

Close encounters across Loiano's skies:  
**A Spectrophotometric  
 Characterization of the  
 OSIRIS-Rex Earth Flyby**

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### OSIRIS-Rex

heading to Earth flyby, as seen  
 with the "Cassini" telescope -  
 Loiano Obs. - Sep 21, 2017, 23:20 UT

D = 413 000 km

Credit: Alberto Buzzoni  
 INAF OABO

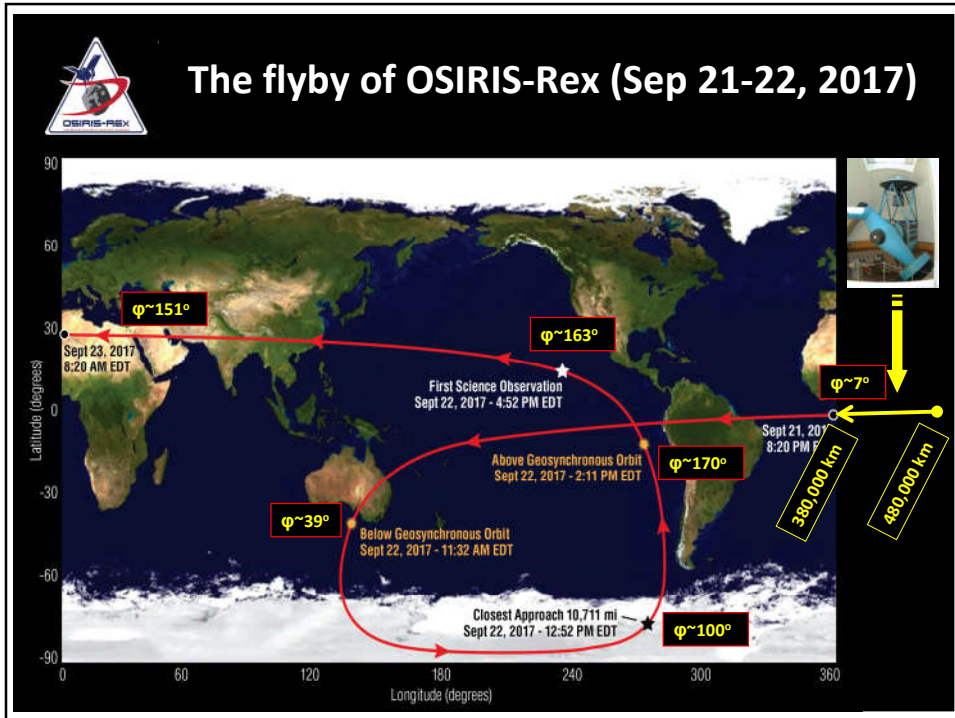
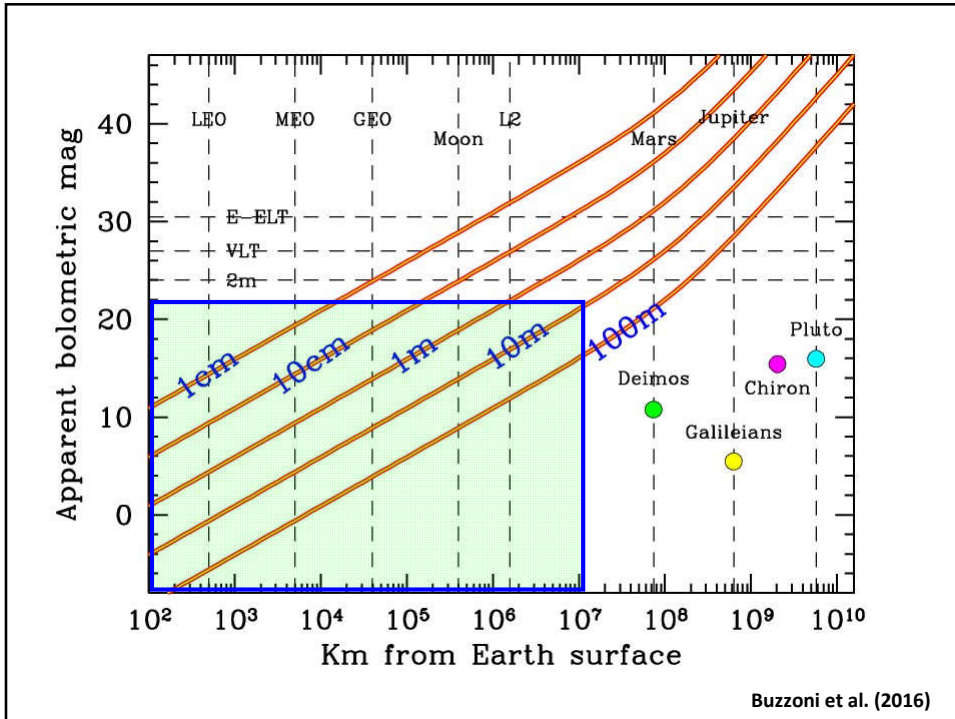
**OSIRIS-Rex EGA Image Taken by Alberto Buzzoni**

On Sept. 21, 2017 (at 23:20 UTC), Alberto Buzzoni captured this imagery of OSIRIS-Rex as the spacecraft approached for Earth Gravity Assist. Buzzoni used the Cassini Telescope at The Astronomical Observatory of Bologna (OABO)–one of 17 institutes belonging to National Institute for Astrophysics (INAF)–in Bologna, Italy.

Date Taken: Sept. 21, 2017

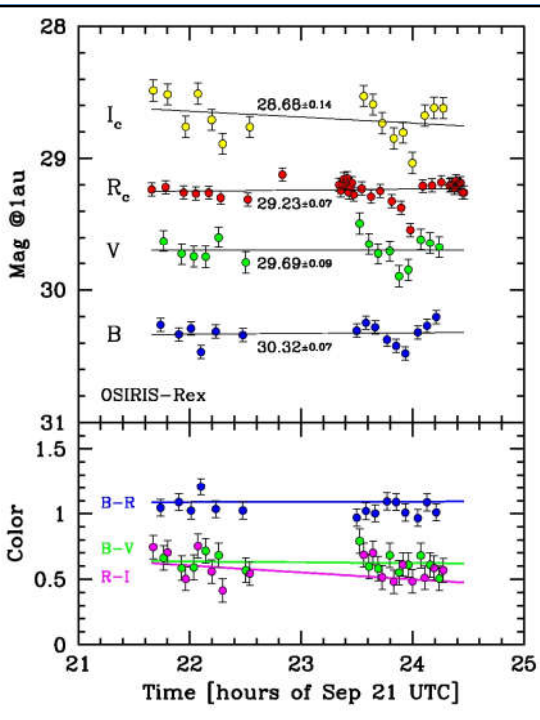
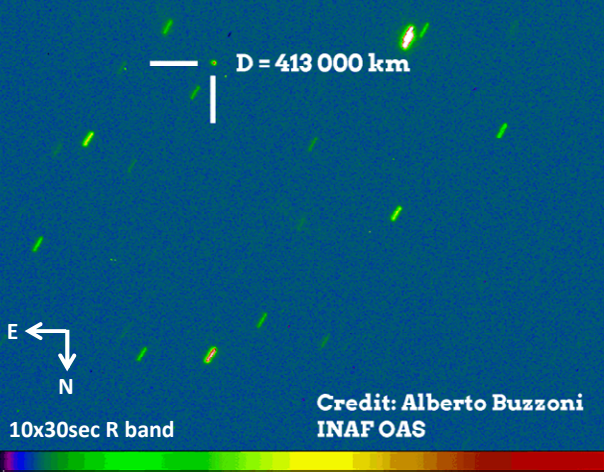
Credit: Alberto Buzzoni, INAF OABO

Downloads:

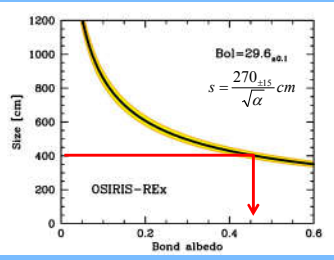


# OSIRIS-Rex

heading to Earth flyby, as seen with the "Cassini" telescope -  
Loiano Obs. - Sep 21, 2017, 23:20 UT



## Observing from Loiano (Sep 21, 2017)



$\phi \sim 6.7^\circ$

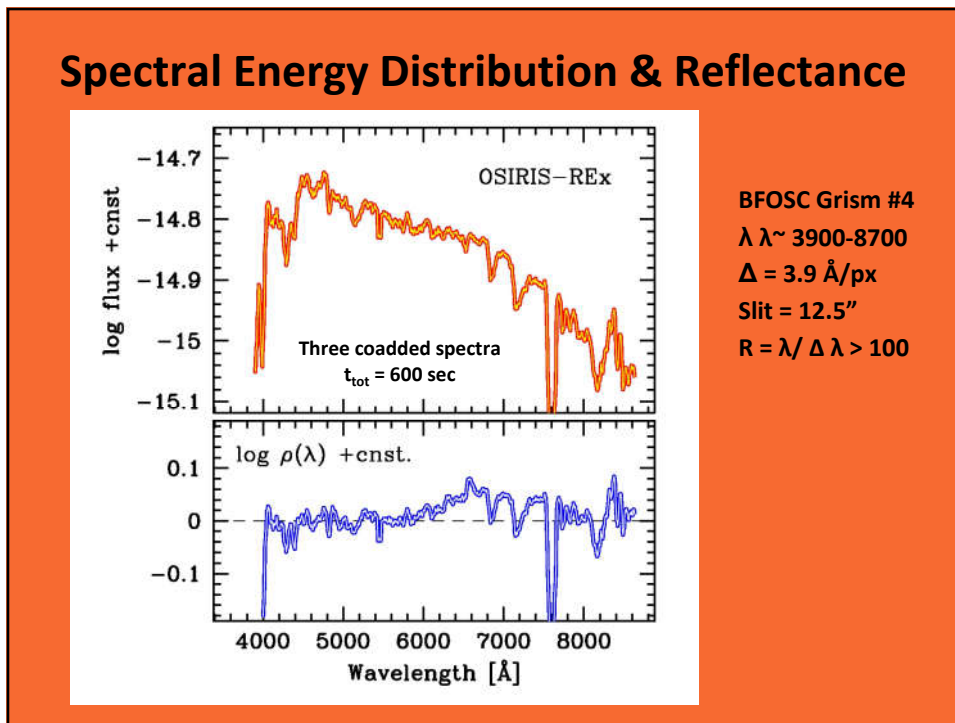
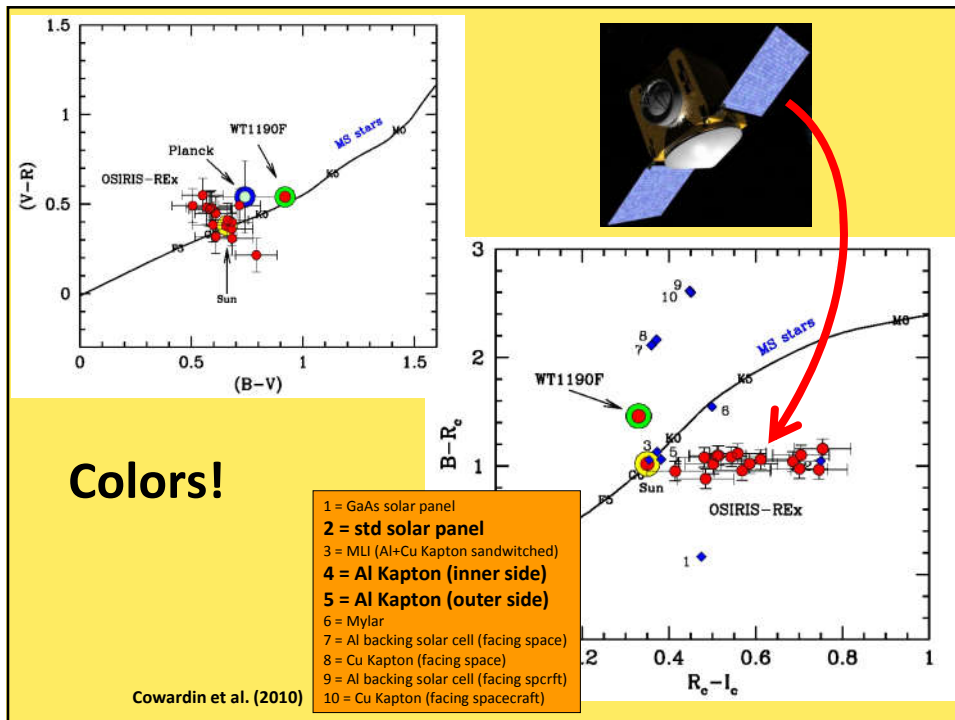
Colors @23:00 UTC

$\langle B-V \rangle = 0.629 \pm 0.125$

$\langle V-R \rangle = 0.46 \pm 0.122$

$\langle B-R \rangle = 1.089 \pm 0.104$

$\langle R-I \rangle = 0.551 \pm 0.16$



# Find\_Orb dynamical check

Orbital elements: 2016-055A = OSIRIS-REx  
 Perihelion 2017 Dec 9.760811 TT = 18:15:34 (JD 2458097.260811)  
 Epoch 2017 Sep 22.0 TT = JD T 2458018.5 Earth MOID: 0.0002 Ve: 0.0581  
 M 283.04977 (J2000 ecliptic)  
 n 0.97701160 Peri. 287.02741  
 a 1.00585638 Node 175.40132  
 e 0.2304183 Incl. 0.15968  
 P 1.0136846d H 29.2 G 0.15 q 0.77408902 0.133752493  
 From 12 observations 2017 Sept. 21-22 (3.0 d) **1 mean residual 0".06**

Orbital elements: 2016-055A = OSIRIS-REx  
 Perigee 2017 Sep 22.703451 TT = 16:52:58 (JD 2458019.203451)  
 Epoch 2017 Sep 22.0 TT = JD T 2458018.5 Find\_Orb  
 q 23755.4991km (J2000 equator)  
 H 29.2 G 0.15 Peri. 284.33182  
 Node 185.61975  
 e 3.3318056 Incl. 84.98006  
 From 12 observations 2017 Sept. 21-22 (3.0 d) **1 mean residual 0".06**

1709 21.895310	598	00 23 56.880	-01 24 29.04	09-	.12-
1709 21.901316	598	00 23 53.502	-01 26 27.59	.11+	.11+
1709 21.908583	598	00 23 49.191	-01 28 53.69	.00	.05+
1709 21.924145	598	00 23 39.269	-01 34 15.27	.01-	.00
1709 21.938598	598	00 23 29.243	-01 39 25.11	.01+	.05-
1709 21.975149	598	00 23 00.844	-01 53 20.26	.03-	.00
1709 21.981182	598	00 22 55.801	-01 55 45.73	.03-	.01-
1709 21.988106	598	00 22 49.908	-01 58 35.47	.04-	.01+
1709 21.995910	598	00 22 43.155	-02 01 50.43	.08+	.07+
1709 22.006721	598	00 22 33.596	-02 06 27.42	.06-	.08-
1709 22.014609	598	00 22 26.525	-02 09 54.32	.08+	.06+
1709 22.018811	598	00 22 22.714	-02 11 46.49	.02-	.03-

## Helio solution:

	Find_Orb	JPL
M =	283.05	282.98
n =	0.9770	0.9772
a =	1.0059	1.0057 au
q =	0.7741	0.7748 au
Q =	1.2376	1.2367 au
e =	0.2304	0.2297
i =	0.1597	0.1601
P =	368.46	368.41 days
$\pi$ =	287.03	286.99
$\Omega$ =	175.40	175.42
Epoch Peri = 2017, Dec 09		
	18:15:34	19:40:04 UTC

## Geo solution:

	Find_Orb	JPL
e =	3.332	3.298
i =	84.98	84.85
$\pi$ =	284.33	284.51
$\Omega$ =	185.62	185.62
q =	23751	23597 km
Epoch Peri = 2017, Sep 22		
	16:52:58	16:52:43 UTC

# 60 mas mean...

