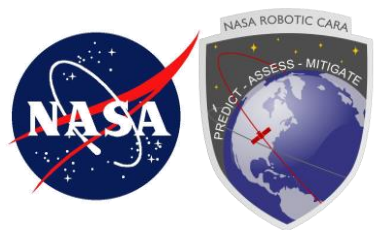




History of Late-Notice HIEs

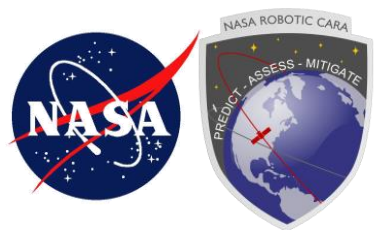
P. Frakes

22 MAR 2016



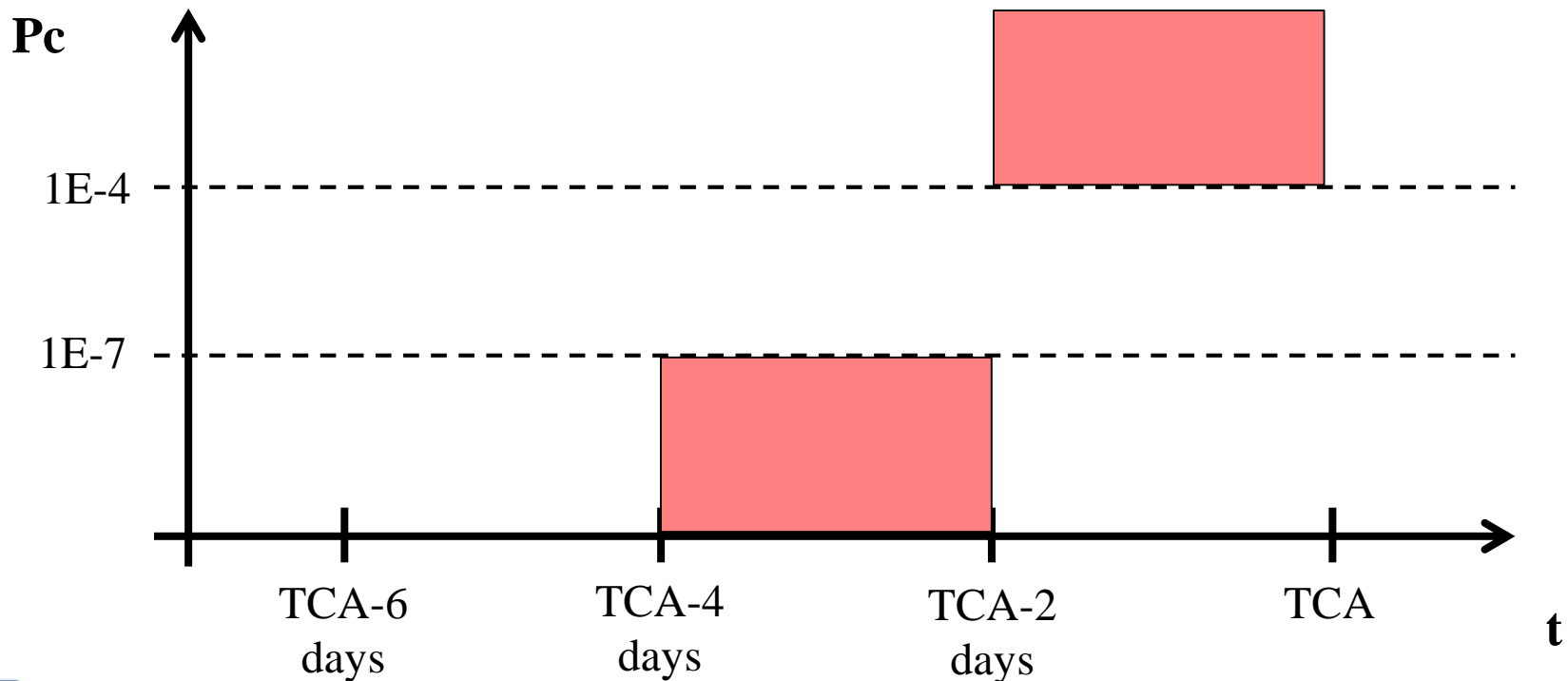
Late-Notice HIE Case Studies

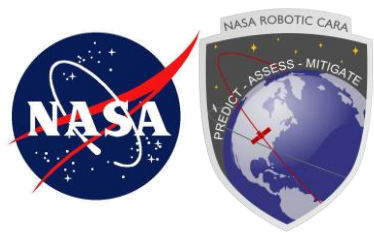
- **Question was raised: are we seeing more late-notice events in recent months?**
- **Two definitions of “late-notice” used to compare data:**
 1. Event has at least one data point between TCA-4 days and TCA-2 days where the Pc was below $1E-7$, OR there were no data points in that timeframe
AND
Event has at least one data point between TCA-2 days and TCA where the Pc was at least $1E-4$
 2. Event has at least one data point between TCA-4 days and TCA-2 days where the Pc was below $1E-5$, OR there were no data points in that timeframe
AND
Event has at least one data point between TCA-2 days and TCA where the Pc was at least $1E-4$
- **The case studies that were examined all fall within criteria for both definitions**
 - Terra vs 38192; TCA 24 JUN 2015
 - Aura vs 89477; TCA 29 AUG 2015
 - Terra vs 37131; TCA 19 DEC 2015
 - GPM vs 28685; TCA 5 SEP 2015



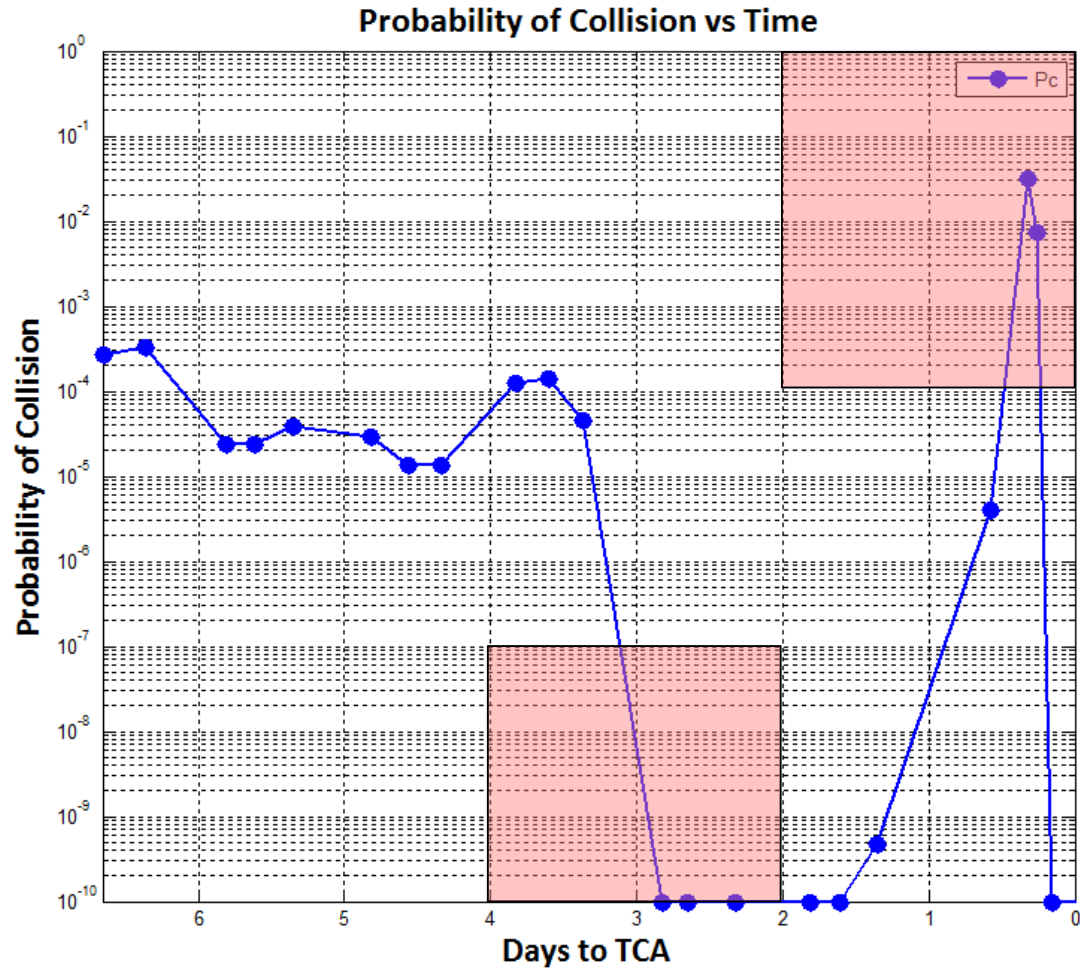
Historical Look at Late-Notice HIEs

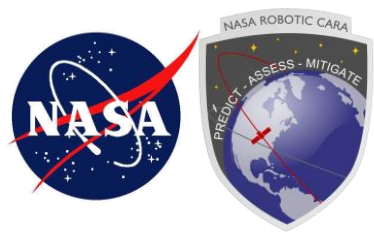
- **Query CARA database for events for which the following are true:**
 - Event has at least one data point between TCA-4 days and TCA-2 days where the P_c was below $1E-7$, OR there were no data points in that timeframe
 - Event has at least one data point between TCA-2 days and TCA where the P_c was at least $1E-4$



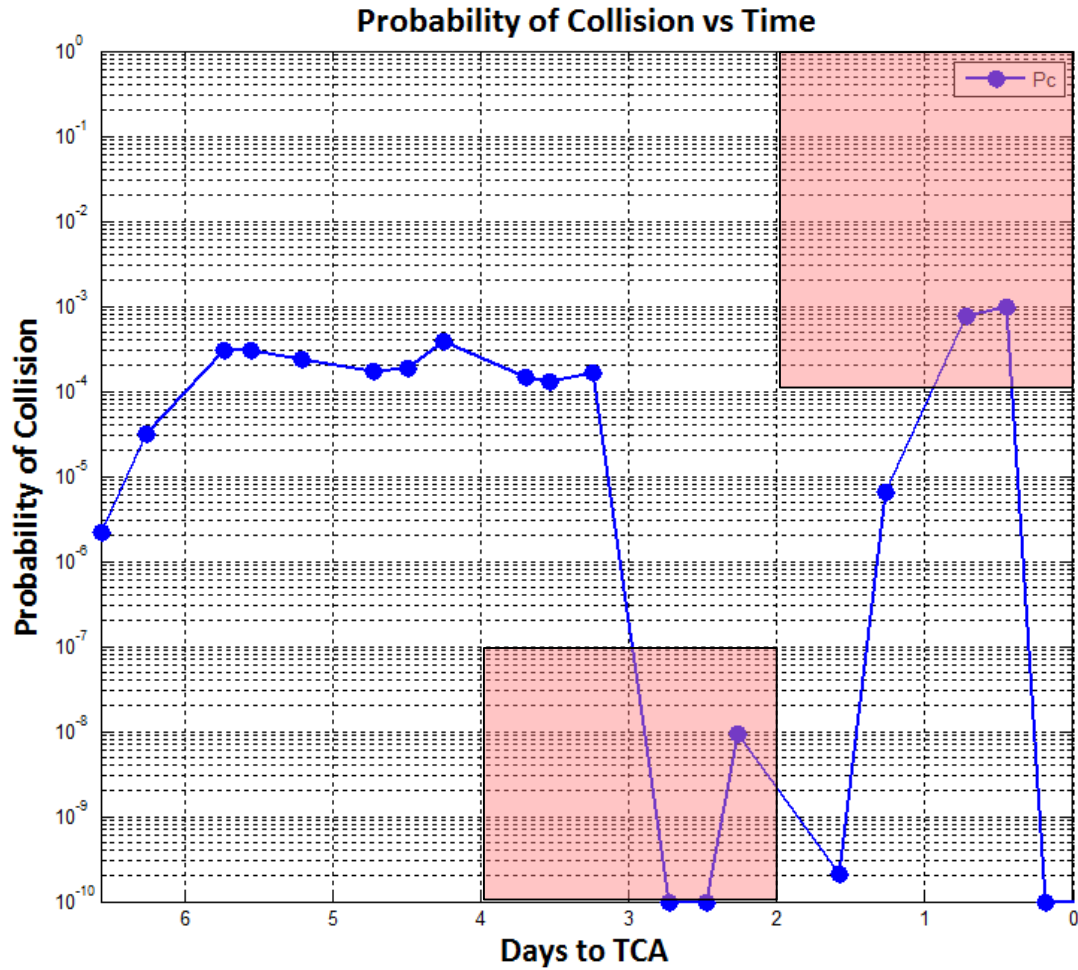


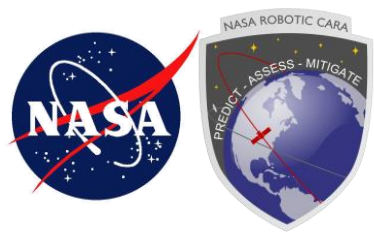
Terra vs. 38192, 24 JUN 2015



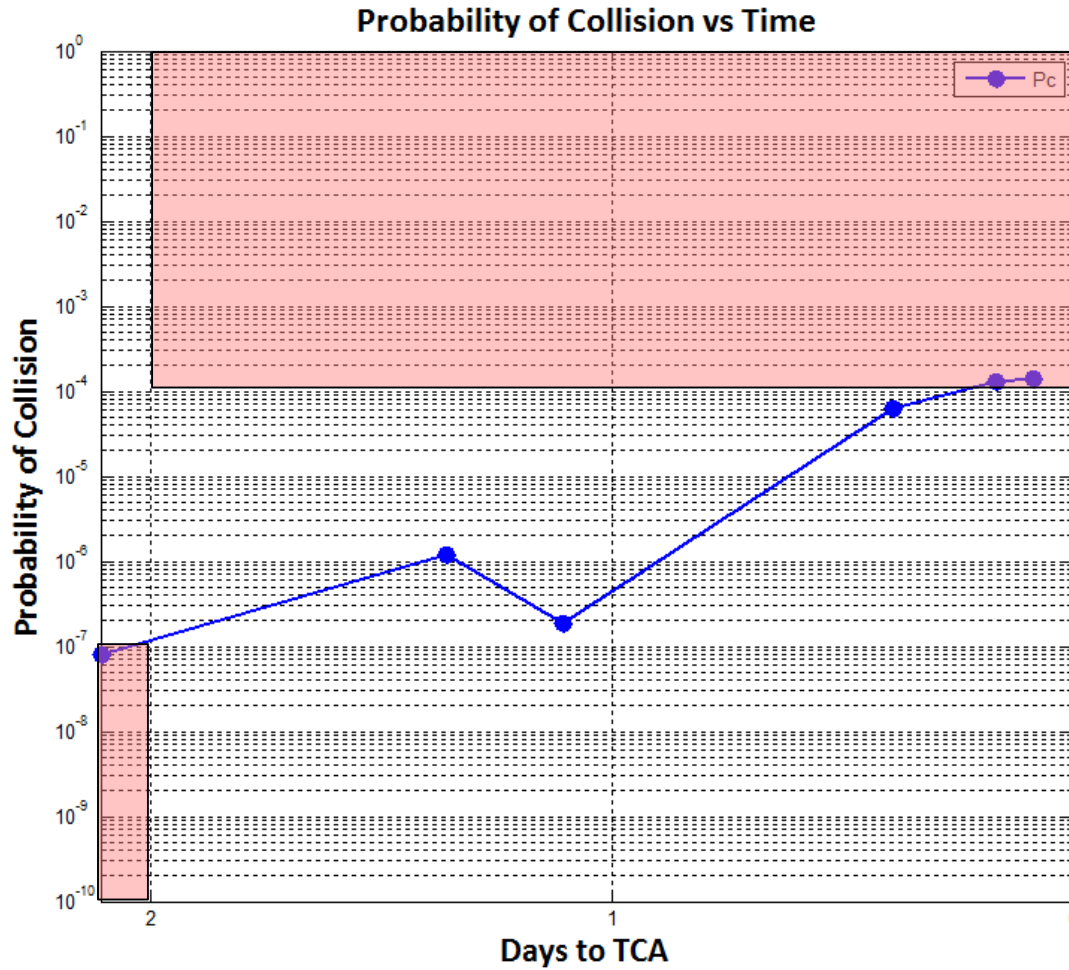


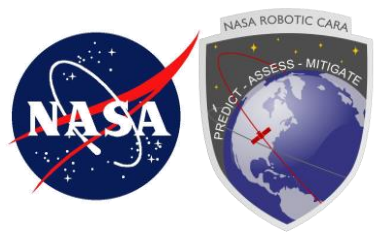
Aura vs. 89477, 29 AUG 2015



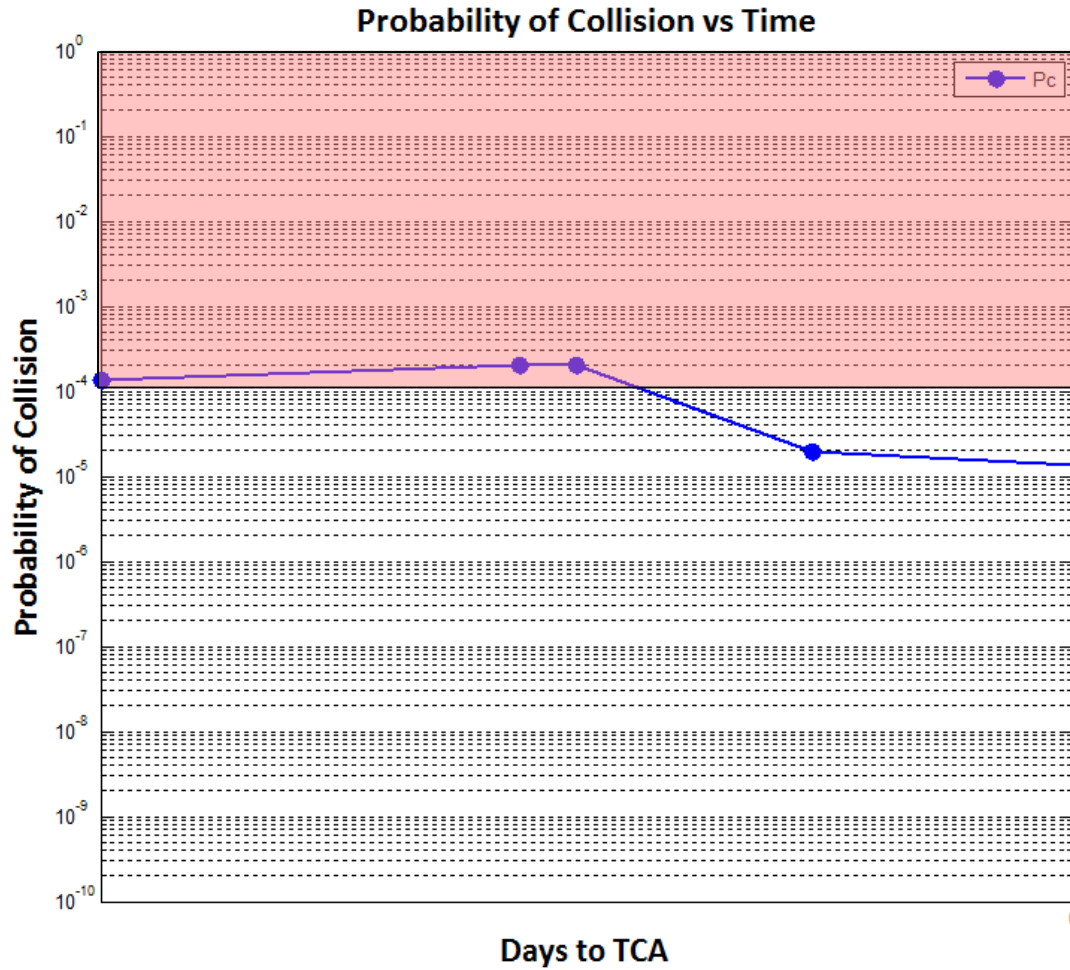


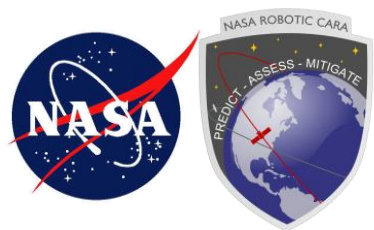
Terra vs. 37131, 19 DEC 2015



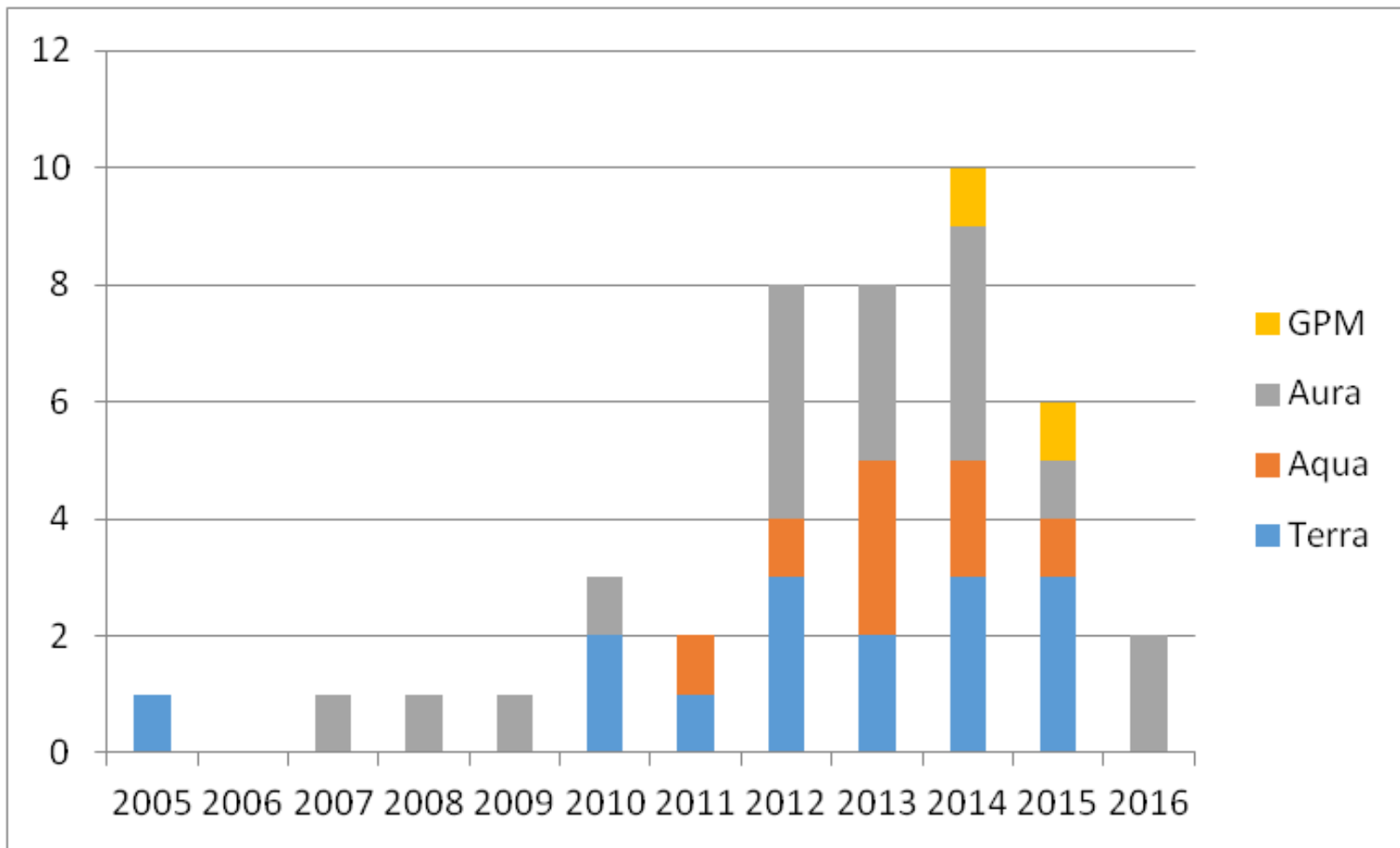


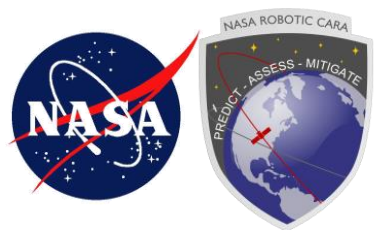
GPM vs. 28685, 5 SEP 2015





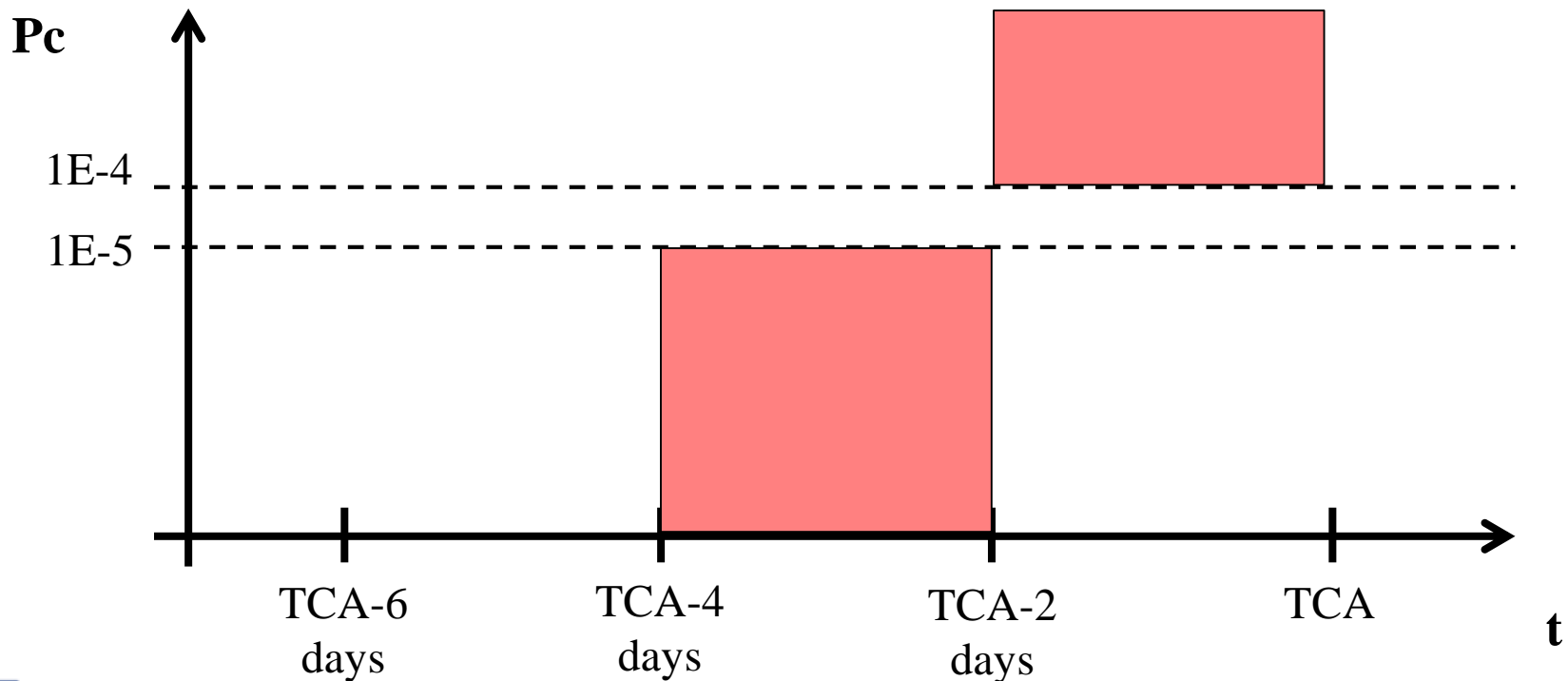
Summary of data for ESMO missions Using 1E-7 as lower Pc threshold

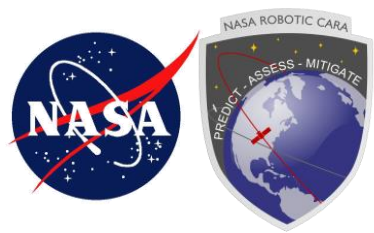




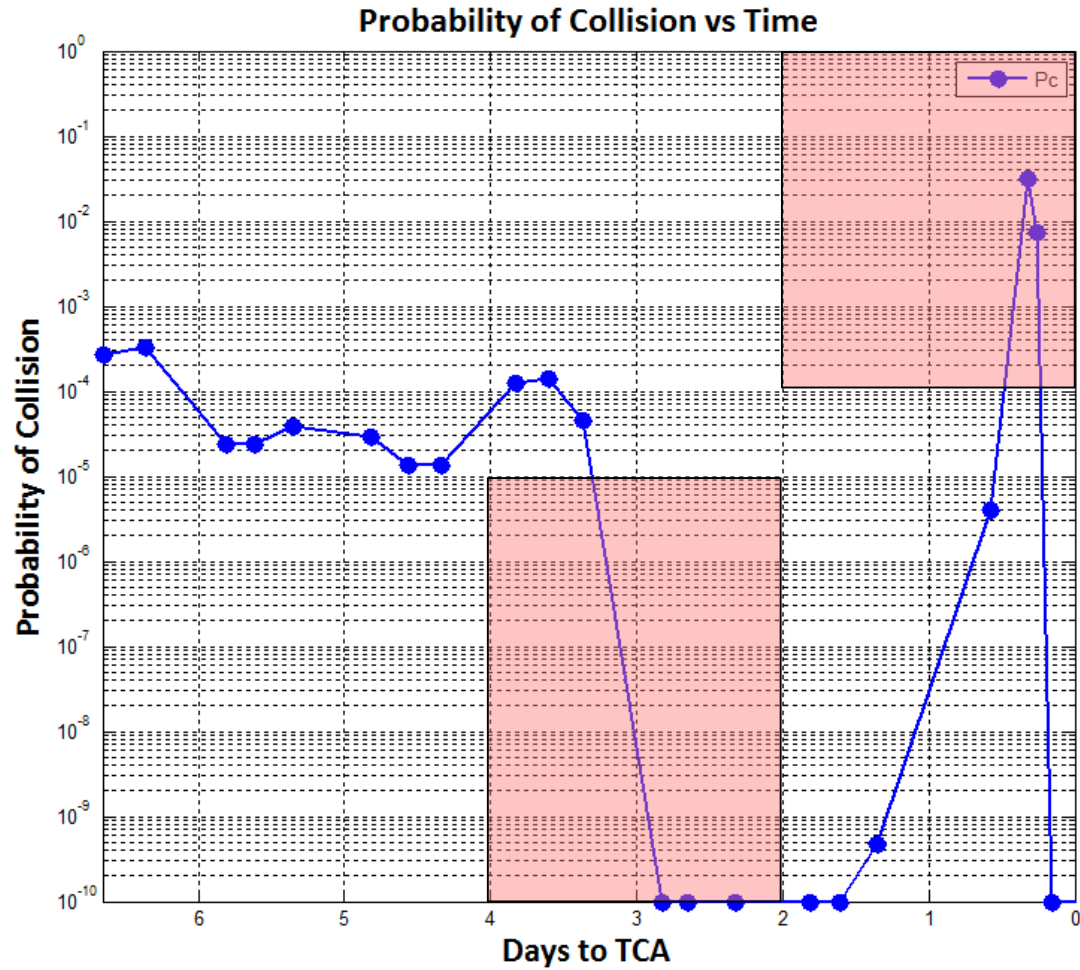
Historical Look at Late-Notice HIEs: Repeat with higher low-Pc threshold

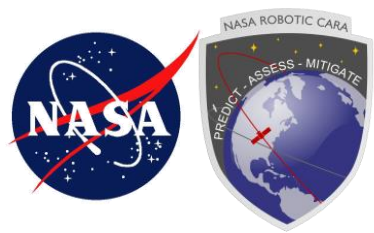
- Query CARA database for events for which the following are true:
 - Event has at least one data point between TCA-4 days and TCA-2 days where the Pc was below $1E-5$, OR there were no data points in that timeframe
 - Event has at least one data point between TCA-2 days and TCA where the Pc was at least $1E-4$



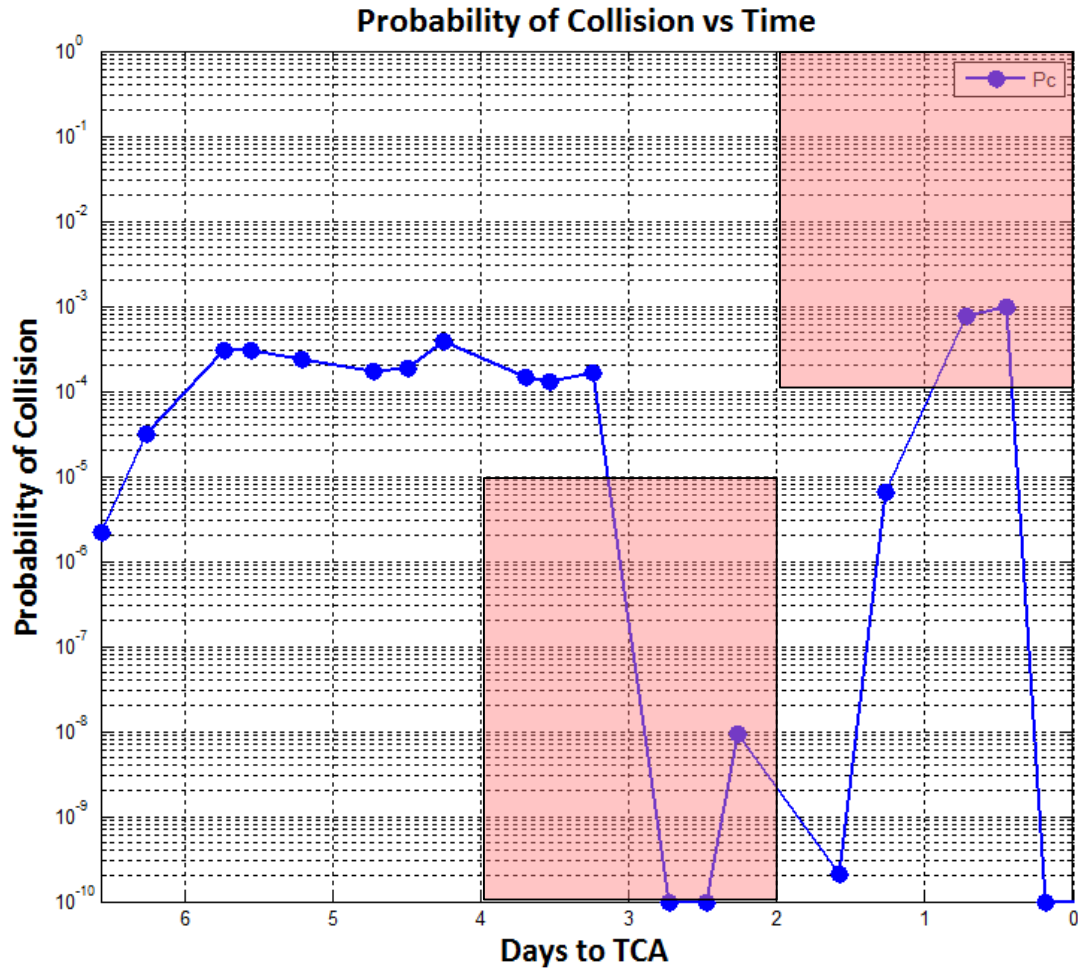


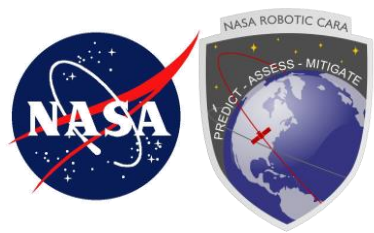
Terra vs. 38192, 24 JUN 2015



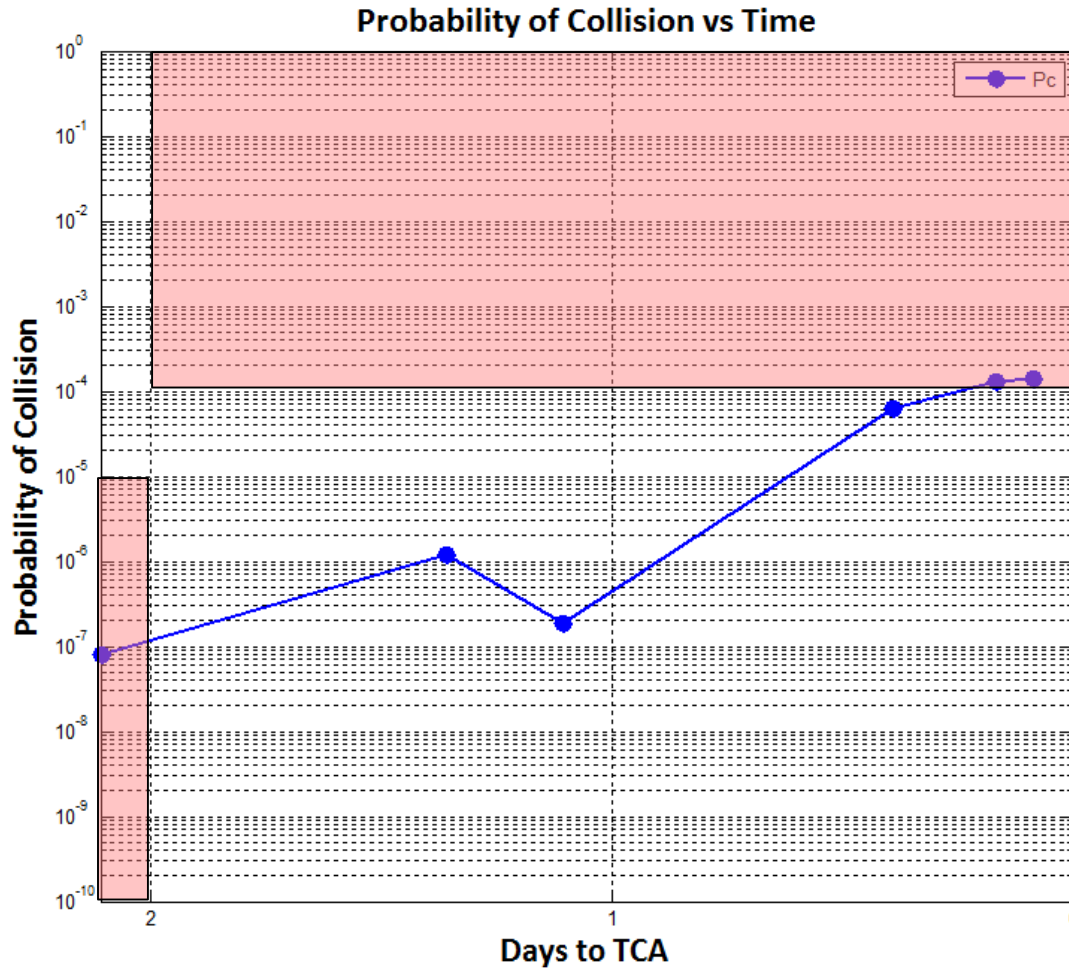


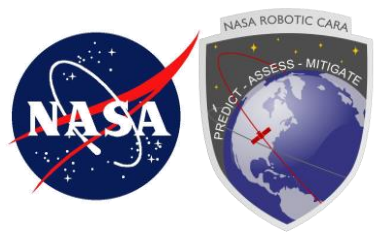
Aura vs. 89477, 29 AUG 2015



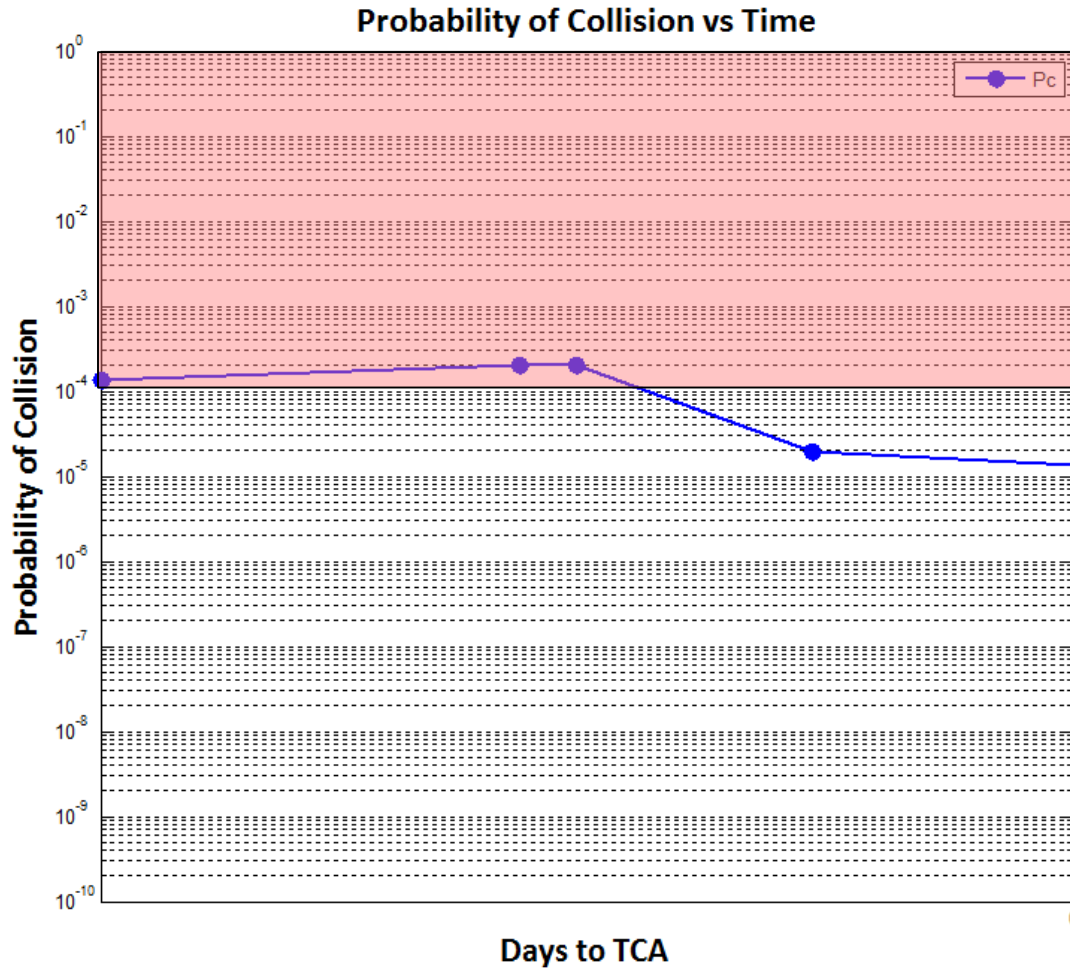


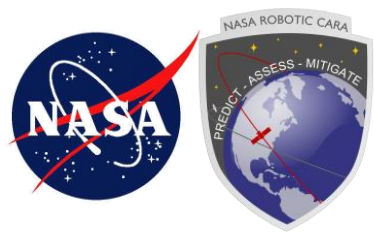
Terra vs. 37131, 19 DEC 2015



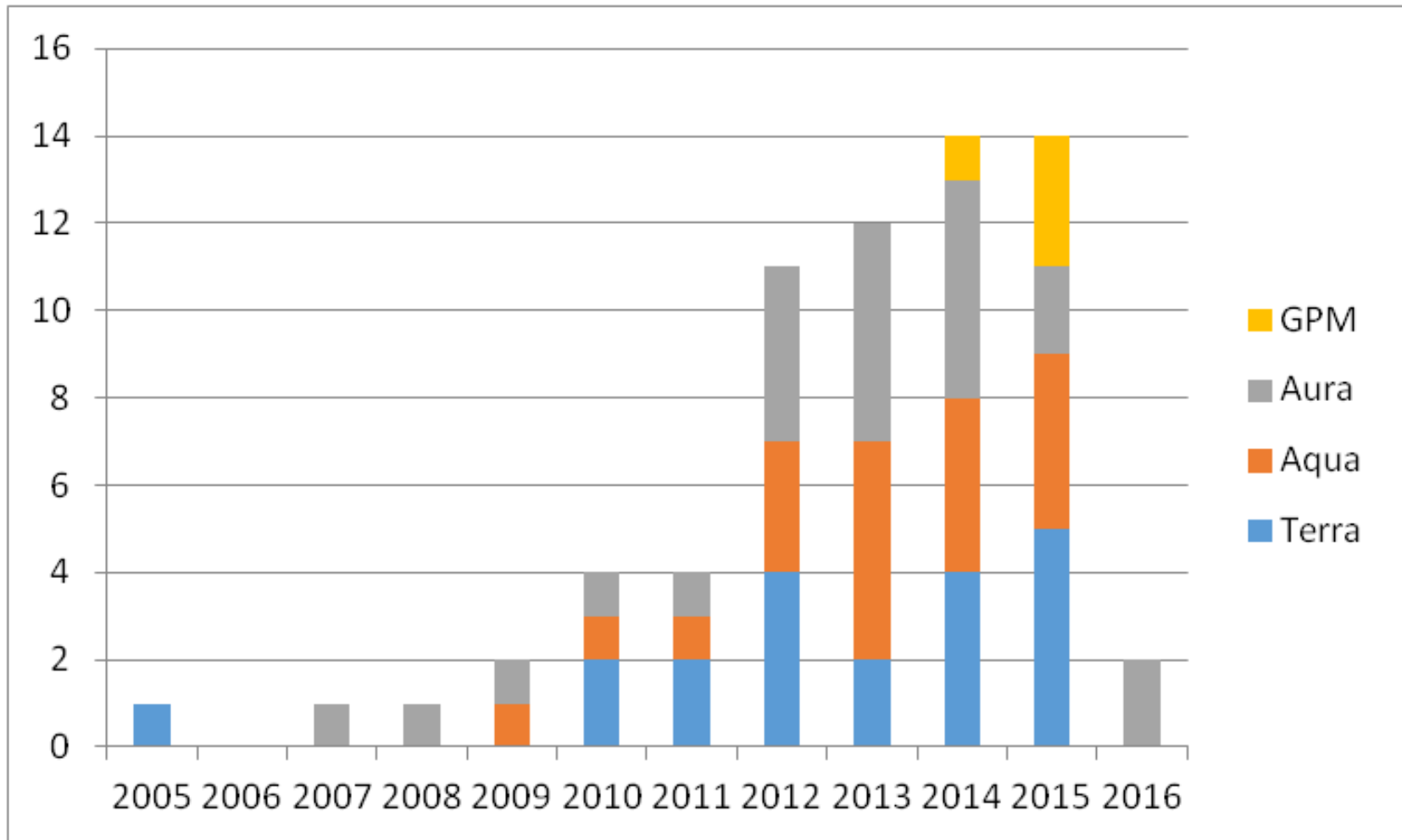


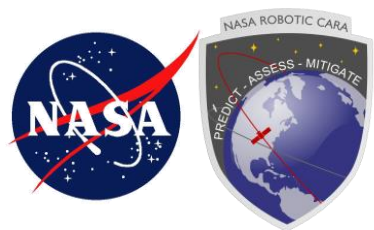
GPM vs. 28685, 5 SEP 2015





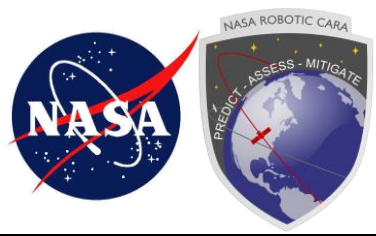
Summary of data for ESMO missions Using 1E-5 as lower Pc threshold



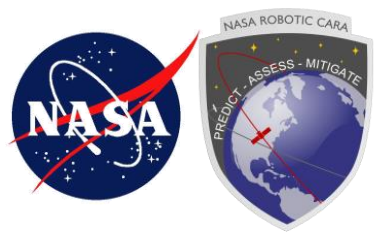


Conclusions

- **There has not been a notable increase in the number of “late-notice” events in recent months**
- **From 2011-2015 we saw about a dozen “late-notice” events per year for Aqua/Aura/Terra combined**
 - This represents an increase over previous years
 - This has held relatively constant over the last 4 years
 - This uses data assuming the higher of the two lower Pc bounds considered
- **This study may be repeated with different time periods and Pc thresholds**
 - Note that in the case studies presented, all of the “late-breaking” data appeared within TCA-24 hours, not just TCA-48 hours
 - Since GPM is in a different orbit regime, it may be prudent to consider different definitions of “late-notice” than for 705-km assets

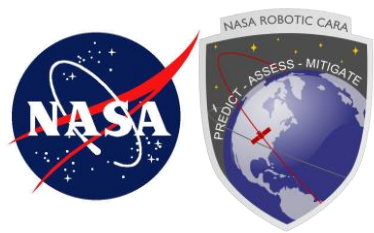


BACKUP



Raw secondary and TCA data using 1E-7 threshold

		ID #	YYYY	M	D	h	m	s			ID #	YYYY	M	D	h	m	s		
1	Terra	14222	2005	10	23	20	48	52			24	Aura	17649	2007	4	19	12	50	31
2	Terra	30508	2010	4	13	2	40	26			25	Aura	29768	2008	12	17	19	7	9
3	Terra	31301	2010	3	4	9	21	37			26	Aura	34623	2009	4	23	21	20	22
4	Terra	81030	2011	12	29	3	23	38			27	Aura	29590	2010	11	1	18	38	23
5	Terra	26200	2012	10	13	4	5	16			28	Aura	34020	2012	1	19	19	51	17
6	Terra	35219	2012	9	23	20	8	1			29	Aura	35449	2012	3	16	13	27	20
7	Terra	80225	2012	7	12	16	2	29			30	Aura	87273	2012	3	18	8	50	36
8	Terra	35768	2013	4	19	19	16	41			31	Aura	87438	2012	9	2	13	28	57
9	Terra	36304	2013	9	22	16	46	47			32	Aura	36718	2013	3	5	17	13	27
10	Terra	32081	2014	11	12	18	10	24			33	Aura	37103	2013	2	1	8	59	37
11	Terra	80767	2014	12	22	22	14	14			34	Aura	38032	2013	4	9	21	47	11
12	Terra	89032	2014	2	15	3	45	4			35	Aura	26654	2014	4	4	20	55	14
13	Terra	35926	2015	12	22	11	51	46			36	Aura	35077	2014	8	3	1	23	51
14	Terra	37131	2015	12	20	4	5	53			37	Aura	35185	2014	12	25	5	57	58
15	Terra	38192	2015	6	24	9	56	50			38	Aura	89239	2014	3	15	19	57	31
16	Aqua	30968	2011	10	7	9	9	52			39	Aura	89477	2015	8	29	7	51	15
17	Aqua	38242	2012	9	28	19	18	19			40	Aura	34726	2016	3	16	8	27	49
18	Aqua	31293	2013	9	7	18	26	17			41	Aura	37549	2016	3	17	23	20	48
19	Aqua	34510	2013	10	25	4	27	41			42	GPM	40140	2014	10	13	8	3	28
20	Aqua	87872	2013	3	20	14	1	54			43	GPM	28685	2015	9	5	9	21	17
21	Aqua	34076	2014	5	6	13	23	0											
22	Aqua	81180	2014	10	21	4	17	27											
23	Aqua	30228	2015	4	17	23	59	48											



Raw secondary and TCA data using 1E-5 threshold

	ID #	YYYY	M	D	h	m	s		ID #	YYYY	M	D	h	m	s		ID #	YYYY	M	D	h	m	s			
1	Terra	14222	2005	10	23	20	48	52	21	Aqua	31612	2009	3	13	4	29	30	40	Aura	17649	2007	4	19	12	50	31
2	Terra	30508	2010	4	13	2	40	26	22	Aqua	35673	2010	1	1	6	47	23	41	Aura	29768	2008	12	17	19	7	9
3	Terra	31301	2010	3	4	9	21	37	23	Aqua	30968	2011	10	7	9	9	52	42	Aura	34623	2009	4	23	21	20	22
4	Terra	34895	2011	10	31	19	22	25	24	Aqua	9819	2012	10	21	15	23	38	43	Aura	29590	2010	11	1	18	38	23
5	Terra	81030	2011	12	29	3	23	38	25	Aqua	38242	2012	9	28	19	18	19	44	Aura	34581	2011	8	1	0	15	29
6	Terra	26200	2012	10	13	4	5	16	26	Aqua	81090	2012	4	18	18	0	52	45	Aura	34020	2012	1	19	19	51	17
7	Terra	35067	2012	11	18	1	7	51	27	Aqua	31293	2013	9	7	18	26	17	46	Aura	35449	2012	3	16	13	27	20
8	Terra	35219	2012	9	23	20	8	1	28	Aqua	81090	2012	4	18	18	0	52	47	Aura	87273	2012	3	18	8	50	36
9	Terra	80225	2012	7	12	16	2	29	29	Aqua	31293	2013	9	7	18	26	17	48	Aura	87438	2012	9	2	13	28	57
10	Terra	35768	2013	4	19	19	16	41	30	Aqua	34510	2013	10	25	4	27	41	49	Aura	34982	2013	11	22	10	52	9
11	Terra	36304	2013	9	22	16	46	47	31	Aqua	35733	2013	3	23	22	51	8	50	Aura	36380	2013	2	1	11	59	36
12	Terra	32081	2014	11	12	18	10	24	32	Aqua	35733	2013	3	23	22	51	8	51	Aura	36718	2013	3	5	17	13	27
13	Terra	34213	2014	11	23	6	18	0	33	Aqua	35733	2013	3	24	0	30	14	52	Aura	37103	2013	2	1	8	59	37
14	Terra	80767	2014	12	22	22	14	14	34	Aqua	87872	2013	3	20	14	1	54	53	Aura	38032	2013	4	9	21	47	11
15	Terra	89032	2014	2	15	3	45	4	35	Aqua	34076	2014	5	6	13	23	0	54	Aura	26654	2014	4	4	20	55	14
16	Terra	35925	2015	1	1	9	41	43	36	Aqua	81180	2014	10	21	4	17	27	55	Aura	34822	2014	11	10	23	57	4
17	Terra	35926	2015	12	22	11	51	46	37	Aqua	82072	2014	12	16	1	27	44	56	Aura	35077	2014	8	3	1	23	51
18	Terra	37131	2015	12	20	4	5	53	38	Aqua	87568	2014	10	4	0	28	13	57	Aura	35185	2014	12	25	5	57	58
19	Terra	38192	2015	6	24	9	56	50	39	Aqua	22475	2015	12	16	16	16	32	58	Aura	89239	2014	3	15	19	57	31
20	Terra	38501	2015	1	15	7	25	51	40	Aqua	30228	2015	4	17	23	59	48	59	Aura	82440	2015	5	10	1	5	27
									41	Aqua	34020	2015	4	5	0	31	13	60	Aura	89477	2015	8	29	7	51	15
									42	Aqua	85095	2015	7	11	0	29	14	61	Aura	89477	2015	8	29	7	51	15
									43	Aqua							62	Aura	34726	2016	3	16	8	27	49	
									44	Aqua							63	Aura	37549	2016	3	17	23	20	48	
									45	Aqua							64	GPM	40140	2014	10	13	8	3	28	
									46	Aqua							65	GPM	24115	2015	6	2	21	36	7	
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