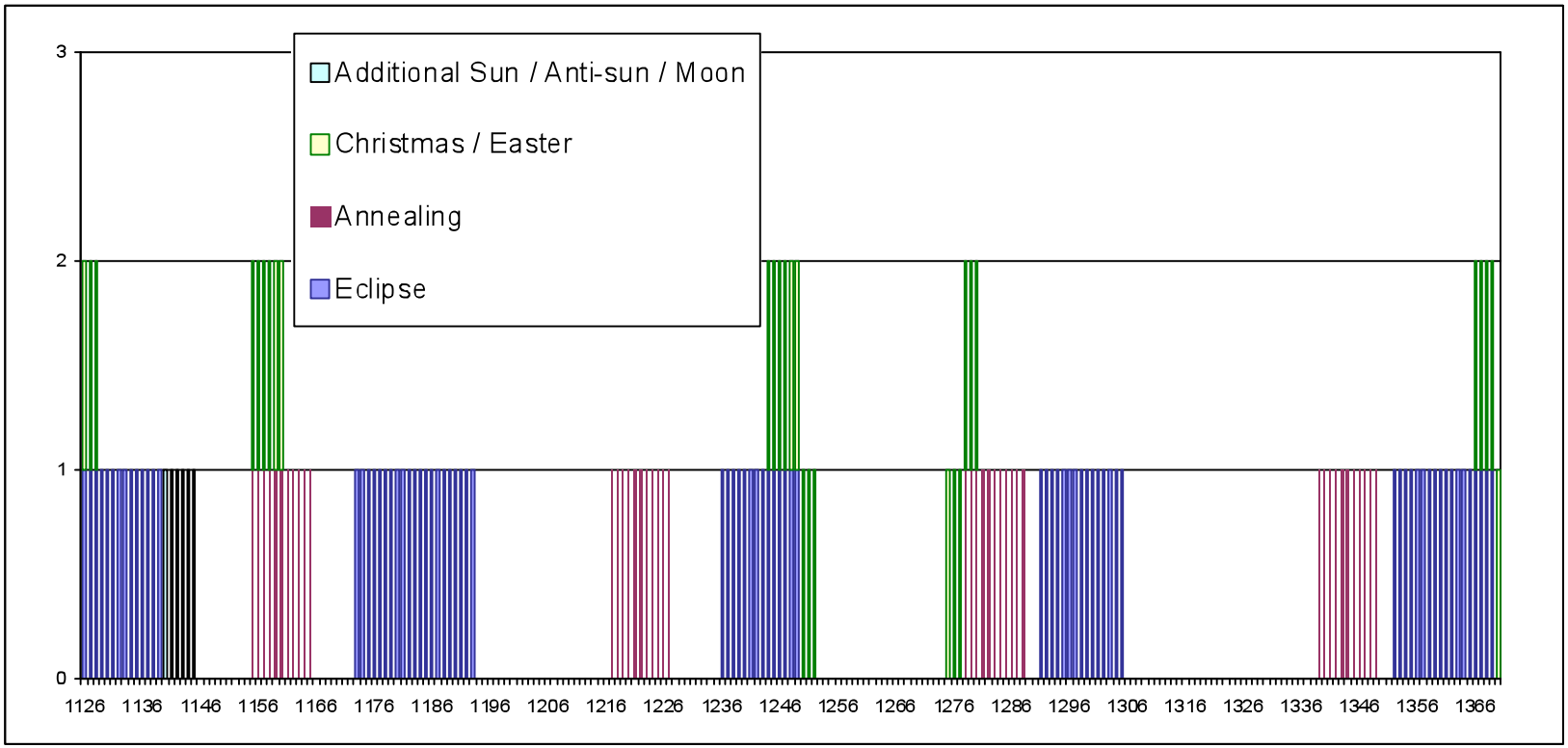


Constraints

- What are the constraints?
  - Not in eclipse season + / - 1 revolution.
  - Annealing
  - Christmas / Easter
  - AOCS Engineer must be on site (2 available)
  - SPI temperature increase at perigee – non-optimised attitude (tbc)
  - Crab calibration
  - Double Station Visibility
- When can we do the EOs?
  - Sun / anti Sun Constraint
  - Moon?
  - Other?

Constraints II

- Constraints: Eclipse / Annealing / Holidays / Attitude.
  - Attitude Constraints for 2012 only included and only for revolutions which are otherwise unconstrained
  - Some revolutions also partially constrained, close to perigee



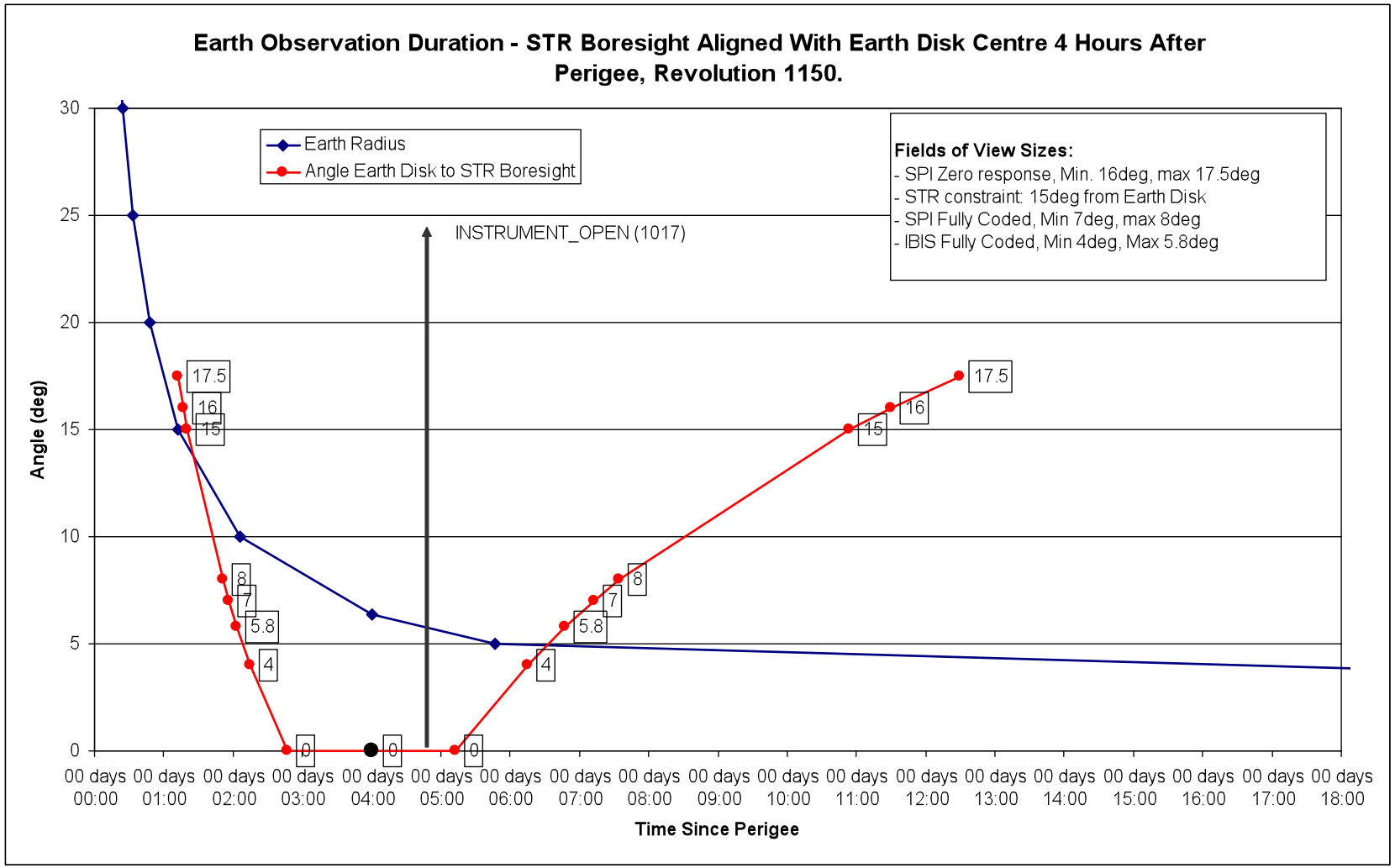
Revolution 1150 (14/3/2012)

- Summary of Event times in Revolution 1150

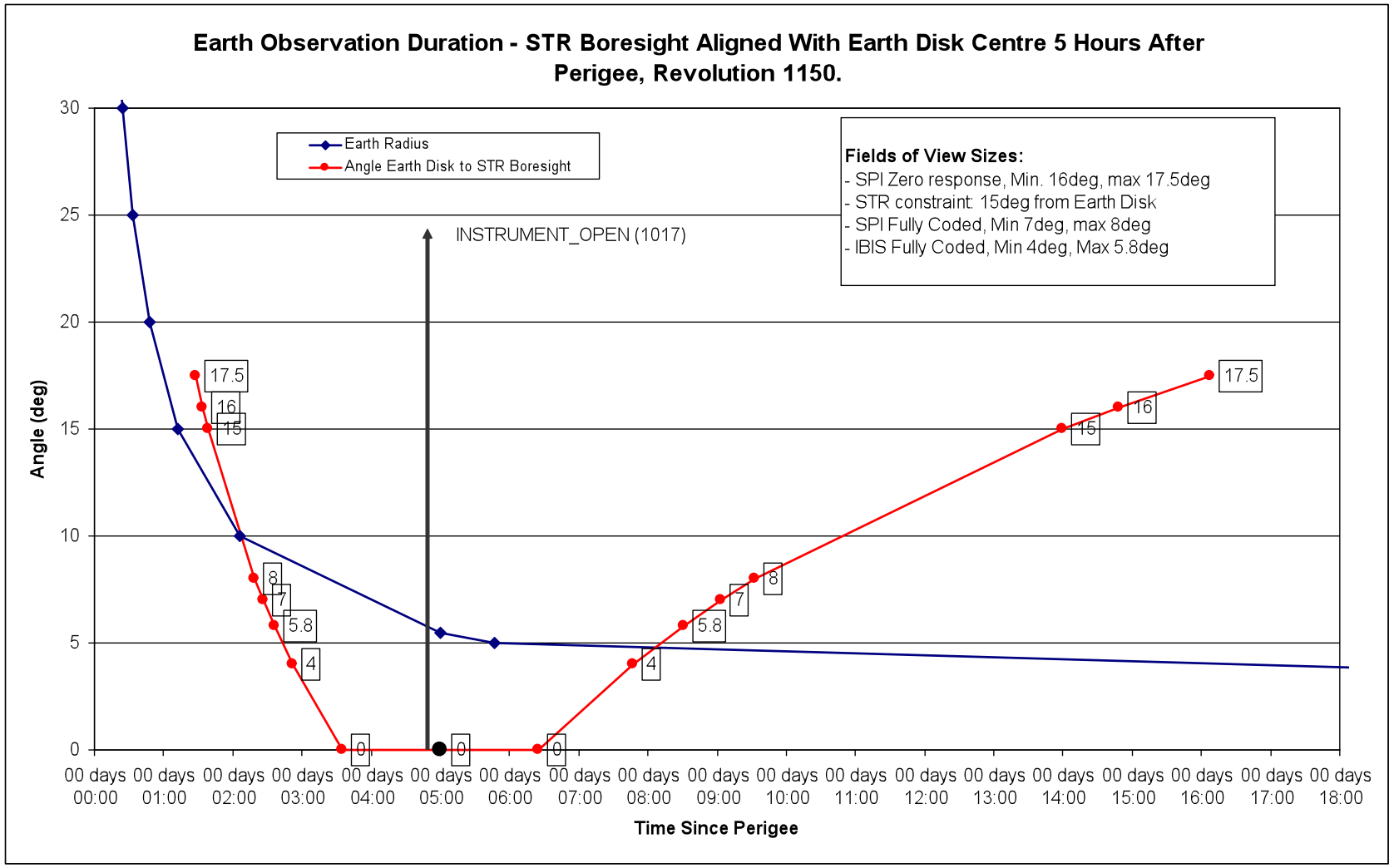
	Event Times After Perigee, Revolution 1150							
	Time After Perigee of STR Boresight Alignment with Earth Disk Centre.							
Earth Disk Event:	2hours	3hours	4hours	5hours	6hours	7hours	8hours	18.5hours
Touches SPI zero response Maximum 17.5 deg	00:37:48	00:55:48	01:12:00	01:28:12	01:43:12	01:58:12	02:13:12	00 days 04:51
Touches SPI zero response Minimum 16.0 deg	00:39:36	00:58:48	01:16:48	01:34:12	01:51:00	02:07:12	02:24:00	00 days 05:19
Touches STR Earth Constraint 15.0 deg	00:41:24	01:01:12	01:20:24	01:38:24	01:56:24	02:13:48	02:31:12	00 days 05:40
Touches SPI Fully Coded Maximum 8.0 deg	00:54:00	01:22:12	01:51:00	02:19:12	02:47:24	03:15:36	03:43:48	00 days 09:01
Touches SPI Fully Coded Minimum 7.0 deg	00:55:48	01:26:24	01:56:24	02:26:24	02:56:24	03:27:00	03:57:36	00 days 09:39
Touches IBIS Fully Coded Maximum 5.8 deg	00:58:48	01:31:12	02:03:36	02:36:00	03:08:24	03:41:24	04:15:00	00 days 10:29
Touches IBIS Fully Coded Minimum 4.0 deg	01:03:00	01:39:00	02:15:00	02:51:36	03:28:48	04:06:36	04:44:24	00 days 11:51
Touches STR boresight 0.0 deg	01:14:24	02:00:00	02:46:48	03:35:24	04:25:12	05:15:36	06:06:36	00 days 15:33
STR Boresight Aligned with Earth Centre	00:02:00	00:03:00	00:04:00	00:05:00	00:06:00	00:07:00	00:08:00	00 days 18:30
Leaves STR boresight 0.0 deg	02:45:00	04:00:00	05:12:36	06:24:36	07:34:48	08:44:24	09:53:24	00 days 21:26
Leaves IBIS Fully Coded Minimum 4.0 deg	03:09:00	04:42:00	06:15:00	07:46:48	09:18:00	10:48:00	12:16:48	01 days 02:39
Leaves IBIS Fully Coded Maximum 5.8 deg	03:22:12	05:04:48	06:48:00	08:31:12	10:13:48	11:54:36	13:34:48	01 days 05:15
Leaves SPI Fully Coded Minimum 7.0 deg	03:31:12	05:21:00	07:12:36	09:03:36	10:54:36	12:43:48	14:31:12	01 days 07:03
Leaves SPI Fully Coded Maximum 8.0 deg	03:39:00	05:36:00	07:34:12	09:33:00	11:31:12	13:27:36	15:22:12	01 days 08:36
Leaves STR Earth Constraint 15.0 deg	04:50:24	07:48:00	10:53:24	14:00:00	17:03:00	19:58:48	22:46:48	01 days 19:37
Leaves SPI zero response Minimum 16.0 deg	05:03:00	08:12:00	11:30:00	14:48:36	18:02:24	21:07:48	01 days 00:03	01 days 21:09
Leaves SPI zero response Maximum 17.5 deg	05:23:24	08:51:36	12:29:24	16:07:12	19:37:48	22:57:36	01 days 02:04	01 days 23:21

- Revolution 1017, INSTRUMENT_OPEN is 04:50:00 after Perigee

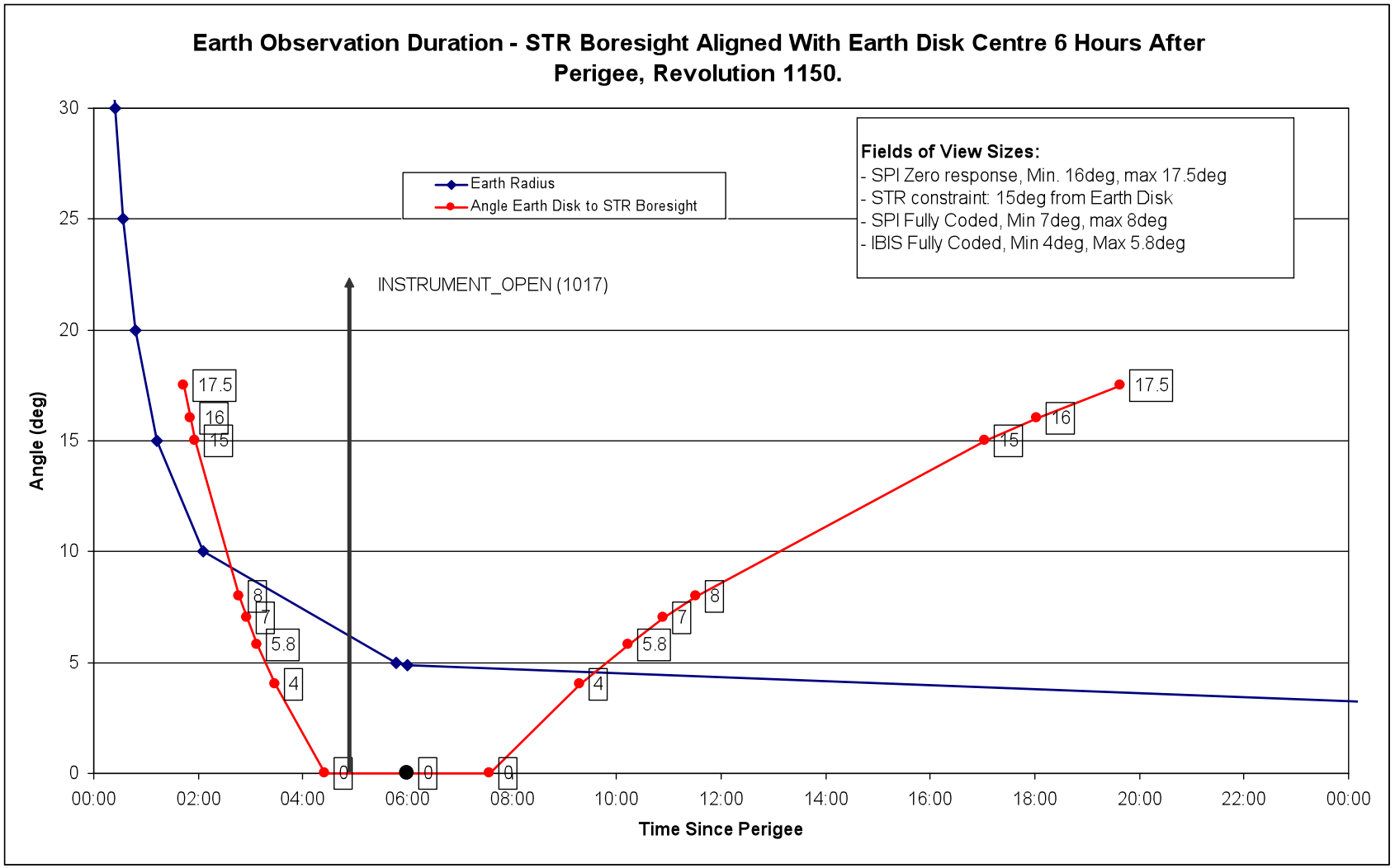
Revolution 1150 (14/3/2012)



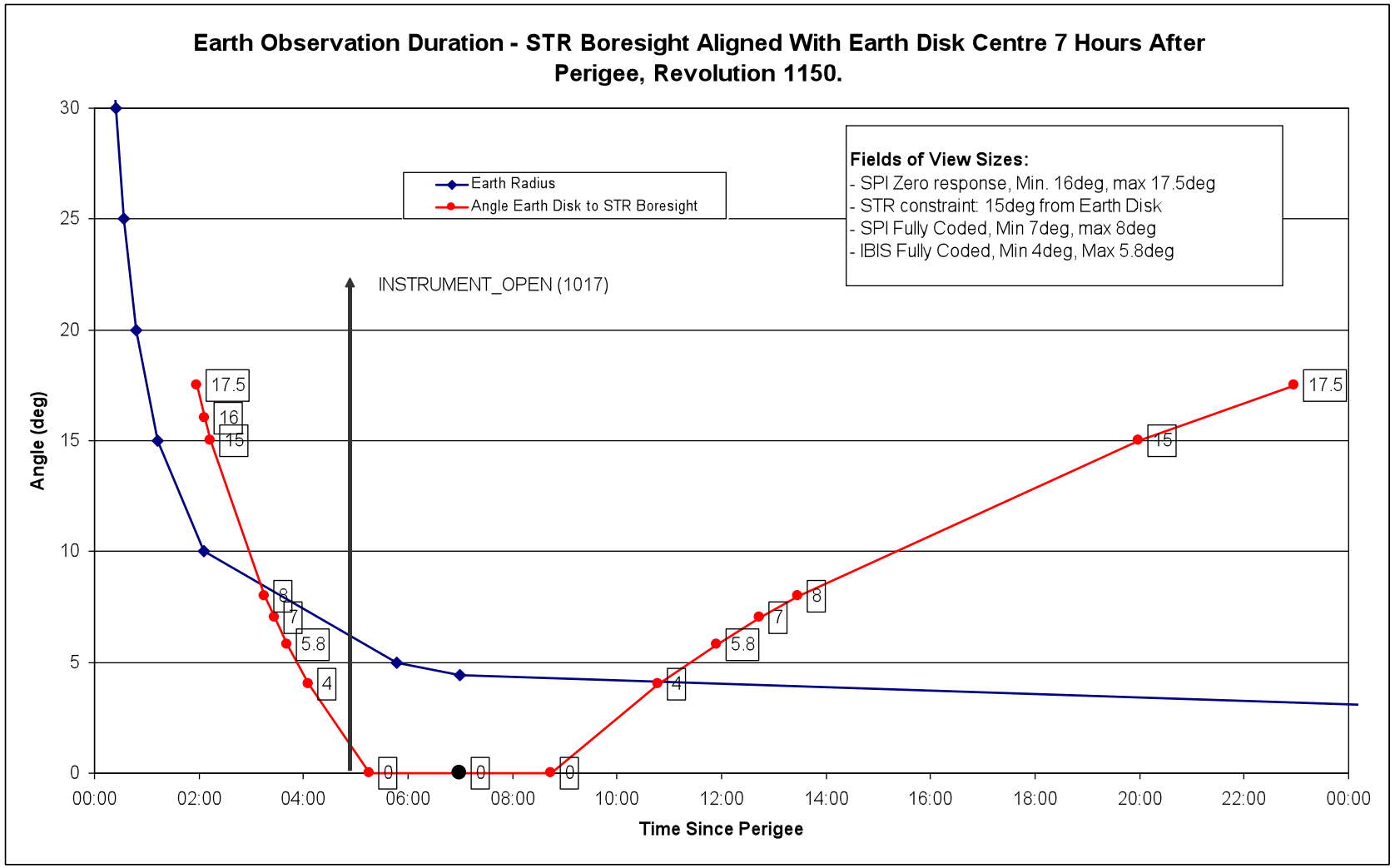
Revolution 1150 (14/3/2012)



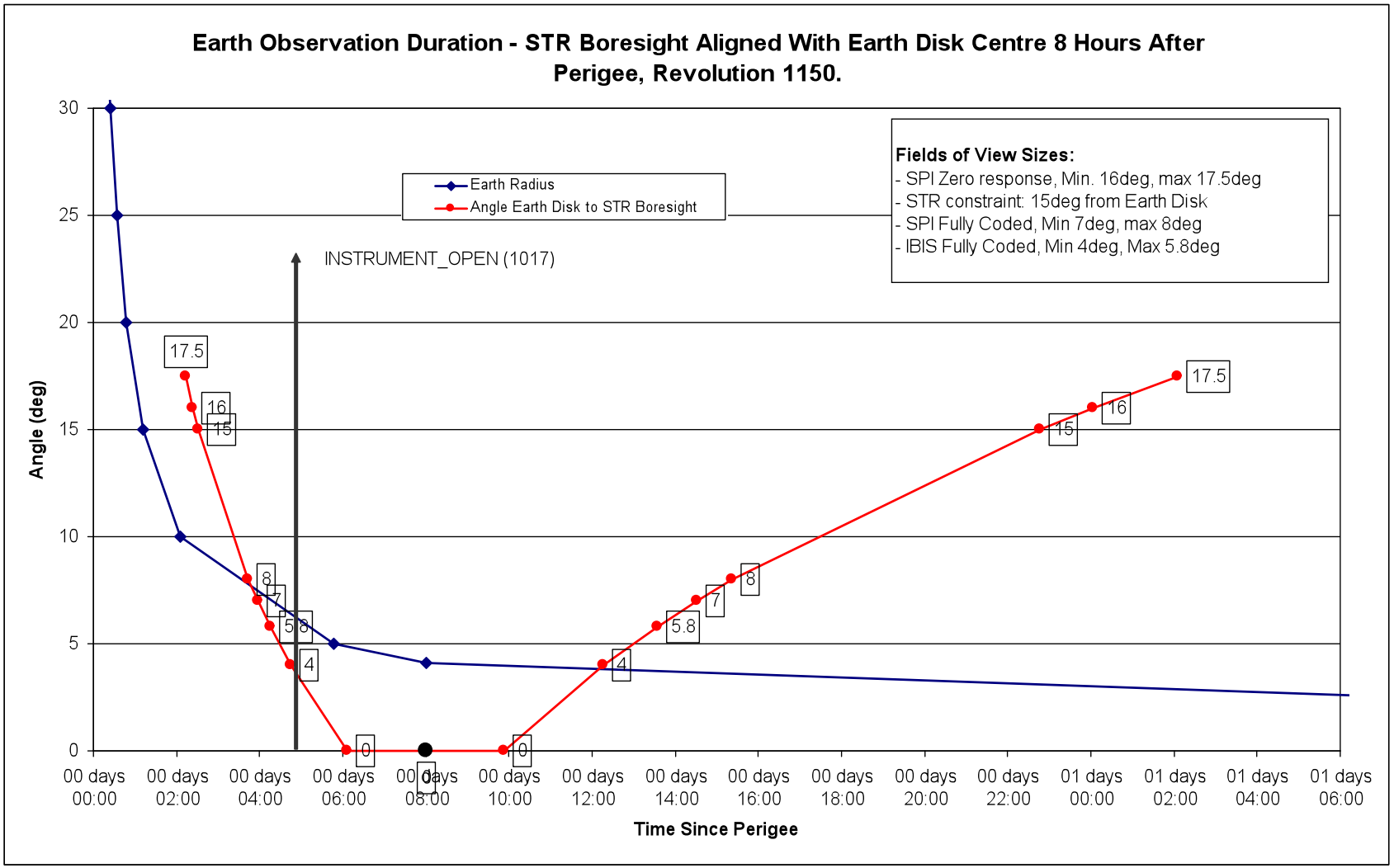
Timing of the EO?



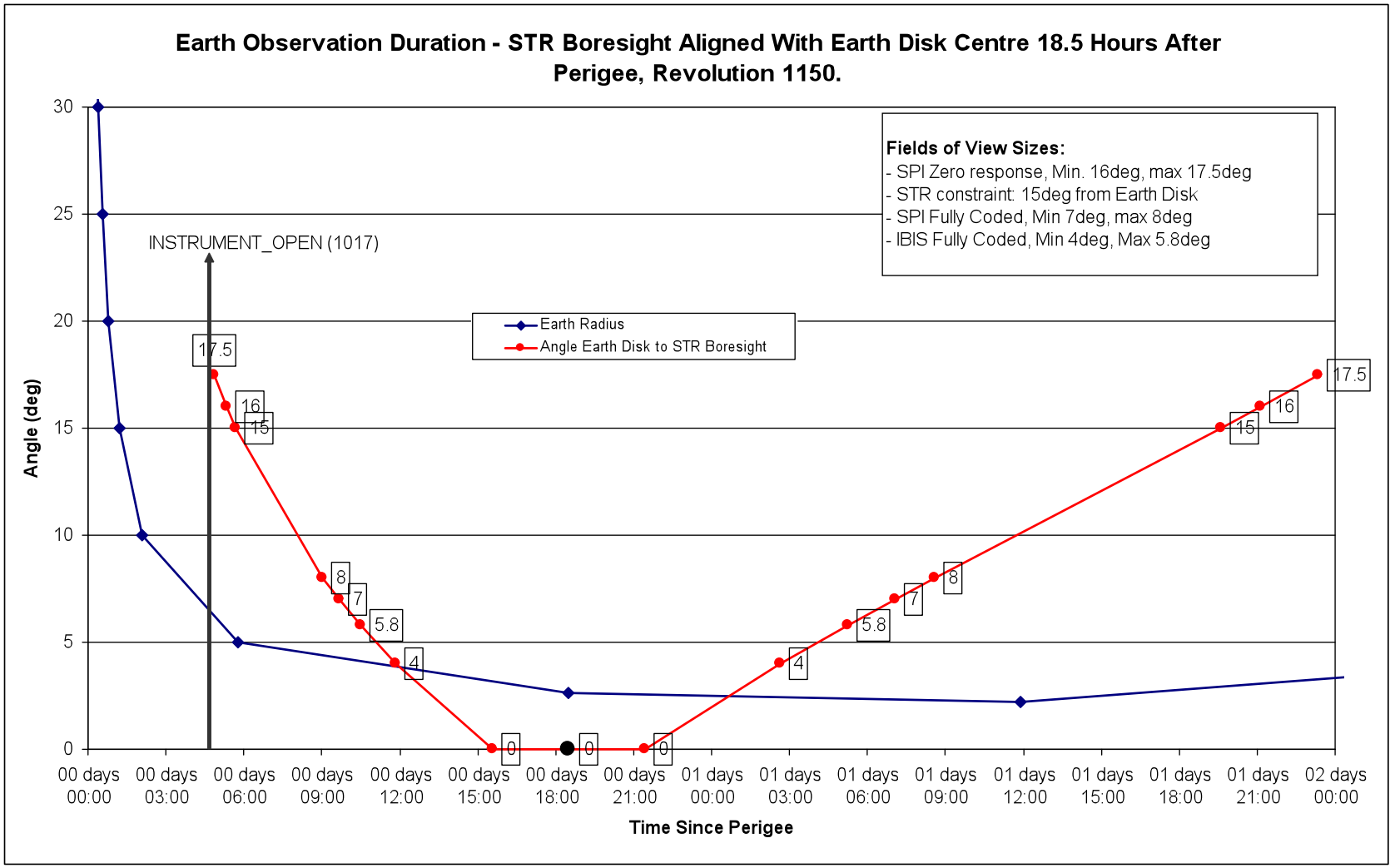
Revolution 1150 (14/3/2012)



Revolution 1150 (14/3/2012)

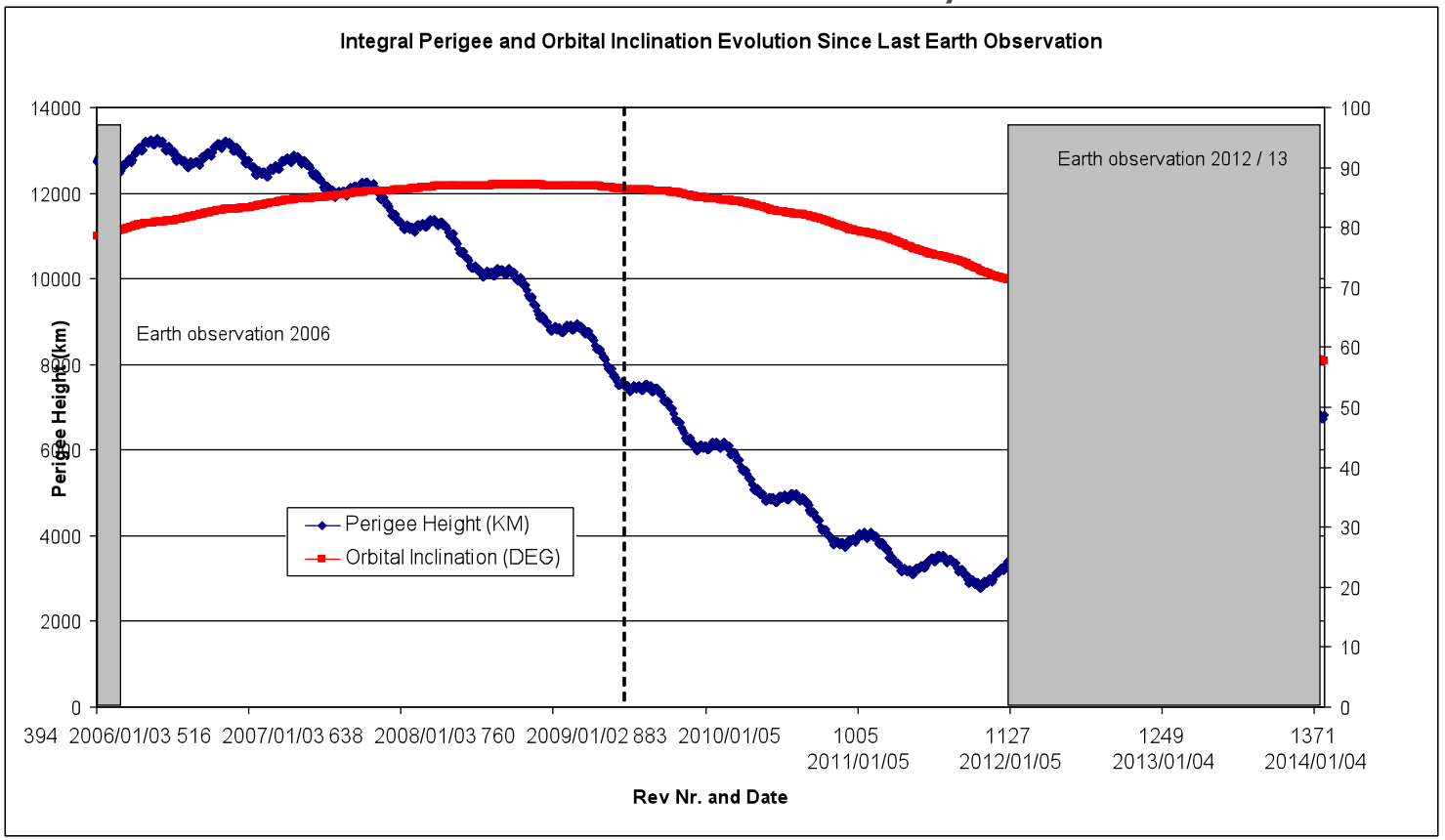


Revolution 1150 (14/3/2012)



Orbital Evolution.

- Orbital evolution 2012 / 2013:
  - As perigee rises observation duration will decrease.
  - Belts exit evolution influenced by Inclination



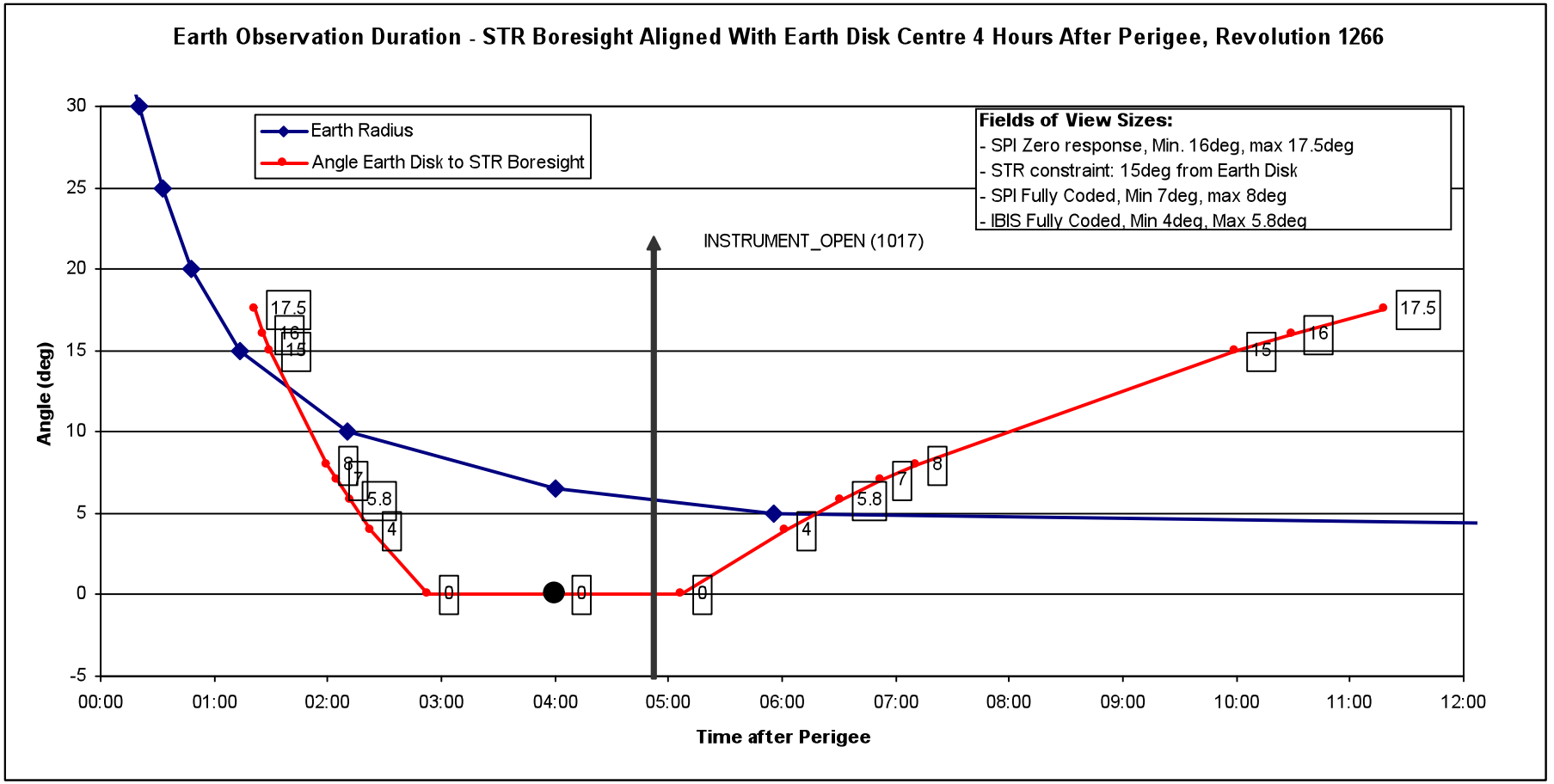
Revolution 1266 (24/2/2013)

- Summary of Event times in Revolution 1266

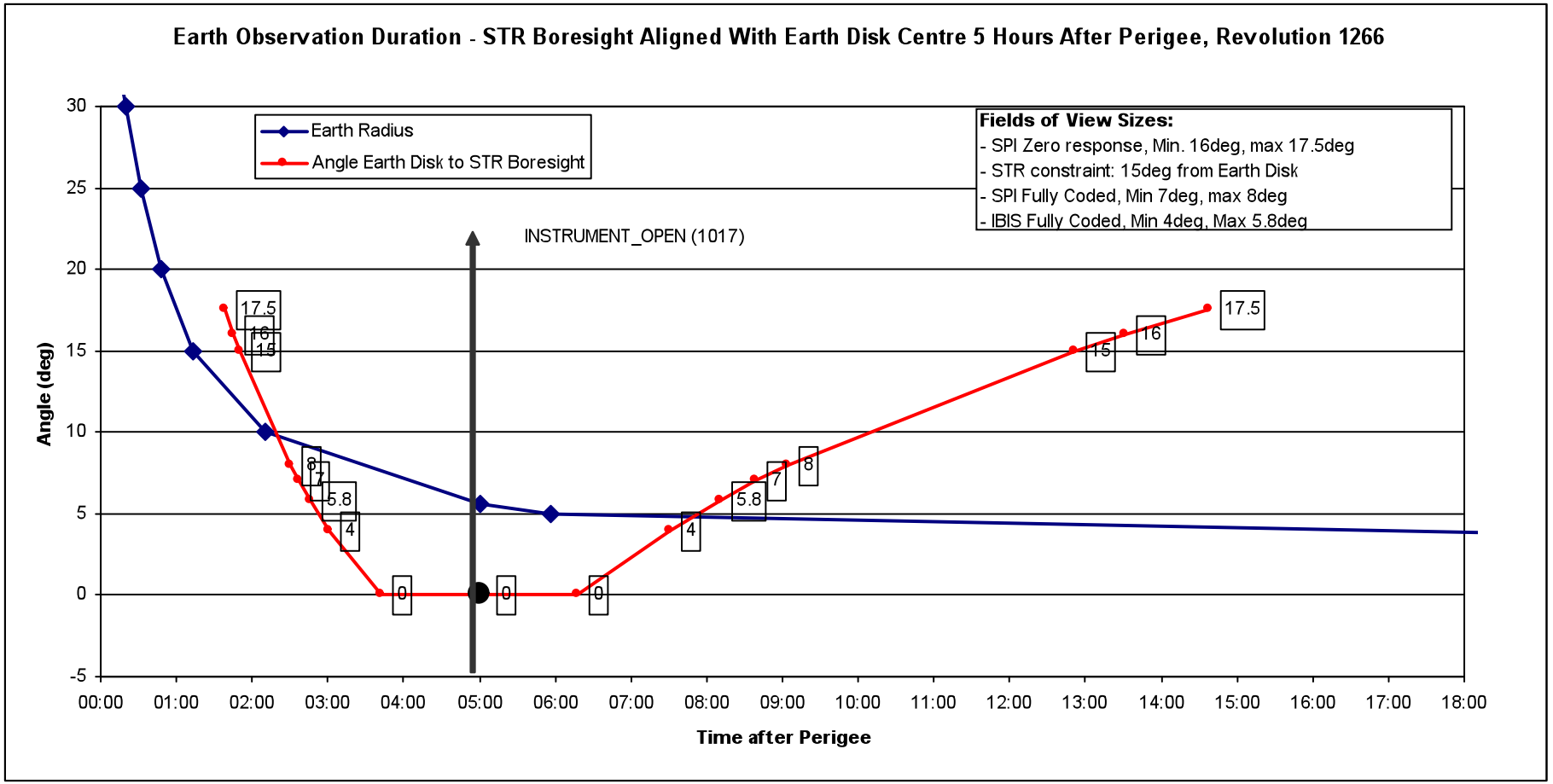
	Event Times After Perigee, Revolution 1266				
	Time After Perigee of STR Boresight Alignment with Earth Disk Centre.				
Earth Disk Event:	4hours	5hours	6hours	7hours	15.5hours
Touches SPI zero response Maximum 17.5 deg	00 days 01:21	00 days 01:39	00 days 01:56	00 days 02:13	00 days 04:34
Touches SPI zero response Minimum 16.0 deg	00 days 01:26	00 days 01:45	00 days 02:04	00 days 02:22	00 days 04:58
Touches STR Earth Constraint 15.0 deg	00 days 01:29	00 days 01:49	00 days 02:09	00 days 02:29	00 days 05:15
Touches SPI Fully Coded Maximum 8.0 deg	00 days 02:00	00 days 02:30	00 days 03:00	00 days 03:30	00 days 07:55
Touches SPI Fully Coded Minimum 7.0 deg	00 days 02:04	00 days 02:37	00 days 03:09	00 days 03:40	00 days 08:25
Touches IBIS Fully Coded Maximum 5.8 deg	00 days 02:12	00 days 02:46	00 days 03:20	00 days 03:55	00 days 09:03
Touches IBIS Fully Coded Minimum 4.0 deg	00 days 02:22	00 days 03:01	00 days 03:40	00 days 04:19	00 days 10:07
Touches STR boresight 0.0 deg	00 days 02:52	00 days 03:42	00 days 04:32	00 days 05:23	00 days 12:58
STR Boresight Aligned with Earth Centre	04:00:00	05:00:00	00:06:00	07:00:00	00:15:30
Leaves STR boresight 0.0 deg	00 days 05:07	00 days 06:18	00 days 07:27	00 days 08:36	00 days 18:01
Leaves IBIS Fully Coded Minimum 4.0 deg	00 days 06:01	00 days 07:31	00 days 08:59	00 days 10:27	00 days 22:10
Leaves IBIS Fully Coded Maximum 5.8 deg	00 days 06:31	00 days 08:10	00 days 09:48	00 days 11:26	01 days 00:18
Leaves SPI Fully Coded Minimum 7.0 deg	00 days 06:52	00 days 08:38	00 days 10:24	00 days 12:09	01 days 01:47
Leaves SPI Fully Coded Maximum 8.0 deg	00 days 07:10	00 days 09:04	00 days 10:56	00 days 12:47	01 days 03:04
Leaves STR Earth Constraint 15.0 deg	00 days 09:59	00 days 12:51	00 days 15:40	00 days 18:25	01 days 12:58
Leaves SPI zero response Minimum 16.0 deg	00 days 10:29	00 days 13:31	00 days 16:31	00 days 19:24	01 days 14:26
Leaves SPI zero response Maximum 17.5 deg	00 days 11:18	00 days 14:37	00 days 17:52	00 days 20:58	01 days 16:38

- Revolution 1017, INSTRUMENT_OPEN is 04:50:00 after Perigee

Revolution 1266 (24/2/2013)



Revolution 1266 (24/2/2013)



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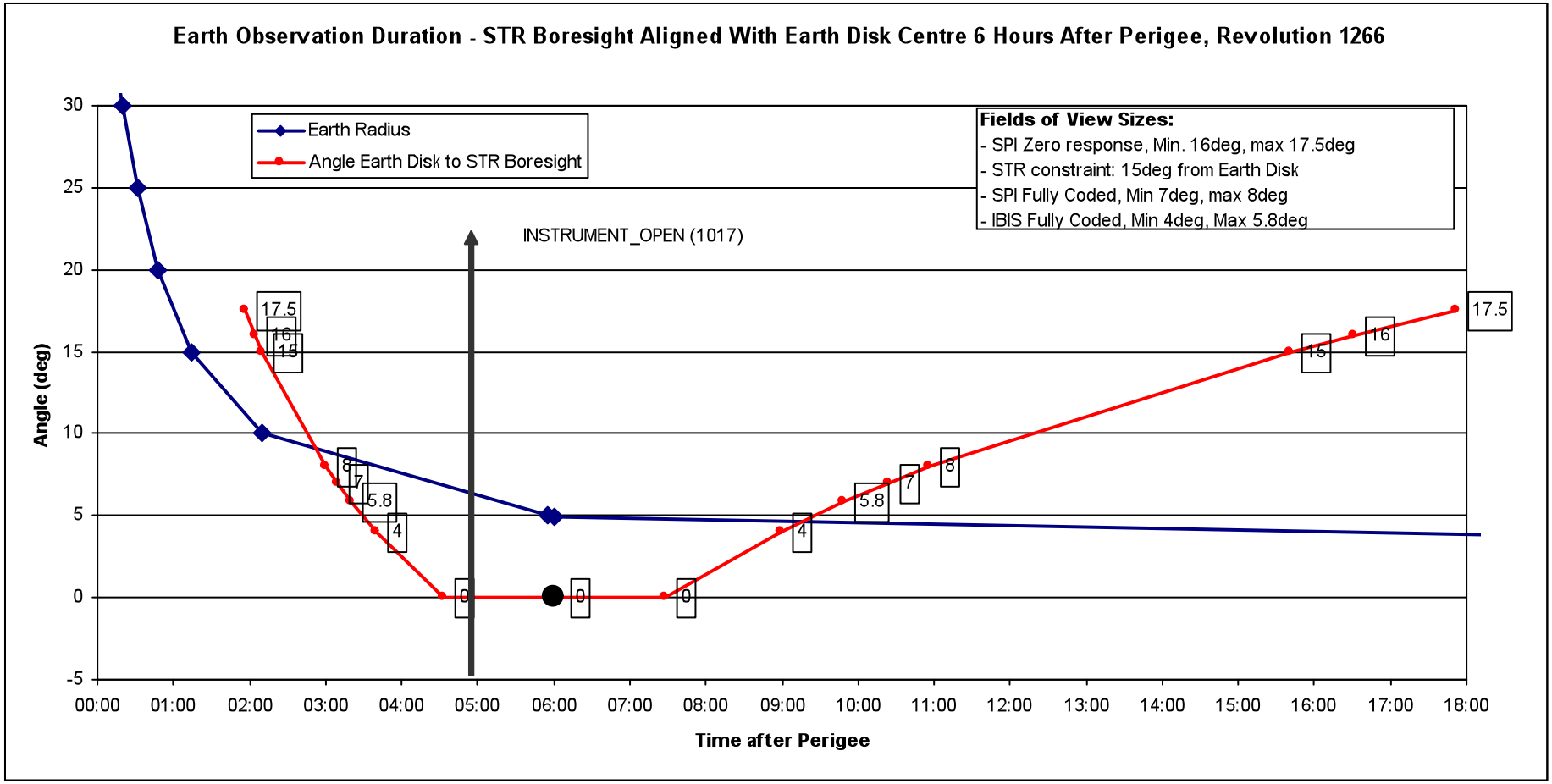
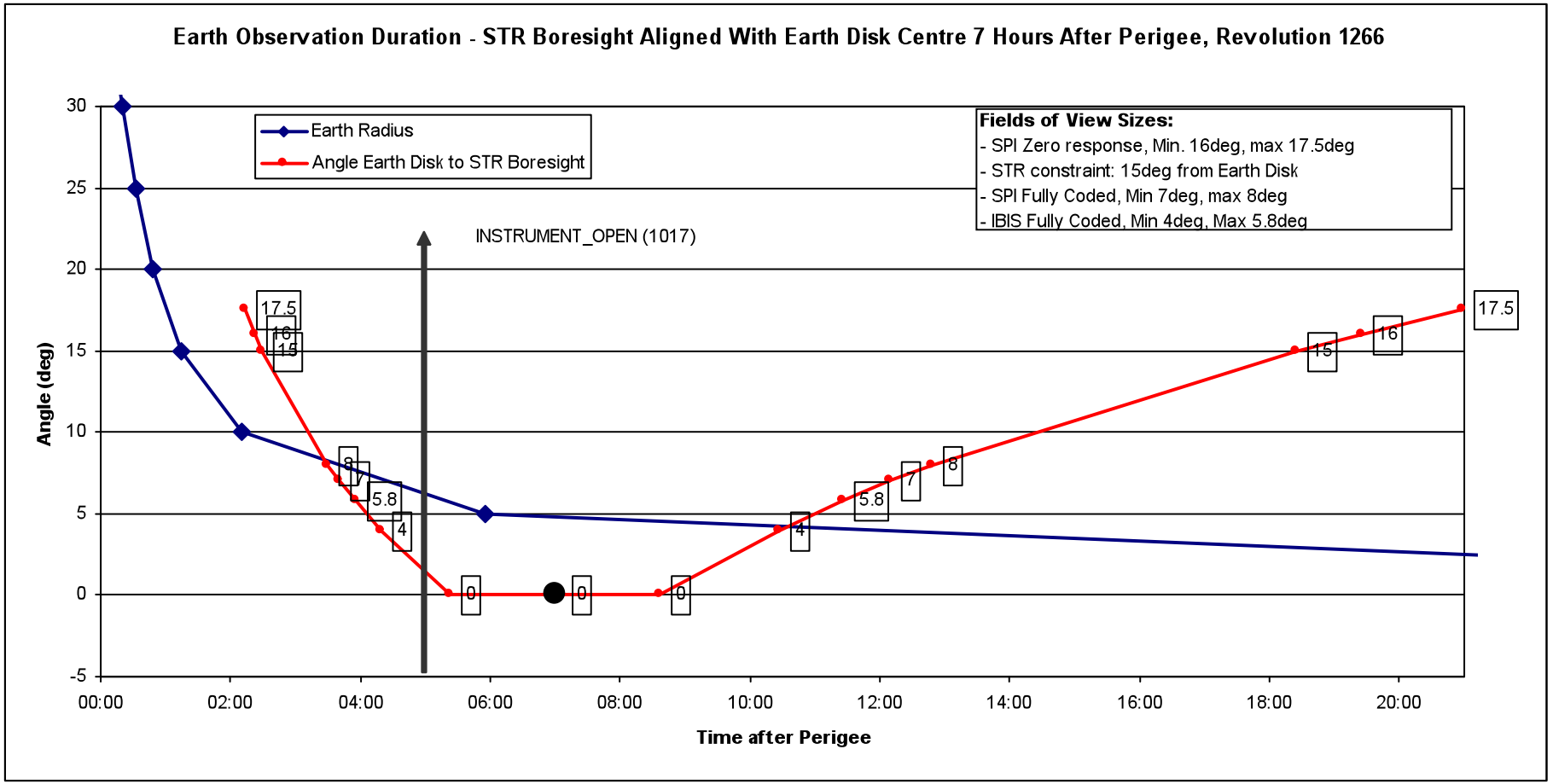


Revolution 1266 (24/2/2013)



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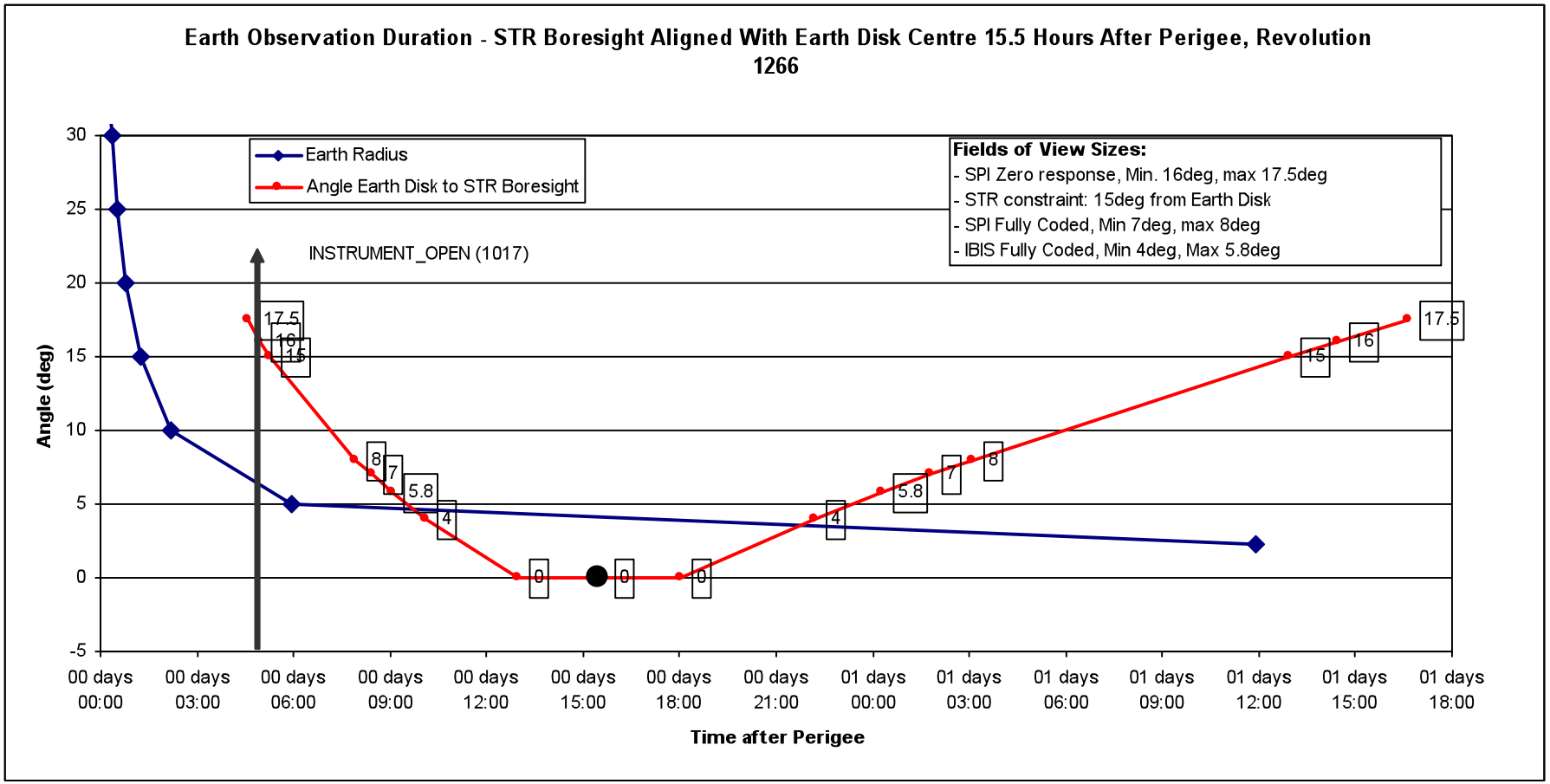

Earth Observation Next Steps

- MOC will propose a first set of 5 (TBC) revolutions in 2012?.
- SOC to choose the geometric centre time of each observation?.
- For each revolution a set of predictions will be supplied by MOC in the following form IntEObsEvent_r1150_h4.txt
- As Orbit predictions evolve better predictions can be given