

**DEPARTMENT OF SPACE**

## DEMAND NO.89

**Department of Space**

A. The Budget allocations, net of recoveries, are given below:

		<i>(In crores of Rupees)</i>								
Major Head	Budget 2007-2008			Revised 2007-2008			Budget 2008-2009			
	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	
Revenue	1838.90	438.60	2277.50	1486.72	459.00	1945.72	1820.50	474.00	2294.50	
Capital	1581.10	...	1581.10	1344.28	...	1344.28	1779.50	...	1779.50	
<b>Total</b>	<b>3420.00</b>	<b>438.60</b>	<b>3858.60</b>	<b>2831.00</b>	<b>459.00</b>	<b>3290.00</b>	<b>3600.00</b>	<b>474.00</b>	<b>4074.00</b>	
1. Secretariat - Economic Services	3451	...	4.69	4.69	...	4.90	4.90	...	5.46	5.46
<b>Space Research</b>										
<b>Space Technology</b>										
<b>Launch Vehicle Technology</b>										
2. Geo -Synchronous Satellite Launch Vehicle	3402	9.00	...	9.00	8.00	...	8.00	1.00	...	1.00
3. GSLV MK-III Development	3402	231.00	...	231.00	173.86	...	173.86	167.00	...	167.00
	5402	104.00	...	104.00	110.22	...	110.22	103.00	...	103.00
	<i>Total</i>	<i>335.00</i>	...	<i>335.00</i>	<i>284.08</i>	...	<i>284.08</i>	<i>270.00</i>	...	<i>270.00</i>
4. Cryogenic Upper Stage Project [CUSP]	3402	1.30	...	1.30	1.30	...	1.30	0.10	...	0.10
5. Polar Satellite Launch Vehicle - Continuation (PSLV-C) Project	3402	155.61	...	155.61	155.00	...	155.00	170.00	...	170.00
	5402	4.39	...	4.39	5.00	...	5.00	10.00	...	10.00
	<i>Total</i>	<i>160.00</i>	...	<i>160.00</i>	<i>160.00</i>	...	<i>160.00</i>	<i>180.00</i>	...	<i>180.00</i>
6. Vikram Sarabhai Space Centre (VSSC)	3402	134.02	116.24	250.26	129.28	121.28	250.56	122.04	128.41	250.45
	5402	101.94	...	101.94	79.56	...	79.56	181.83	...	181.83
	<i>Total</i>	<i>235.96</i>	<i>116.24</i>	<i>352.20</i>	<i>208.84</i>	<i>121.28</i>	<i>330.12</i>	<i>303.87</i>	<i>128.41</i>	<i>432.28</i>
7. Indian Space Research Organisation - Inertial Systems Unit(IISU)	3402	10.94	...	10.94	14.78	...	14.78	10.79	...	10.79
	5402	10.31	...	10.31	8.76	...	8.76	12.37	...	12.37
	<i>Total</i>	<i>21.25</i>	...	<i>21.25</i>	<i>23.54</i>	...	<i>23.54</i>	<i>23.16</i>	...	<i>23.16</i>
8. Liquid Propulsion Systems Centre	3402	150.41	46.37	196.78	107.71	46.12	153.83	123.76	46.33	170.09
	5402	21.17	...	21.17	17.76	...	17.76	34.10	...	34.10
	<i>Total</i>	<i>171.58</i>	<i>46.37</i>	<i>217.95</i>	<i>125.47</i>	<i>46.12</i>	<i>171.59</i>	<i>157.86</i>	<i>46.33</i>	<i>204.19</i>
9. GSLV Operational Project	3402	251.36	...	251.36	218.33	...	218.33	235.00	...	235.00
	5402	13.64	...	13.64	18.17	...	18.17	20.00	...	20.00
	<i>Total</i>	<i>265.00</i>	...	<i>265.00</i>	<i>236.50</i>	...	<i>236.50</i>	<i>255.00</i>	...	<i>255.00</i>
10. Space Capsule Recovery Experiment (SRE)	3402	9.45	...	9.45	4.45	...	4.45	10.00	...	10.00
11. Manned Mission Initiatives/ Human Space Flight	3402	25.00	...	25.00	2.50	...	2.50	100.00	...	100.00
	5402	25.00	...	25.00	1.50	...	1.50	25.00	...	25.00
	<i>Total</i>	<i>50.00</i>	...	<i>50.00</i>	<i>4.00</i>	...	<i>4.00</i>	<i>125.00</i>	...	<i>125.00</i>
12. Indian Institute of Space Science & Technology	3402	10.00	...	10.00	10.00	...	10.00	65.25	...	65.25
	5402	65.00	...	65.00	15.00	...	15.00	...	...	...
	<i>Total</i>	<i>75.00</i>	...	<i>75.00</i>	<i>25.00</i>	...	<i>25.00</i>	<i>65.25</i>	...	<i>65.25</i>
13. Semi Cryogenic Engine/Stage Development	3402	10.00	...	10.00	...	...	...	15.00	...	15.00
	5402	15.00	...	15.00	...	...	...	7.50	...	7.50
	<i>Total</i>	<i>25.00</i>	...	<i>25.00</i>	...	...	...	<i>22.50</i>	...	<i>22.50</i>
<b>Total - Launch Vehicle Technology</b>		<b>1358.54</b>	<b>162.61</b>	<b>1521.15</b>	<b>1081.18</b>	<b>167.40</b>	<b>1248.58</b>	<b>1413.74</b>	<b>174.74</b>	<b>1588.48</b>
<b>Setellite Technology</b>										
14. Cartosat-2	3402	0.15	...	0.15	0.15	...	0.15	...	...	...
15. Oceansat-2 and 3	3402	9.00	...	9.00	3.15	...	3.15	3.00	...	3.00
	5402	21.00	...	21.00	26.85	...	26.85	7.00	...	7.00
	<i>Total</i>	<i>30.00</i>	...	<i>30.00</i>	<i>30.00</i>	...	<i>30.00</i>	<i>10.00</i>	...	<i>10.00</i>
16. Resourcesat-2 and 3	3402	6.00	...	6.00	2.74	...	2.74	3.00	...	3.00
	5402	44.00	...	44.00	45.26	...	45.26	32.00	...	32.00
	<i>Total</i>	<i>50.00</i>	...	<i>50.00</i>	<i>48.00</i>	...	<i>48.00</i>	<i>35.00</i>	...	<i>35.00</i>
17. ISRO Satellite Centre (ISAC)	3402	75.12	47.25	122.37	105.15	49.89	155.04	93.74	51.36	145.10
	5402	90.92	...	90.92	22.08	...	22.08	70.75	...	70.75
	<i>Total</i>	<i>166.04</i>	<i>47.25</i>	<i>213.29</i>	<i>127.23</i>	<i>49.89</i>	<i>177.12</i>	<i>164.49</i>	<i>51.36</i>	<i>215.85</i>

No.89/ Department of Space

		(In crores of Rupees)								
Major Head		Budget 2007-2008			Revised 2007-2008			Budget 2008-2009		
		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
18. Laboratory for Electro-Optics System(LEOS)	3402	11.67	...	11.67	12.10	...	12.10	22.59	...	22.59
	5402	9.54	...	9.54	3.66	...	3.66	14.55	...	14.55
	<i>Total</i>	<i>21.21</i>	<i>...</i>	<i>21.21</i>	<i>15.76</i>	<i>...</i>	<i>15.76</i>	<i>37.14</i>	<i>...</i>	<i>37.14</i>
19. Radar Imaging Satellite-1 (RISAT-1)	3402	12.00	...	12.00	3.01	...	3.01	2.68	...	2.68
	5402	44.00	...	44.00	53.47	...	53.47	22.32	...	22.32
	<i>Total</i>	<i>56.00</i>	<i>...</i>	<i>56.00</i>	<i>56.48</i>	<i>...</i>	<i>56.48</i>	<i>25.00</i>	<i>...</i>	<i>25.00</i>
20. G.SAT-4	3402	7.34	...	7.34	4.50	...	4.50	5.00	...	5.00
	5402	0.66	...	0.66	...	...	...	2.00	...	2.00
	<i>Total</i>	<i>8.00</i>	<i>...</i>	<i>8.00</i>	<i>4.50</i>	<i>...</i>	<i>4.50</i>	<i>7.00</i>	<i>...</i>	<i>7.00</i>
21. Satellite Navigation System	3402	15.00	...	15.00	12.48	...	12.48	18.00	...	18.00
	5402	86.00	...	86.00	81.52	...	81.52	252.00	...	252.00
	<i>Total</i>	<i>101.00</i>	<i>...</i>	<i>101.00</i>	<i>94.00</i>	<i>...</i>	<i>94.00</i>	<i>270.00</i>	<i>...</i>	<i>270.00</i>
22. Semi Conductor Development(SCL)	3402	36.12	...	36.12	38.07	...	38.07	34.28	...	34.28
	5402	5.00	...	5.00	3.00	...	3.00	...	...	...
	<i>Total</i>	<i>41.12</i>	<i>...</i>	<i>41.12</i>	<i>41.07</i>	<i>...</i>	<i>41.07</i>	<i>34.28</i>	<i>...</i>	<i>34.28</i>
23. Advanced Communication Technology Satellite	3402	10.00	...	10.00	...	...	...	15.00	...	15.00
	5402	2.00	...	2.00	...	...	...	7.50	...	7.50
	<i>Total</i>	<i>12.00</i>	<i>...</i>	<i>12.00</i>	<i>...</i>	<i>...</i>	<i>...</i>	<i>22.50</i>	<i>...</i>	<i>22.50</i>
24. Earth Observation - New Missions[Geo-HR Imager, Cartostat-3, SARAL, Technology Experiment Satellites, Disaster Management Satellite)	3402	5.00	...	5.00	...	...	...	20.00	...	20.00
	5402	25.00	...	25.00	...	...	...	45.00	...	45.00
	<i>Total</i>	<i>30.00</i>	<i>...</i>	<i>30.00</i>	<i>...</i>	<i>...</i>	<i>...</i>	<i>65.00</i>	<i>...</i>	<i>65.00</i>
<b>Total - Satellite Technology</b>		<b>515.52</b>	<b>47.25</b>	<b>562.77</b>	<b>417.19</b>	<b>49.89</b>	<b>467.08</b>	<b>670.41</b>	<b>51.36</b>	<b>721.77</b>
<b>Launch Support, Tracking Network &amp; Range Facility</b>										
25. Satish Dhawan Space Centre - SHAR	3402	69.15	55.51	124.66	74.02	58.00	132.02	95.29	55.25	150.54
	5402	74.28	...	74.28	81.36	...	81.36	87.45	...	87.45
	<i>Total</i>	<i>143.43</i>	<i>55.51</i>	<i>198.94</i>	<i>155.38</i>	<i>58.00</i>	<i>213.38</i>	<i>182.74</i>	<i>55.25</i>	<i>237.99</i>
26. ISRO Telemetry, Tracking & Command Network (ISTRAC)	3402	22.15	15.04	37.19	22.84	14.57	37.41	32.77	16.42	49.19
	5402	26.16	...	26.16	44.90	...	44.90	14.09	...	14.09
	<i>Total</i>	<i>48.31</i>	<i>15.04</i>	<i>63.35</i>	<i>67.74</i>	<i>14.57</i>	<i>82.31</i>	<i>46.86</i>	<i>16.42</i>	<i>63.28</i>
27. ISRO Radar Development Unit (ISRAD)	3402	4.32	...	4.32	5.45	...	5.45	...	...	...
	5402	0.17	...	0.17	0.20	...	0.20	...	...	...
	<i>Total</i>	<i>4.49</i>	<i>...</i>	<i>4.49</i>	<i>5.65</i>	<i>...</i>	<i>5.65</i>	<i>...</i>	<i>...</i>	<i>...</i>
<b>Total-Launch Support, Tracking Network &amp; Range Facility</b>		<b>196.23</b>	<b>70.55</b>	<b>266.78</b>	<b>228.77</b>	<b>72.57</b>	<b>301.34</b>	<b>229.60</b>	<b>71.67</b>	<b>301.27</b>
<b>Total-Space Technology</b>		<b>2070.29</b>	<b>280.41</b>	<b>2350.70</b>	<b>1727.14</b>	<b>289.86</b>	<b>2017.00</b>	<b>2313.75</b>	<b>297.77</b>	<b>2611.52</b>
<b>Space Applications</b>										
28. Space Applications Centre	3402	57.39	54.11	111.50	41.27	56.77	98.04	54.51	58.67	113.18
	5402	37.64	...	37.64	28.23	...	28.23	56.66	...	56.66
	<i>Total</i>	<i>95.03</i>	<i>54.11</i>	<i>149.14</i>	<i>69.50</i>	<i>56.77</i>	<i>126.27</i>	<i>111.17</i>	<i>58.67</i>	<i>169.84</i>
29. Development and Educational Communication Unit	3402	76.77	4.59	81.36	64.60	4.76	69.36	52.35	4.60	56.95
	5402	4.00	...	4.00	3.12	...	3.12	1.46	...	1.46
	<i>Total</i>	<i>80.77</i>	<i>4.59</i>	<i>85.36</i>	<i>67.72</i>	<i>4.76</i>	<i>72.48</i>	<i>53.81</i>	<i>4.60</i>	<i>58.41</i>
30. National Natural Resources Management System	3402	53.97	...	53.97	15.78	...	15.78	28.23	...	28.23
31. Earth Observation Application Mission(EOAM)	3402	3.97	...	3.97	3.38	...	3.38	2.68	...	2.68
32. Regional Remote Sensing Service Centers(RRSSC)	3402	6.97	...	6.97	7.63	...	7.63	7.62	...	7.62
	5402	6.73	...	6.73	1.44	...	1.44	3.48	...	3.48
	<i>Total</i>	<i>13.70</i>	<i>...</i>	<i>13.70</i>	<i>9.07</i>	<i>...</i>	<i>9.07</i>	<i>11.10</i>	<i>...</i>	<i>11.10</i>
33. National Remote Sensing Agency(NRSA)	3402	2.46	27.54	30.00	2.46	27.54	30.00	3.00	32.00	35.00

<i>(In crores of Rupees)</i>										
	Major Head	Budget 2007-2008			Revised 2007-2008			Budget 2008-2009		
		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
34. Disaster Management Support System	3402	40.00	...	40.00	28.46	...	28.46	50.00	...	50.00
	5402	30.00	...	30.00	9.31	...	9.31	15.00	...	15.00
	<i>Total</i>	70.00	...	70.00	37.77	...	37.77	65.00	...	65.00
35. North Eastern Space Applications Centre	3402	4.35	0.65	5.00	4.35	0.65	5.00	4.35	0.65	5.00
<b>Total - Space Applications</b>		<b>324.25</b>	<b>86.89</b>	<b>411.14</b>	<b>210.03</b>	<b>89.72</b>	<b>299.75</b>	<b>279.34</b>	<b>95.92</b>	<b>375.26</b>
<b>Space Sciences</b>										
36. Physical Research Laboratory(PRL)	3402	33.02	13.50	46.52	34.26	15.61	49.87	35.72	15.72	51.44
37. MST Radar Based Research(NARL)	3402	8.77	0.85	9.62	6.74	1.21	7.95	10.35	0.96	11.31
38. RESPOND	3402	13.00	...	13.00	12.00	...	12.00	13.00	...	13.00
39. Sensor Payload Development / Planetary Science Programme	3402	23.25	...	23.25	7.50	...	7.50	5.00	...	5.00
40. Megha-tropiques	3402	8.00	...	8.00	2.07	...	2.07	2.22	...	2.22
	5402	12.00	...	12.00	12.93	...	12.93	17.78	...	17.78
	<i>Total</i>	20.00	...	20.00	15.00	...	15.00	20.00	...	20.00
41. Astrosat 1 & 2	3402	5.00	...	5.00	5.05	...	5.05	0.65	...	0.65
	5402	35.00	...	35.00	43.45	...	43.45	24.35	...	24.35
	<i>Total</i>	40.00	...	40.00	44.00	...	44.00	25.00	...	25.00
42. Indian Lunar Mission - Chandrayan - 1 & 2	3402	8.00	...	8.00	4.06	...	4.06	3.85	...	3.85
	5402	88.00	...	88.00	127.11	...	127.11	74.15	...	74.15
	<i>Total</i>	96.00	...	96.00	131.17	...	131.17	78.00	...	78.00
43. ISRO Geosphere Biosphere Programme (ISRO GBP)	3402	25.32	...	25.32	25.28	...	25.28	19.00	...	19.00
44. Atmospheric Science Programmes	3402	18.63	...	18.63	17.15	...	17.15	14.49	...	14.49
45. Small Satellites for Atmospheric Research and Astronomy	3402	2.00	...	2.00	...	...	...	10.00	...	10.00
46. Other Schemes	3402	15.21	1.30	16.51	9.98	1.70	11.68	19.38	1.75	21.13
<b>Total - Space Sciences</b>		<b>295.20</b>	<b>15.65</b>	<b>310.85</b>	<b>303.08</b>	<b>18.52</b>	<b>321.60</b>	<b>249.94</b>	<b>18.43</b>	<b>268.37</b>
<b>Direction &amp; Administration / Other Programmes</b>										
47. Special Indigenisation/Advance Ordering	3402	30.45	...	30.45	12.95	...	12.95	20.00	...	20.00
	5402	208.55	...	208.55	1.00	...	1.00	330.00	...	330.00
	<i>Total</i>	239.00	...	239.00	13.95	...	13.95	350.00	...	350.00
48. Others	3402	3.00	39.86	42.86	3.15	44.85	48.00	3.15	44.38	47.53
	5402	9.58	...	9.58	11.23	...	11.23	11.05	...	11.05
	<i>Total</i>	12.58	39.86	52.44	14.38	44.85	59.23	14.20	44.38	58.58
<b>Total - Direction &amp; Administration / Other Programmes</b>		<b>251.58</b>	<b>39.86</b>	<b>291.44</b>	<b>28.33</b>	<b>44.85</b>	<b>73.18</b>	<b>364.20</b>	<b>44.38</b>	<b>408.58</b>
<b>INSAT Operational</b>										
49. Master Control Facility(MCF)	3252	13.91	11.10	25.01	13.06	11.15	24.21	12.66	12.04	24.70
	5252	26.67	...	26.67	16.50	...	16.50	30.11	...	30.11
	<i>Total</i>	40.58	11.10	51.68	29.56	11.15	40.71	42.77	12.04	54.81
50. INSAT-3 Satellites	3252	29.35	...	29.35	6.16	...	6.16	3.00	...	3.00
	5252	12.75	...	12.75	43.94	...	43.94	7.00	...	7.00
	<i>Total</i>	42.10	...	42.10	50.10	...	50.10	10.00	...	10.00
51. INSAT-4 Satellites (Including Launch Services)	3252	75.00	...	75.00	55.01	...	55.01	80.00	...	80.00
	5252	321.00	...	321.00	427.75	...	427.75	260.00	...	260.00
	<i>Total</i>	396.00	...	396.00	482.76	...	482.76	340.00	...	340.00
<b>Total - INSAT Operational</b>		<b>478.68</b>	<b>11.10</b>	<b>489.78</b>	<b>562.42</b>	<b>11.15</b>	<b>573.57</b>	<b>392.77</b>	<b>12.04</b>	<b>404.81</b>
52. Aid Materials & Equipment-Gross Deduct-Transfers to Functional Major Head	3606	...	0.02	0.02	...	0.02	0.02	...	0.02	0.02
	3606	...	-0.02	-0.02	...	-0.02	-0.02	...	-0.02	-0.02
	<i>Total</i>	...	...	...	...	...	...	...	...	...
<b>Grand Total</b>		<b>3420.00</b>	<b>438.60</b>	<b>3858.60</b>	<b>2831.00</b>	<b>459.00</b>	<b>3290.00</b>	<b>3600.00</b>	<b>474.00</b>	<b>4074.00</b>
<b>C. Plan Outlay</b>	Head of Dev	Budget Support	IEBR	Total	Budget Support	IEBR	Total	Budget Support	IEBR	Total
1. Space Research	13402	3420.00	...	3420.00	2831.00	...	2831.00	3600.00	...	3600.00

**1. Secretariat – Economic Services:** Provision is made for expenditure to be incurred on the Secretariat of the Department of Space.

**2. Geo-Synchronous Satellite Launch Vehicle (GSLV):** The GSLV Project envisaged the development of a launch vehicle capable of launching 2 tonne INSAT-class satellites into Geo-synchronous Transfer Orbit (GTO). The third test flight will carry the indigenous cryogenic engine & stage.

**3. GSLV Mk-III Development:** GSLV Mk-III is intended to develop a cost-effective launch vehicle capable of launching 4 tonne class of communication satellites in Geo-synchronous Transfer Orbit (GTO). The project envisages the development of a number of technologies which include, among others, 200 tonne solid stage booster (S-200), 25 tonne cryogenic engines (C-25), and L-110 tonne liquid stage engines as core boosters. The first developmental flight of GSLV MK III is expected by 2009-2010.

**4. Cryogenic Upper Stage (CUS) Project:** The objective of the Project is to develop and qualify an indigenous restartable cryogenic stage employing liquid oxygen as oxidizer and liquid hydrogen as fuel for the upper stage of GSLV. The first flight of the indigenous cryo stage is targeted for flight testing by GSLV during 2008-2009.

**5. Polar Satellite Launch Vehicle-Continuation (PSLV-C) Project:** The PSLV is capable of placing 1400-1600 kg class IRS satellites in Polar Sun- Synchronous Orbit, 1000 kg class satellites into Geo-synchronous Transfer Orbit and upto 2800 kg class satellites into Low Earth Orbit. The Chandrayaan-1 – Indian Lunar Mission is also planned for launch by PSLV.

**6. Vikram Sarabhai Space Centre (VSSC):** VSSC is the lead Centre for the development of satellite launch vehicles and sounding rockets and houses the major test and fabrication facilities for launch vehicles.

**7. ISRO Inertial Systems Unit (IISU):** IISU is responsible for research & development in the area of inertial sensors & systems for launch vehicles, satellites and allied satellite elements.

**8. Liquid Propulsion Systems Centre (LPSC):** LPSC is the lead Centre in the area of liquid and cryogenic rocket engines and stages for launch vehicle and small thrust engines for launch vehicles and spacecraft control.

**9. GSLV-Operational Project:** The GSLV-Operational Project has been conceived to meet the launch requirement of 2 tonne class of operational INSAT satellites. The first operational flight of GSLV-F01 was successfully launched on 20.09.2004 placing EDUSAT Satellite into orbit. The launch of GSLV-F02 on 10.07.2006 was unsuccessful due to malfunctioning of one of the strapon stages. A National level failure analysis committee has reviewed the flight data and recommended certain additional tests/improved inspection process, which were carried out and GSLV-F04 carrying INSAT-4CR was successfully launched on September 2, 2007.

**10. Space Capsule Recovery Experiment (SRE):** The main objective of the Space Capsule Recovery Experiment (SRE) is to develop and demonstrate capability to recover on orbiting capsule back on earth. SRE-I has successfully launched on-board PSLV on January 10, 2007 and was also successfully recovered from Bay of Bengal on January 22, 2007. The work on SRE-II is in progress.

**11. Manned Mission Initiatives/Human Space Flight Programme:** The main objective of Indian Manned Mission Initiatives/Human Space Flight programme is to develop a fully autonomous manned space vehicle to carry two crew to 400 km LEO and safe return to earth. Detailed studies have been initiated on the technologies required for realising the flight safety and reliability, propulsion systems, advanced materials etc. Formulation of the project proposal for approval of the Government is in progress.

**12. Indian Institute of Space Science & Technology:** Indian Institute of Space Science & Technology is an autonomous body under DOS with the objective of creating quality human resources tuned to suit the space programme. The institute offers graduate, post-graduate and research programme in the area of space science technology and applications. The Institute has started functioning from the academic year 2007-2008 around the existing infrastructure of ISRO Centres in Thiruvananthapuram.

**13. Semi Cryogenic Engine/Stage Development:** The objective of the project is to develop and qualify a high thrust Semi Cryogenic engine and stage (employing kerosene of required grade/spar as fuel and Liquid Oxygen as oxidizer) for the future advanced launch vehicle.

**14. Cartosat-2:** The Cartosat-2 Project is an advanced high resolution satellite to support large scale cartographic mapping and thematic applications. Cartosat-2 was successfully launched on board PSLV-C7 on January 10, 2007.

**15. Oceansat-2 & 3:** The main objective of Oceansat-2 is to provide continuity of data & services hitherto provided by Oceansat-1 on Oceanography and coastal studies. The launch of Oceansat-2 onboard PSLV is planned in 2008-2009. Oceansat-3, planned to be initiated towards end of 11<sup>th</sup> plan will be a follow-on satellite for Oceansat-2 to provide continuity of data on Ocean & Coastal resources.

**16. Resourcesat-2 & 3:** Taking into account the increased use of space imageries for different applications and continued Earth Observation services required from the IRS satellites, Resourcesat-2 has been conceived as a continuity mission with enhanced capabilities which will be mainly for crop applications, vegetation dynamics and natural resources census applications. The Payload realisation and sub-system fabrication are targeted for 2008-2009. Resourcesat-3 will provide continuity of data after Resourcesat-2.

**17. ISRO Satellite Centre (ISAC):** ISAC is the lead Center for the design, fabrication, testing and management of satellite systems for scientific, technological and application missions.

**18. Laboratory for Electro-Optics Systems (LEOS):** LEOS is responsible for research & development and production of electro-optics sensors for satellites.

**19. Radar Imaging Satellite-1 (RISAT-1):** Radar Imaging Satellite (RISAT) is intended to provide all-weather, day and night imaging capability providing vital inputs during Khariff season for various agricultural and disaster applications. The satellite is targeted for launch during 2009.

**20. GSAT-4:** The satellite will be utilized for conducting various experiments in the communications area and early introduction of geo-based navigation system. The satellite is targeted for launch on board GSLV during 2008-2009.

**21. Navigation Satellite System:** The Indian Regional Navigation Satellite System (IRNSS), is planned to be a constellation of 7 satellites – 3 in GEO and 4 in GSO orbit. This satellite is expected to provide position accuracies similar to GPS in a region centered around India with a coverage extending upto 1500 km from India.

**22. Semi-conductor Laboratory:** SCL is engaged in the Design, Development and Manufacture of Very Large Scale Integrated Circuits (VLSIs) and Board Level Products to meet the stringent quality requirement of strategic sectors. SCL is to undertake radiation hardened devices and about more than 60 types of ASICs have been identified for development by SCL for Space Programme.

**23. Advanced Communication Satellite:** The main objective is to develop a 4 tonne class communication satellite incorporating advanced technologies of relevance for future.

**24. Earth Observation – New Missions (Saral, Geo-HR Imager, TES-Hyp, DMSAR & Carto-3):** Indian Earth Observation program is directed towards providing continuity of EO data for resource management applications and enhancing the imaging capability. Towards this, it is planned to undertake development of small satellite with Argos & Altimeter (SARAL) for oceanography studies, Geostationary Imager (Geo-HR) for constant environment surveillance, Technology Experiment Satellite in Hyper Spectral Imaging (TES-HYP), Radar Imaging Satellite for Disaster Management (DMSAR) & advanced cartography satellite (Carto-3).

**25. Satish Dhawan Space Centre-SHAR (SDSC-SHAR):** SDSC-SHAR provides the launch infrastructure as well as solid propellant processing.

**26. ISRO Telemetry, Tracking and Command Network (ISTRAC):** ISTRAC provides spacecraft TTC and Mission Control services to major launch vehicle and spacecraft missions.

**27. ISRO Radar Development Unit (ISRAD):** ISRAD is responsible for research, development and productionalisation of radars systems required for tracking and weather forecasting.

**28. Space Applications Centre (SAC):** SAC is the lead Centre for the development of communication, meteorological and remote sensing payloads besides R&D in space applications.

**29. Development and Educational Communication Unit (DECU):** DECU is involved in the concept, definition, planning, implementation and socio-economic evaluation of developmental space applications.

**30. National Natural Resources Management System (NNRMS):** The National Natural Resources Management System (NNRMS) has the objective of ensuring optimal management/ utilization of natural resources by integrating information derived from remote sensing data with conventional techniques.

**31. Earth Observation Application Mission (EOAM):** The main goal of the Earth Observation Application Mission (EOAM) are to (i) evolve newer application/R&D programmes based on technology trends leading to operational applications programmes; (ii) guiding total remote sensing applications programmes towards implementation of remote-sensing based solutions, and (iii) steering commercial activities of remote sensing involving development of value-added services.

**32. Regional Remote Sensing Services Centres (RRSSCs):** The five Regional Remote Sensing Services Centres (RRSSCs) at Bangalore, Dehradun, Jodhpur, Kharagpur and Nagpur have been established under the aegis of NNRMS with the prime objective of providing remote sensing application services to the user in the respective regions for better planning and optimal utilization of natural resources and also bring about awareness amongst the users on the potential of remote sensing and associated technologies.

**33. National Remote Sensing Agency (NRSA):** NRSA is a registered society and is the nodal agency for operational remote sensing activities in the country. It is responsible for acquisition, processing, distribution and archiving of data from remote sensing satellites.

**34. Disaster Management System (DMS):** The main objective of Disaster Management Support Programme is to provide Space inputs & services on a timely & reliable basis, for the Disaster Management System in the country.

**35. North Eastern Space Applications Centres (NE-SAC):** NE-SAC set up as an autonomous society jointly with North Eastern Council, is supporting the North Eastern region by providing information on natural resources utilization and monitoring, developmental planning and interactive training using space technology inputs of remote sensing and satellite communication.

**36. Physical Research Laboratory (PRL):** PRL, an autonomous institution funded by the Department of Space through grant-in-aid, is one of the premier research institutions in the country carrying out basic research in several areas of experimental & theoretical physics, earth sciences, astronomy & aeronomy & planetary exploration.

**37. National Atmospheric Research Laboratory (NARL):** NARL, a registered Society, is responsible for carrying out advanced research in atmospheric and space sciences and related disciplines.

**38. RESPOND:** The RESPOND programme of ISRO supports sponsored research activity in Space Science, Space Applications and Space Technology in various national academic/ research institutions and Space Technology Cells in premier technological institutes of the country through grants-in-aid.

**39. Sensor Payload Development/Planetary Science Programme:** It includes funding requirement for advance action for activities related to scientific payload developments for space science and planetary exploration studies in different institutions and universities.

**40. Megha-Tropiques Project:** Megha-Tropiques is an ISRO-CNES of France joint mission and is intended for studying water cycle and energy exchanges in the tropics using a satellite platform.

**41. Astrosat 1 & 2 :** The objective of the Astrosat project is to build and launch an astronomical observatory satellite for expanding the scientific knowledge about the evolution of stellar objects and gather valuable scientific data on high energy Astronomy and Astrophysics research. The Astrosat-1 satellite is planned for launch in 2009 onboard PSLV.

**42. Indian Lunar Mission Chandrayaan-1 & 2 :** The main objective of Indian Lunar Mission - Chandrayaan-1 is high resolution remote sensing of the Moon in low energy and high

energy x-ray regions, etc., for preparing 3-dimensional atlas of regions of scientific interest of the Moon and chemical mapping of the entire lunar surface for various elements.. The Chandrayaan-1 is targeted for launch during 2008 on board the PSLV. Detailed studies on mission objectives & payload instruments for the follow-on satellite Chandrayaan-2 has been initiated.

**43. ISRO Geosphere Biosphere Programme (ISRO GBP):** ISRO GBP encompasses the study of land-air-ocean interaction, past climate, changes in atmospheric composition, aerosols, carbon cycle, bio-mass estimation, bio-diversity and other related areas of scientific investigation.

**44. Atmospheric Science Program:** Atmospheric Science Program is intended to develop advanced observation tools & techniques of atmospheric modeling, leading to operational end user products in different domains of atmospheric science.

**45. Small Satellite for Atmospheric Studies & Astronomy:** The project envisages development of small satellites for study of Earth's near-space environment, magnetometer studies, study of aerosol and gases, tropical weather and climate studies.

**46. Other Schemes:** These includes Microgravity Research, Space Science promotion, Multi-institutional research programs, setting up of Digital workflow systems, support for conferences, symposia, etc..

**47. Special Indigenisation/Advance Ordering:** Indigenisation envisages ISRO to have interface with the Indian

Industry to develop various electronic components, materials, chemicals, etc., for the space programme. The scope of the scheme also includes procurement of certain long lead and critical items for futuristic missions.

**48. Others:** Under this, provision has been included for ISRO Headquarters, International Co-operation and Civil Engineering Division.

**49. Master Control Facility:** MCF is responsible for initial orbit raising, payload testing and in-orbit operation of all geo-stationary satellites (INSAT/GSAT/Kalpana).

**50. INSAT-3 Satellites (including Launch Services):** The objective of INSAT-3 Spacecraft Project are to (i) build five INSAT-3 satellites, (INSAT-3A to INSAT-3E) keeping the flexibility for mid-course corrections to accommodate emerging requirements, carry out mission planning, launch campaign and initial phase operations, and (ii) establish required programme elements for carrying out the same. The INSAT-3A, 3B, 3C & 3E Satellites in the series have been launched and operationalised. INSAT-3D is targeted for launch during 2008-2009.

**51. INSAT-4 Satellites (including Launch Services):** The fourth generation INSAT-4 Satellite series has been planned to meet the capacity and service requirements projected by various users and development needs of the country. INSAT-4A, 4B & 4CR satellite in the INSAT-4 series have been launched & operationalised.