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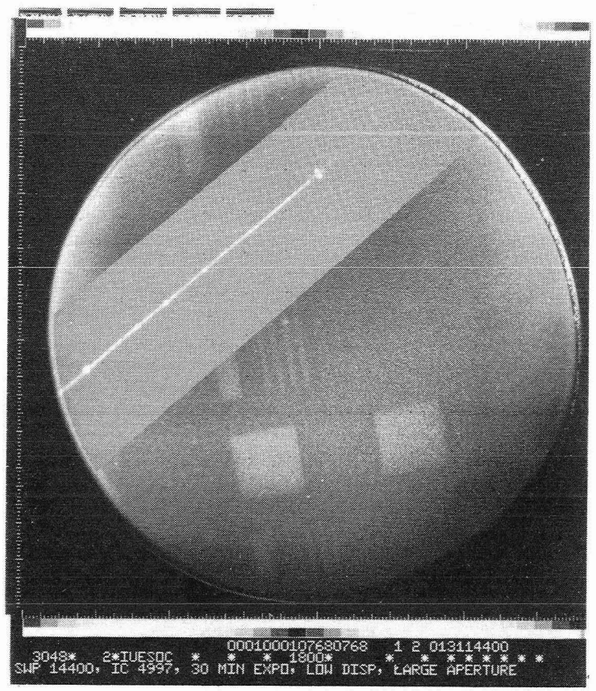

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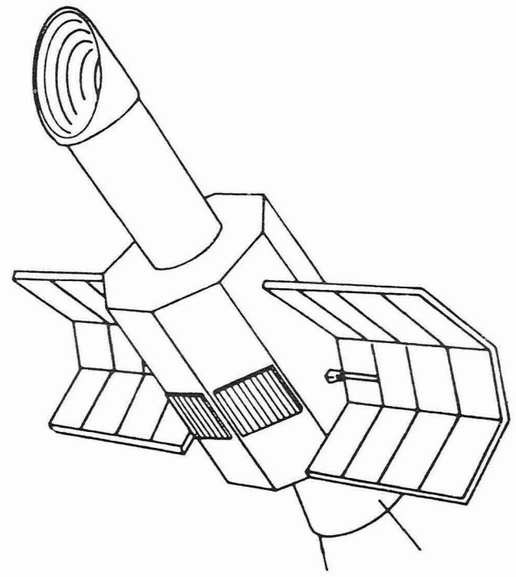

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IUE SPECTRAL ATLAS OF PLANETARY NEBULAE, CENTRAL STARS, AND RELATED OBJECTS

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INTRODUCTION

Nine years of observations with the International Ultraviolet Explorer (IUE) satellite have resulted in a data bank of approximately 180 objects in the category of planetary nebulae, their central stars, and related objects. Most of these objects have been observed in the low dispersion mode with both the short wavelength (SWP) and long wavelength (LWR or LWP) cameras. Although numerous papers have appeared in the recent literature based on these observations, the published data represent various aspects selected for specific purposes and are often processed by widely varying methods. Thus, until now, there has not been available a comprehensive atlas of ultraviolet spectrograms of these objects.

The overwhelming majority of the spectra in this reference atlas were taken through the large (10'' × 20'') entrance aperture, thus resulting in spectra that contain information on the nebular spectrum, as well as that of the central star. The low-dispersion IUE spectra also provide spatial information along the long axis of the large aperture, which is perpendicular to the direction of dispersion, and can therefore be used for a line-by-line analysis. Approximately 40 objects are of large angular diameter relative to the IUE entrance apertures and low nebular intensity so that the central stars were observed without nebular contamination. For about 15 nebulae of sufficient brightness and angular extent, the large or small aperture was purposely offset from the central star so as to obtain a nebular spectrum uncontaminated by the central star. One of the surprising results of these studies has been the realization that no two planetary nebulae have identical spectra in the ultraviolet region, even if their optical spectra are very similar.

THE ATLAS

The ultraviolet observations of planetary nebulae obtained with the IUE during the past 9 years represent an enormous investment in observing time and a most valuable repository of spectral information for these objects. To make this information generally available to the astronomical community, we have prepared this reference atlas, which contains the best representative samples of ultraviolet low-dispersion observations of planetary nebulae that are currently available. The reference atlas consists of 177 plots, which are shown in a standardized format and arranged by Right Ascension. Table 1 gives the following information:

Col.(1) The plot number.

Col.(2) The object name, usually by its NGC, IC, Abell, or other most common designation.

Col.(3) Right Ascension (RA) and Declination (DEC) (1950 epoch), taken from the IUE Merged Log of Observations for the illustrated spectra. The coordinates in the merged log are provided by the guest observer on the observing ''script.'' Slight variations for the coordinates may be found in the Merged Log of Observations of duplicate observations due to individual guest observers using coordinates from different sources, or purposely having chosen the ''center of light'' of the object in question. If the target is relatively bright (i.e., greater than about 10th magnitude) and is centrally condensed, then the IUE can center on the target even if the coordinates supplied by the guest observer are in error by an arcminute or two. Objects with differing coordinates for the LWR and SWP spectra are noted in Table 1 by an asterisk; at the end of the table, we give additional comments of our best estimates on how well the positions of the SWP and LWR spectra agree.

Col.(4) and (5) The SWP image sequence number and exposure time.

Col.(6) and (7) The LWR (or LWP) image sequence number and exposure time.

Col.(8) The wavelength point at which the SWP and LWR (LWP) spectra were spliced together.

Col.(9) Name of the Principal Investigator program for the respective spectra shown.

Col.(10) Additional comments concerning the quality of the spectra, such as saturation, offsets, or identification of objects that are not planetaries, i.e., symbiotics, HII regions, etc.

As much as possible we have tried to present flux calibrated spectra using, where necessary, various correction algorithms for known calibration errors. To begin with, the net flux (Flux Number, or FN) was obtained from the merged extracted low-dispersion file (MELO) supplied by the IUE Spectral Image Processing System (IUESIPS). The exposure time used was generally that supplied by the comments given in the science header. The absolute calibration of Bohlin and Holm (1980) was then applied to the SWP and LWR spectra, while the calibration of Cassatella and Harris (1982) was applied to the LWP spectra. The IUE image processing system has evolved during the past 9 years of IUE operation. The ''new'' low-dispersion processing system was implemented on November 4, 1980, at the Goddard Space Flight Center (GSFC) and on March 10, 1981, at the Villafranca del Castillo (VILSPA) observatory. The main improvement of the ''new'' calibration was to double the spectral extraction frequency and to increase the apparent resolution of the spectra. However, there is no significant flux calibration difference between the two processing methods in the low-dispersion mode. Thus, whenever possible, the most recent optimally exposed spectra were selected.

Table 1

Spectra of Planetary Nebulae, Central Stars and Related Objects Contained in the Atlas

Plot No.	Object	1950 Coordinates[a] RA H M S	DEC ° ′ ″	SWP Image No.	SWP Exposure min	LWR Image No.	LWR Exposure min	Merge Point A	PI[b] SWP/LWR(P)	Comments[c]
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	NGC 40	0 10 18.0	+72 14 00	3074	8	2656	8	1950	Perinotto	SWP reprocessed
2	Vy-1	0 16 01.0	+53 35 41	—	—	3090	90	1890	Johnson	
3	SMC N2	0 30 33.1	−71 58 32	20527	90	—	—	1950	Maran	
4	BB-1	0 34 44.9	−13 59 27	20591	120	16515	113	1950	Clegg/Barlow	CIV, CIII] sat
5	SMC N5	0 39 26.0	−73 01 43	20453	80	—	—	1950	Maran	
6	NGC 246	0 44 32.8	−12 08 43	18642	45s	14706	2	1950	Kaler	CS
7	SMC N43	0 49 24.5	−74 13 54	20455	33	—	—	1950	Maran	
8	SMC L302	0 54 35.0	−72 23 00	16210	180	15738	180	1950	Barlow/Willis	
9	SMC N87	1 19 57.0	−73 30 00	13387	180	10043	175	1920	Barlow	CIII] sat
10	M1-1	1 34 12.9	+50 12 57	17571	70	13850	80	1950	Aller	
11	NGC 650	1 39 11.0	+51 19 00	11239	60	9861	55	1950	Pottasch	
12	M1-2	1 55 32.9	+52 39 15	19289	120	15323	90	1950	Feibelman	CIV, CIII], and NIII? or noise spike at 2960 Å sat
13	K1-26	2 55 09.8	−44 22 20	21421	15	—	—	1950	Kaler	CS
14	P136+5.1	2 59 31.9	+64 42 57	21015	270	—	—	1950	Heckathorn	
15	CPD-26 389	3 31 03.2	+26 02 18	6618	37s	5680	2m 20s	1920	Sion	CPD-26 389 is CS of NGC 1360
16	IC 351	3 44 20.2	+34 53 35*	17574	28	8206	45	1950	Aller/Boggess	several ext pixels
16	IC 351	3 44 20.2	+34 53 35	21158	120	—	—	1950	Aller	HeII, CIV, CIII] sat
17	NGC 1514	4 06 08.0	+30 39 00	18042	40	14219	15	1950	Seaton	CS
18	NGC 1535	4 11 54.0	−12 52 00*	10737	3m 20s	2232	5	1950	Heap/Boggess	CS; many ext pixels
19	M4-18	4 21 17.9	+60 00 00	9659	180	8401	90	1950	Peimbert	
20	LMC P2	4 48 27.0	−72 33 27	20422	45	—	—	1950	Maran	
21	A-7	5 00 51.8	−15 40 33	10279	2×30	14212	65	1940	Green/Seaton	CS; SWP: 2 expo in LGAP
22	J-320	5 02 48.2	+10 38 25	7967	32	6939	35	1950	Boggess	
23	LMC N97	5 05 04.0	−68 43 00	14199	120	—	—	1950	Barlow	BSP? 1832 Å
24	LMC P9	5 08 17.3	−68 44 02*	20424	72	16472	120	1950	Maran	BSP? 1400 Å

Table 1 *continued*

Spectra of Planetary Nebulae, Central Stars and Related Objects Contained in the Atlas

Plot No.	Object	1950 Coordinates[a] RA H M S	DEC ° ′ ″	SWP Image No.	SWP Exposure min	LWR Image No.	LWR Exposure min	Merge Point A	PI[b] SWP/LWR(P)	Comments[c]
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
25	LMC N28	5 11 09.3	−67 51 32	13409	190	12474	80	1950	Barlow	BSP 1509 Å
26	LMC N110	5 11 49.8	−70 05 25	19486	160	—	—	1950	Barlow	
27	LMC N133	5 24 49.2	−70 07 37	19481	168	—	—	1950	Barlow	
28	IC 418	5 25 09.5	−12 44 15	6651	2	2257	1	1950	Lutz/Boggess	
29	LMC N201	5 25 39.0	−71 35 00	14216	150	—	—	1950	Barlow	
30	LMC N141	5 25 44.0	−68 58 00	13408	150	—	—	1950	Barlow	
31	LMC N203	5 25 48.0	−73 43 00	7605	122	10808	120	1950	Willis/Barlow	
32	LMC P33	5 34 30.4	−69 00 15	20528	70	—	—	1950	Maran	
33	LMC N66	5 36 26.2	−67 19 54	19905	183	—	—	1950	Barlow	
34	NGC 2022	5 39 23.9	+09 03 59	8676	45	7428	60	1950	Czyzak	
35	FD 73	5 39 52.0	−68 46 00	7581	60	10792	60	1950	Willis/Barlow	
36	IC 2149	5 52 35.9	+47 07 00	16745	7	13003	7	1890	Harrington	LGAP centered on CS; SWP: some ext data
37	IC 2149	5 52 36.0	+46 07 00	16743	45	13000	30	1940	Harrington	LGAP offset 5.4″E + 4.1″N of CS
38	K1-27	5 58 49.5	−75 40 30	21422	80	—	—	1950	Kaler	CS
39	LMC P40	6 10 36.5	−67 55 33	14032	320	10712	240	1890	Maran	CIV, CIII] sat
40	PW-1	6 15 23.1	+55 37 59	15103	56	12232	150	1950	Kaler/Weinberger	CS
41	IC 2165	6 19 23.9	−12 57 59	8678	20	7430	30	1890	Czyzak	
42	J-900	6 23 02.0	+17 49 15*	7965	20	7429	45	1950	Boggess/Czyzak	
43	A-15	6 24 59.9	−25 21 00	16925	80	—	—	1950	Perinotto	CS; ext data 1300 Å
44	NGC 2346	7 06 50.0	−00 43 00	11248	105	9869	90	1950	Pottasch	Variable
45	NGC 2346	7 06 49.6	−00 43 28	19967	180	15928	120	1950	Feibelman	Variable
46	A-20	7 20 22.1	+01 51 27	13525	130	—	—	1950	Kaler	CS
47	NGC 2371	7 22 25.0	+29 35 00	7039	32	5971	27	1950	Pottasch	
48	NGC 2392	7 26 13.2	+21 00 51	5231	25	4516	15	1940	Aller	Fix; LGAP offset 6.1″W + 2.1″S of CS
49	YM-29	7 26 14.4	+13 20 43	15102	65	15841	138	1950	Kaler	CS; LWR: few ext pixels

Table 1 *continued*

Spectra of Planetary Nebulae, Central Stars and Related Objects Contained in the Atlas

Plot No.	Object	1950 Coordinates[a] RA H M S	DEC ° ′ ″	SWP Image No.	SWP Exposure min	LWR Image No.	LWR Exposure min	Merge Point A	PI[b] SWP/LWR(P)	Comments[c]
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
50	VV 1-7	7 38 59.9	−18 51 59	8866	3×(3m 10s)	—	—	1950	Heap	SWP: 3 exposures in LGAP
51	NGC 2440	7 39 41.5	−18 05 26	17243	6	13507	12	1950	Ferland	Centered on CS
52	NGC 2440	7 39 41.5	−18 05 26	17246	20	13510	30	1950	Ferland	Centered on CS; CIV, HeII, CIII], NeIV sat
53	NGC 2440	7 39 41.5	−18 05 26	17244	20	13508	30	1950	Ferland	LGAP offset 9.0″W + 4.3″N from CS
54	NGC 2440	7 39 41.5	−18 05 26	17245	20	13509	30	1950	Ferland	LGAP offset 9.0″E + 4.3″S from CS
55	NGC 2452	7 45 24.7	−27 12 43	13946	180	12325	180	1950	Aller/Pottasch	SWP: 19.12m NB + 180m CS
56	NGC 2610	8 31 05.0	−15 58 36	15502	60	11978	85	1950	Kaler	Ping 2600 Å
57	A-28	8 37 37.8	+58 24 37	16965	100	—	—	1950	Kaler	
58	M3-6	8 38 39.0	−32 12 00	16346	45	12595	40	1950	Seaton	Ext data 2600-2870 Å
59	A-31	8 51 31.7	+09 05 25	16970	30	13237	30	1940	Kaler	CS
60	IC 2448	9 06 33.0	−69 44 00*	17474	10	8733	45	1950	Grewing/Seaton	Sat data 2800 Å
61	NGC 2792	9 10 34.0	−42 13 00	16032	167	12326	114	1950	Pottasch	BSP near CIV
62	NGC 2867	9 20 00.8	−58 05 57	5234	5	4518	30	1940	Aller	Fix
63	A-33	9 36 38.6	−02 35 05*	8870	40	13236	30	1950	Heap/Kaler	
64	IC 2501	9 37 21.0	−59 52 00	16320	15	12567	27	1940	Seaton	
65	A-34	9 43 10.0	−12 56 22	16951	100	—	—	1950	Kaler	CS; ext data 1200-1350 Å
66	NGC 3132	10 04 55.1	−40 11 29	22288	20	LWP 2796	13	1950	Prevot	LGAP centered on CS; ext data 2650-2900 Å
67	NGC 3132	10 04 53.0	−40 11 09	6160	120	5325	120	1950	Bohlin	LGAP offset 15″E from CS
68	IC 2553	10 07 47.2	−62 22 03	19897	55	15880	65	1890	Seaton/Barlow	CIV, HeII, CIII], [NeIV], OIII sat
69	NGC 3195	10 10 06.0	−80 37 00	17465	30	13754	33	1940	Grewing	
70	NGC 3211	10 16 12.4	−62 25 05	10996	40	9663	40	1950	Boggess	LGAP offset 6.6″W + 2.4″N of CS; CIII] sat
71	NGC 3242	10 22 22.0	−18 23 19	17247	3	13511	5	1950	Ferland	LGAP centered on CS
72	NGC 3242	10 22 21.3	−18 23 23	15496	5	11974	5	1960	Aller	LGAP offset 7.2″E + 2″N of CS; LWR ping 2890-3020 Å
73	NGC 3242	10 22 21.2	−18 23 22	16418	45	12678	45	1950	Aller	LGAP offset 3.3″W + 7.3″S of CS; several lines sat
74	NGC 3242	10 22 21.0	−18 23 07	17422	50	13679	70	1950	Barker	SMAP offset 9″W + 12″N of CS

Table 1 *continued*

Spectra of Planetary Nebulae, Central Stars and Related Objects Contained in the Atlas

Plot No. (1)	Object (2)	1950 Coordinates[a] RA H M S (3)	DEC ° ′ ″ (3)	SWP Image No. (4)	SWP Exposure min (5)	LWR Image No. (6)	LWR Exposure min (7)	Merge Point A (8)	PI[b] SWP/LWR(P) (9)	Comments[c] (10)
75	AG Car	10 54 10.0	−60 11 10	3542	80s	3115	40s	1950	Johnson	SWP reprocessed; Nebulae around WN9 star
76	NGC 3587	11 11 55.0	+55 17 00	16327	60	12579	60	1950	Seaton	Mainly CS; ext data 1200-1350 Å
77	K1-22	11 24 17.5	−34 05 44	16969	70	—	—	1950	Kaler	CS
78	NGC 4361	12 21 54.8	−18 30 28	19903	4	15879	9	1940	Barlow	
79	IC 3568	12 31 46.6	+82 50 22	13875	15	10509	20	1950	Harrington	NV ext, ext data 2800 Å
80	LT-5	12 53 07.8	+26 09 44	17236	10	13502	10	1950	Kaler	MgII sat
81	H4-1	12 57 02.8	+27 54 20	20599	60	16513	60	1890	Barlow	CIII] sat
82	LO-8	13 22 45.0	−37 21 00	8237	4	7186	6	1940	Barlow	CS
83	A-36	13 37 57.4	−19 37 47*	14215	1m 20s	6781	2m 30s	1950	Kaler/Seaton	CS
84	VV-68	13 50 10.0	−66 16 00	8000	30	6963	30	1940	Grewing	also NGC 5135
85	He2-108	14 14 48.0	−51 57 00	17067	45	10776	27	1940	Seaton/Barlow	
86	IC 4406	14 19 15.5	−43 55 27	23420	60	LWP 3725	60	1950	Grewing	
87	Hen 1044	14 56 14.7	−54 06 09	5567	60	4805	40+10	1940	Purton	Probably not a PN; Fix; LWR: 2 exposures in LGAP;
88	NGC 5882	15 13 25.0	−45 28 00	16349	30	12599	31	1940	Seaton	
89	Me2-1	15 19 23.0	−23 27 05	5233	9	4517	30	1940	Aller	Fix; CD-22 12238 is the CS of Me2-1
90	He2-131	15 31 54.0	−71 45 00	6772	6	9547	4	1940	Seaton/Heck	CS
91	CN 1-1	15 47 38.5	−48 36 00	13665	30	10293	75	1940	Lutz	
92	SP-1	15 47 56.7	−51 22 23	17732	60	—	—	1950	Kaler	CS; high extinction
93	He2-138	15 51 19.0	−66 00 00	6720	4	5735	3	1940	Seaton	CS
94	NGC 6026	15 58 07.0	−34 24 00	16348	35	12597	30	1950	Seaton	SWP: Image header lists incorrect expo. time
95	NGC 6058	16 02 43.4	+40 49 04	14293	10	10913	20	1950	Kaler	CS
96	Sand 3	16 03 12.0	−35 37 00	6721	27	5765	20	1950	Seaton	
97	IC 4593	16 09 23.3	+12 12 08	6646	2m 30s	5705	4	1950	Lutz	CS
98	A-39	16 25 32.2	+28 01 12	17237	40	15846	82	1950	Kaler	CS
99	NGC 6210	16 42 24.0	+23 54 00	10733	3x (5m 20s)	9422	3x 6m	1940	Heap	3 exposures in LGAP; NV ext

Table 1 *continued*

Spectra of Planetary Nebulae, Central Stars and Related Objects Contained in the Atlas

Plot No.	Object	1950 Coordinates[a] RA H M S	DEC ° ′ ″	SWP Image No.	SWP Exposure min	LWR Image No.	LWR Exposure min	Merge Point A	PI[b] SWP/LWR(P)	Comments[c]
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
100	IC 4634	16 58 34.0	−21 45 12	20578	35	16497	15	1950	Clegg	
101	M2-9	17 02 52.5	−10 04 31	20662	150	16571	25	1950	Feibelman	
102	CPD-56 8032	17 04 48.0	−56 51 00	8947	55	7700	25	1950	Heck	HeII?, CII/OIII/MgI? sat
103	IC 4642	17 07 36.0	−55 20 00*	10507	80	5734	40	1950	Perinotto/Seaton	
104	A-41	17 26 10.3	−15 10 45	22456	300	16938	200	1950	Bond	CS
105	K1-14	17 40 29.3	+21 28 17	27899	70	—	—	1950	Kaler	CS
106	He2-274	17 41 53.0	−46 04 00	13413	4	10078	7m 30s	1950	Barlow	Also TC-1; ext data 2600-2900 Å
107	M1-26	17 42 45.1	−30 10 53	20579	157	16498	200	1950	Clegg	Also HD 316248
108	NGC 6445	17 46 17.0	−19 59 41*	17030	180	4507	90	1940	Pottasch/Aller	
109	H1-36	17 46 24.1	−37 00 34*	5566	60	5802	30	1940	Purton/Allen	SS; Fix
110	A-43	17 51 11.0	+10 38 00	10245	85	8735	60	1950	Clavel/Seaton	CS
111	NGC 6543	17 58 34.0	+66 38 05	1897	4	1761	4	1950	Daltabuit	SWP reprocessed; 1250-1450 Å, CIV sat
112	NGC 6565	18 08 42.2	−28 11 22	24266	60	LWP 4611	60	1950	Aller	
113	NGC 6563	18 08 45.0	−33 53 00	17029	120	—	—	1950	Pottasch	
114	NGC 6572	18 09 41.9	+06 49 59	8669	15	7421	12	1940	Czyzak	CIII] sat
115	NGC 6567	18 10 48.0	−19 05 00	17019	186	13307	60	1950	Pottasch	CIV CIII] sat; ext/sat 1200-1350 Å
116	SWST 1	18 12 58.0	−30 53 00	10035	20	10077	7	1940	Seaton/Barlow	
117	K1-16	18 21 35.3	+64 20 30	17235	20	13501	35	1950	Kaler	CS: much of LWR sat
118	A-46	18 29 18.0	+26 54 05	9473	45	8203	40	1940	Boggess	
119	NGC 6644	18 29 30.0	−25 10 00	1734	30	1630	40	1940	Boggess	Fix; CIII] sat
120	IC 4776	18 42 34.0	−33 24 00	16504	30	12764	30	1950	Pottasch	[OII] ext
121	Hu 2-1	18 47 39.1	+20 47 11	8589	40	5703	40	1940	Boggess/Lutz	
122	NGC 6720	18 51 43.4	+32 57 49	7230	60	6238	90	1950	Barker	CS in LGAP but offset 7.4″E + 2.1″S from CS;
123	NGC 6720	18 51 46.0	+32 58 07	7231	90	6239	90	1950	Barker	LGAP offset 16″N + 42.8″E of CS
124	NGC 6720	18 51 43.4	+32 58 08	7219	60	6222	30	1940	Barker	LGAP offset 7.8″E + 16″N of CS

Table 1 *continued*

Spectra of Planetary Nebulae, Central Stars and Related Objects Contained in the Atlas

Plot No.	Object	1950 Coordinates[a] RA H M S	DEC ° ′ ″	SWP Image No.	SWP Exposure min	LWR Image No.	LWR Exposure min	Merge Point A	PI[b] SWP/LWR(P)	Comments[c]
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
125	A-51	18 58 06.0	−18 17 00	16935	120	—	—	1950	Perinotto	CS
126	NGC 6741	19 00 02.0	−00 31 12	5213	70	4508	60	1940	Aller	Fix
127	K3-27	19 12 30.8	+28 35 26	17729	80	—	—	1950	Kaler	
128	IC 1297	19 13 54.0	−39 41 00	13920	58	1635	50	1940	Aller/Boggess	CIV, HeII, CIII] sat; LWR image no. wrong in label
129	NGC 6778	19 15 49.3	−01 41 24	6643	80	5704	27	1940	Lutz	
130	NGC 6790	19 20 25.0	+01 25 00	15411	90	11922	60	1890	Seaton	CIII] sat
131	NGC 6803	19 28 53.5	+09 57 00	6256	60	5428	60	1940	Harrington	
132	BD +30°3639	19 32 47.9	+30 23 59	8590	5	7333	5	1890	Boggess	
133	HM Sge	19 39 41.1	+16 37 33	13548	10	10186	30	1950	Boggess	SS; MgII, OIII, [ArIV], OIII sat
134	NGC 6818	19 41 09.4	−14 16 21	13944	15	10557	60	1950	Aller	LGAP offset 4.9″E + 4.3″N of CS; [NeIV] sat
135	NGC 6826	19 43 27.0	+50 24 00	16328	1m 30s	12580	1m 30s	1950	Seaton	LGAP centered on CS
136	NGC 6826	19 43 27.0	+50 24 00	14626	60	11215	60	1890	Helfer	LGAP offset 8.6″W + 4.8″S of CS; CIII] sat
137	NGC 6826	19 43 27.0	+50 24 00	14616	20	11207	60	1950	Helfer	LGAP offset 4.8″E + 8.6″S of CS
138	A-65	19 43 34.3	−23 15 36	18641	165	—	—	1950	Kaler	CS
139	V1016 Cyg	19 55 20.0	+39 41 24	22891	2	LWP 3261	2	1950	Feibelman	SS
140	V1016 Cyg	19 55 19.9	+39 41 39	24656	25	LWP 4959	25	1950	Nussbaumer	SS; many lines sat
141	NGC 6853	19 57 30.0	+22 35 00	6406	17	5515	30	1940	Bohlin	LGAP centered on CS
142	NGC 6853	19 57 26.4	+22 34 32	17420	100	13676	120	1950	Barker	LGAP offset 48″W + 27″S of CS
143	NGC 6853	19 57 20.7	+22 33 49	18737	240	14790	180	1950	Barker	LGAP offset 127″W + 70″S of CS
144	NGC 6884	20 08 49.1	+46 18 44*	17018	180	1784	40	1950	Pottasch/Daltabuit	
145	FG Sge	20 09 43.0	+20 11 00	—	—	13391	160	1890	Cassatella	
146	NGC 6886	20 10 29.6	+19 50 16	8983	240	7735	240	1940	Aller	CIII], OIII sat
147	NGC 6891	20 12 48.0	+12 33 00	8864	3×8	8708	9	1940	Heap/Seaton	SWP: 3 exposures in LGAP
148	IC 4997	20 17 51.0	+16 34 27	14400	30	11011	30	1890	Feibelman	CIII], [OII], MgII sat
149	NGC 6905	20 20 9.0	+19 56 00	13405	20	10068	20	1950	Barlow	

Table 1 *continued*

Spectra of Planetary Nebulae, Central Stars and Related Objects Contained in the Atlas

Plot No. (1)	Object (2)	1950 Coordinates[a] RA H M S (3)	DEC ° ′ ″ (3)	SWP Image No. (4)	SWP Exposure min (5)	LWR Image No. (6)	LWR Exposure min (7)	Merge Point A (8)	PI[b] SWP/LWR(P) (9)	Comments[c] (10)
150	A-70	20 28 54.0	−07 16 00	13765	150	—	—	1950	Perinotto	CS; Bsp 1340 Å
151	A-72	20 47 40.0	+13 22 00	16936	100	—	—	1950	Perinotto	CS
152	HBV 475	20 49 02.6	+35 23 37	13434	40	10097	40	1940	Feibelman	Variable SS
153	HBV 475	20 49 02.6	+35 23 37	26943	35	LWP 6919	30	1950	Nussbaumer	Variable SS; MgII ext
154	NGC 7008	20 59 05.0	+54 21 00	11237	135	11934	90	1950	Pottasch/Seaton	CS; LWR: 20h 59m 6.8s
155	NGC 7009	21 01 29.9	−11 33 59	9387	7	7431	8	1940	Lutz/Czyzak	LGAP centered on CS
156	NGC 7009	21 01 27.6	−11 33 54	9053	10	7804	25	1940	Boggess	LGAP offset 8″W of CS
157	NGC 7026	21 04 35.0	+47 39 03	1739	40	1633	20	1950	Boggess	Fix
158	NGC 7027	21 05 09.4	+42 02 01	19877	12	15862	27	1950	Barlow	
159	NGC 7027	21 05 09.4	+42 02 03	17242	180	15861	180	1950	Ferland/Barlow	Many lines sat
160	K648	21 27 34.0	+11 57 00	17069	60	13360	60	1890	Seaton	in M15; CIII] sat
161	HU 1-2	21 31 6.9	+39 24 40	13339	47	8851	80	1950	Matson/Aller	
162	A-78	21 33 20.1	+31 28 18	19907	4	15881	6	1940	Kaler	CS
163	NGC 7094	21 34 27.9	+12 33 49	14289	12	10774	18	1950	Kaler/Barlow	
164	IC 5148	21 56 33.0	−39 37 28	16968	60	—	—	1950	Kaler	CS
165	IC 5217	22 21 56.0	+50 42 45	7257	72	5429	36	1940	Harrington	
166	NGC 7293	22 26 55.0	+21 05 32	19832	5	15828	14	1950	Drilling	CS
167	Wein-12	23 10 02.7	+59 19 45	19770	35	15782	25	1950	Kaler	Small HII region; ext/sat data 2640-2970 Å
168	NGC 7662	23 23 28.7	+42 15 34	6467	6	5548	12	1950	Bohlin	LGAP offset 6.8″W + 1.5″S of CS
169	NGC 7662	23 23 30.0	+42 15 37	6466	12	5547	9	1950	Bohlin	LGAP offset 6.9″E + 1″N of CS; CIV, HeII, CIII] sat
170	NGC 7662	23 23 29.4	+42 15 41	20095	30	16036	60	1950	Barker	SMAP offset 4″N of CS
171	HB-12	23 23 57.0	+57 54 00	17075	150	13359	120	1940	Seaton	
172	Z And	23 31 15.3	+48 32 32	9080	20	7827	21	1950	Plavec	SS, quiescent state; several lines sat
173	Z And	23 31 15.0	+48 32 32	27202	15	LWP 7217	15	1950	Oliversen	SS, in outburst; LGAP; several lines sat
174	Z And	23 31 15.0	+48 32 32	27202	15	LWP 7217	15	1950	Oliversen	SS, in outburst; SMAP

Table 1 *continued*

Spectra of Planetary Nebulae, Central Stars and Related Objects Contained in the Atlas

Plot No.	Object	1950 Coordinates[a] RA H M S	DEC ° ′ ″	SWP Image No.	SWP Exposure min	LWR Image No.	LWR Exposure min	Merge Point A	PI[b] SWP/LWR(P)	Comments[c]
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
175	Jn-1	23 33 24.1	+30 11 26	15104	85	—	—	1950	Kaler	CS
176	A-82	23 43 20.6	+56 47 21	19908	120	—	—	1950	Kaler	CS

Comments:

[a] RA and DEC were obtained from the IUE merged log. An asterisk in the DEC column indicates that the coordinates listed in the IUE merged log were different for the SWP and LWR spectra. For these cases the SWP coordinates are given in the RA and DEC columns above while the LWR coordinates are given in the comments below. Please refer to the additional comments given below about the centering of the individual spectra. Note that the coordinates listed in the IUE merged log are supplied by the guest observer and may be subject to small errors (see discussion in text).

[b] If the Principal Investigator for the SWP and LWR(P) spectra were the same only one PI was listed.

[c] sat = saturated data, ext = extrapolated data, Bsp = bright spot, Fix = SWP spectrum corrected for SWP ITF error
CS = central star, SS = symbiotic star, NB = nebulae
LGAP = large aperture (10″×20″), SMAP = small aperture (3″ diameter circle)— The LGAP was used unless otherwise specified.

Additional notes concerning the positioning of the SWP and LWR spectral pairs:

		LWR 1950 coordinates: RA	DEC	
16	IC 351	3h 44m 18s	+34° 54′ 00″	Probably same position. FES centering was used.
18	NGC 1535	4h 11m 57s	−12° 51′ 42″	Position uncertain. The quality of the SWP and LWR merge is only "fair." FES centering was used.
24	LMC P9	5h 8m 16.7s	−68° 43′ 59″	Position uncertain. The SWP coordinates may not be correct because the spacecraft was moved prior to the start of the SWP exposure.
42	J-900	6h 23m 00s	+17° 49′ 00″	Probably same position. FES centering was used.
60	IC 2448	9h 06m 37s	−69° 44′ 07″	Probably same position. The SWP and LWR merge together well and FES centering was used.
63	A-33	9h 36m 37.1s	− 2° 34′ 57″	Position uncertain. Blind offsetting techniques were used. The quality of the merge of the SWP and LWR spectra appear to be ok.
83	A-36	13h 37m 58s	−19° 37′ 33″	Probably same position. The SWP and LWR merge together well.
103	IC 4642	17h 07m 37s	−55° 20′ 00″	Probably same position. The SWP and LWR merge together well.
108	NGC 6445	17h 46m 17.0s	−19° 59′ 41″	Position uncertain. The coordinates for the SWP and LWR are the same however some drift may have occurred during the LWR exposure.
109	H1-36	17h 46m 24.6s	−37° 00′ 36″	Position uncertain. FES centering was used, however FES counts for the target are not consistent between the SWP and LWR observations.
128	IC 1297	19h 14m 00s	−39° 42′ 00″	Position uncertain. The SWP and LWR merge together well. FES centering was used, however the FES counts for the target are not consistent between the SWP and LWR observations.
144	NGC 6884	20h 8m 50s	+46° 18′ 44″	Probably same position. FES centering was used.

For a small number of objects, where only a single, early observation was available, reprocessing to avoid calibration errors has been necessary. Early SWP images suffer from an error in the 20 percent intensity transfer function (ITF) level (Holm, et. al., 1982). Approximately 6 percent of the atlas objects were affected by the ITF error. This ITF error was corrected by the use of a procedure (SWPFIX), which is available at the Goddard Regional Data Analysis Facility (RDAF). Each LWR spectrum has also been corrected for the sensitivity degradation of the LWR camera using the wavelength dependent correction algorithm of Clavel, Gilmozzi and Prieto (1986). Comparable wavelength dependent correction algorithms for the SWP and LWP cameras do not yet exist. The resolution of the IUE Project's routine sensitivity monitoring analysis is too coarse for use for this atlas. Consequently, no sensitivity degradation correction has been applied to either the SWP or LWP spectra. The degradation in the SWP and LWP cameras is 2-4 times less than for the LWR camera (Sonneborn and Garhart 1986).

Other than the corrections mentioned above, we present the data "as taken," i.e., without smoothing or filtering out noise spikes (like the one at 2200 Å), since such procedures may also lose information. Some of the plots contain regions with low signal-to-noise levels that can drop below the zero flux level. Such low signal-to-noise levels are typically due to regions on the IUE cameras with lower sensitivity (e.g., near 2200 Å for the LWR), or just plain underexposure. Such objects may be candidates for reobservation if of sufficient importance. Furthermore, due to the uncertainty of extinction values we decided to present the observed data without corrections for interstellar absorptions. For large values of the logarithmic extinction at Hβ, C, the slope of the continuum at the short-wavelength end is greatly steepened when corrected for the appropriate extinction, and the corresponding absolute flux values may change by a large amount. A good example of this is the central star spectrum of Sp-1 (see Kaler and Feibelman 1985).

Each calibrated spectrum is shown in its entirety, if available, from 1200 Å to 3200 Å on a 30-cm by 10-cm Calcomp plot, with tic marks every 100 Å. A second plot shows the same object on an expanded vertical scale to bring out the weaker features but truncates the stronger emission lines. For each plot, an SWP and an LWR (or LWP) spectrum were spliced together at a position where the two plots appeared to blend relatively smoothly together. In most cases, the splice point was chosen to be at 1950 Å in order to avoid splitting the C III] 1909 Å emission line. For a few objects the splice point was chosen to be at 1890 Å when the C III] line was saturated in the SWP spectra but not in the LWR spectra. Occasionally it was unavoidable to include spectra which contained saturated data and/or data extrapolated above the highest level of the ITF. The reseau marks have been indicated on the spectra by crosses along the lower wavelength axis, while the saturated and/or extrapolated data have been indicated by crosses along the upper wavelength axis.

In Table 2, adapted from Köppen and Aller (1987), we show a list of the most common emission lines found in planetary nebulae in the IUE spectral range. The last plot in the atlas locates the more prominent of these wavelength identifications from which the user may want to make a transparent overlay.

SUPPLEMENTAL INFORMATION

For a complete listing of all objects in category 70 (planetary nebulae plus central stars) and 71 (planetary nebulae minus central star), as well as the symbiotics, HII regions and related objects, the reader is referred to the IUE Merged Log of Observations which is updated periodically. A browse file of the photowrite images obtained with IUE from Goddard is available for

Table 2
Lines Observed in Planetary Nebulae
(Adapted from Köppen and Aller 1987)

Wavel.	Identification		Lo	Hi	Excitation
1175/76	CIII	$2p\ ^3P^0—2p^2\ ^3P$	6	17	coll?
1239/43	NV	$2s\ ^2S—2p\ ^2P^0$	0	10	coll, wind
1309	SiII	$3p\ ^2P^0—3p^2\ ^2S$	0	9	coll
1335/36	CII	$2p\ ^2P^0—2p\ ^2D$	0	9	coll, diel. rec.
1371	OV	$2p\ ^1P^0—2p^2\ ^1D$	20	29	wind, rad.
1394/1403	SiIV	$3s\ ^2S—3p\ ^2P^0$	0	9	coll
1397—1407	OIV]	$2p\ ^2P^0—2p^2\ ^4P$	0	9	coll
1483/87	NIV]	$2s^2\ ^1S—2p\ ^3P^0$	0	9	coll
1548/50	CIV	$2s\ ^2S—2p\ ^2P^0$	0	8	coll
1575	[NeV]	$2p^2\ ^3P—2p^2\ ^1S$	0	8	coll
1602	[NeIV]	$2p^3\ ^4S^0—2p^3\ ^2P^0$	0	8	coll
1640	HeII	Balmer alpha	41	49	rec
1658—66	OIII]	$2p^2\ ^3P—2p^3\ ^5P^0$	0	8	coll
1718	NIV	$2p\ ^1P^0—2p^2\ ^1D$	16	23	wind, diel. rec.
1711	SiII	$3p^2\ ^2D—5f\ ^2F^0$	7	14	coll?
1747—54	NIII]	$2p\ ^2P^0—2p^2\ ^4P$	0	7	coll
1760	CII	$2p^2\ ^2D—3p\ ^2P^0$	9	16	rec
1815	[NeIII]	$2p^4\ ^3P—2p^4\ ^1S$	0	7	coll
1808/17	SiII	$3p\ ^2P^0—3p^2\ ^2D$	0	7	coll
1882/92	SiIII]	$3s^2\ ^1S—3p\ ^3P^0$	0	7	coll
1907/09	CIII]	$2s^2\ ^1S—2p\ ^3P^0$	0	7	coll
2253	HeII	Paschen 6	48	54	rec
2297	CIII	$2p\ ^1P^0—2p^2\ ^1D$	13	18	diel. rec.
2306	HeII	Paschen epsilon	48	54	rec
2321/31	[OIII]	$2p^2\ ^3P—2p^2\ ^1S$	0	6	coll
2325—29	CII]	$2p\ ^2P^0—2p^2\ ^4P$	0	6	coll
2334—50	[SiII]	$3p\ ^2P^0—3p^2\ ^4P$	0	6	coll
2385	HeII	Paschen delta	48	54	rec

Table 2 *continued*

Lines Observed in Planetary Nebulae
(Adapted from Köppen and Aller 1987)

Wavel.	Identification		Lo	Hi	Excitation
2423/25	[NeIV]	$2p^3\ ^4S—2p^3\ ^2D$	0	6	coll
2470	[OII]	$2p^3\ ^4S—2p^3\ ^2P$	0	6	coll
2511	HeII	Paschen gamma	48	54	rec
2663	HeI	$2s\ ^3S—11p\ ^3P^0$	20	24	rec
2696	HeI	$2s\ ^3S—9p\ ^3P^0$	20	24	rec
2723	HeI	$2s\ ^S—8p\ ^3P^0$	20	24	rec
2733	HeII	Paschen beta	48	54	rec
2763	HeI	$2s\ ^3S—7p\ ^3P^0$	20	24	rec
2784/2929	[MgV]	$2p^4\ ^3P—2p^4\ ^1D$	0	4	coll
2786	[ArV]	$3p^2\ ^3P—3p^2\ ^1S$	0	4	coll
2796/2803	MgII	$3s\ ^2S—3p\ ^2P^0$	0	4	coll
2791/2797	MgII	$3p\ ^2P^0—3d\ ^2D$	4	9	coll?
2829	HeI	$2s\ ^3S—6p\ ^3P^0$	20	24	rec
2837/38	CII	$2p^2\ ^2S—3p\ ^2P^0$	12	16	rec
2837	OIII	$3p\ ^3D—3d\ ^3P^0$	36	41	Bowen fluo.
2852	MgI	$3s^2\ ^1S—3p\ ^1P^0$	0	4	coll
2854/68	[ArIV]	$3p^2\ ^4S—3p^2\ ^2P$	0	4	coll
2929/37	MgII	$3p\ ^2P^0—4s\ ^2S$	4	9	coll?
2929	[MgV]	$2p^4\ ^3P—2p^4\ ^1D$	0	4	coll
2945	HeI	$2s\ ^3S—5p\ ^3P^0$	20	24	rec
2973/79	NIII	$3p\ ^2P—3d\ ^2P^0$	38	43	???
3023	OIII	$3s\ ^3P^0—3p\ ^3P$	33	37	Bowen fluo.
3043/47	OIII	$3s\ ^3P^0—3p\ ^3P$	33	37	Bowen fluo.
3063/71	[NII]	$2p^2\ ^3P—2p^2\ ^1S$	0	4	coll
3109/3005	[ArIII]	$3p^4\ ^3P—3p^4\ ^1S$	0	4	coll
3133	OIII	$3p\ ^3S—3d\ ^3P^0$	37	41	Bowen fluo.
3188	HeI	$2s\ ^3S—4p\ ^3P^0$	20	24	rec
3203	HeII	Paschen alpha	48	54	rec

inspection at GSFC and a file of images obtained from VILSPA is currently being processed at GSFC.

A master tape of spectra in this atlas has been generated and is available at the Regional Data Analysis Facilities to guest observers and other interested colleagues. A bibliographical index of all published data on planetary nebulae based on IUE data up to the end of 1985 is contained in IUE NEWSLETTER No. 30. This compendium by Mead, Brotzman, and Kondo (1986) lists the names of almost 9600 objects observed by IUE and identifies 1133 refereed papers, arranged alphabetically by names of first authors, that have appeared in main journals. Copies of the Newsletters are available from the IUE project. We plan to update the atlas after the IUE satellite's termination. In the meantime, the semiannual editions of *Astronomy and Astrophysics Abstracts* serve as a useful list of updated references.

We thank Keith Feggans for retrieving much of the original data from the National Space Science Data Center files for us. Support for this atlas provided by NASA IUE contract NAS5-28749 with CSC for the Archival Program NAGWF is gratefully acknowledged.

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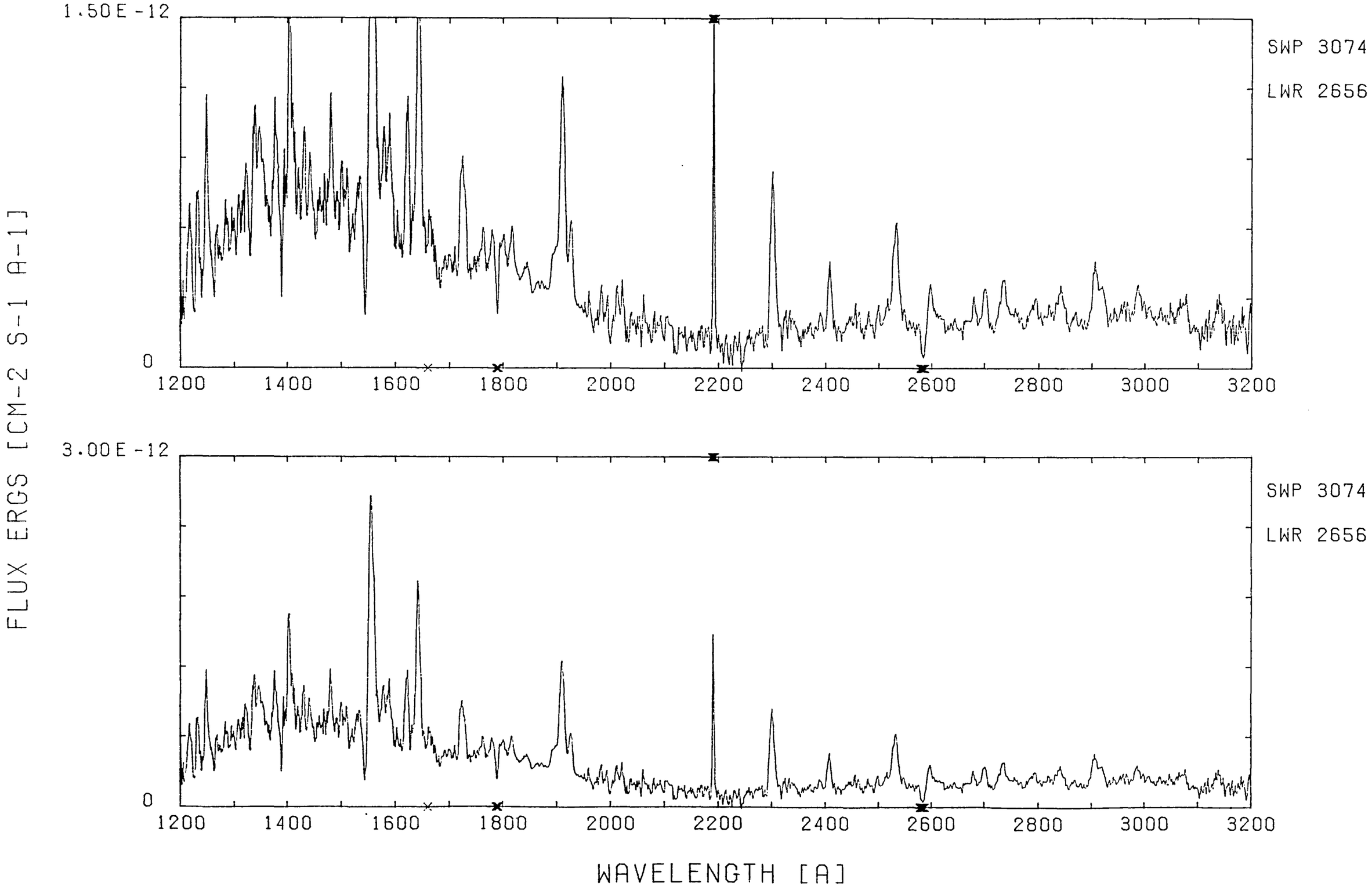
NGC 40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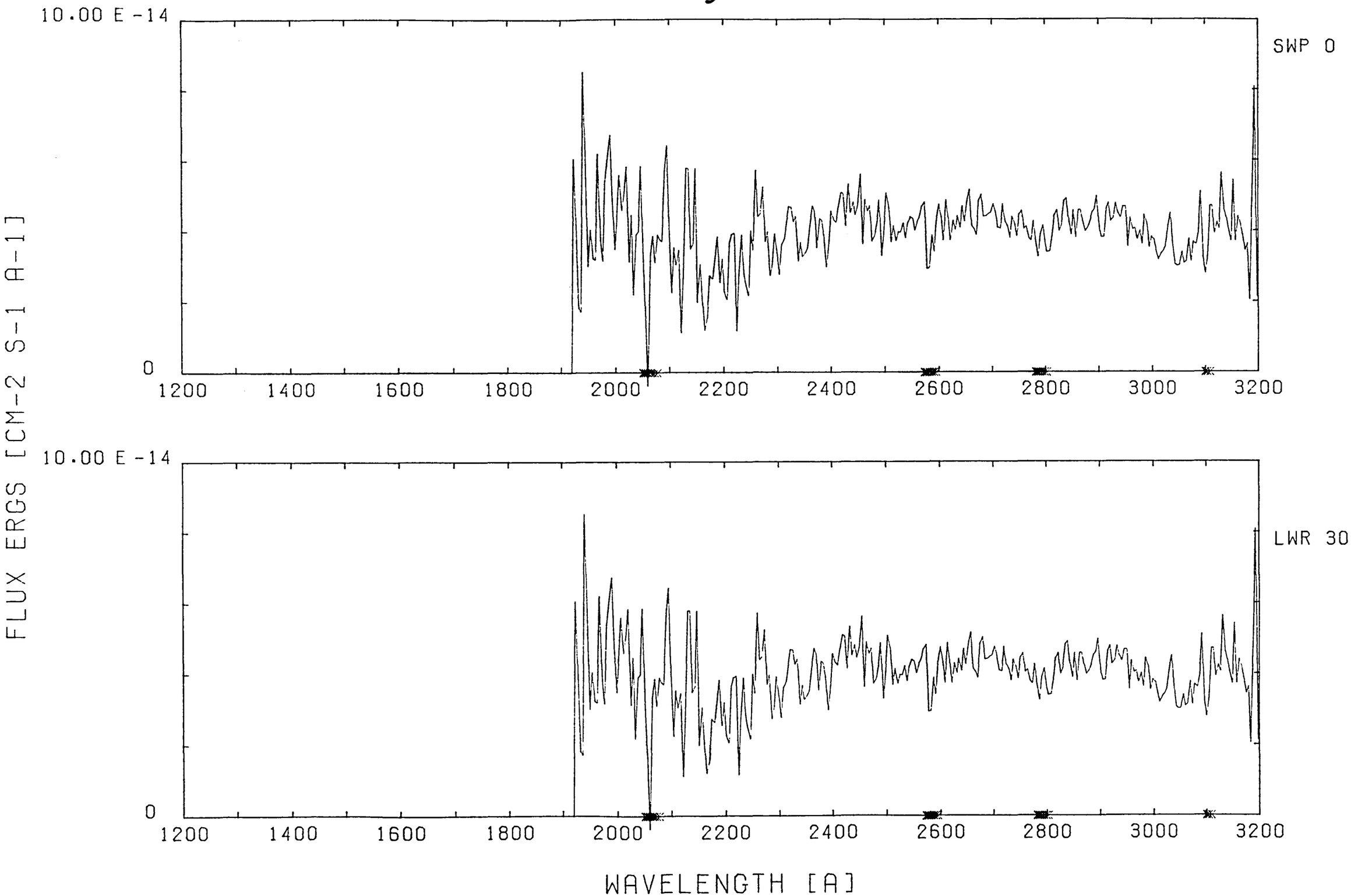
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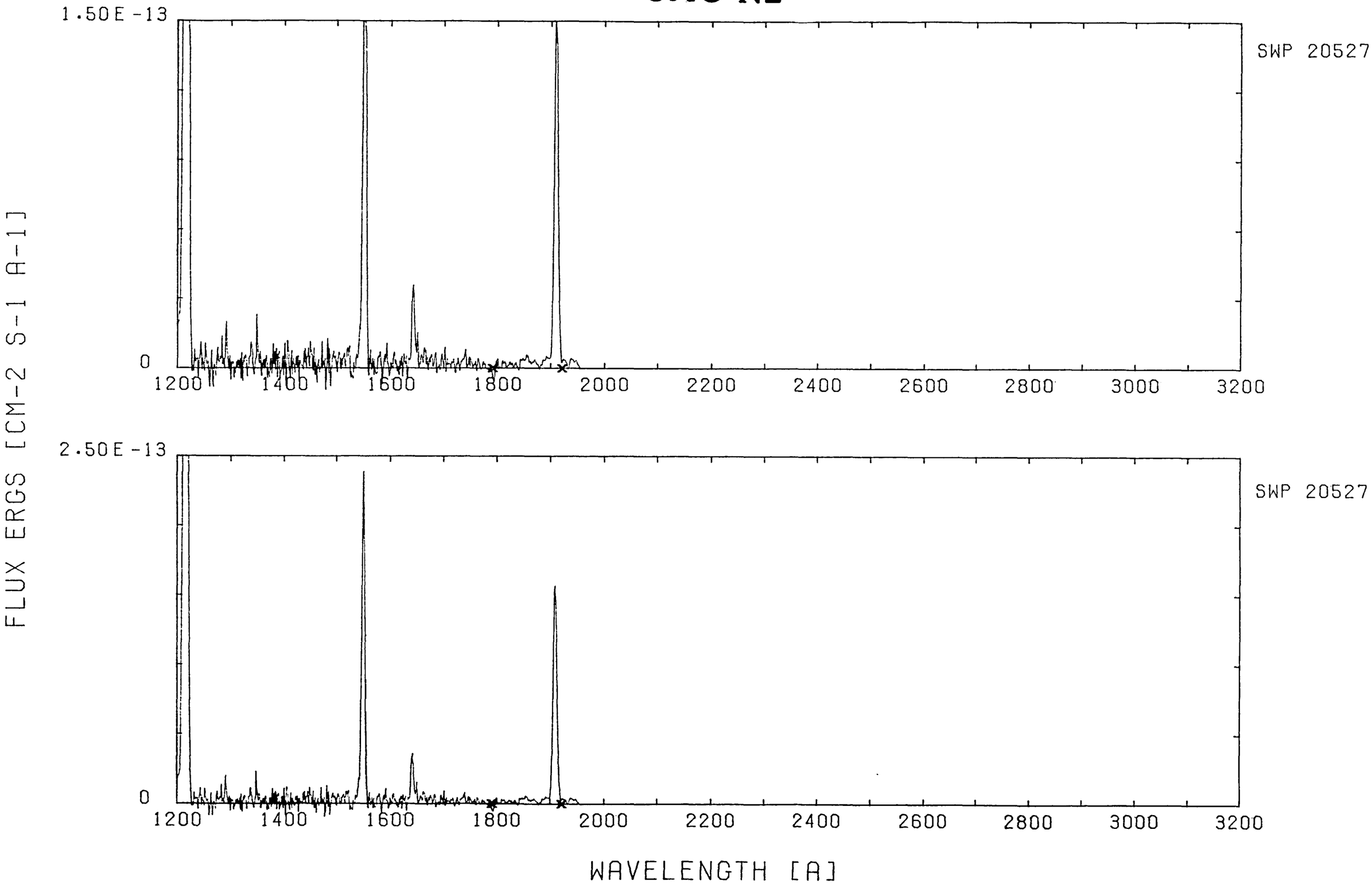
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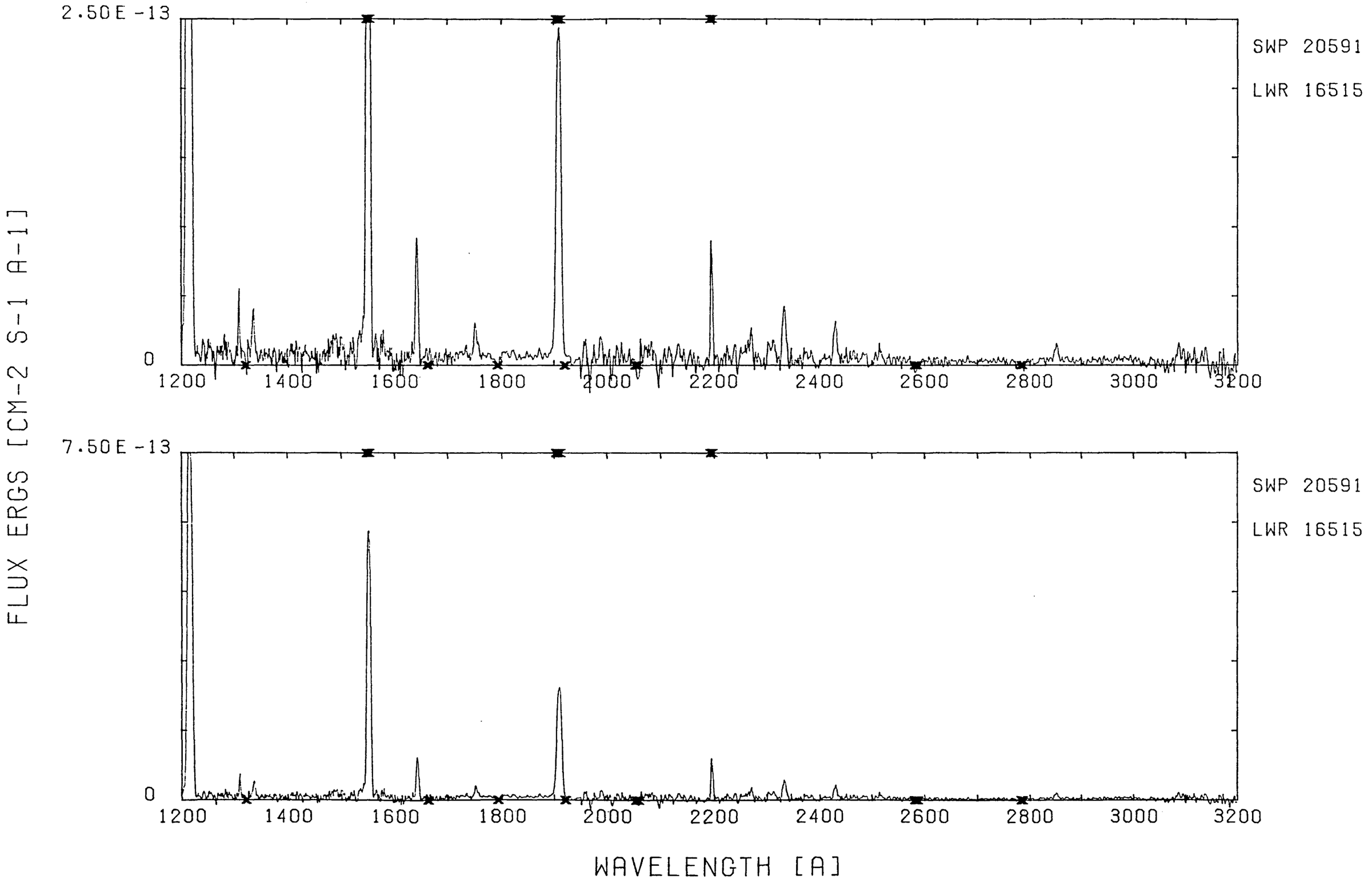
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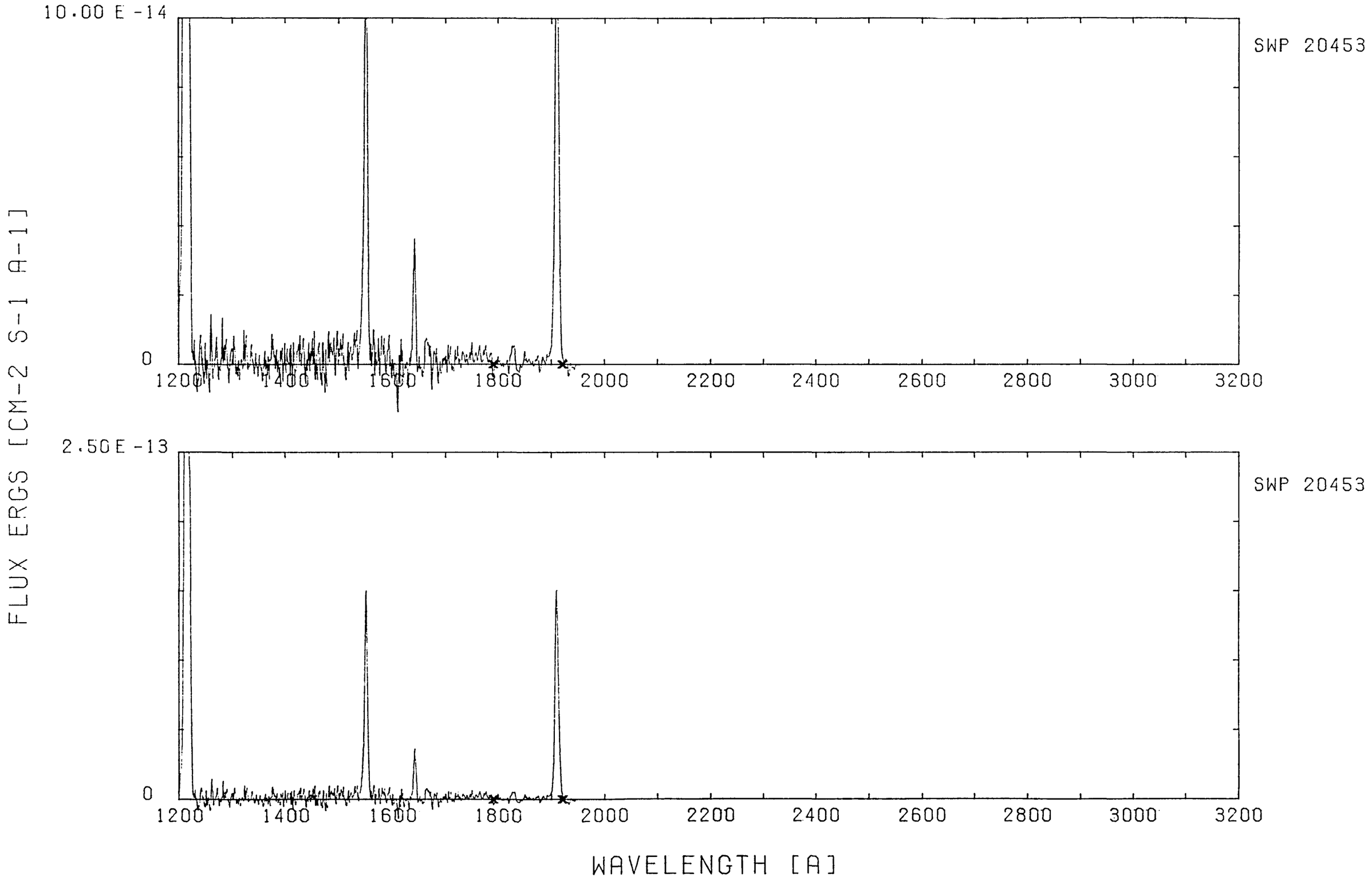
SMC N5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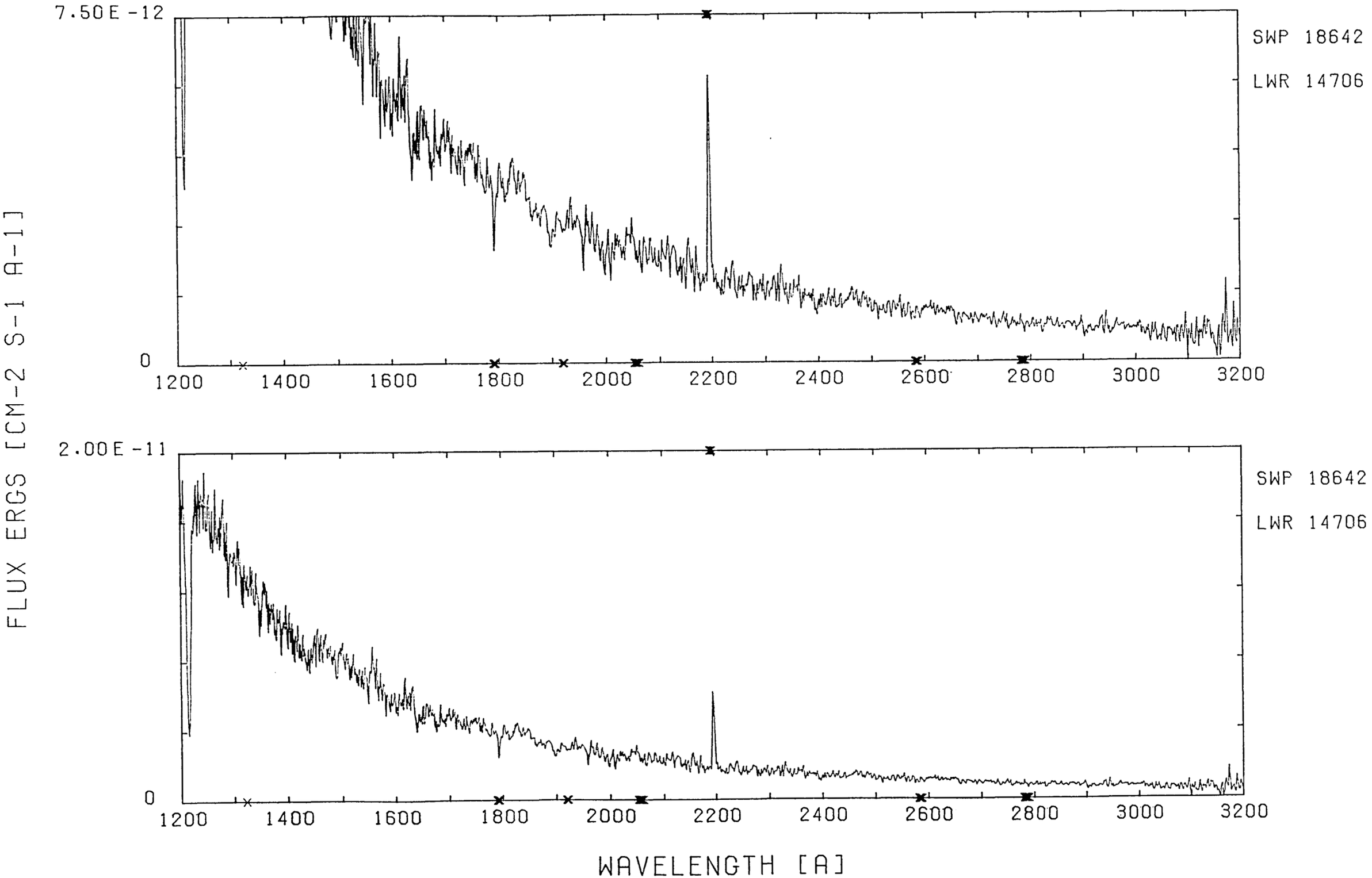
NGC 246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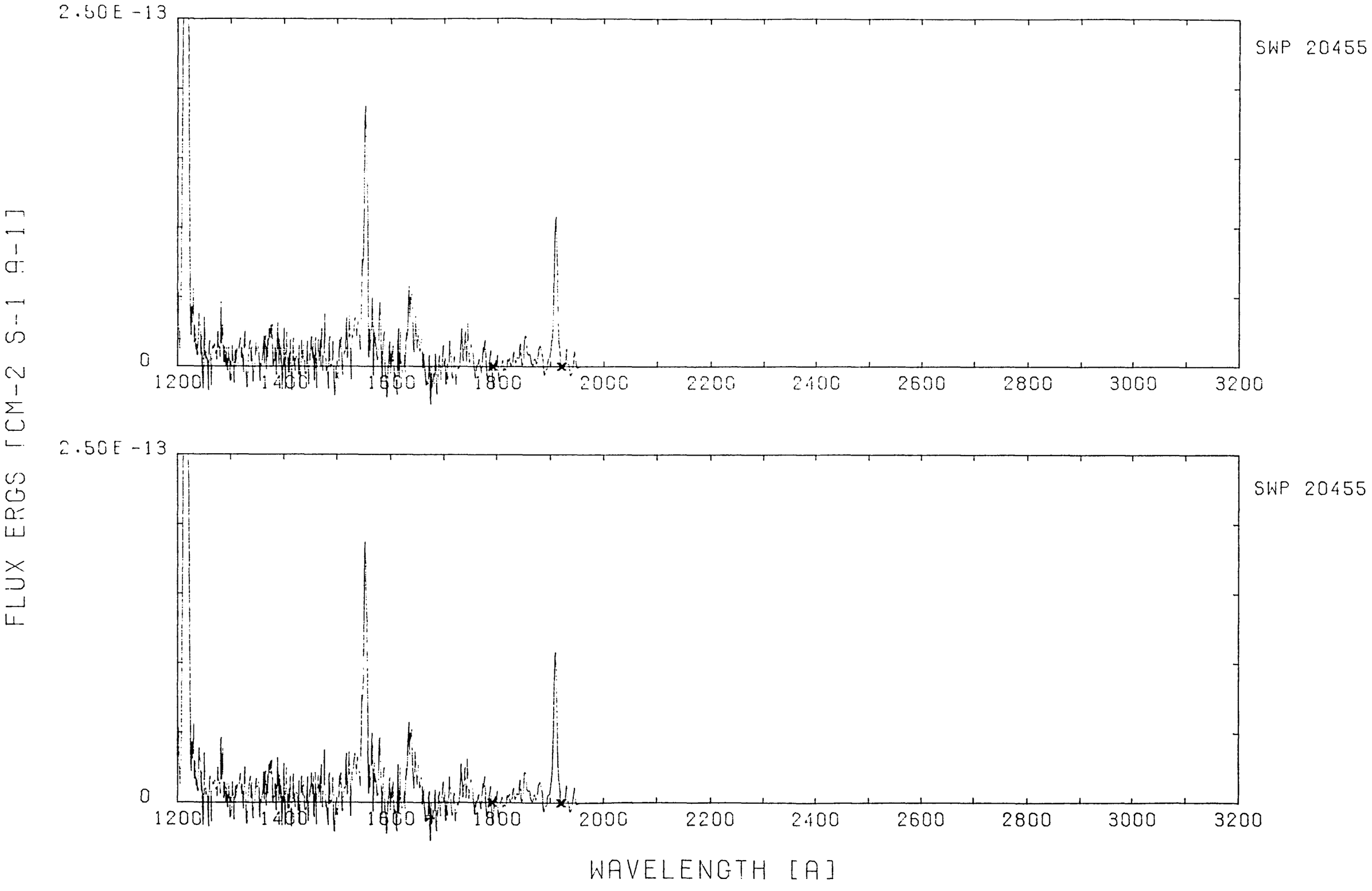
SMC N43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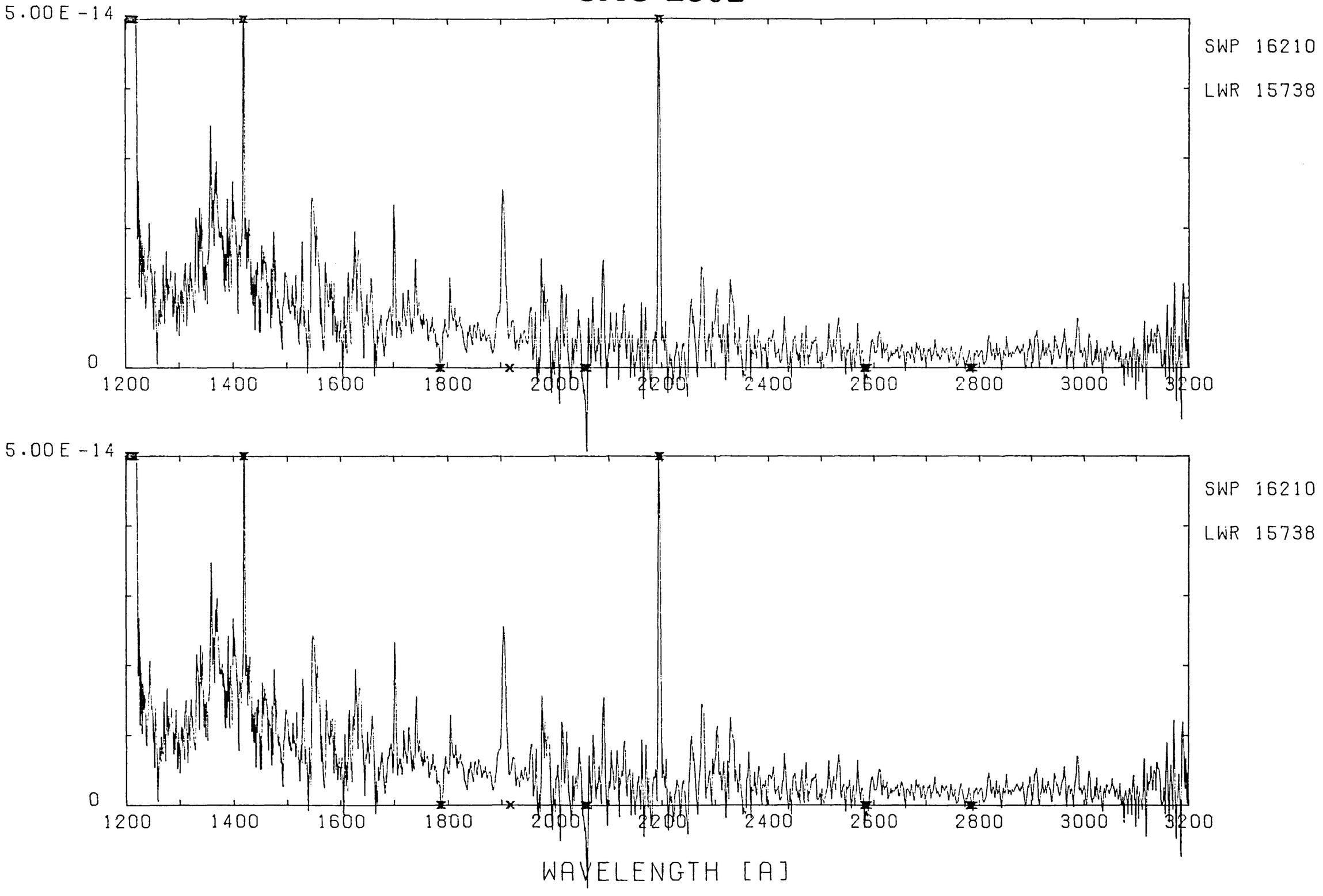
WAVELENGTH [A]

SMC L302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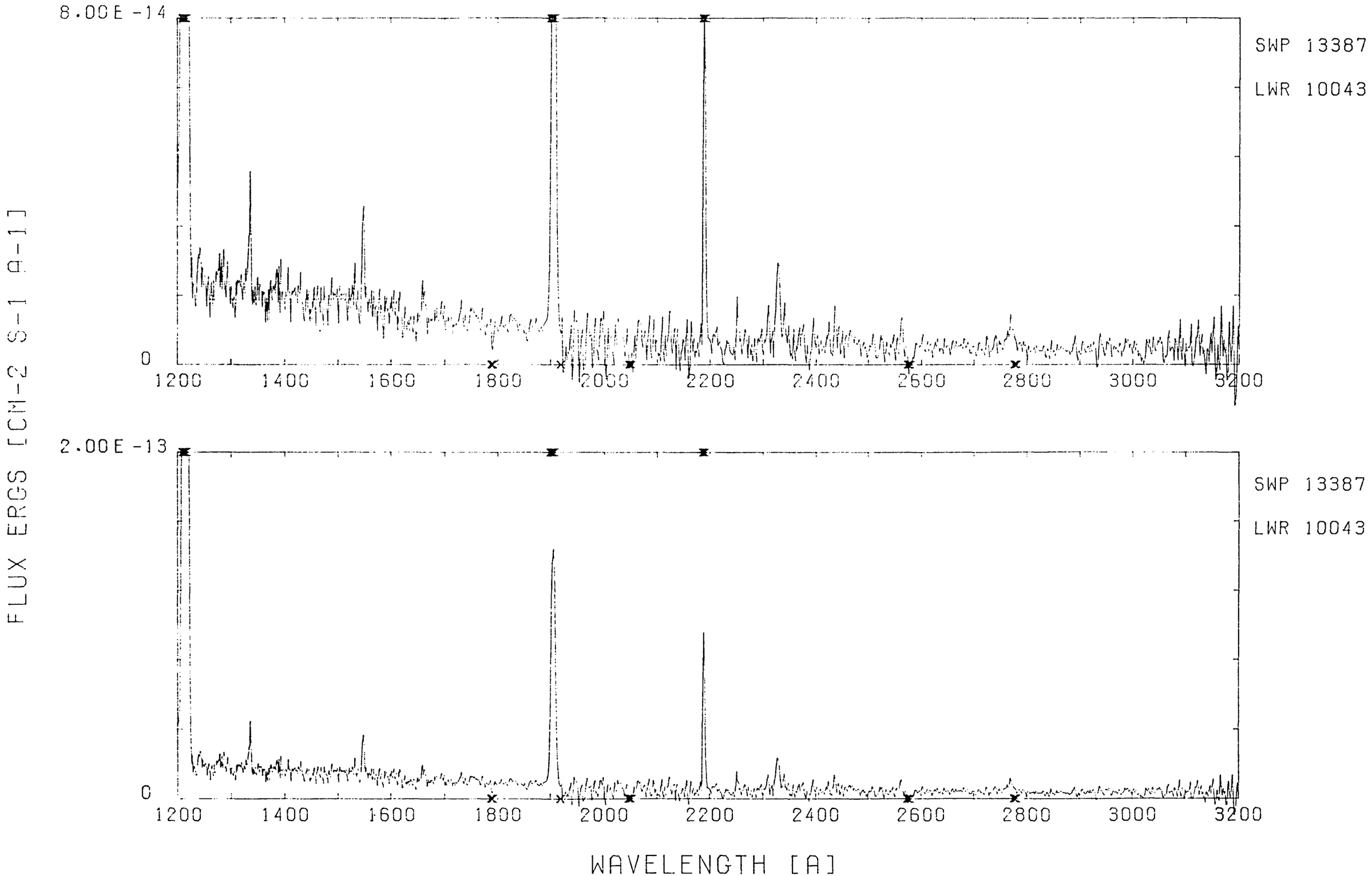
WAVELENGTH [A]

SMC N87


8.00E-14
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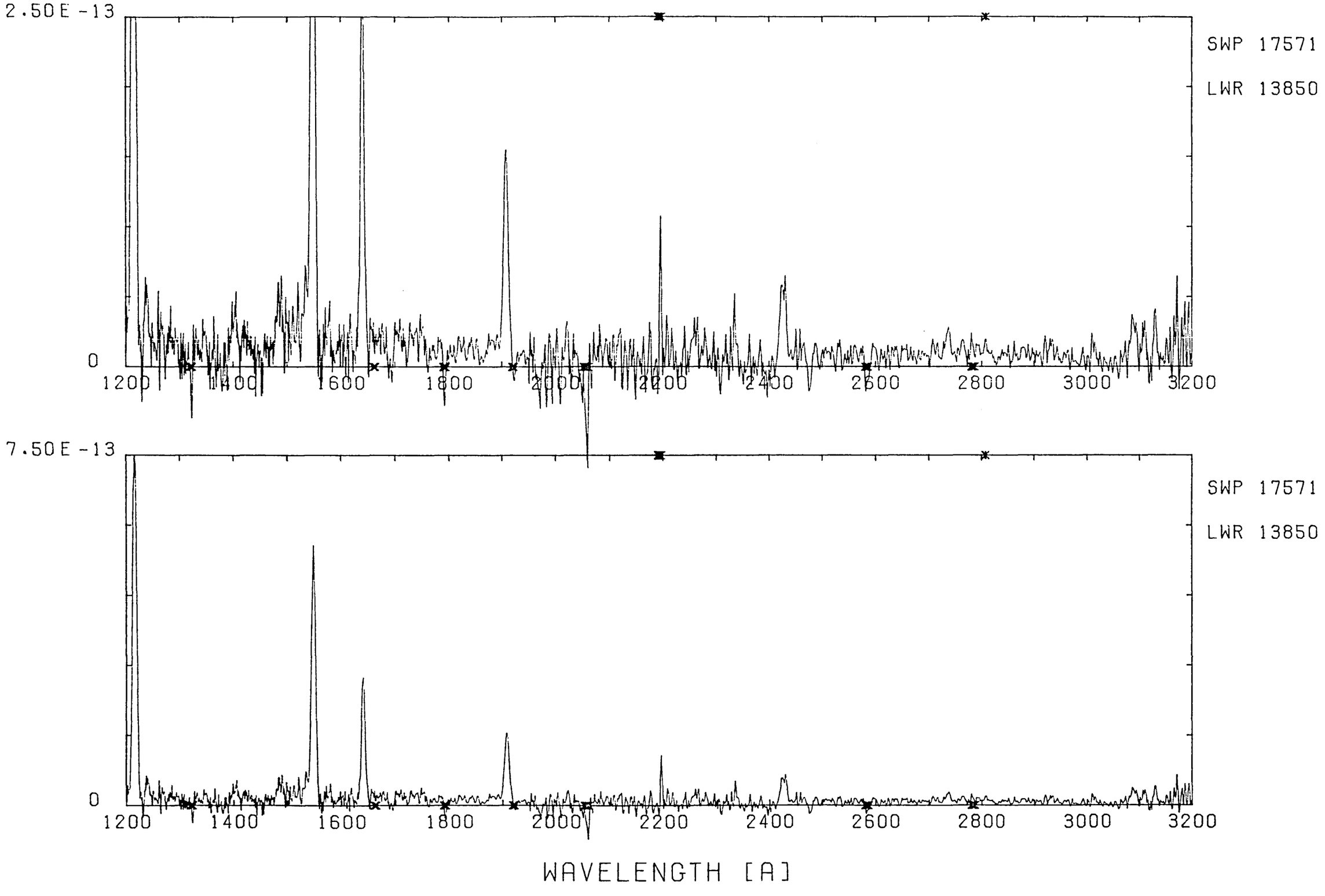
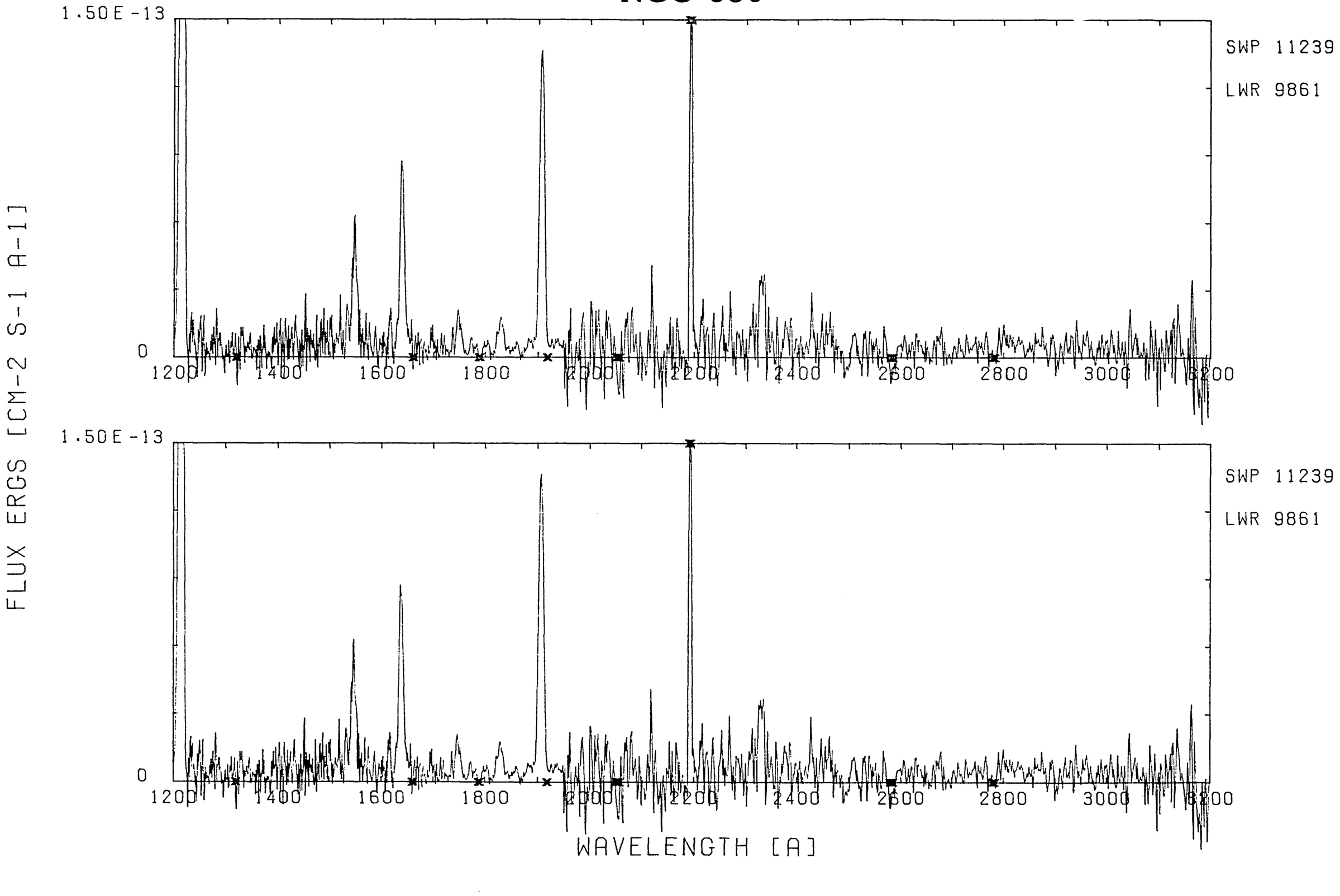
SWP 13387
LWR 10043
2.00E-13
0
SWP 13387
LWR 10043
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

M1-1


2.50E-13
0
SWP 17571
LWR 13850
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
7.50E-13
0
SWP 17571
LWR 13850
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 650


1.50E-13
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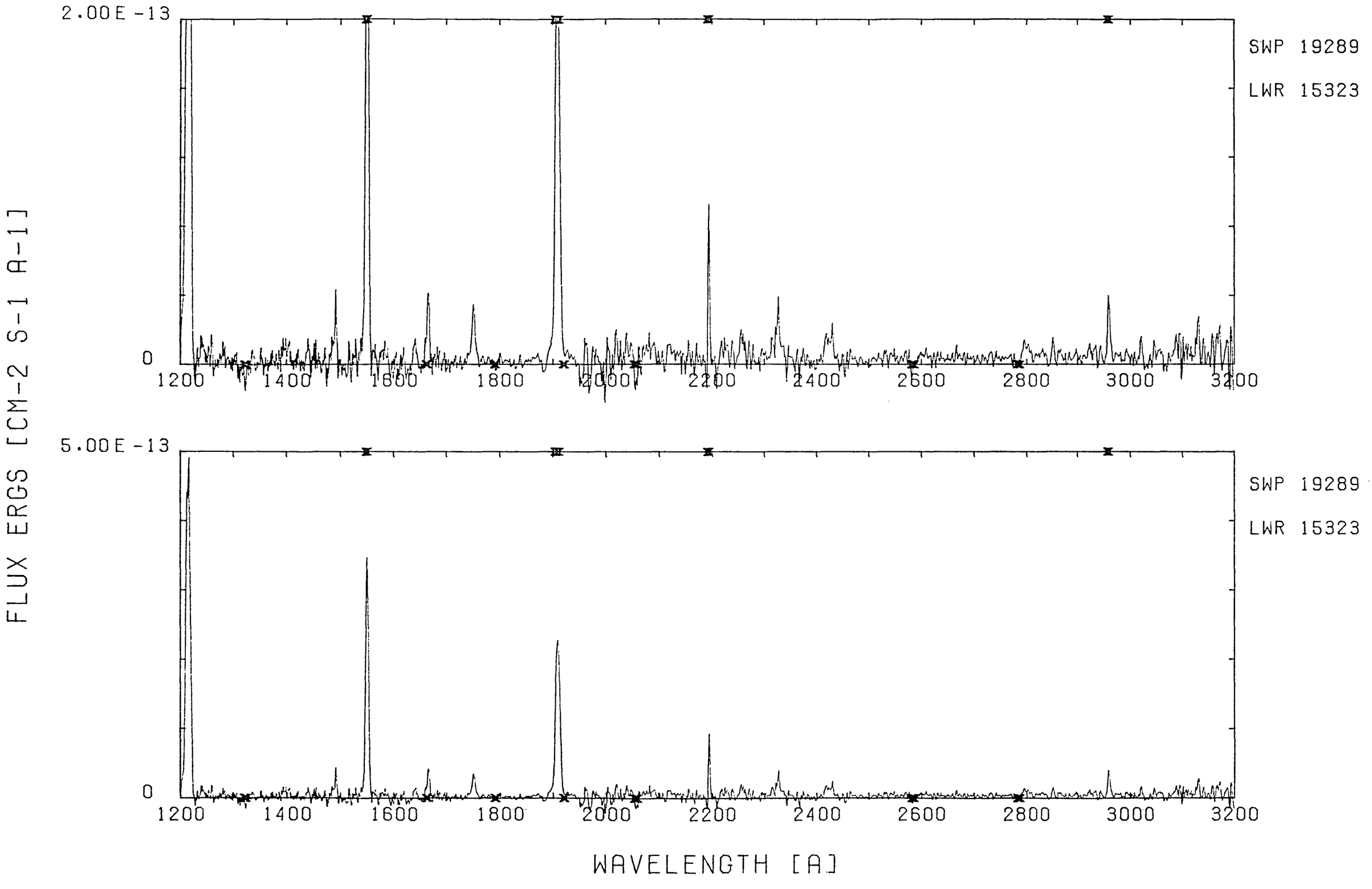
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 11239
LWR 9861
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

M1-2


2.00E-13
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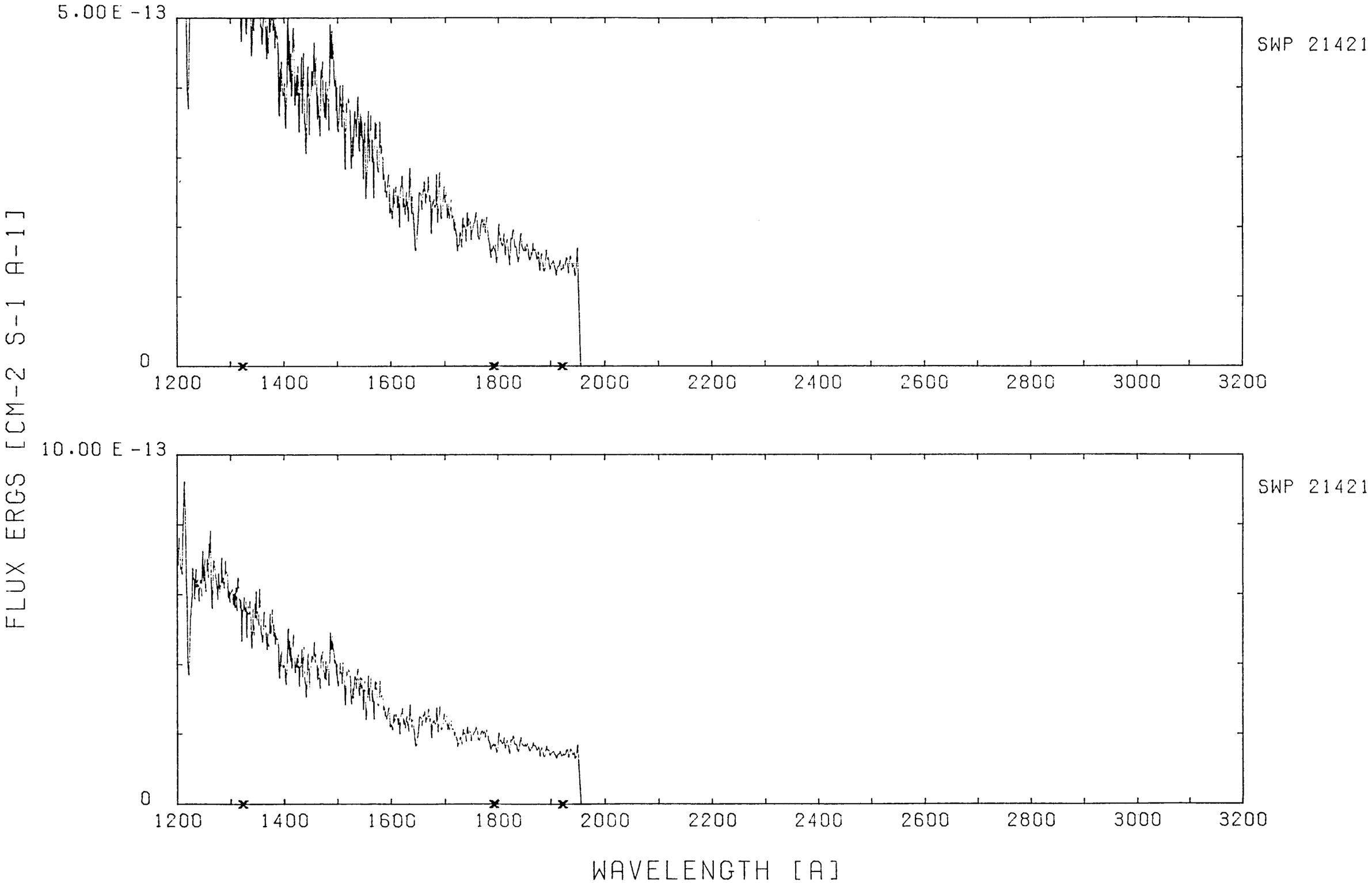
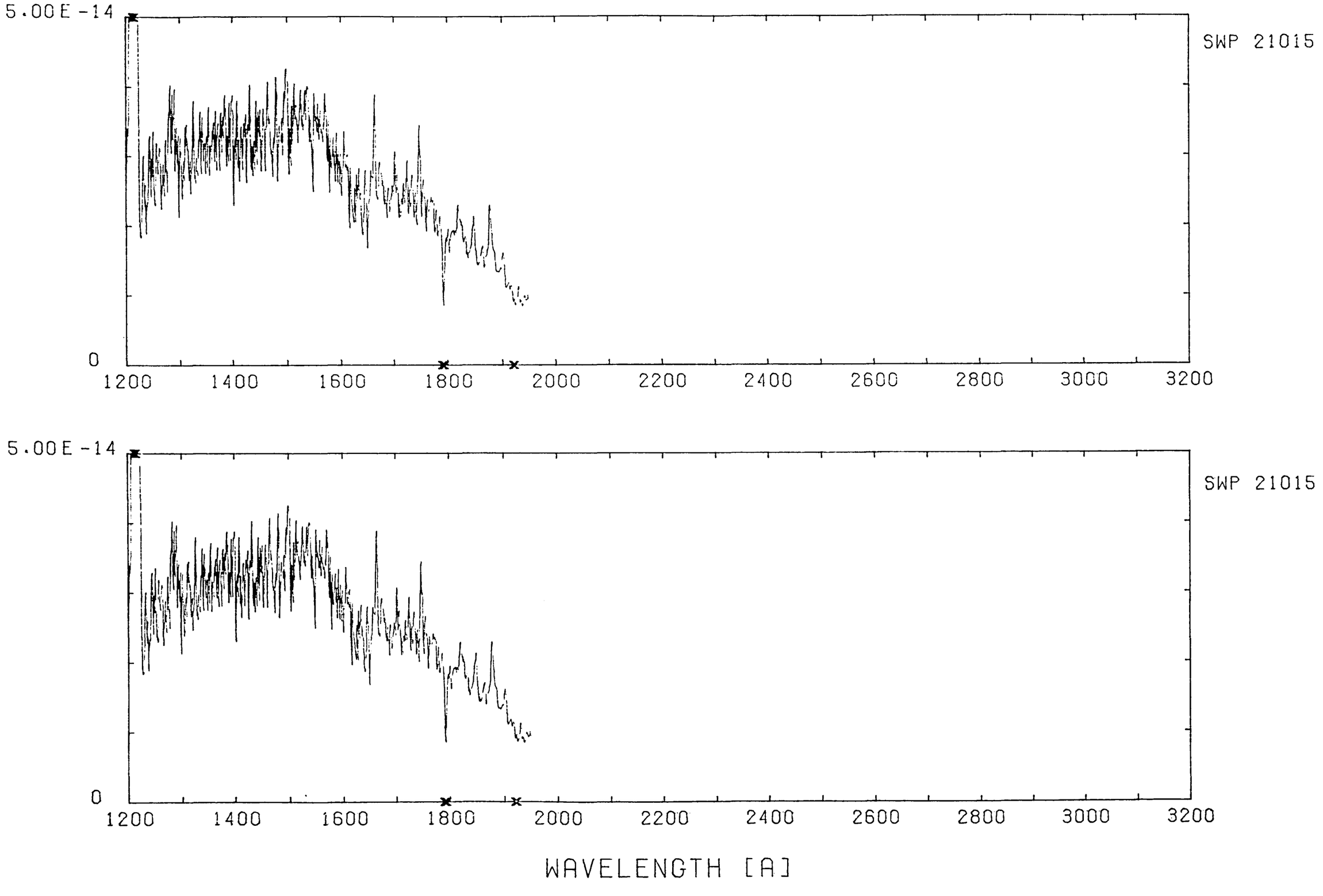
SWP 19289
LWR 15323
5.00E-13
0
SWP 19289
LWR 15323
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

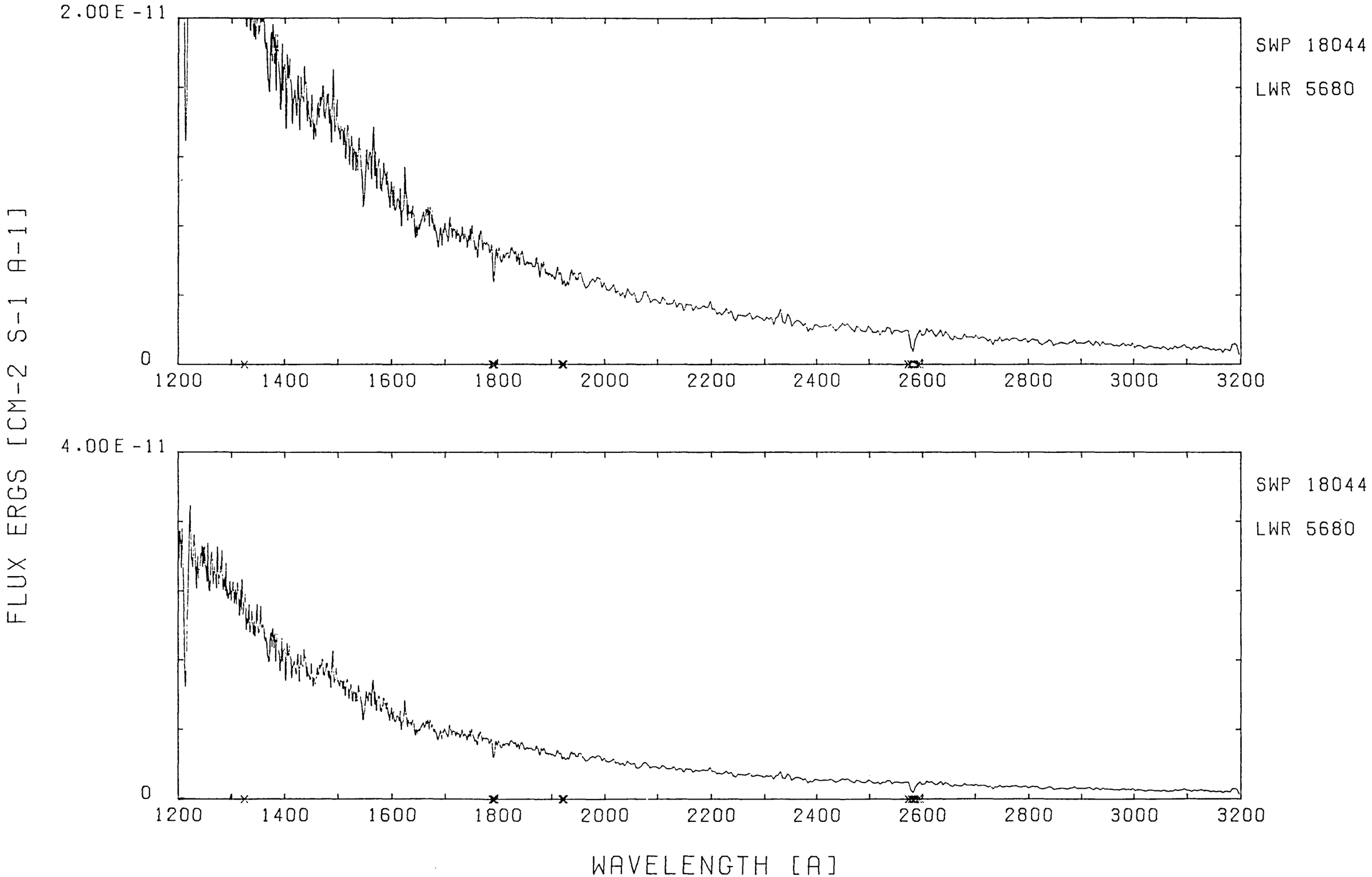
K1-26


5.00E-13
0
SWP 21421
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
10.00 E-13
0
SWP 21421
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

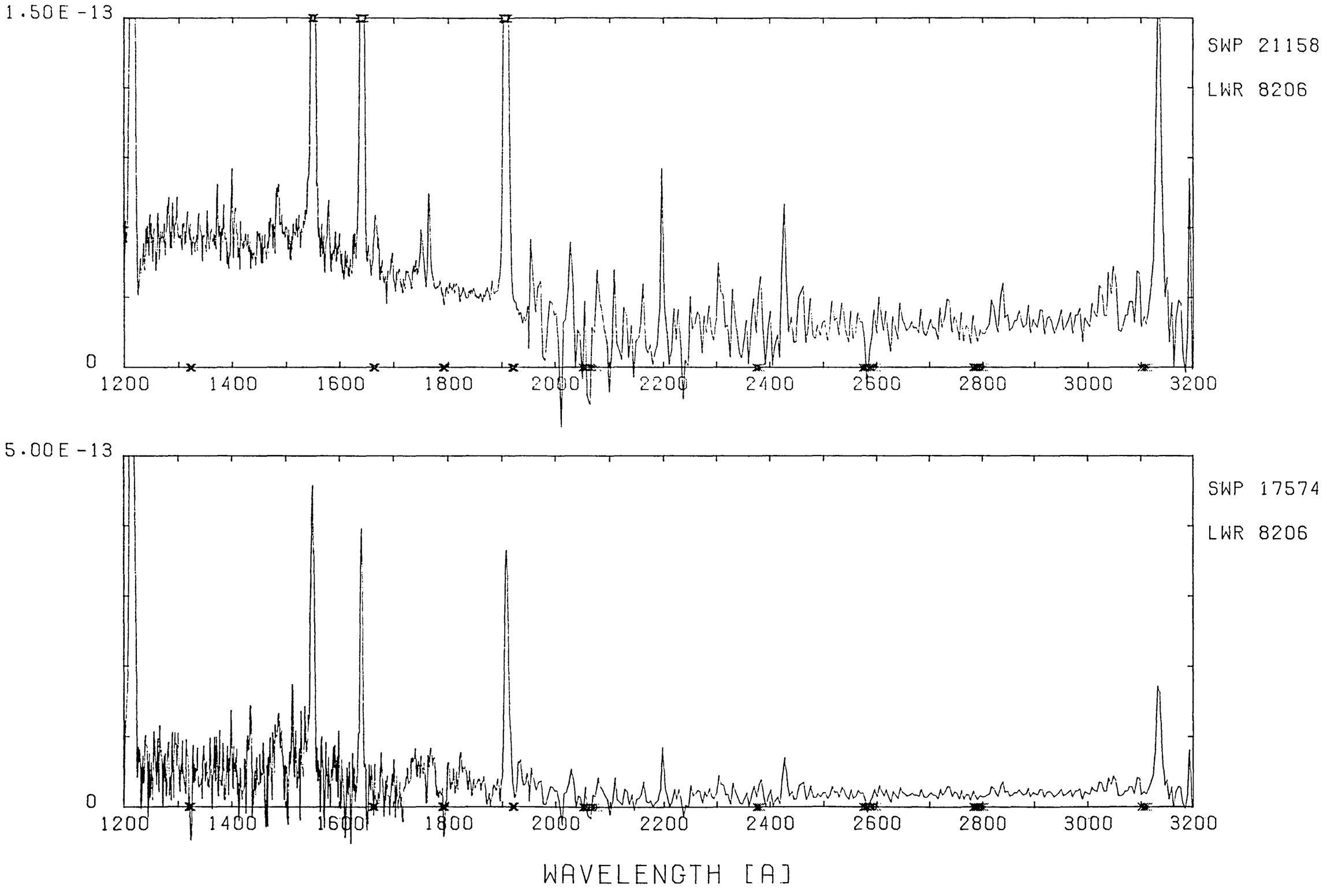
P136+5.1


5.00E-14
0
SWP 21015
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

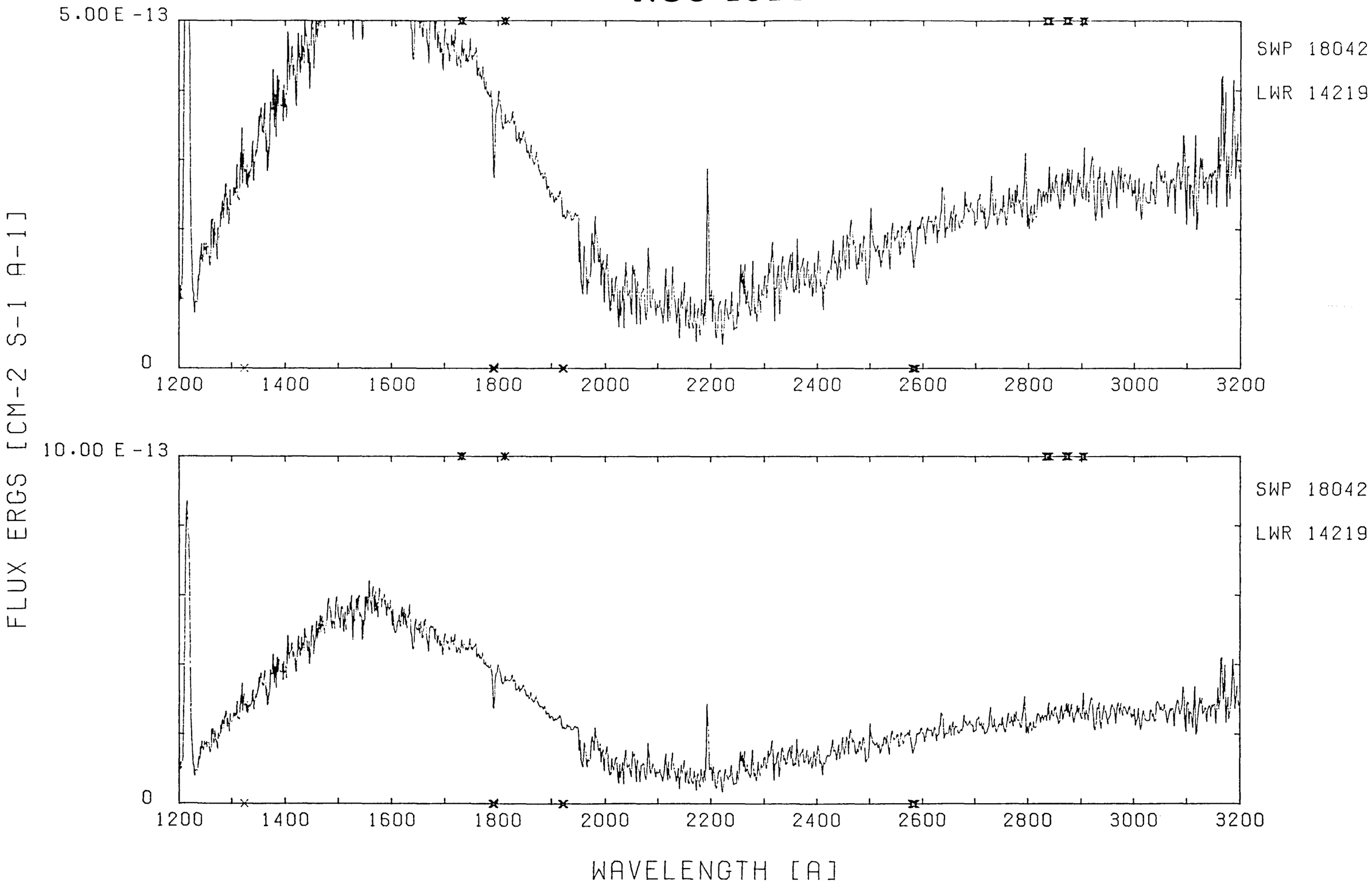
CPD-26 389


2.00E-11
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 18044
LWR 5680
FLUX ERGS CM-2 S-1 A-1]
4.00E-11
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 18044
LWR 5680
WAVELENGTH [A]

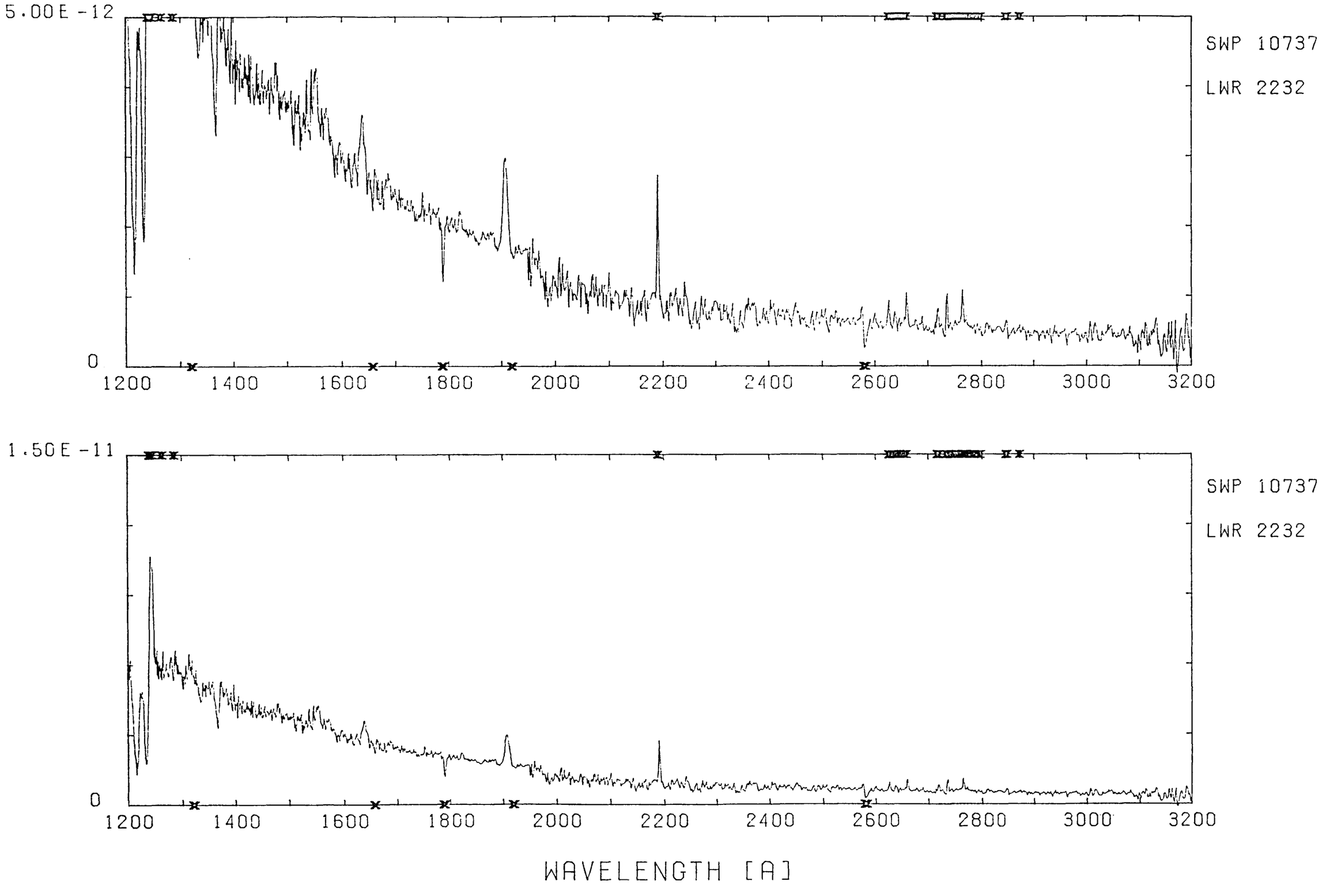
IC 351


1.50E-13
0
SWP 21158
LWR 8206
5.00E-13
0
SWP 17574
LWR 8206
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

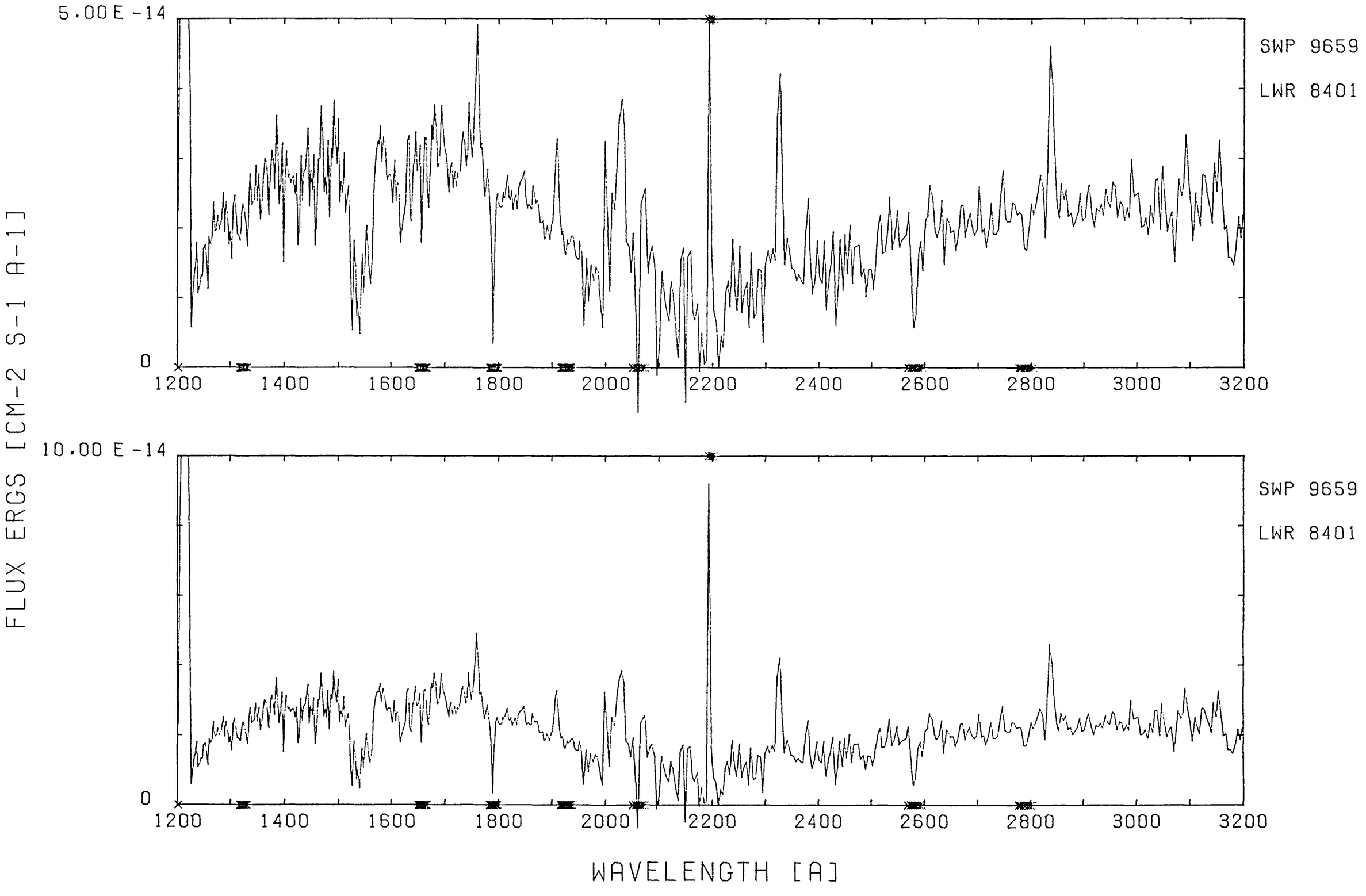
NGC 1514


5.00E-13
0
SWP 18042
LWR 14219
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
10.00 E-13
0
SWP 18042
LWR 14219
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

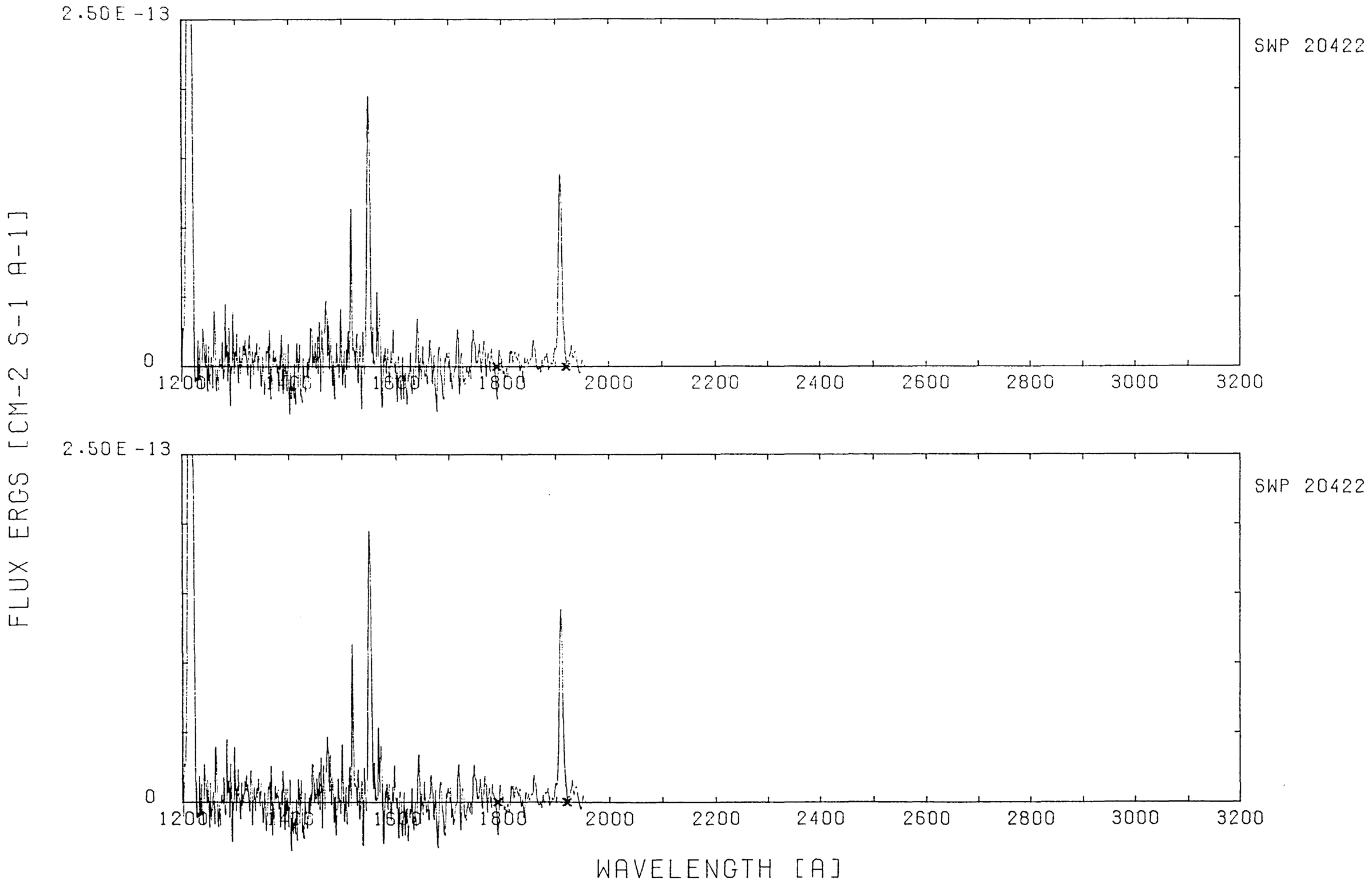
NGC 1535

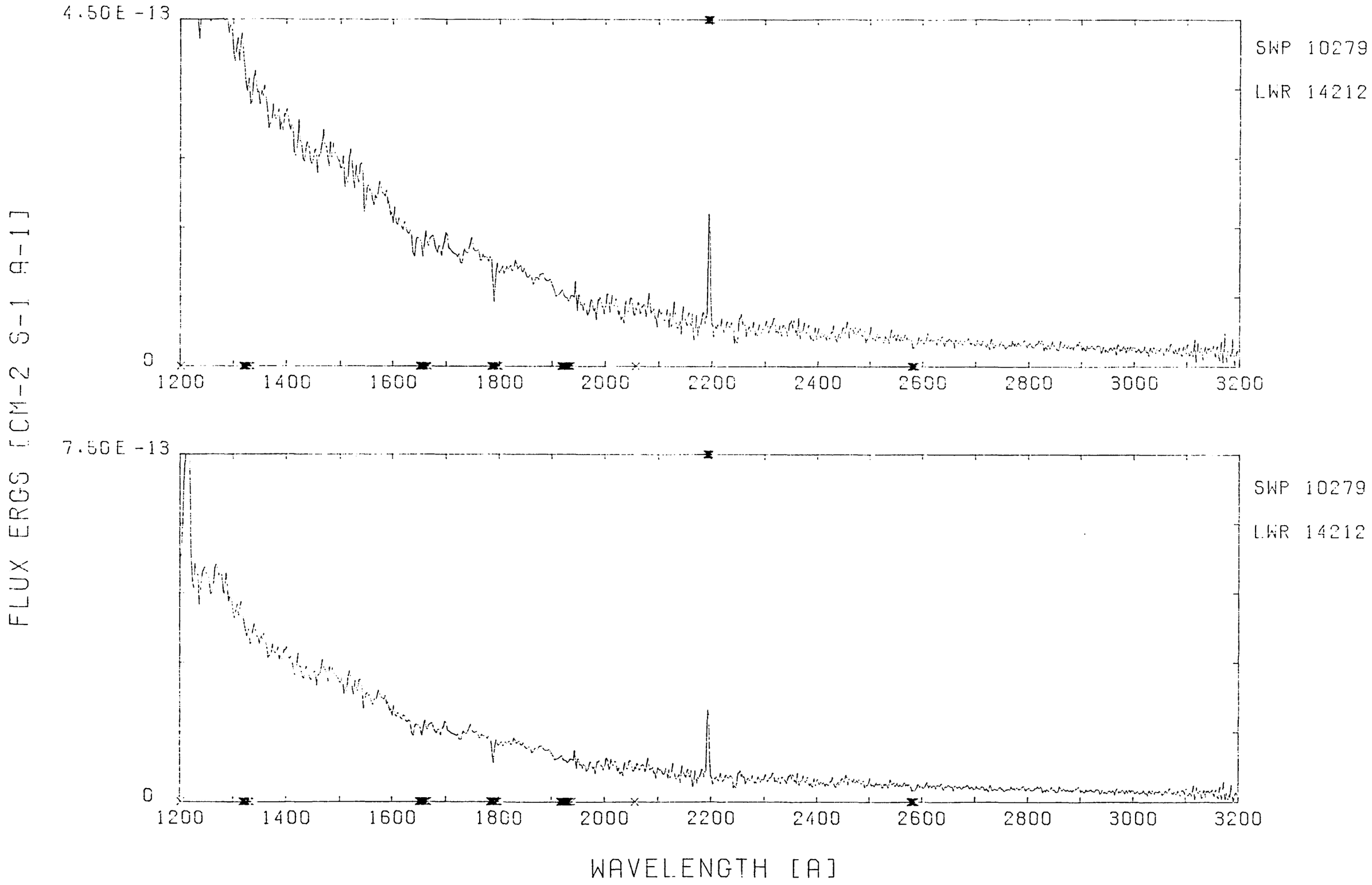

5.00E-12
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 10737
LWR 2232
FLUX ERGS CM-2 S-1 A-1]
1.50E-11
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 10737
LWR 2232
WAVELENGTH [A]

M4-18

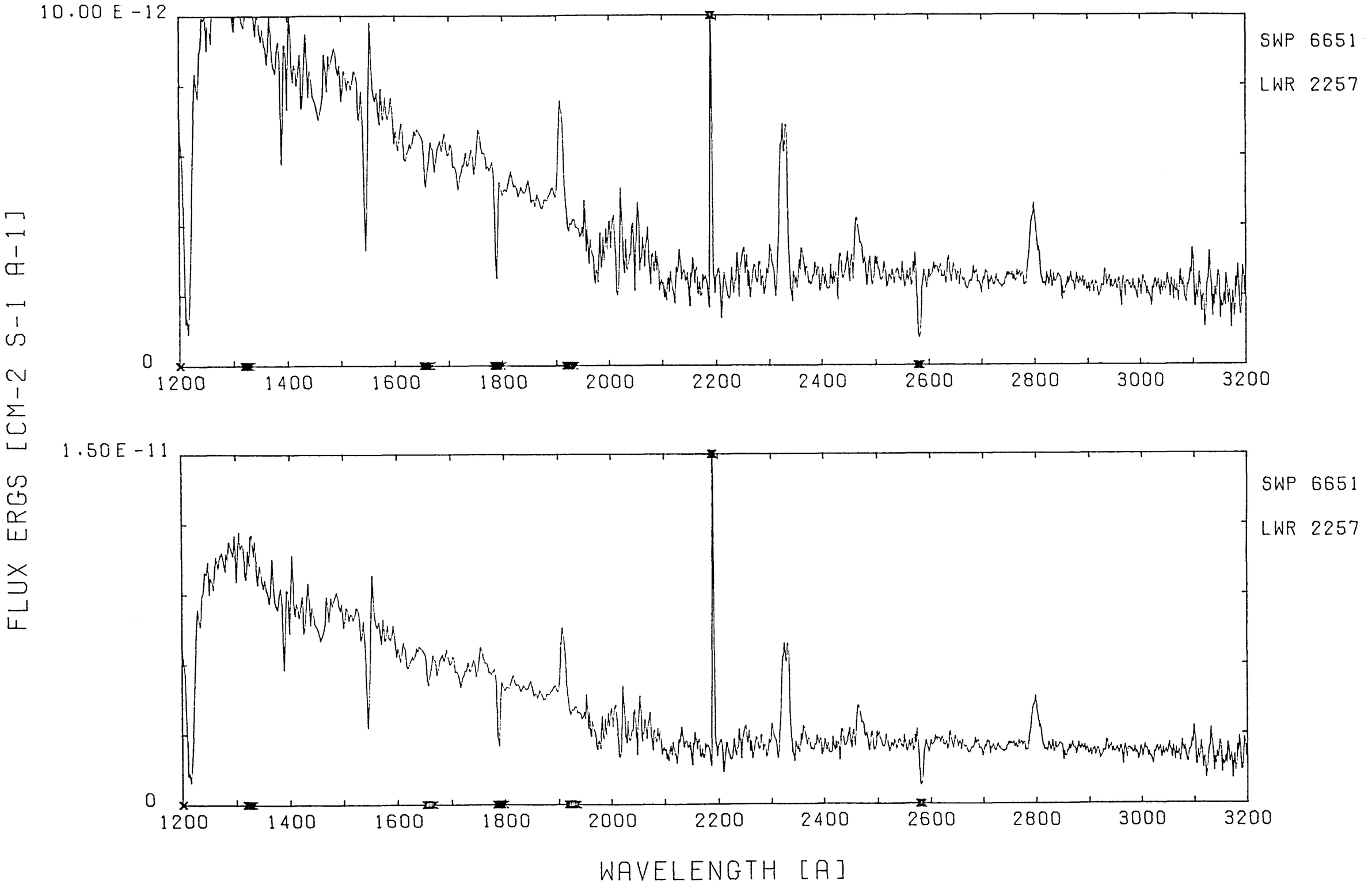

5.00E-14
0
SWP 9659
LWR 8401
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
10.00 E-14
0
SWP 9659
LWR 8401
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

LMC P2

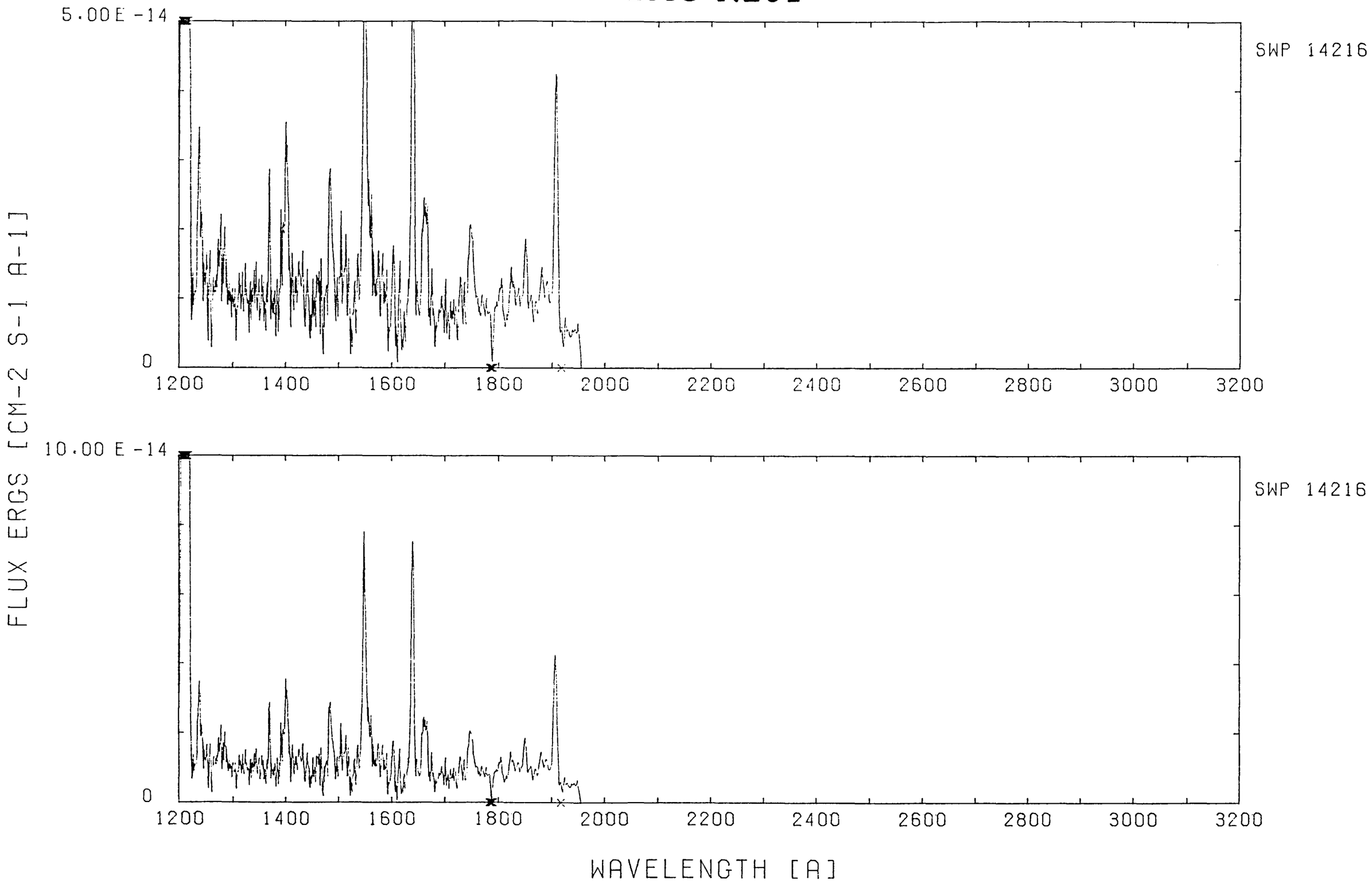

2.50E-13
0
SWP 20422
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]


4.50E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 10279
LWR 14212
FLUX ERGS FCM-2 S-1 A-1
7.50E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 10279
LWR 14212
WAVELENGTH [A]

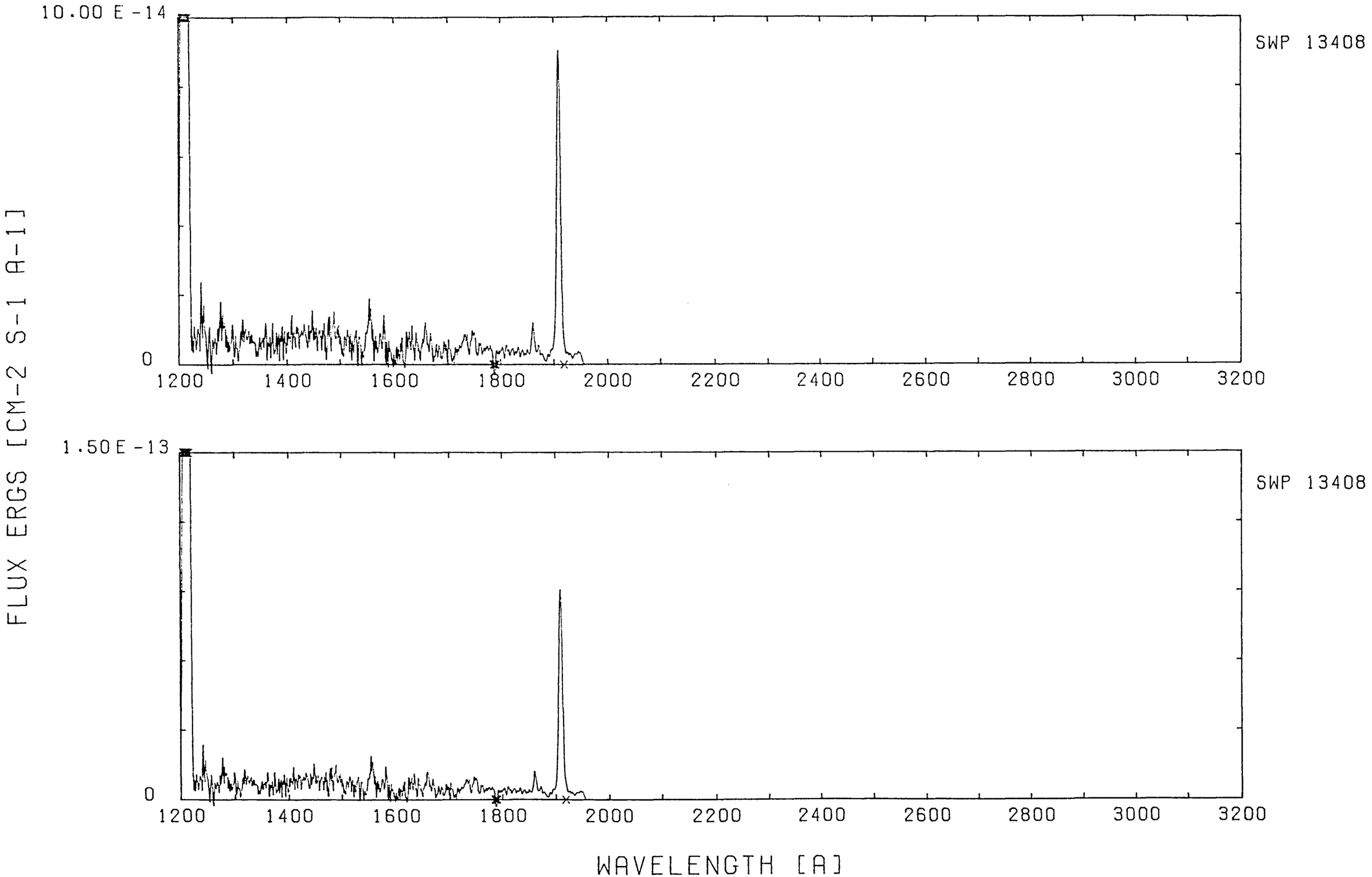
IC 418


10.00 E -12
0
SWP 6651
LWR 2257
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
1.50E-11
0
SWP 6651
LWR 2257
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

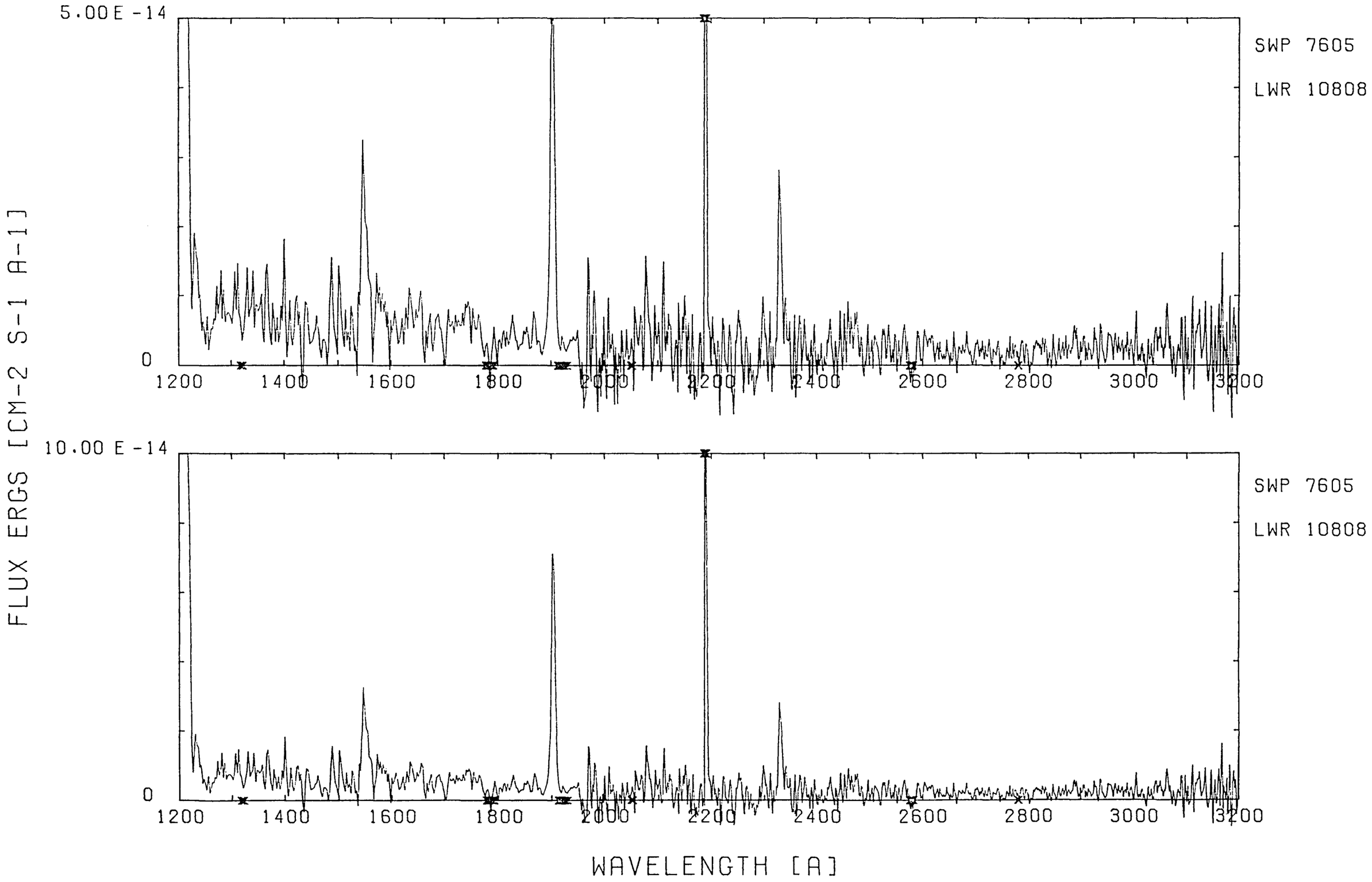
LMC N201


5.00E-14
0
SWP 14216
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
10.00 E-14
0
SWP 14216
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

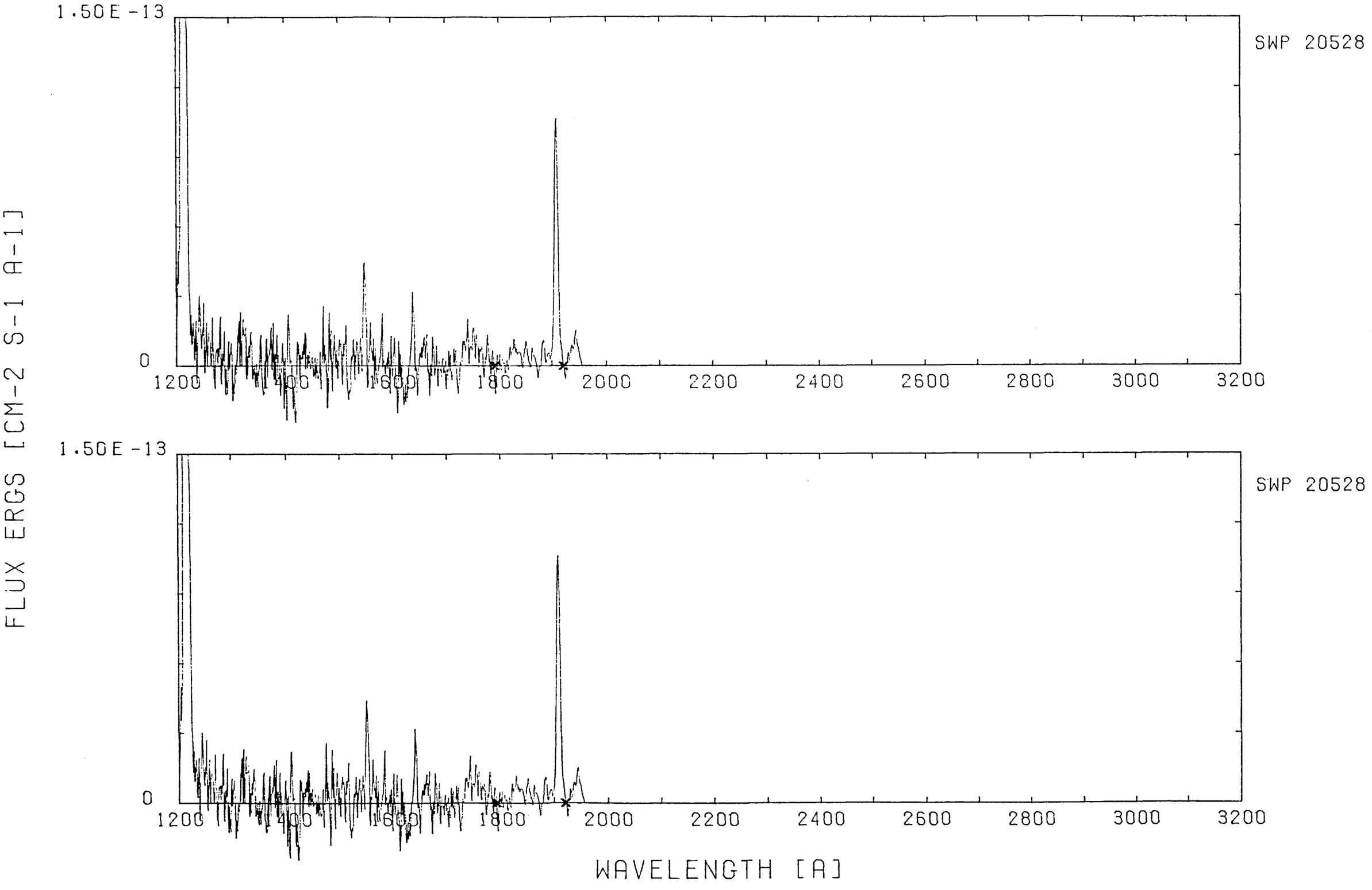
LMC N141


10.00 E -14
0
SWP 13408
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
1.50E -13
0
SWP 13408
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

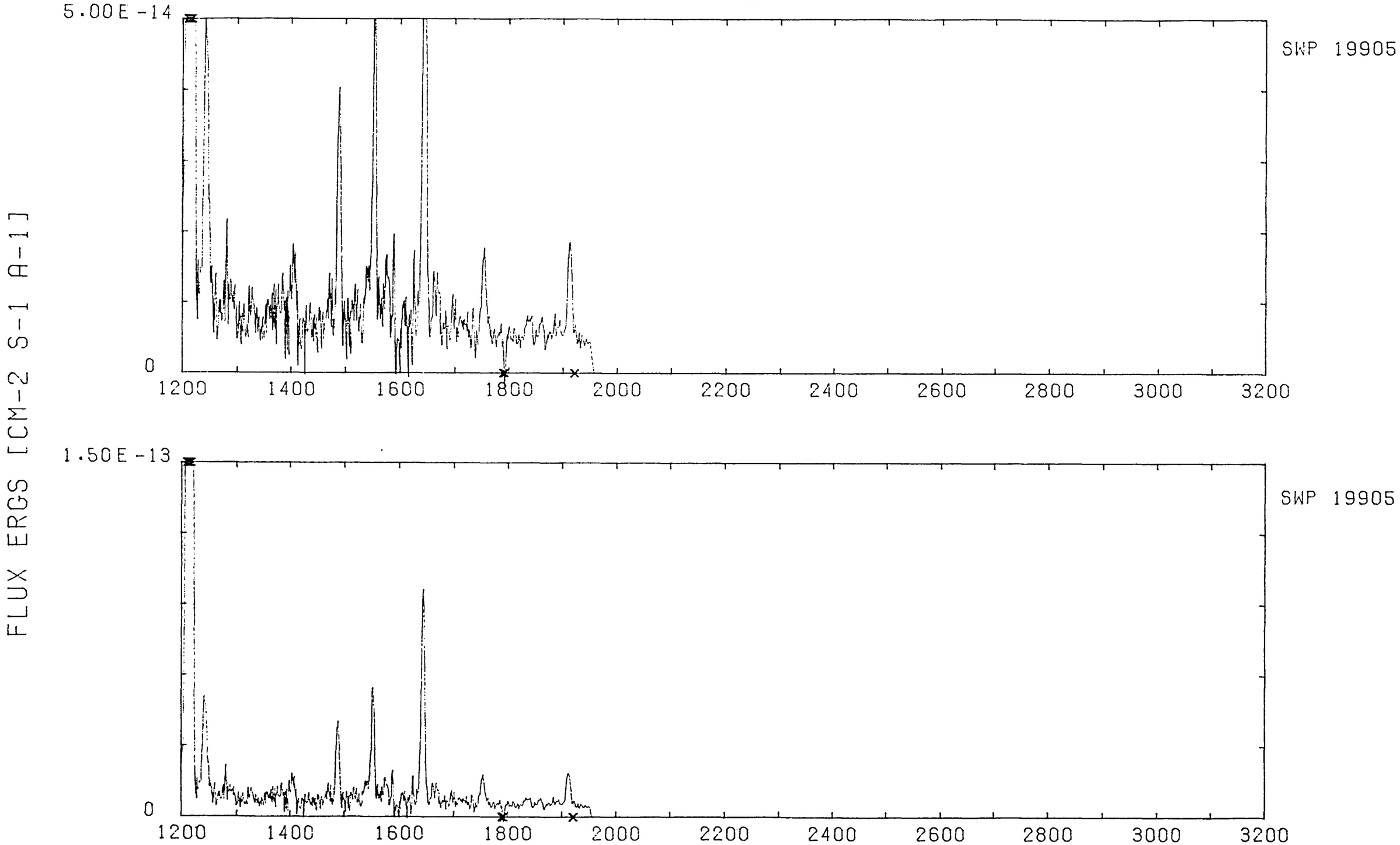
LMC N203


5.00E-14
0
10.00 E-14
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 7605
LWR 10808
SWP 7605
LWR 10808
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

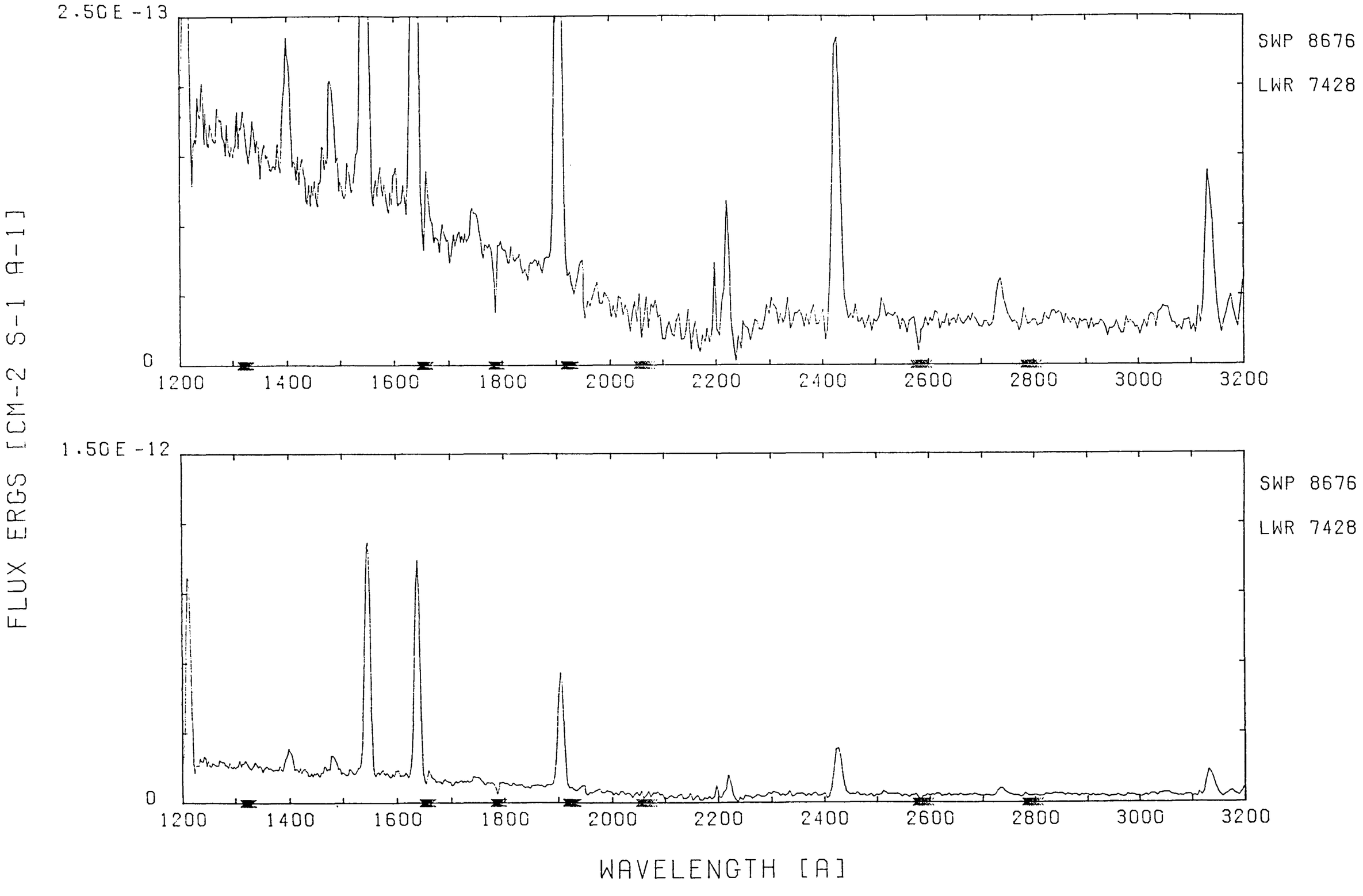
LMC P33


1.50E-13
0
SWP 20528
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

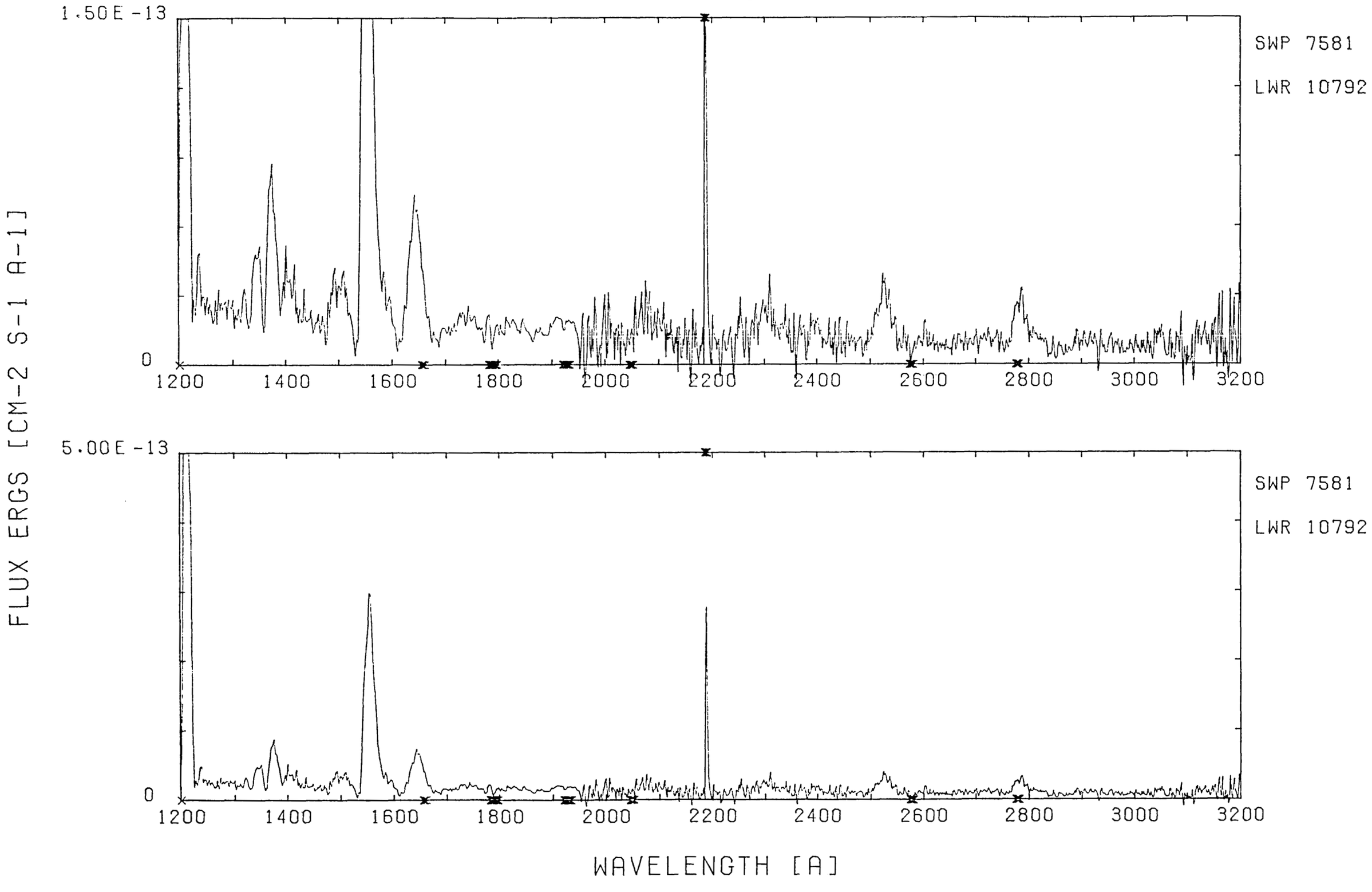
LMC N66


5.00E-14
0
SWP 19905
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
1.50E-13
0
SWP 19905
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

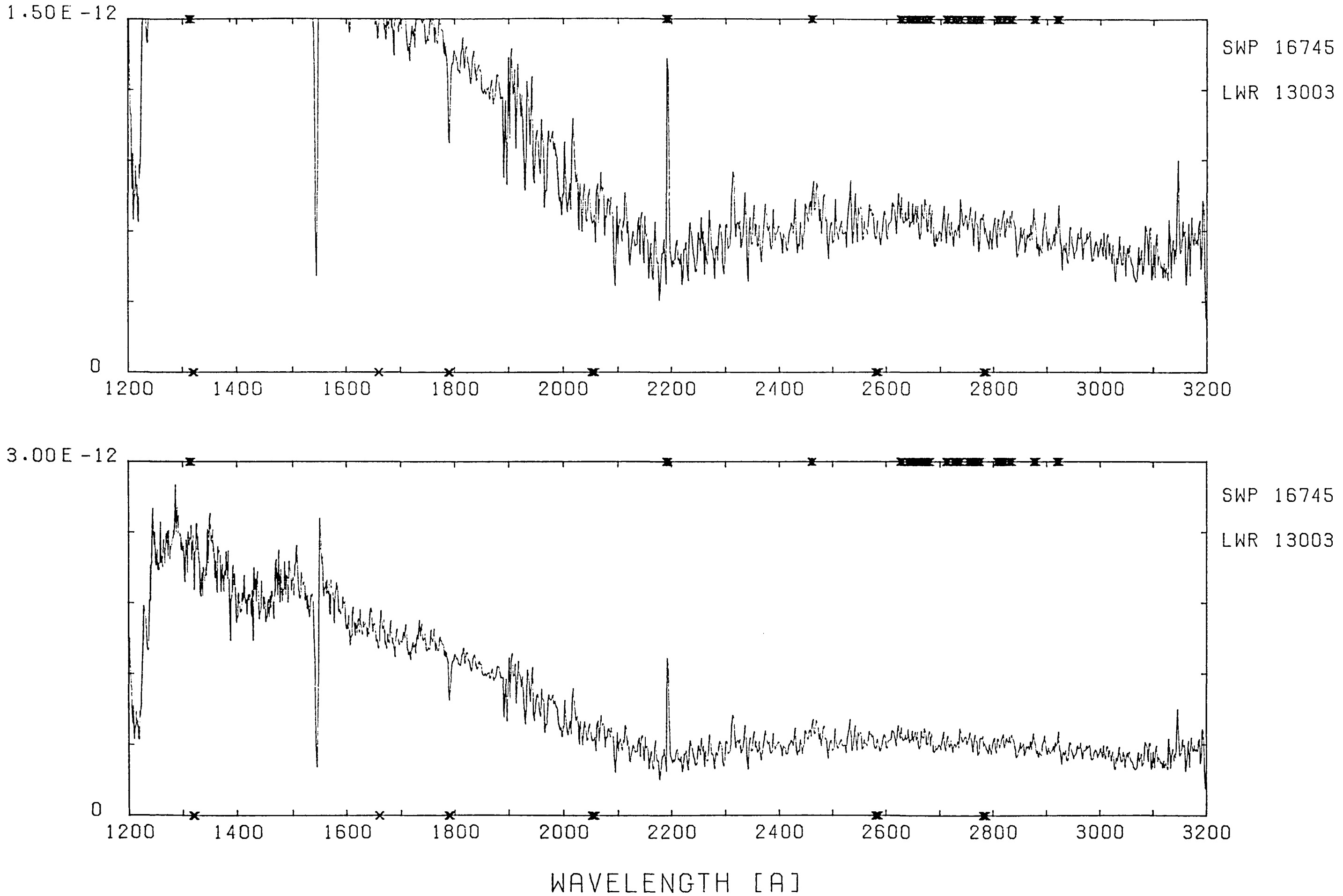
NGC 2022


2.50E-13
0
SWP 8676
LWR 7428
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
1.50E-12
0
SWP 8676
LWR 7428
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

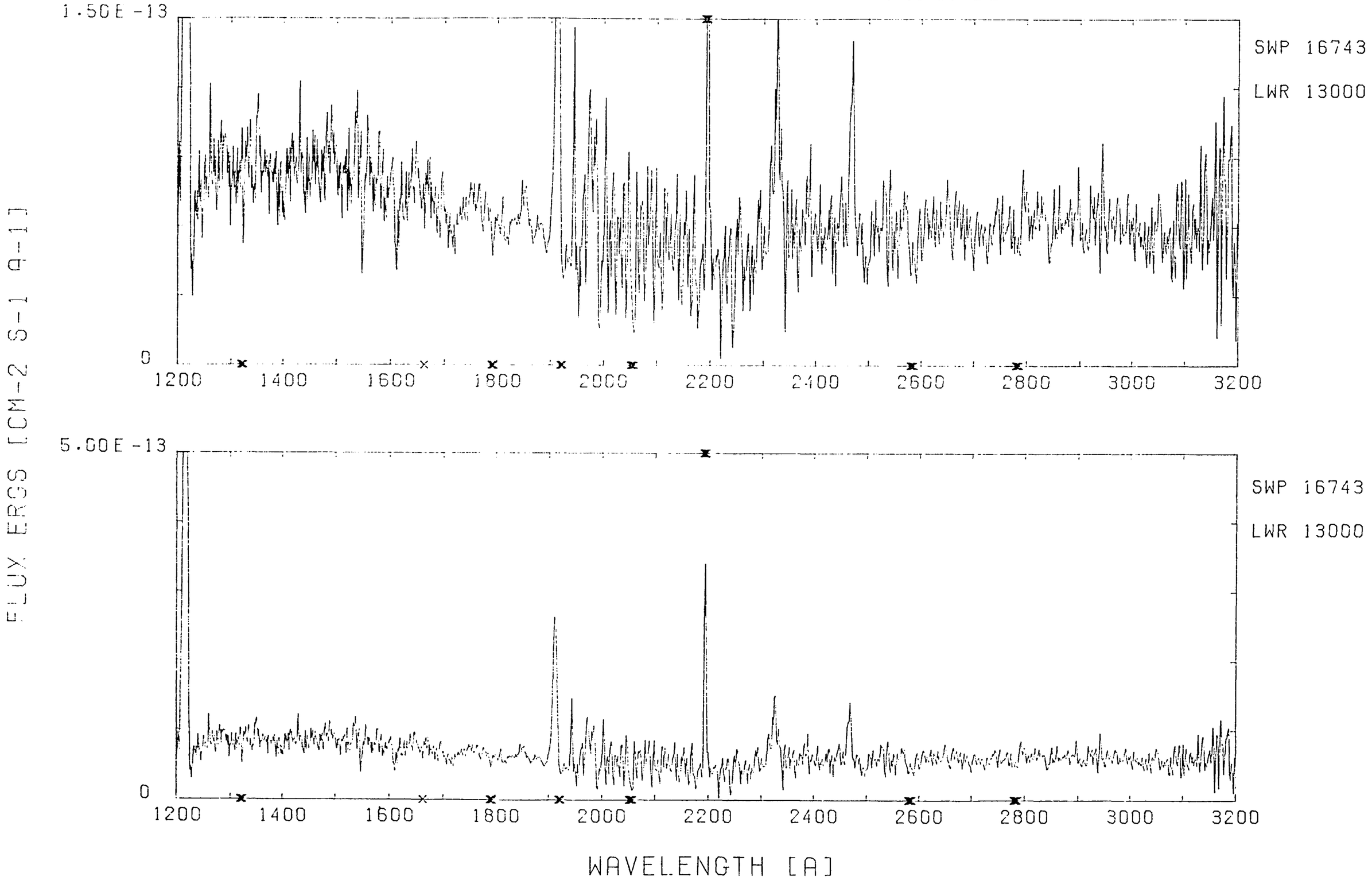
FD 73


1.50E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 7581
LWR 10792
FLUX ERGS CM-2 S-1 A-1]
5.00E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 7581
LWR 10792
WAVELENGTH [A]

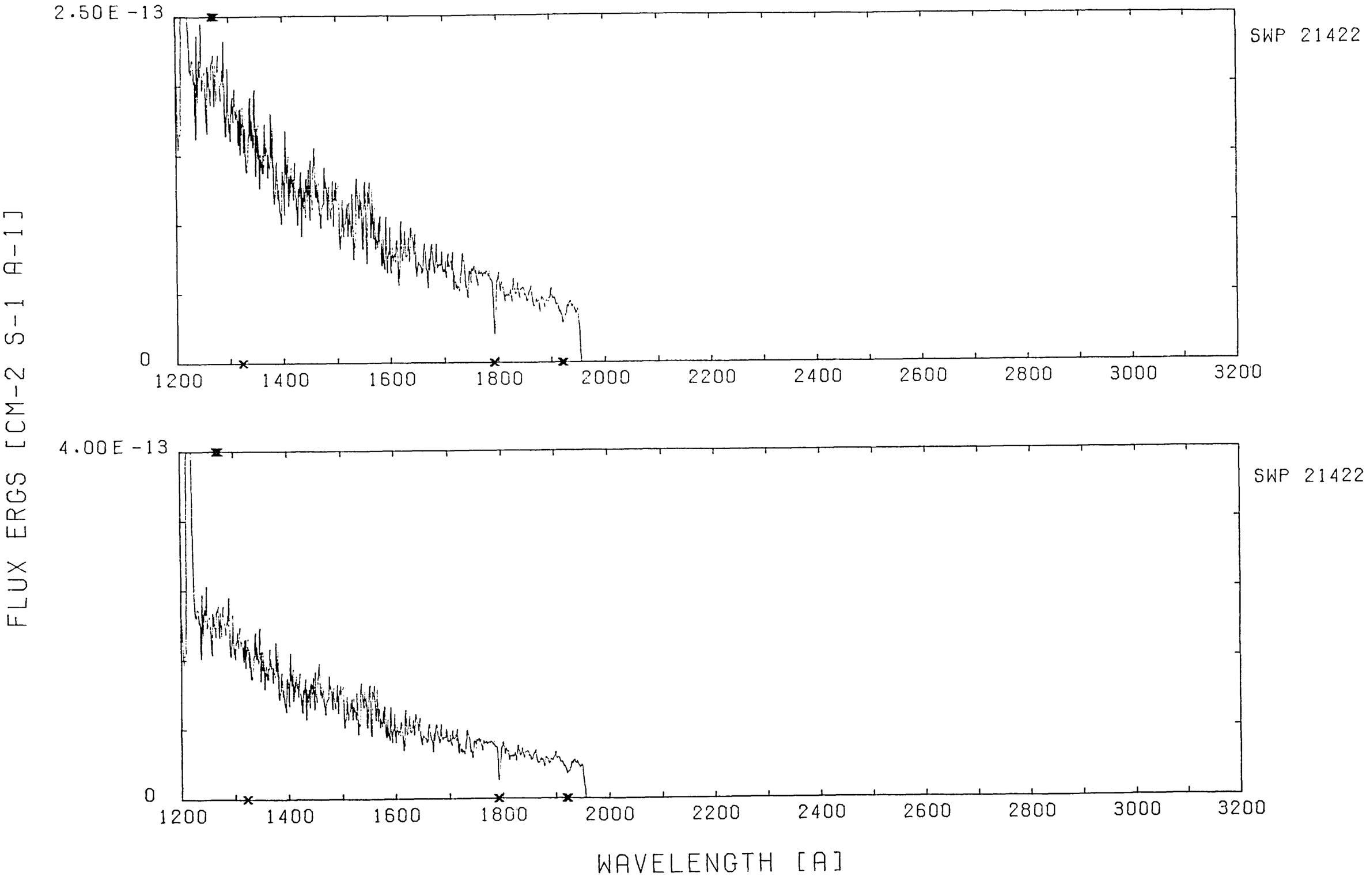
IC 2149 - LGAP centered on CS



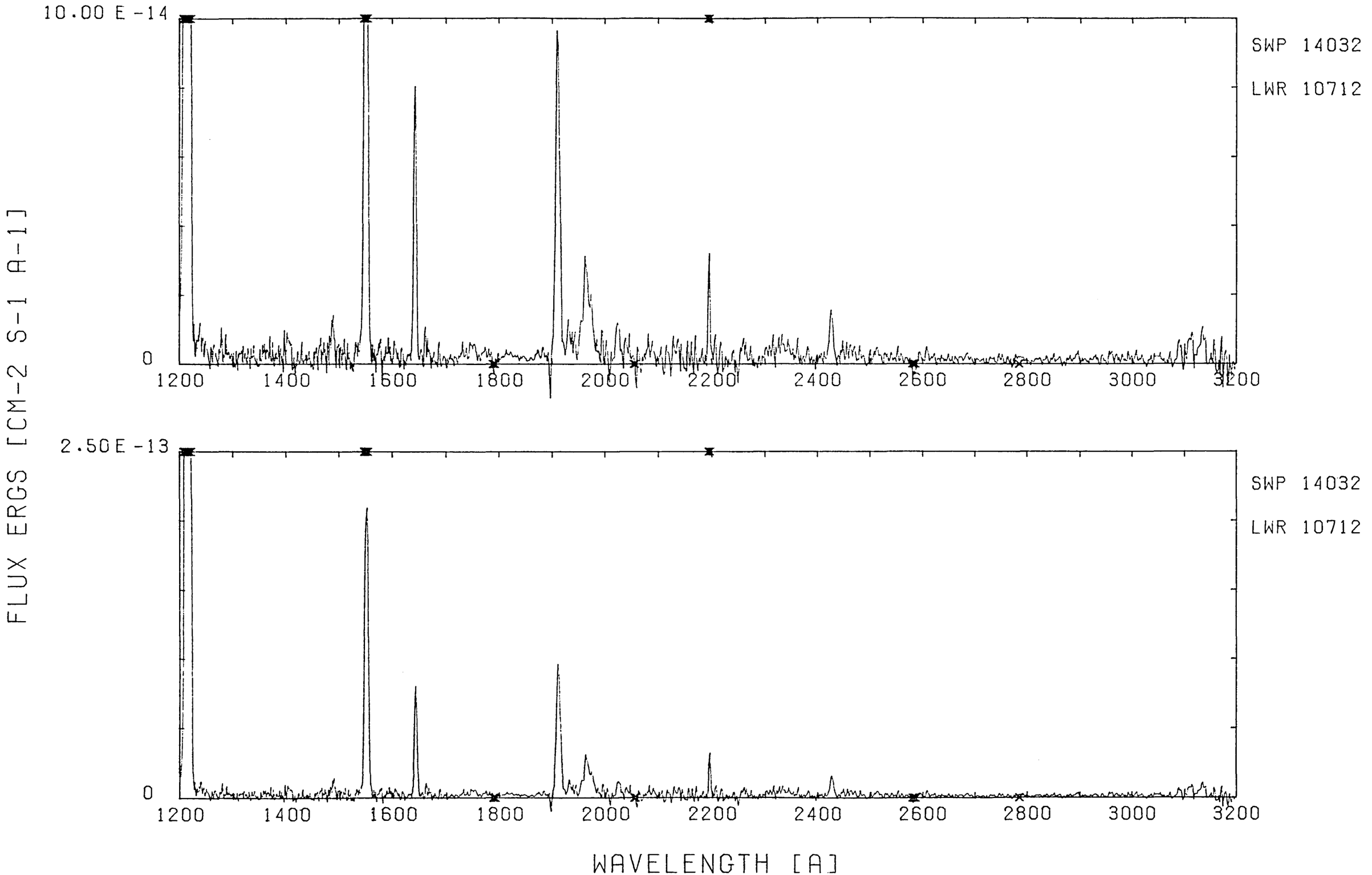
IC 2149 - LGAP offset 5.4″E & 4.1″N of CS



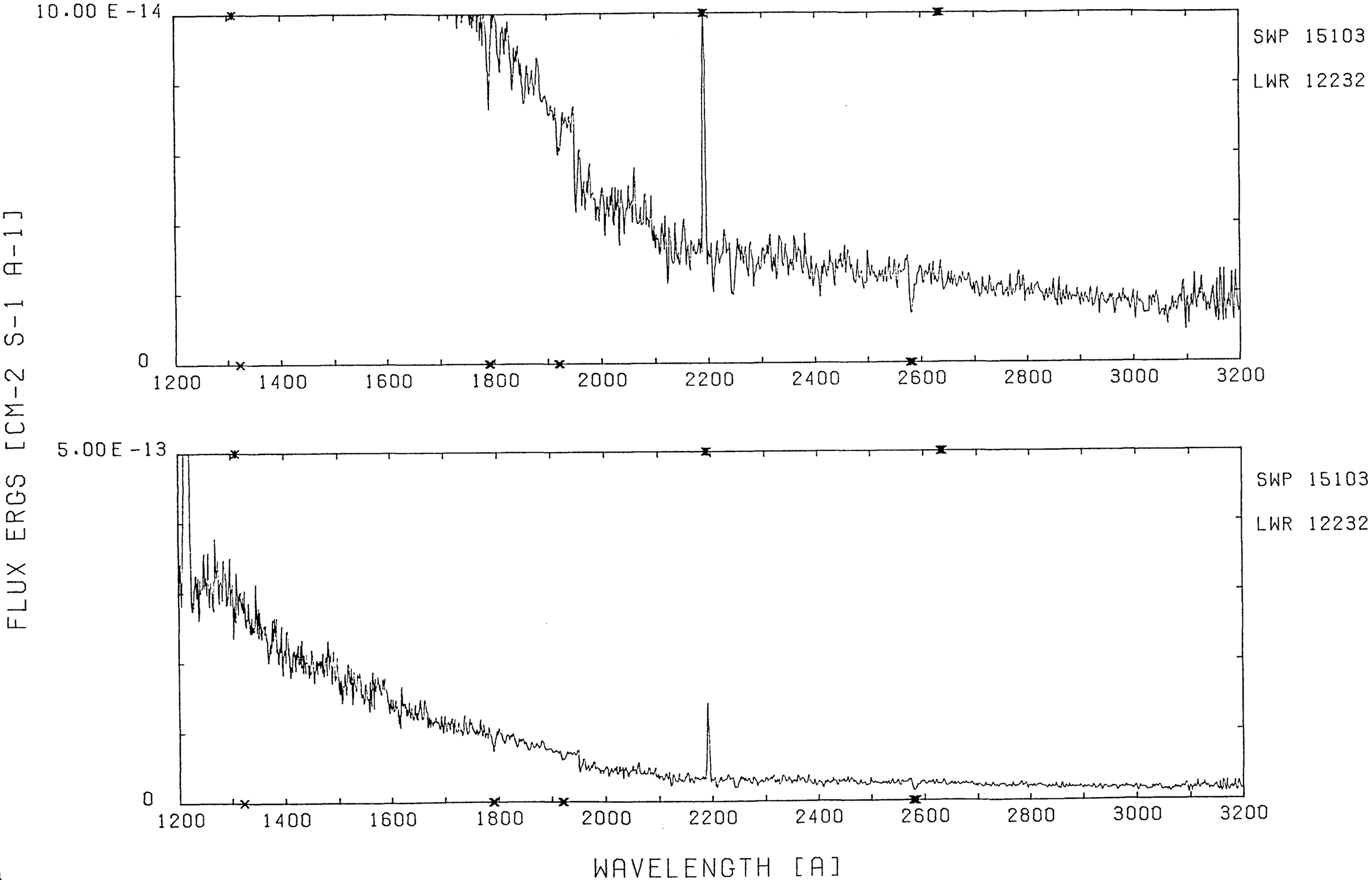
K1-27


2.50E-13
0
SWP 21422
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
4.00E-13
0
SWP 21422
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

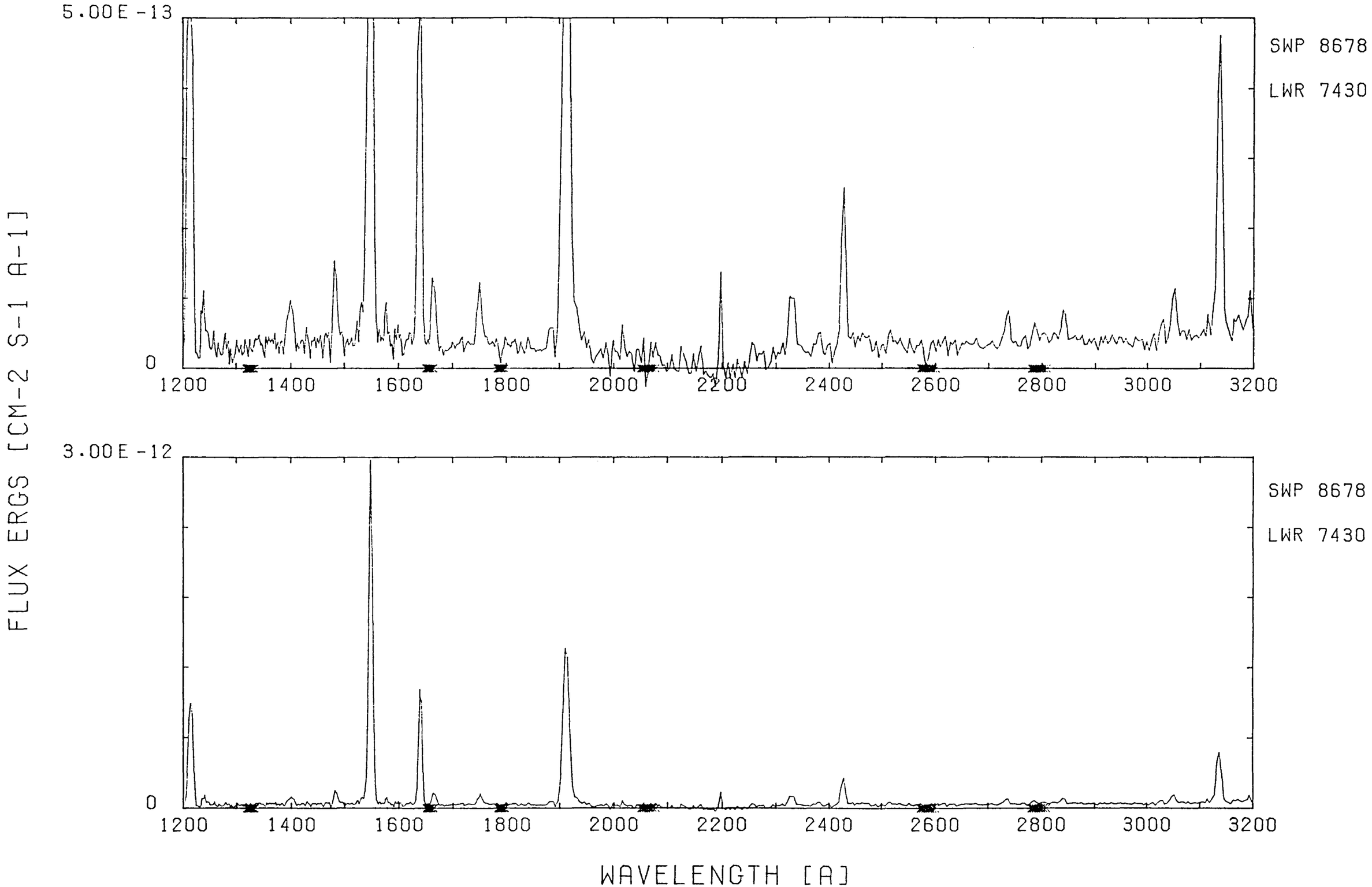
LMC P40


10.00 E -14
0
SWP 14032
LWR 10712
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
2.50E -13
0
SWP 14032
LWR 10712
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

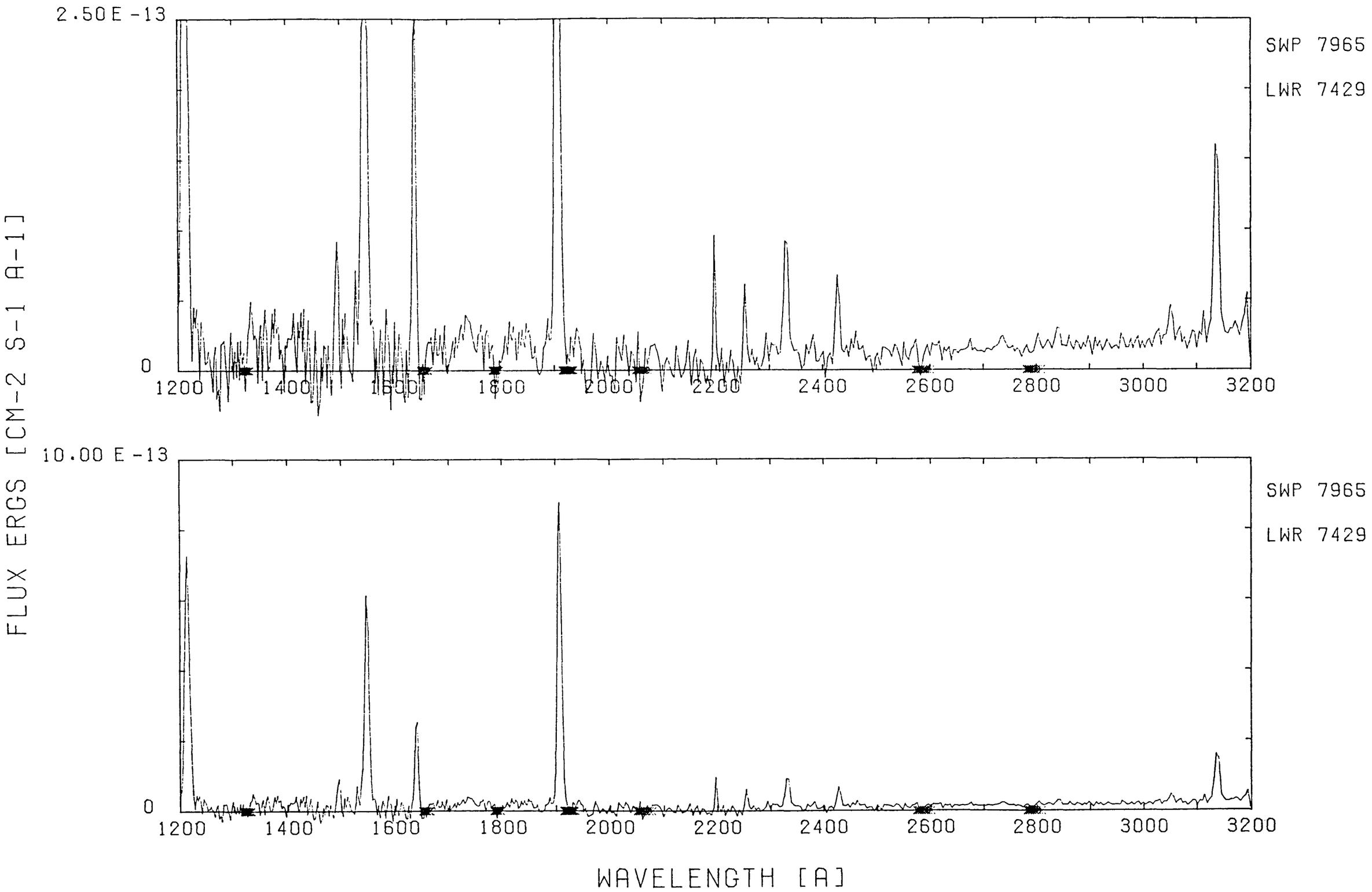
PW-1


10.00 E -14
0
SWP 15103
LWR 12232
FLUX ERGS [CM-2 S-1 A-1]
5.00E -13
0
SWP 15103
LWR 12232
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

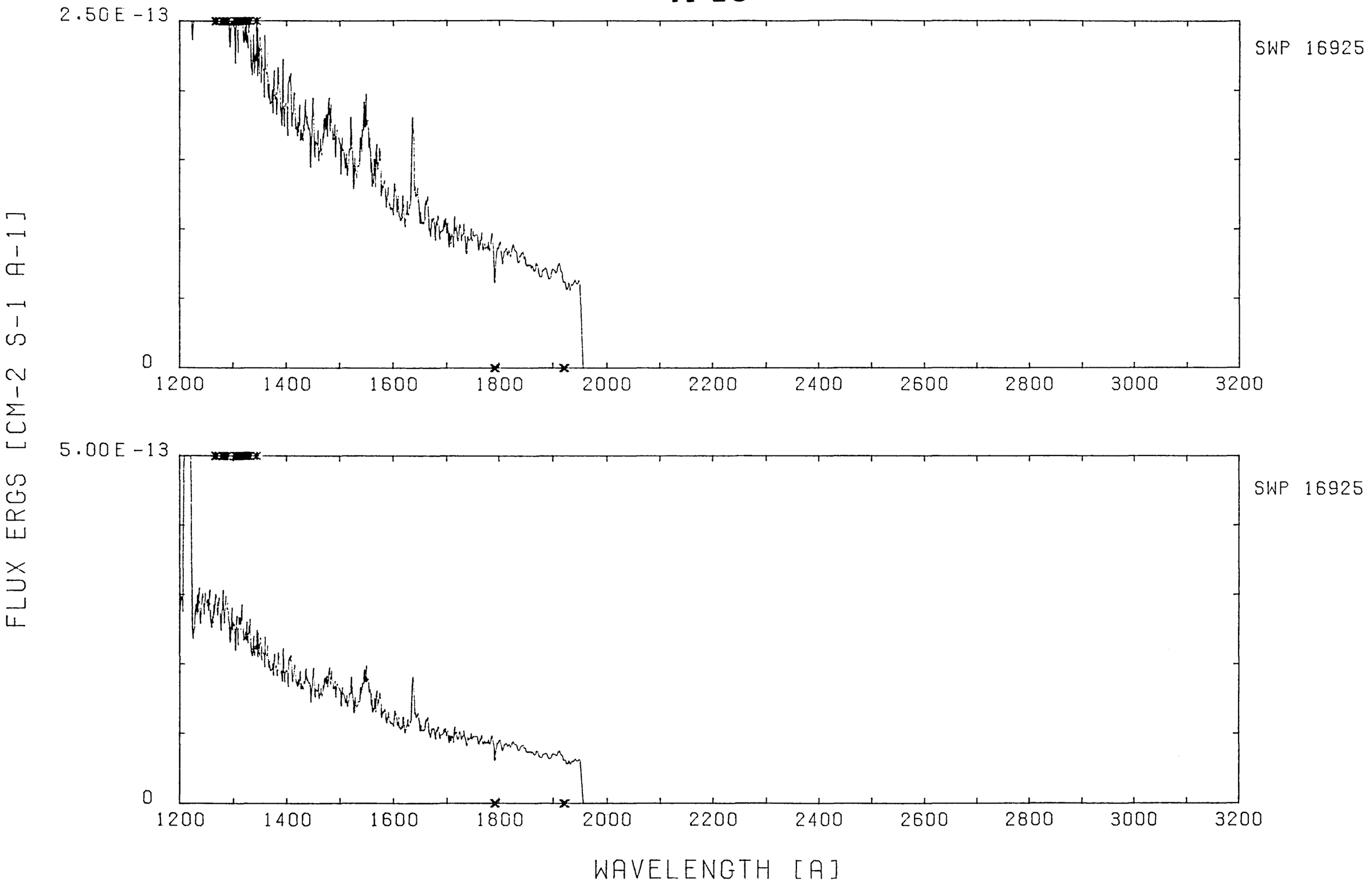
IC 2165


5.00E-13
0
SWP 8678
LWR 7430
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
3.00E-12
0
SWP 8678
LWR 7430
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

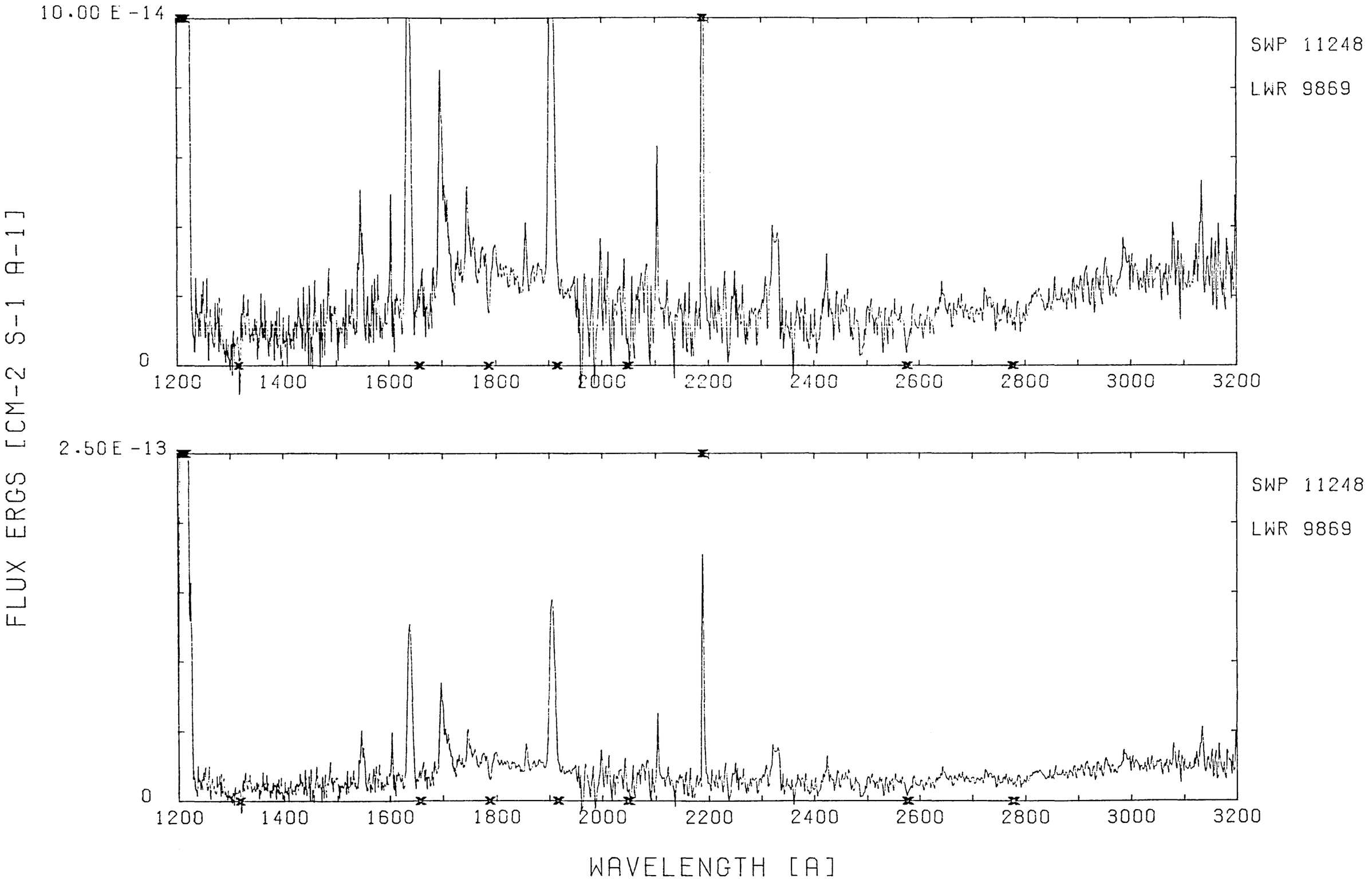
J-900


2.50E-13
0
SWP 7965
LWR 7429
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
10.00 E-13
0
SWP 7965
LWR 7429
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

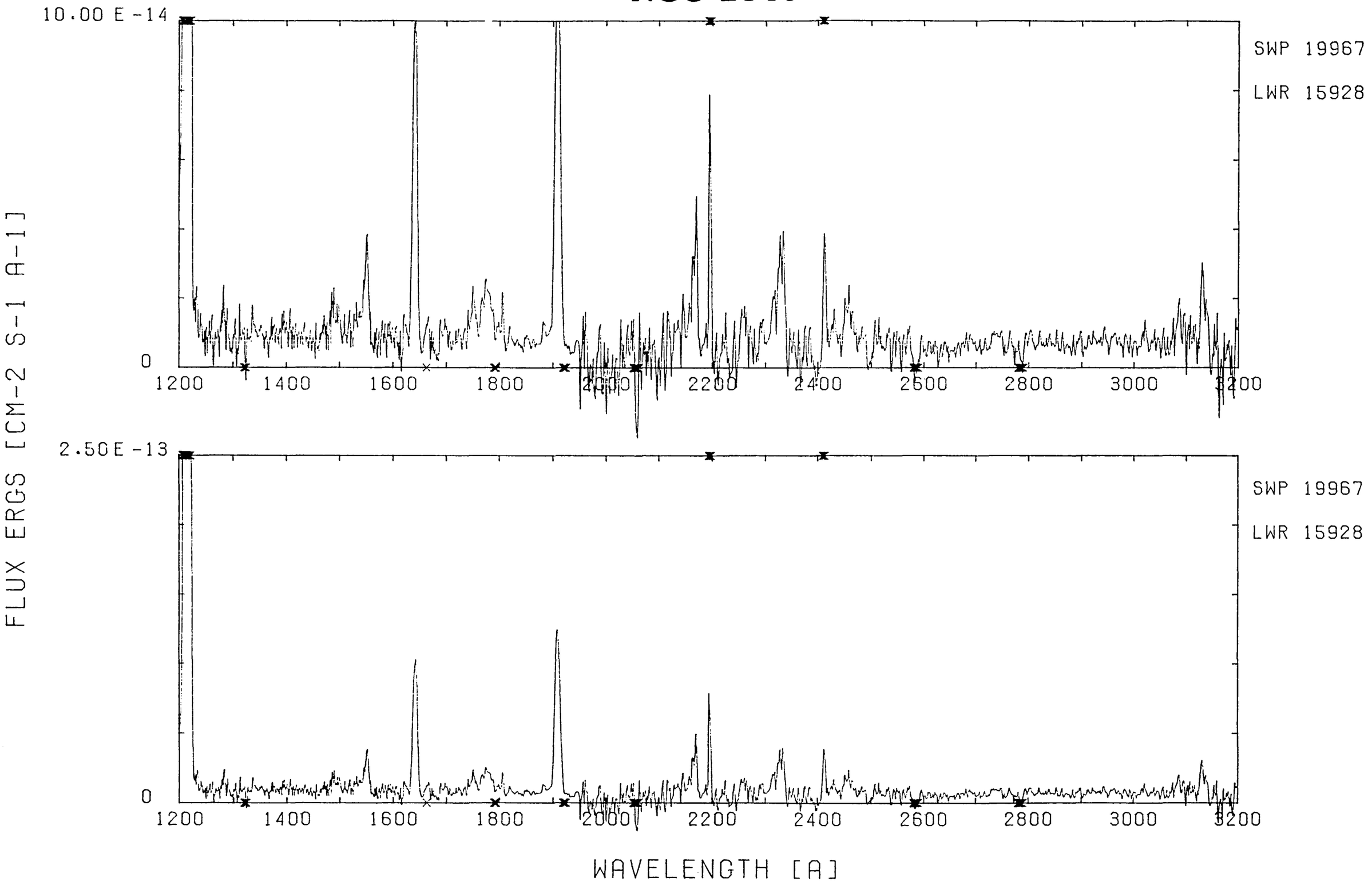
A-15


2.50E-13
0
SWP 16925
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
5.00E-13
0
SWP 16925
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

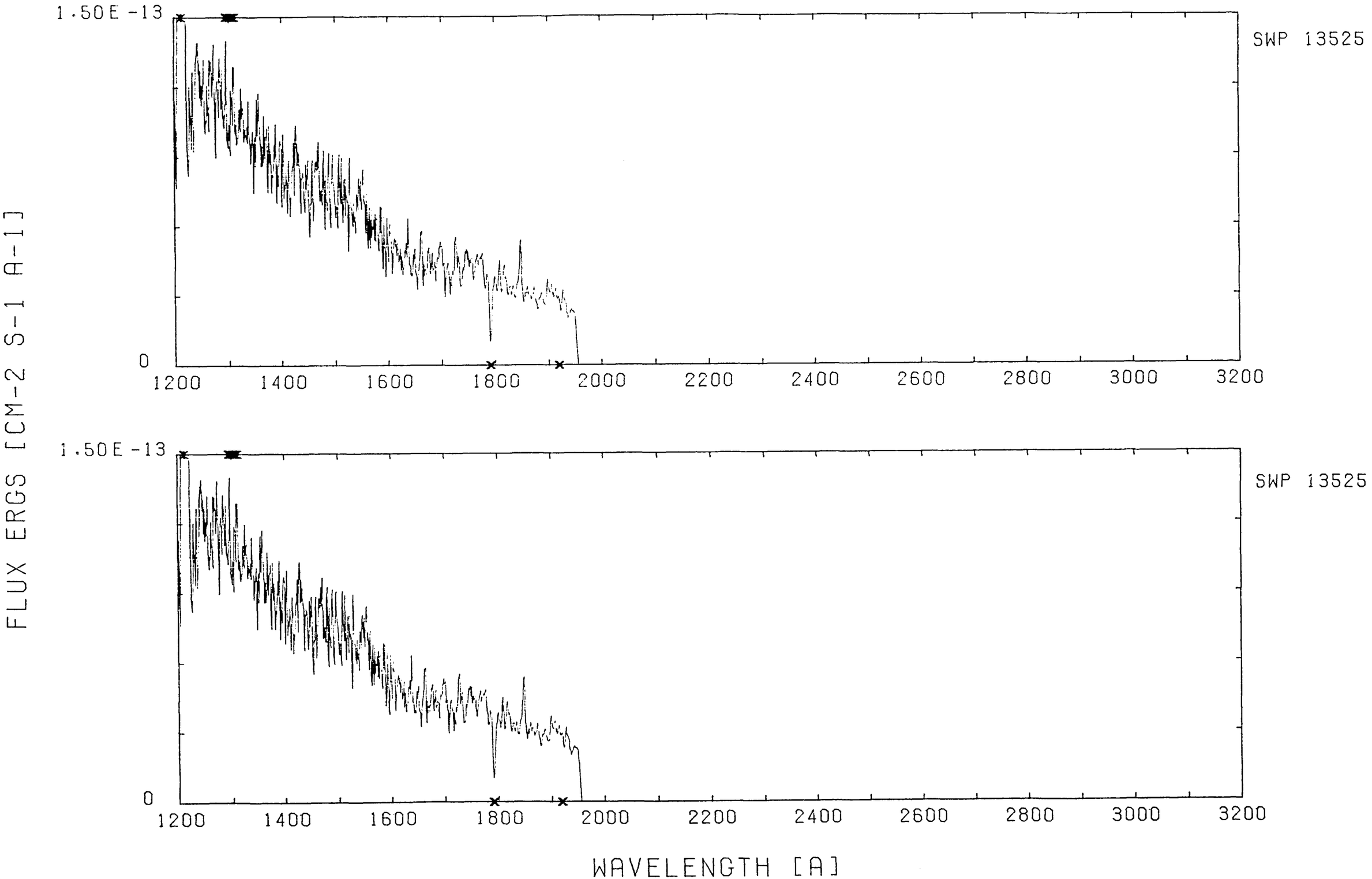
NGC 2346


10.00 E -14
0
SWP 11248
LWR 9869
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
2.50E -13
0
SWP 11248
LWR 9869
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

NGC 2346


10.00 E -14
0
SWP 19967
LWR 15928
2.50E -13
0
SWP 19967
LWR 15928
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

A-20


1.50E-13
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SWP 13525
1200
1400
1600
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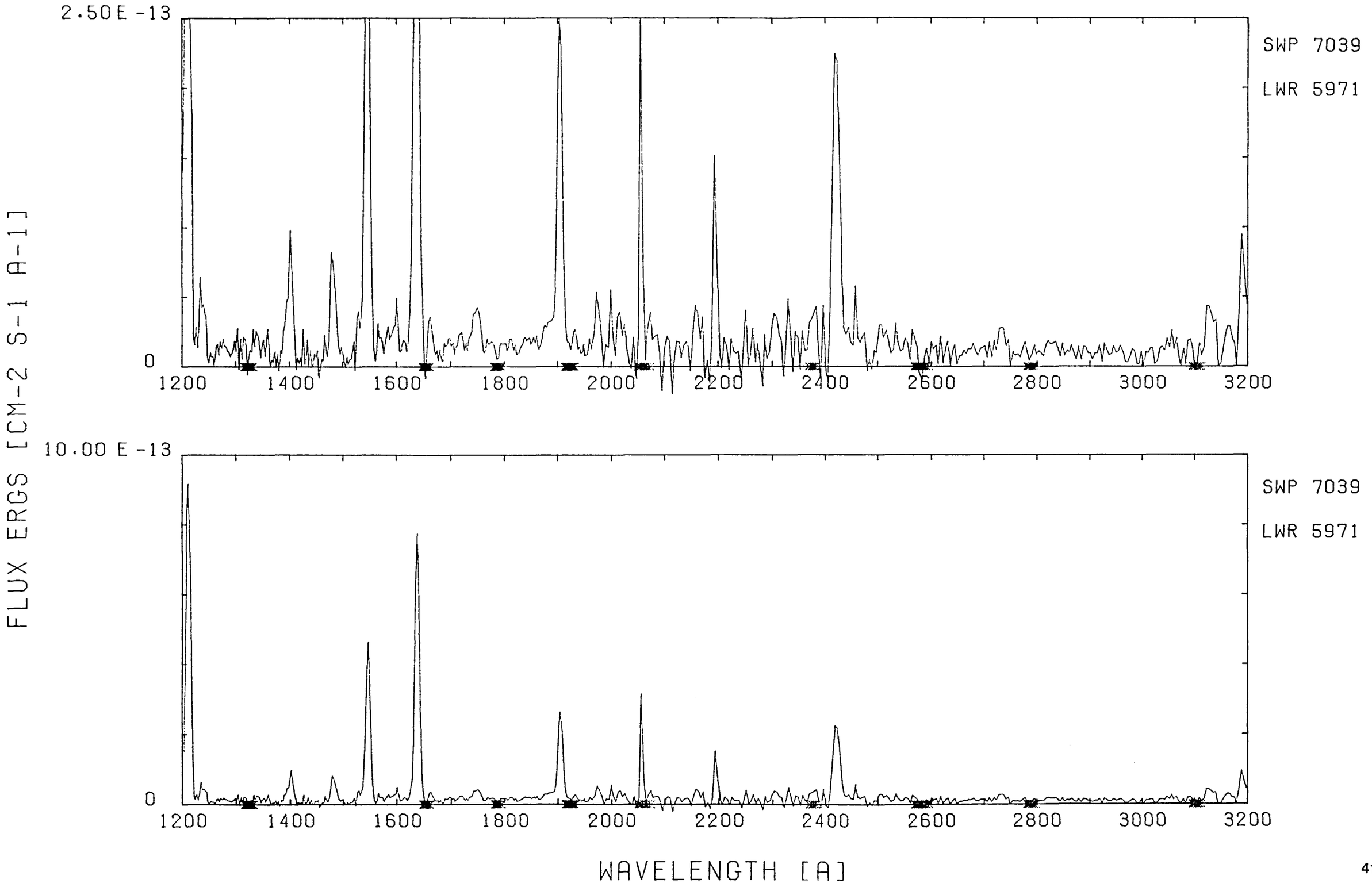
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 2371


2.50E-13
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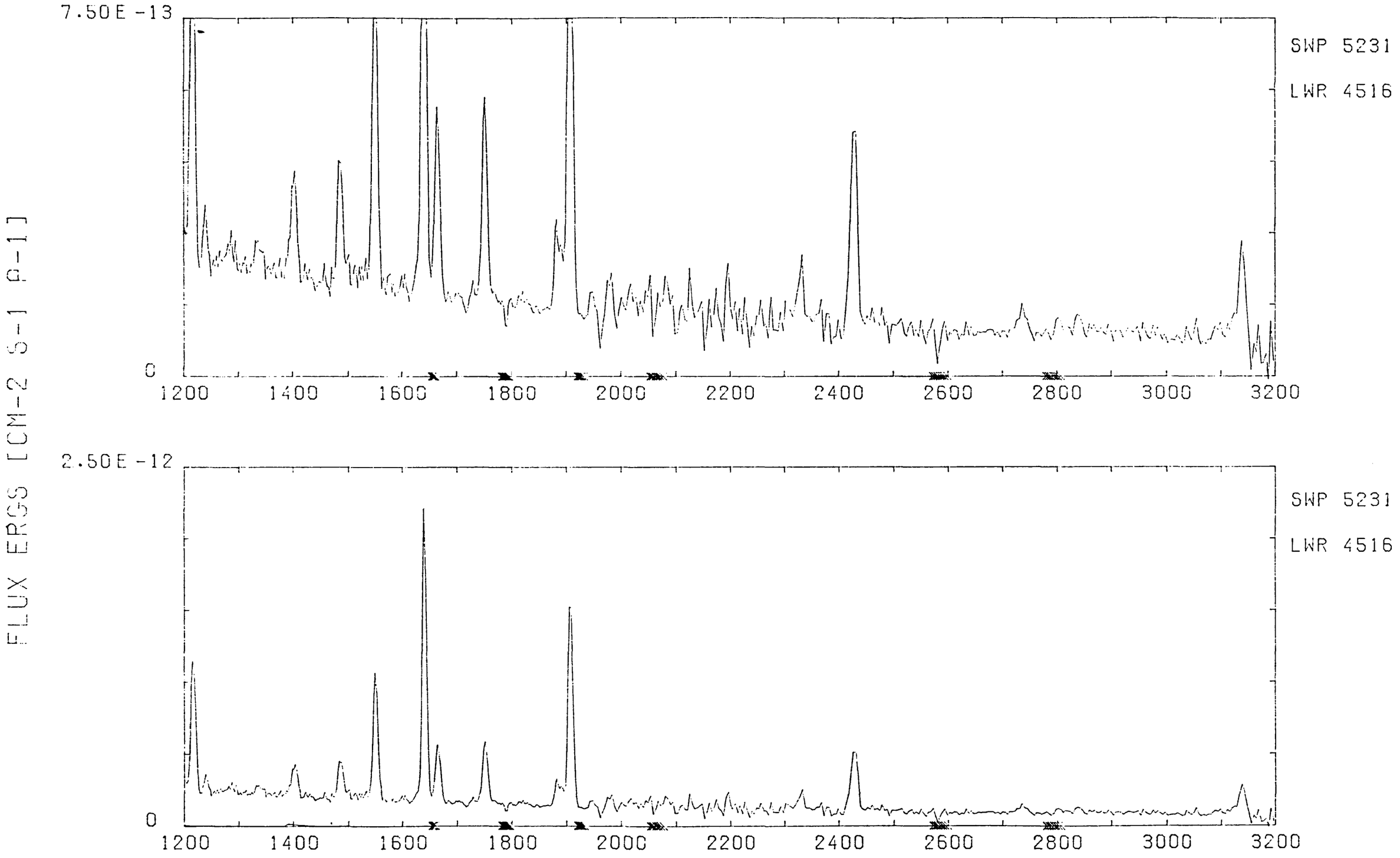
SWP 7039
LWR 5971
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
M-2 S-1 A-1]
10.00 E-13
0
SWP 7039
LWR 5971
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [C
WAVELENGTH [A]

NGC 2392


7.50E-13
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SWP 5231
LWR 4516
2.50E-12
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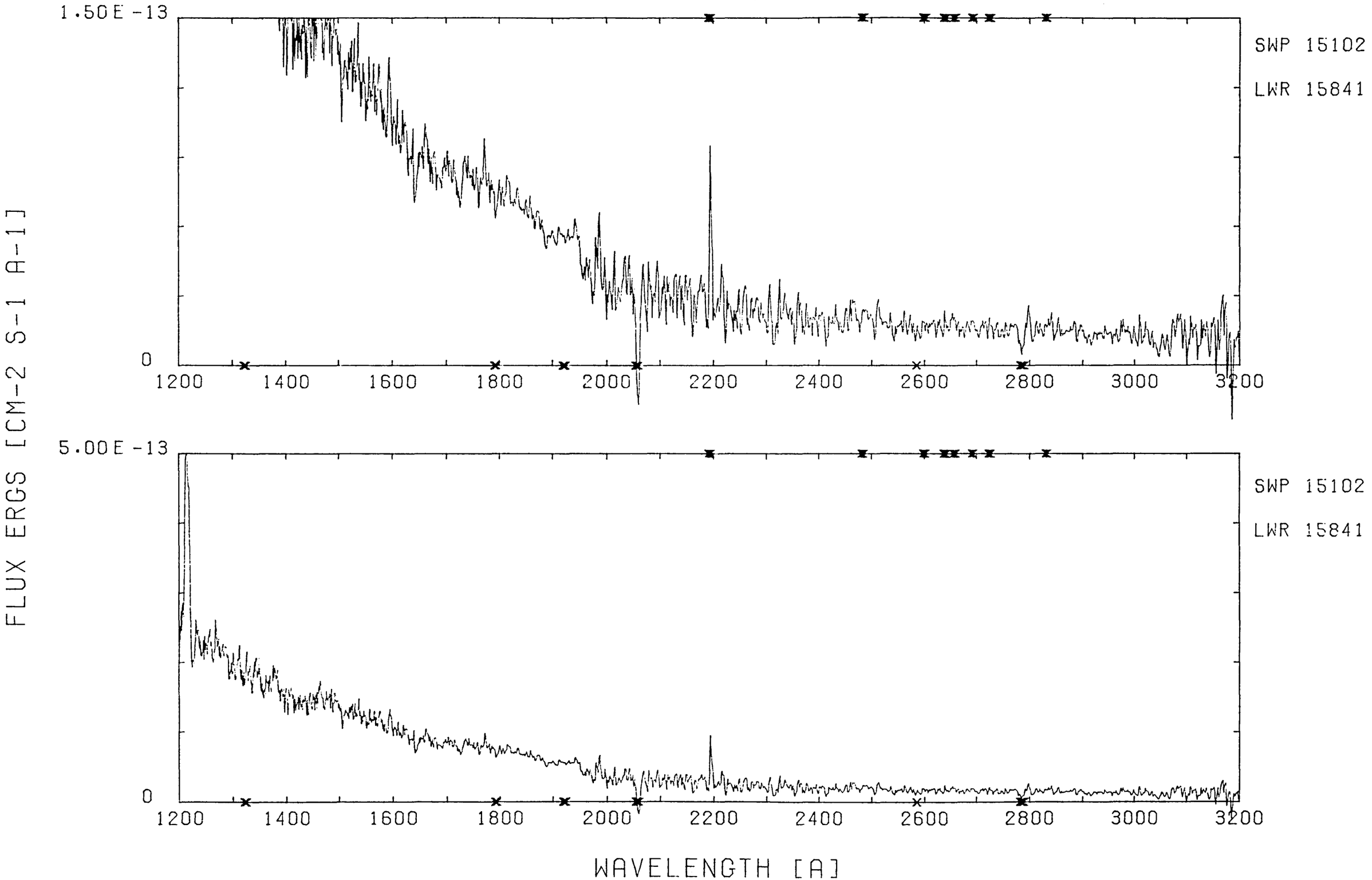
LWR 4516
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

YM-29


1.50E-13
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1400
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2000
2200
2400
2600
2800
3000
3200
SWP 15102
LWR 15841
FLUX ERGS CM-2 S-1 A-1]
5.00E-13
0
1200
1400
1600
1800
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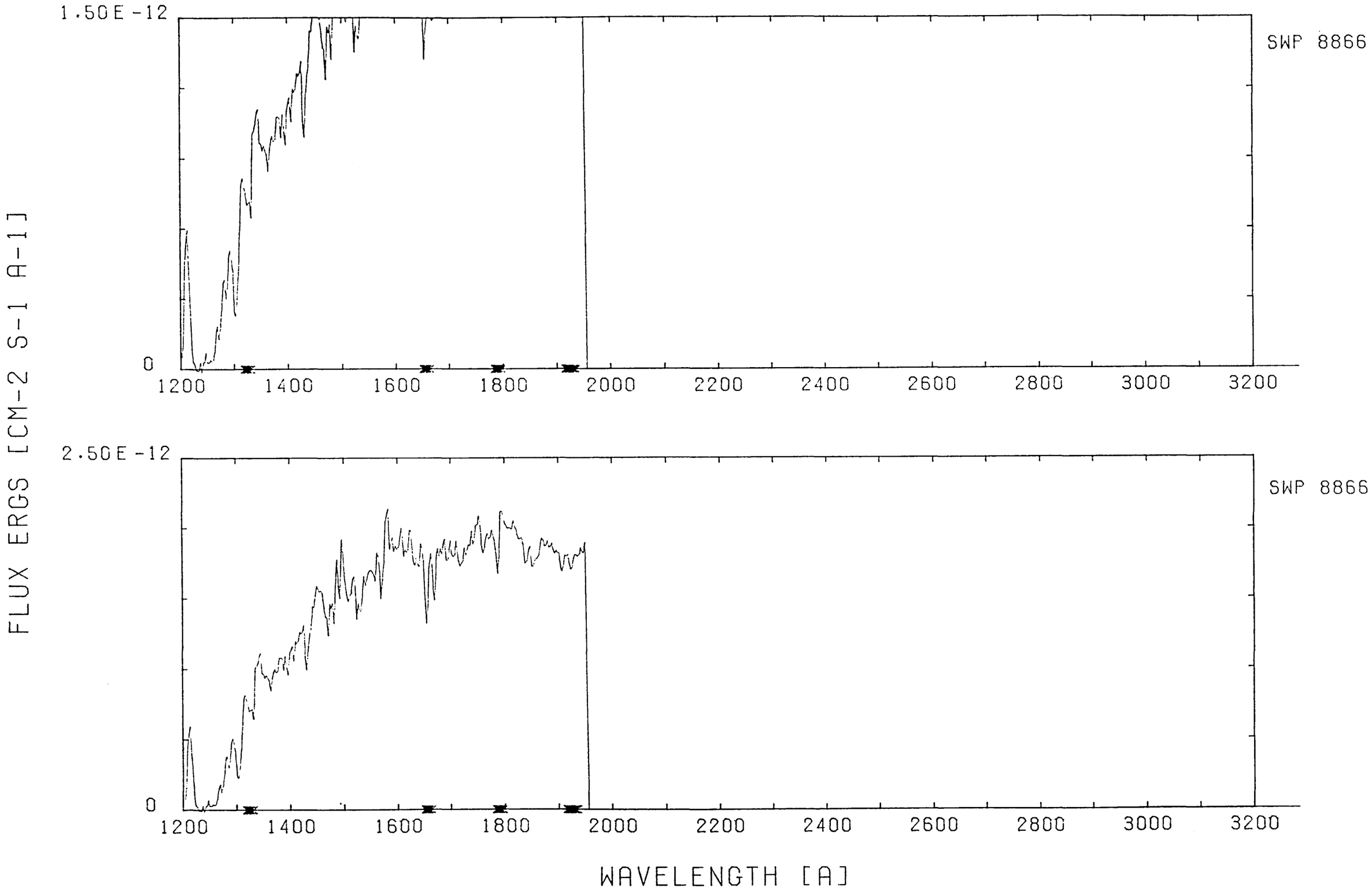
2200
2400
2600
2800
3000
3200
SWP 15102
LWR 15841
WAVELENGTH [A]

VV1-7


1.50E-12
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SWP 8866
2.50E-12
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SWP 8866
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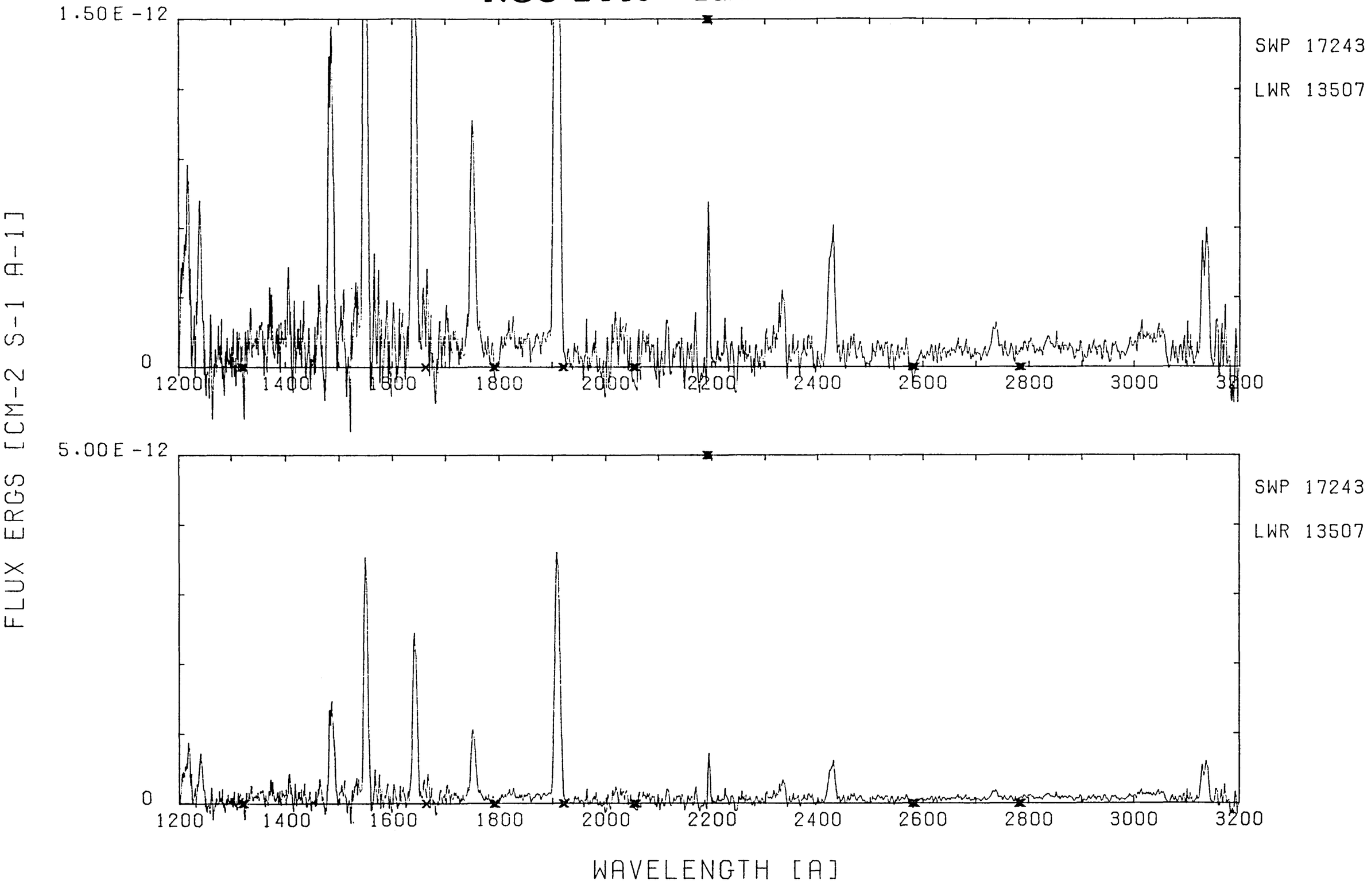
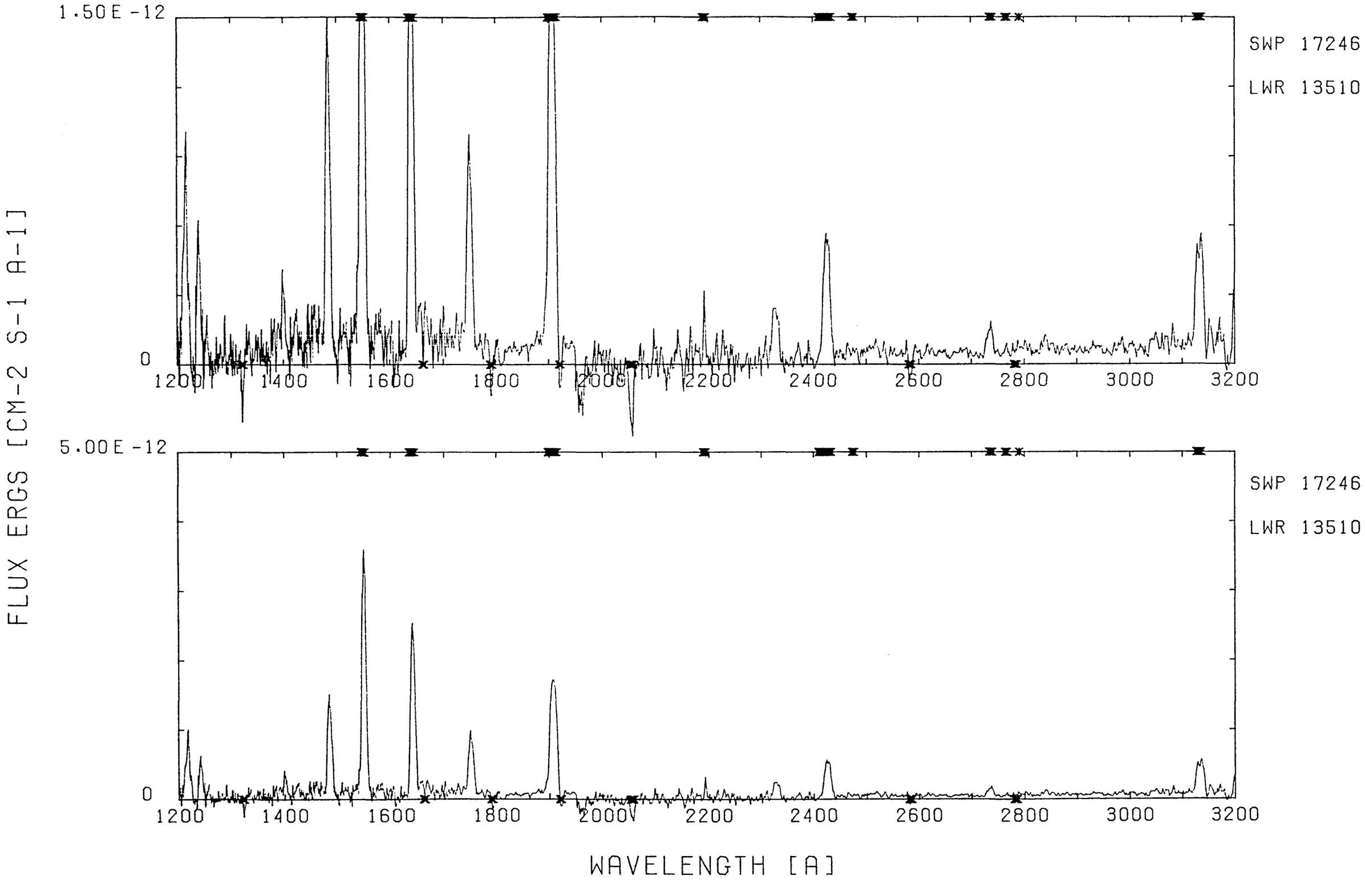
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

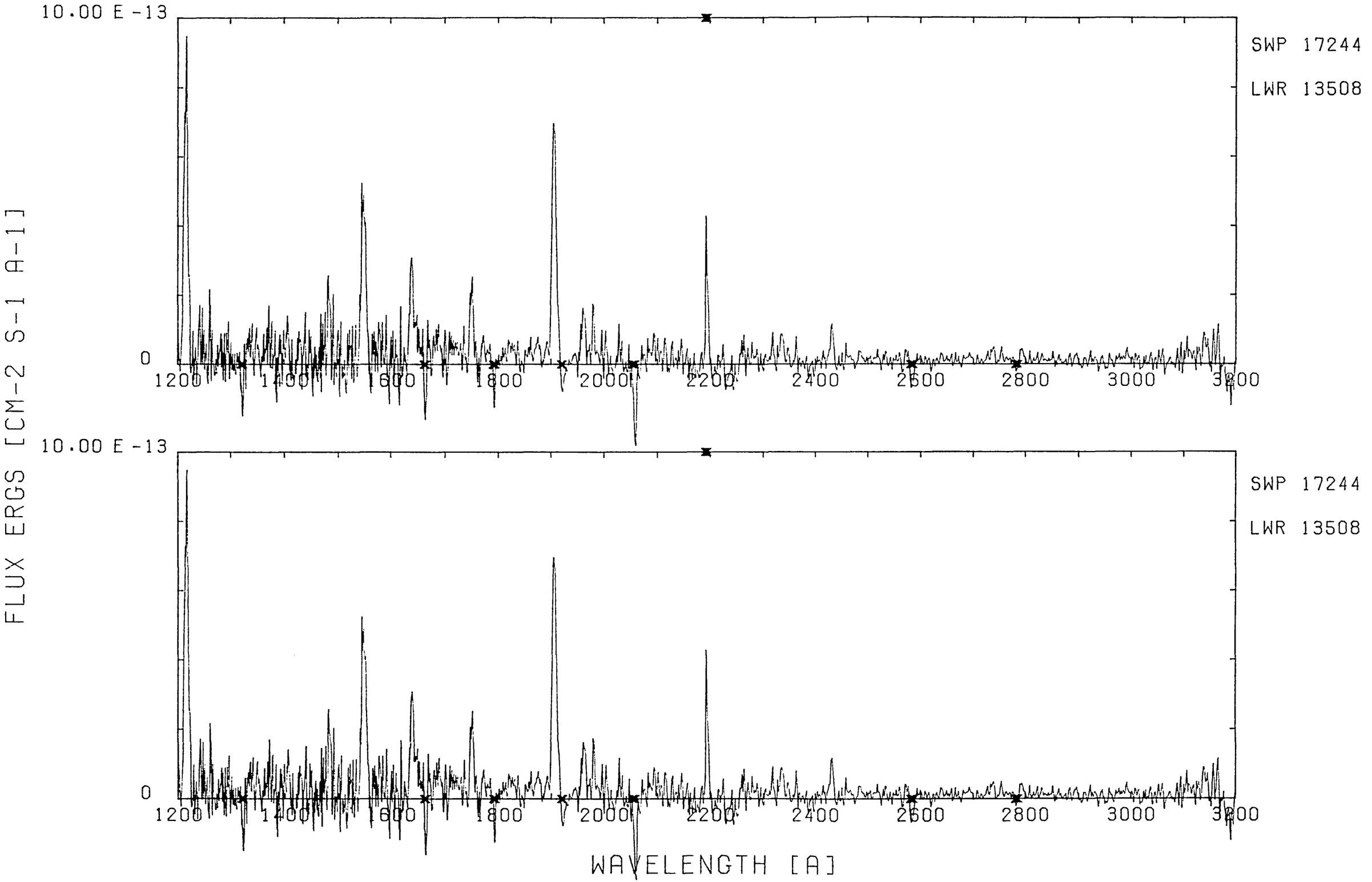
NGC 2440 - LGAP cented on CS



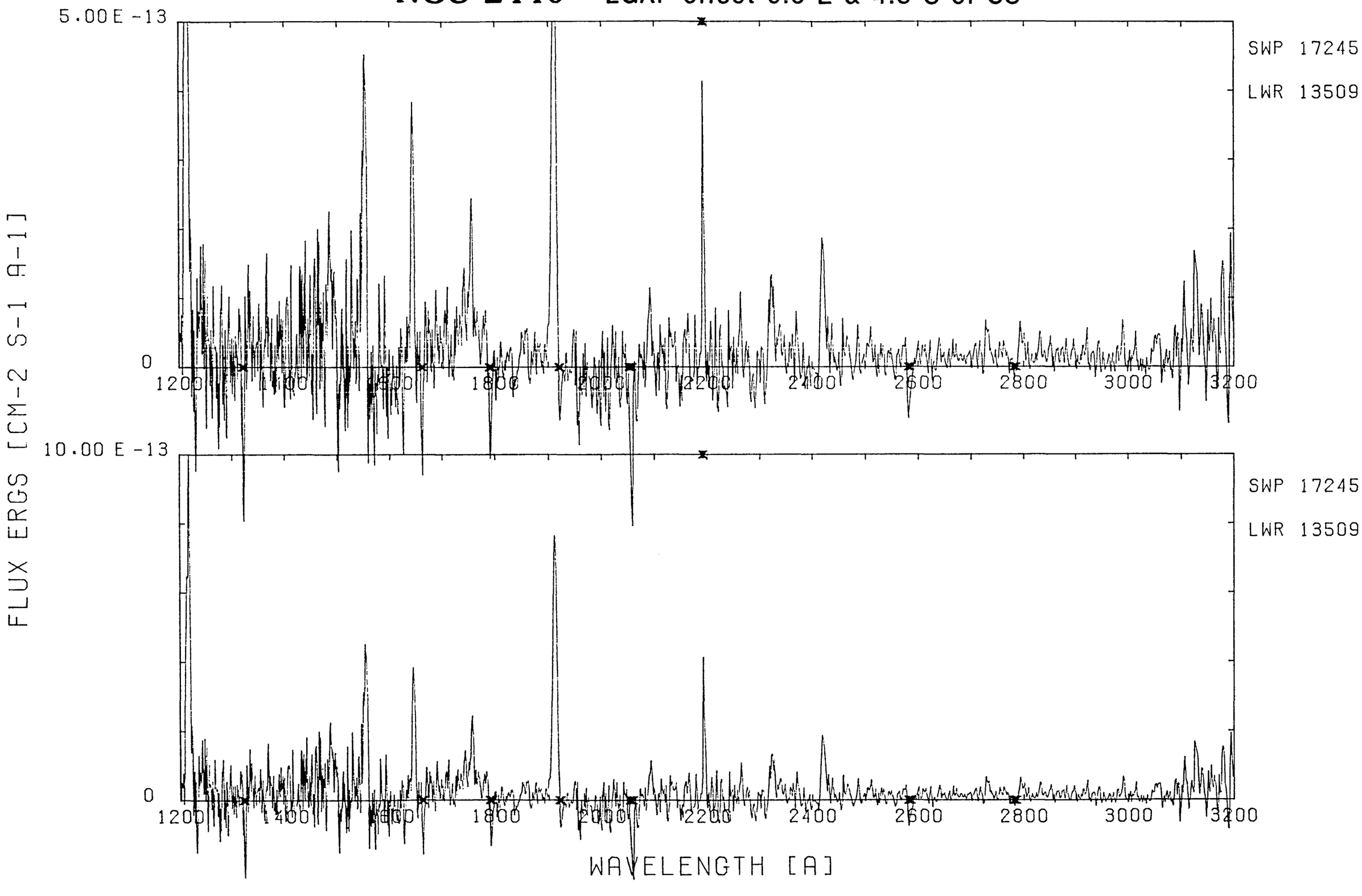
NGC 2440 - LGAP centered on CS



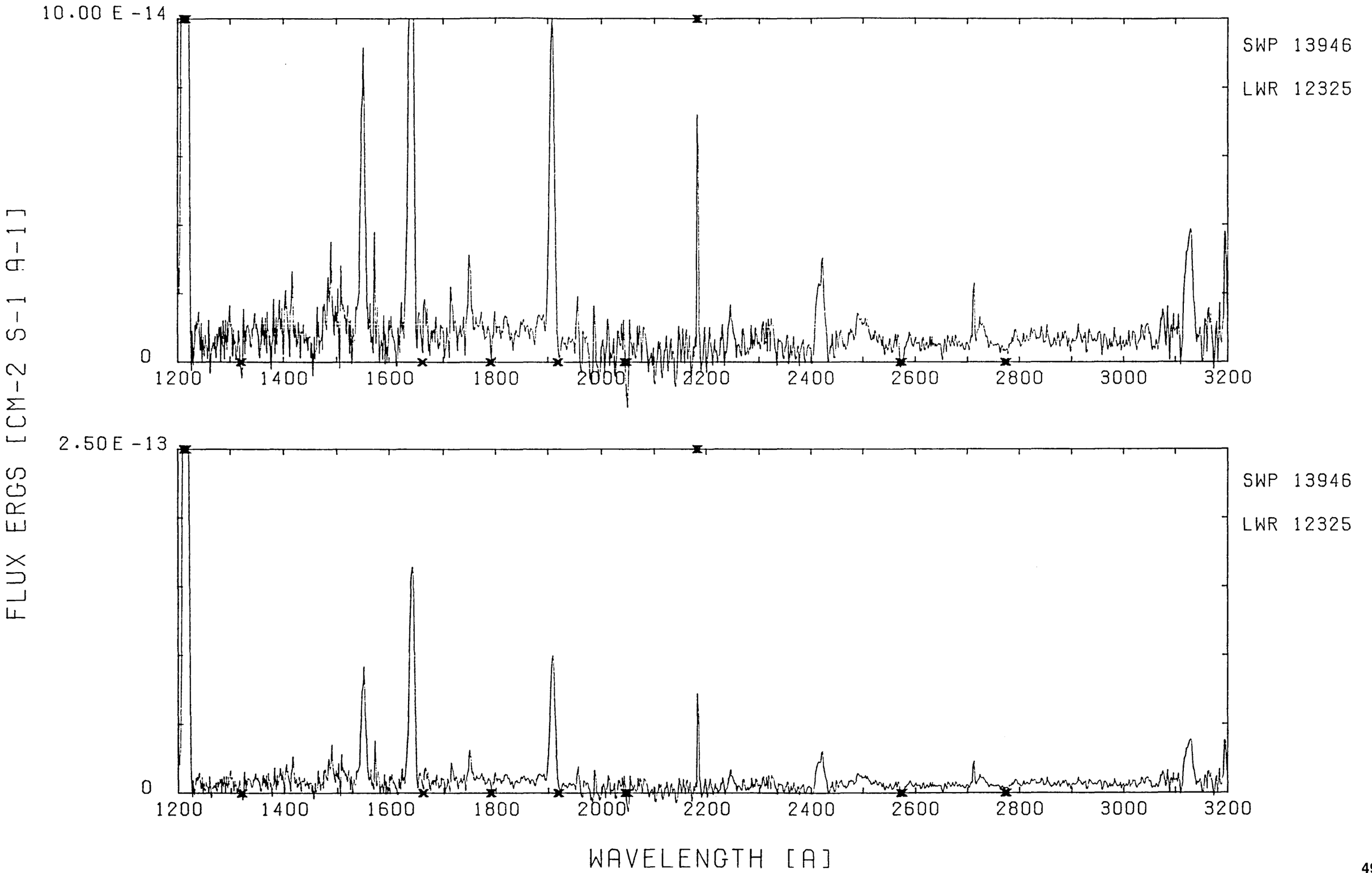
NGC 2440 - LGAP offset 9.0"W & 4.3"N of CS



NGC 2440 - LGAP offset 9.0″E & 4.3″S of CS



NGC 2452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LWR 12325
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
2.50E -13
0
SWP 13946
LWR 12325
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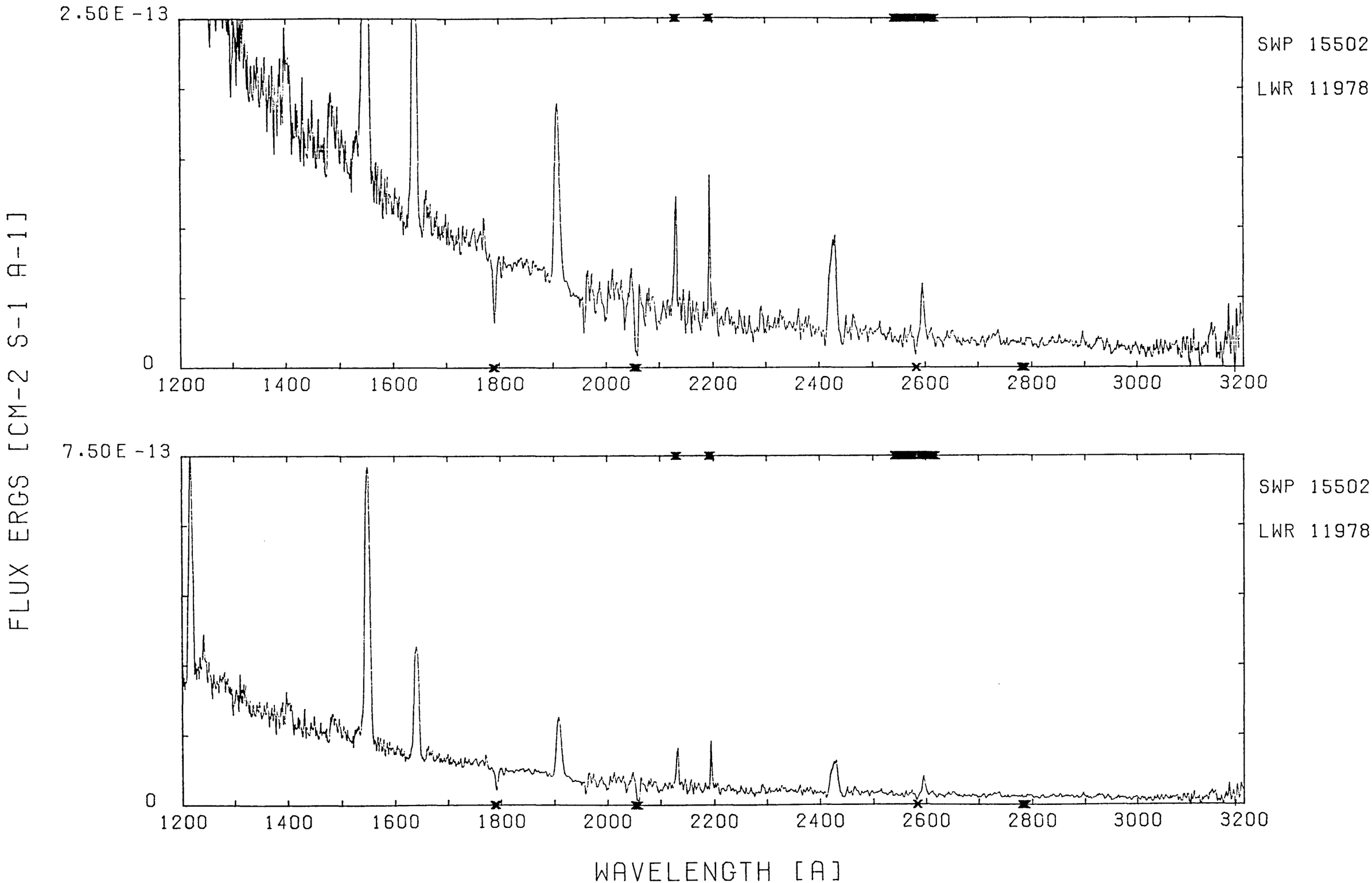
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

NGC 2610


2.50E-13
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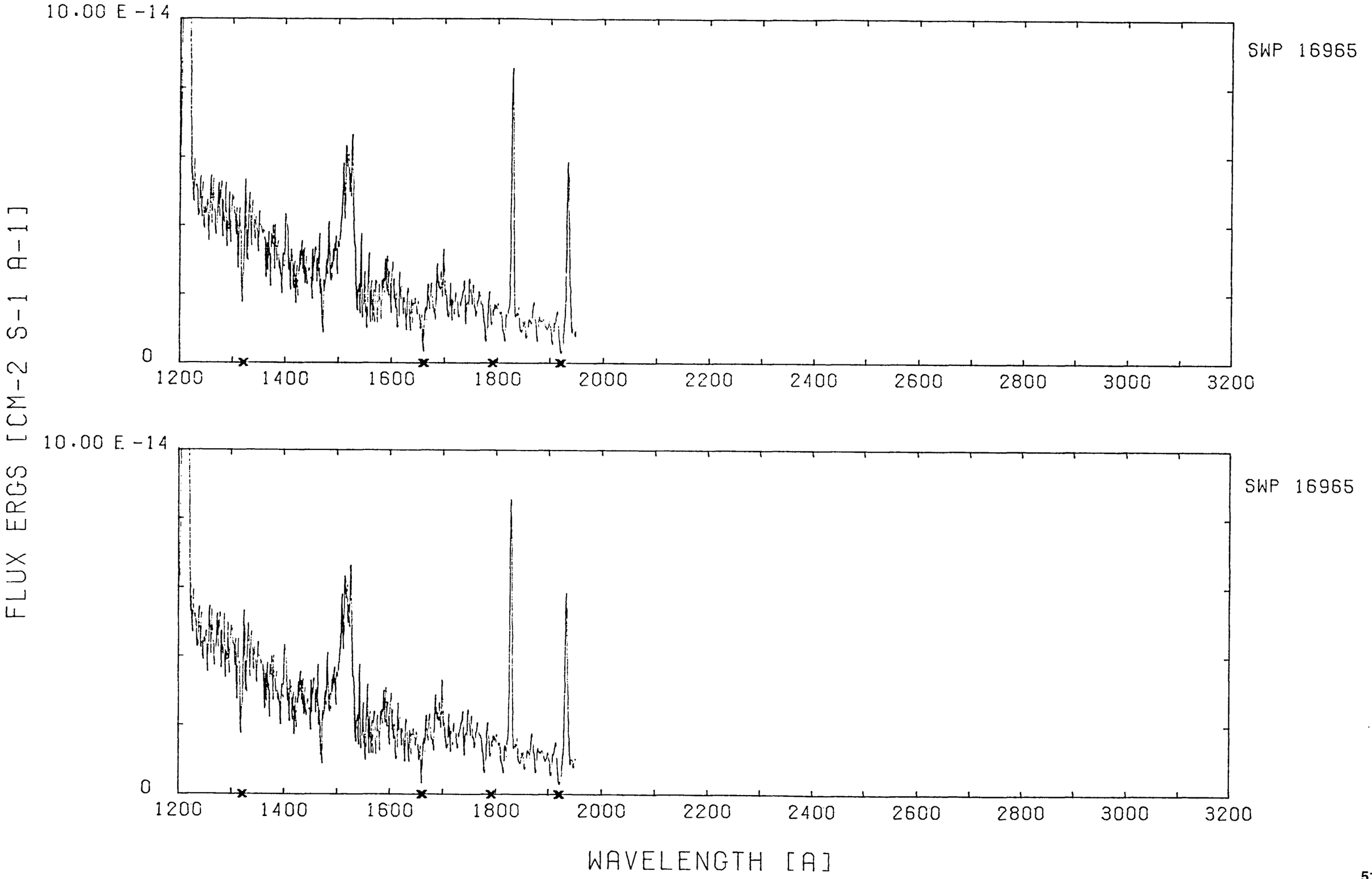
SWP 15502
LWR 11978
7.50E-13
0
SWP 15502
LWR 11978
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

A-28


10.00 E -14
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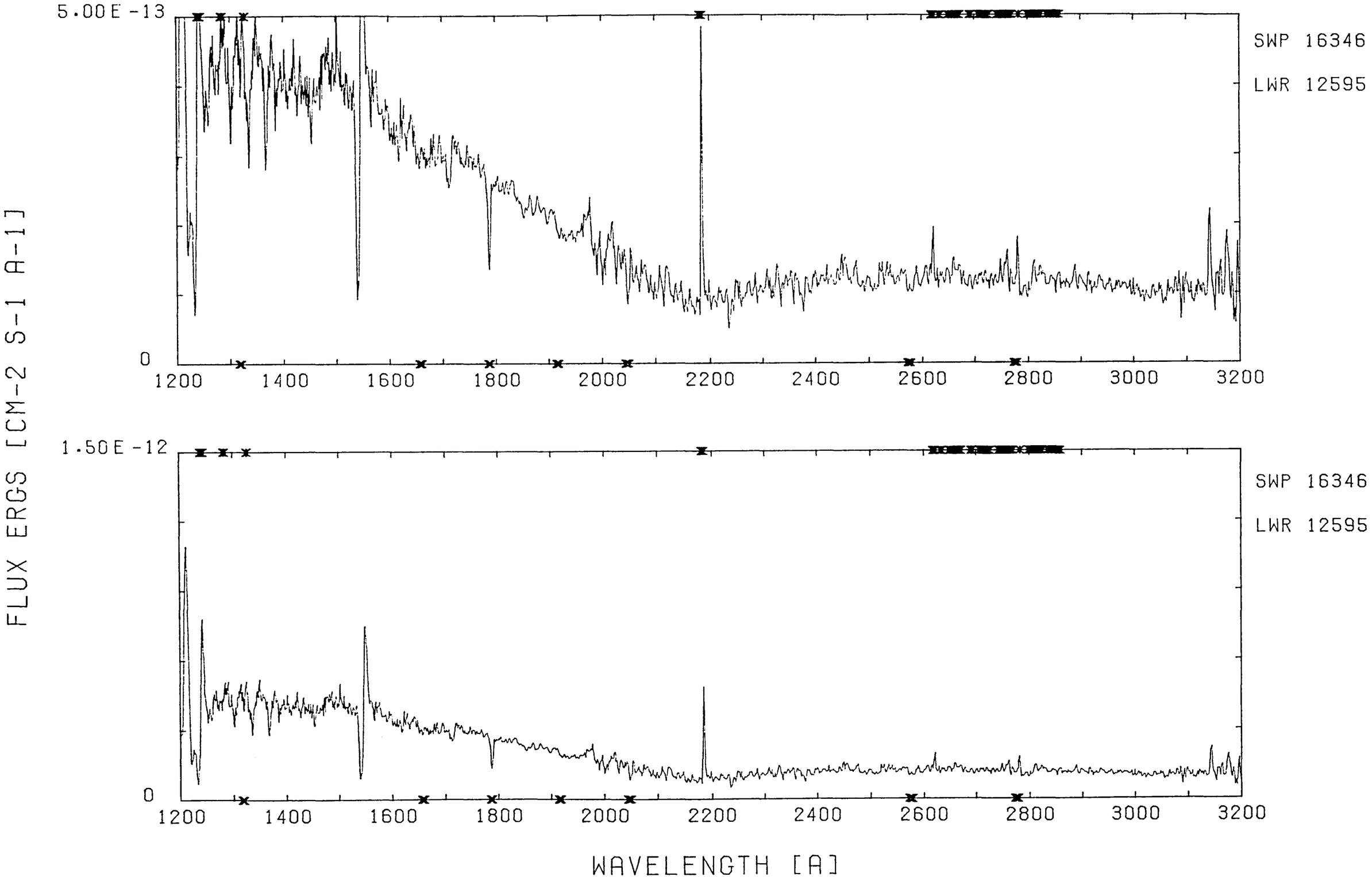
SWP 16965
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

M3-6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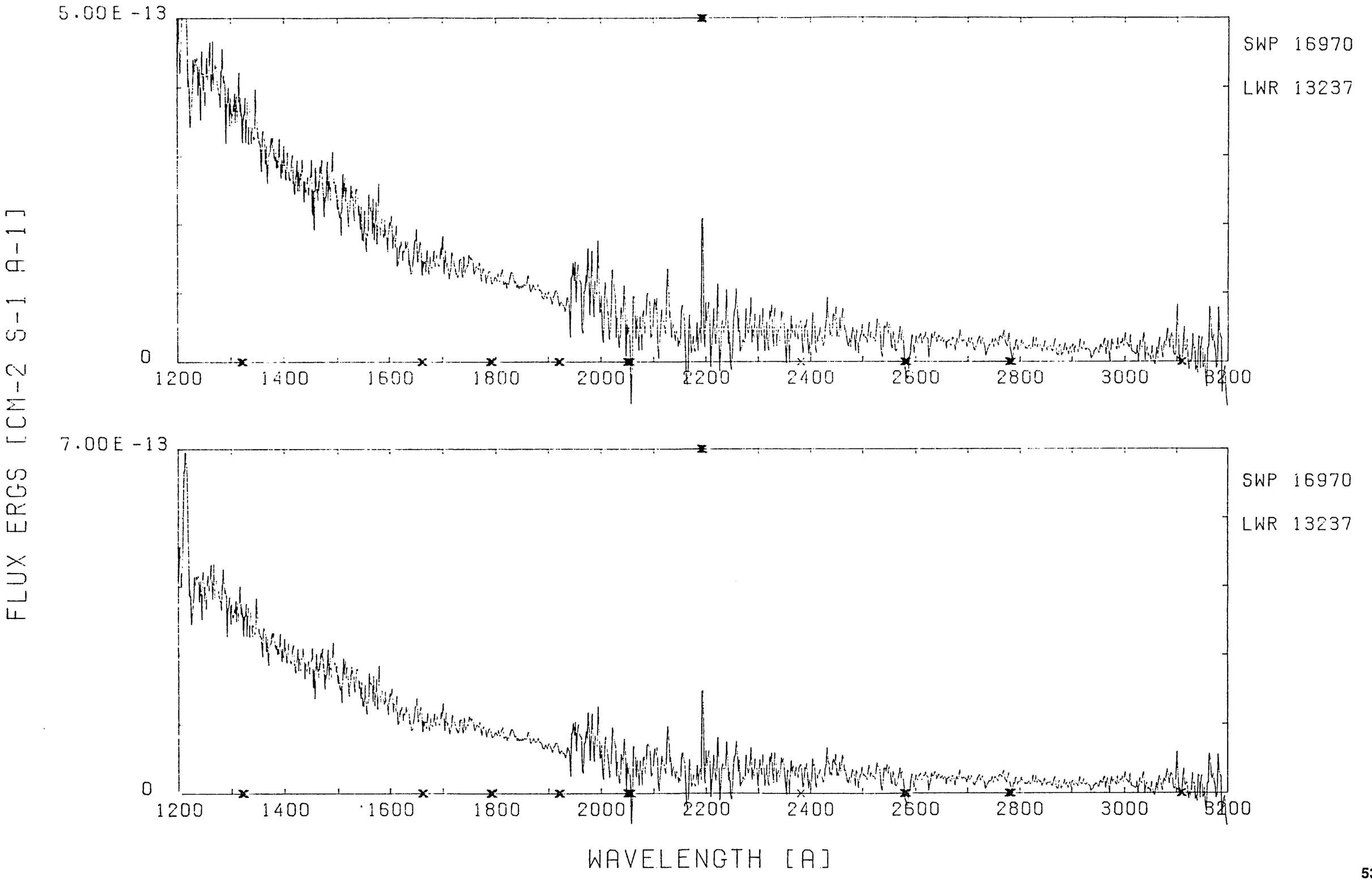
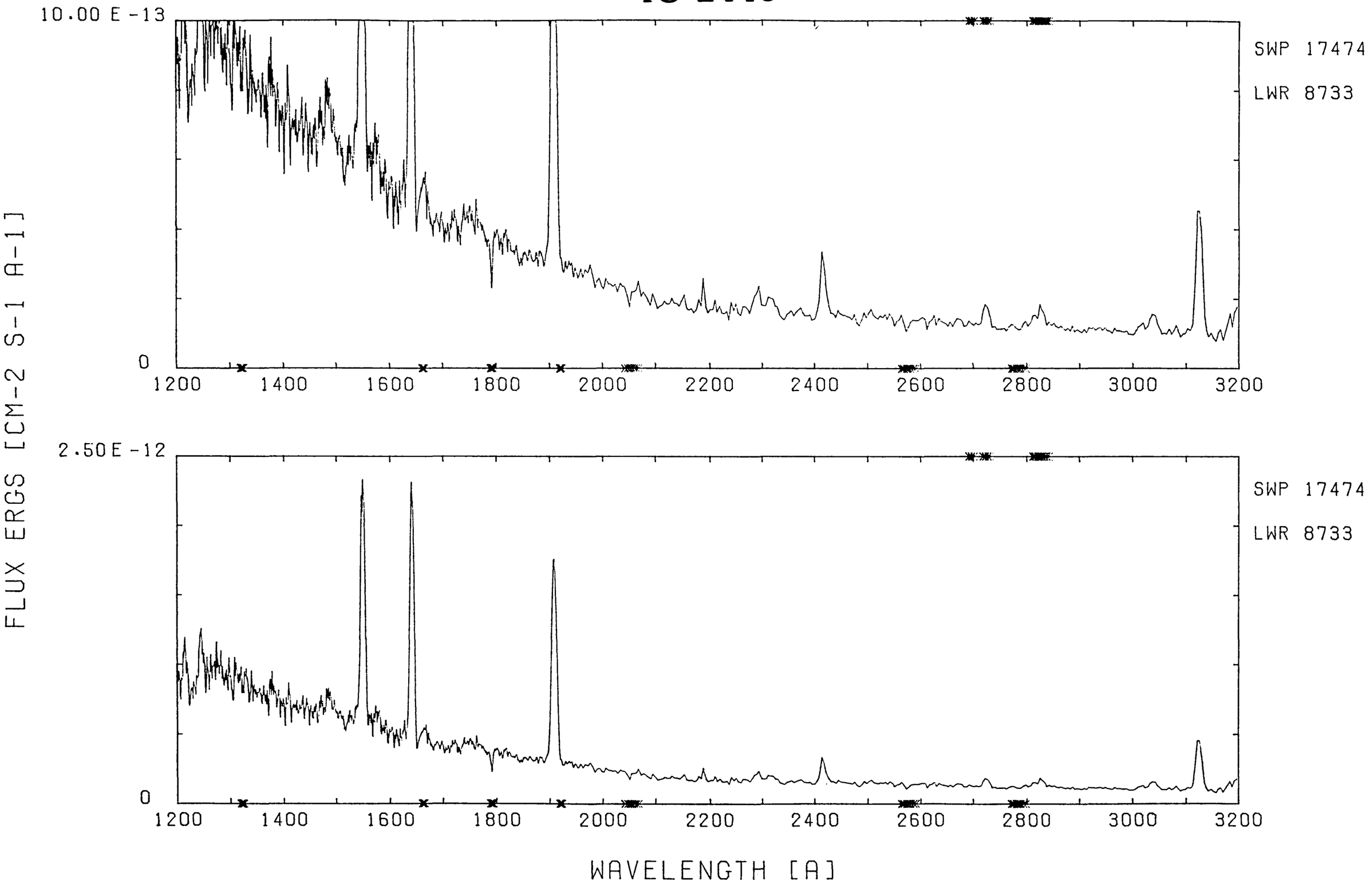
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 16346
LWR 12595
FLUX ERGS [CM-2 S-1 A-1]
1.50E-12
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 16346
LWR 12595
WAVELENGTH [A]

A-31


5.00E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 16970
LWR 13237
FLUX ERGS CM-2 S-1 A-1]
7.00E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 16970
LWR 13237
WAVELENGTH [A]

IC 2448


10.00 E -13
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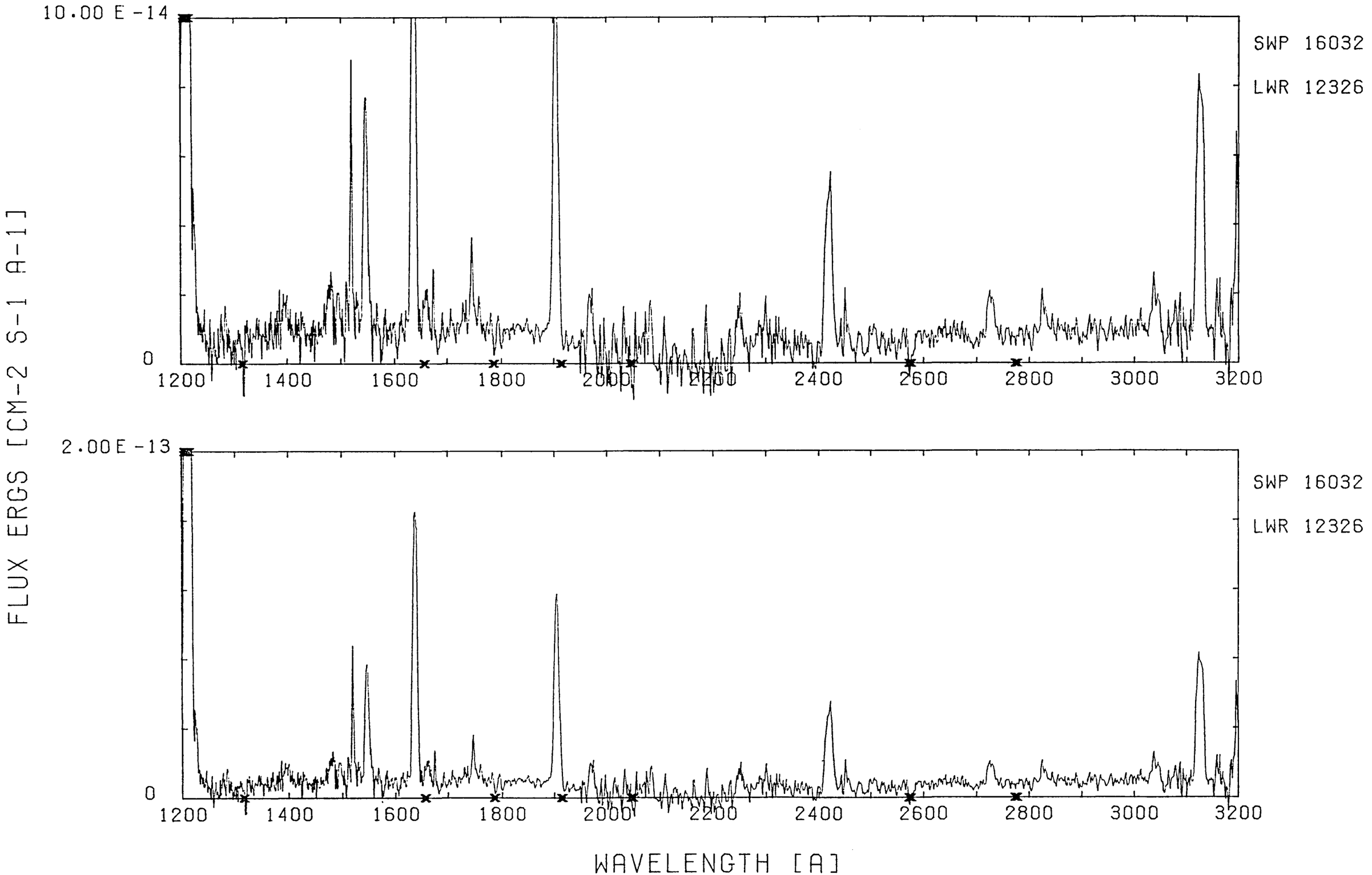
SWP 17474
LWR 8733
FLUX ERGS [CM-2 S-1 A-1]
2.50 E -12
0
SWP 17474
LWR 8733
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

NGC 2792


10.00 E -14
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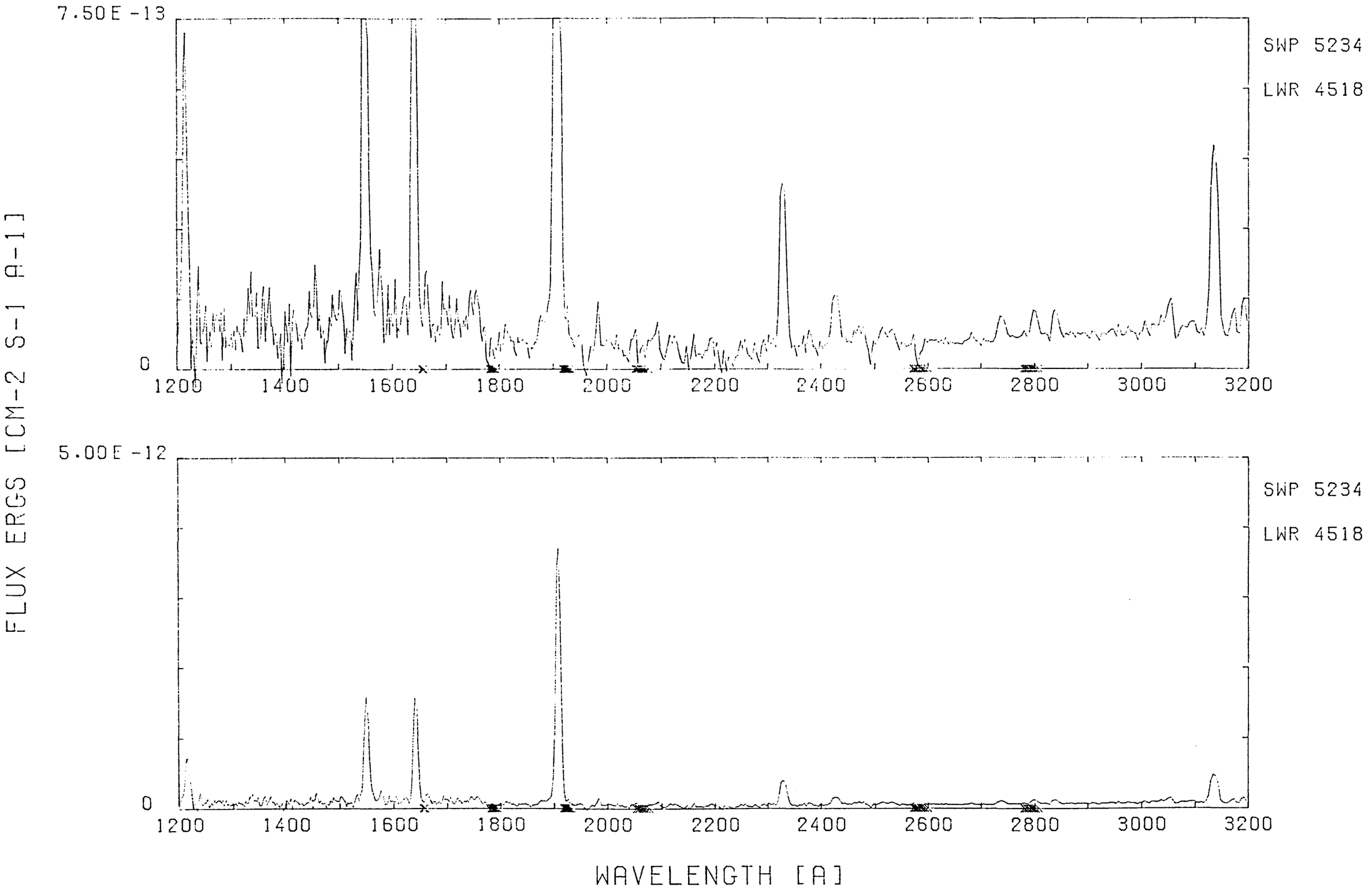
SWP 16032
LWR 12326
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
2.00E -13
0
SWP 16032
LWR 12326
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

NGC 2867


7.50E-13
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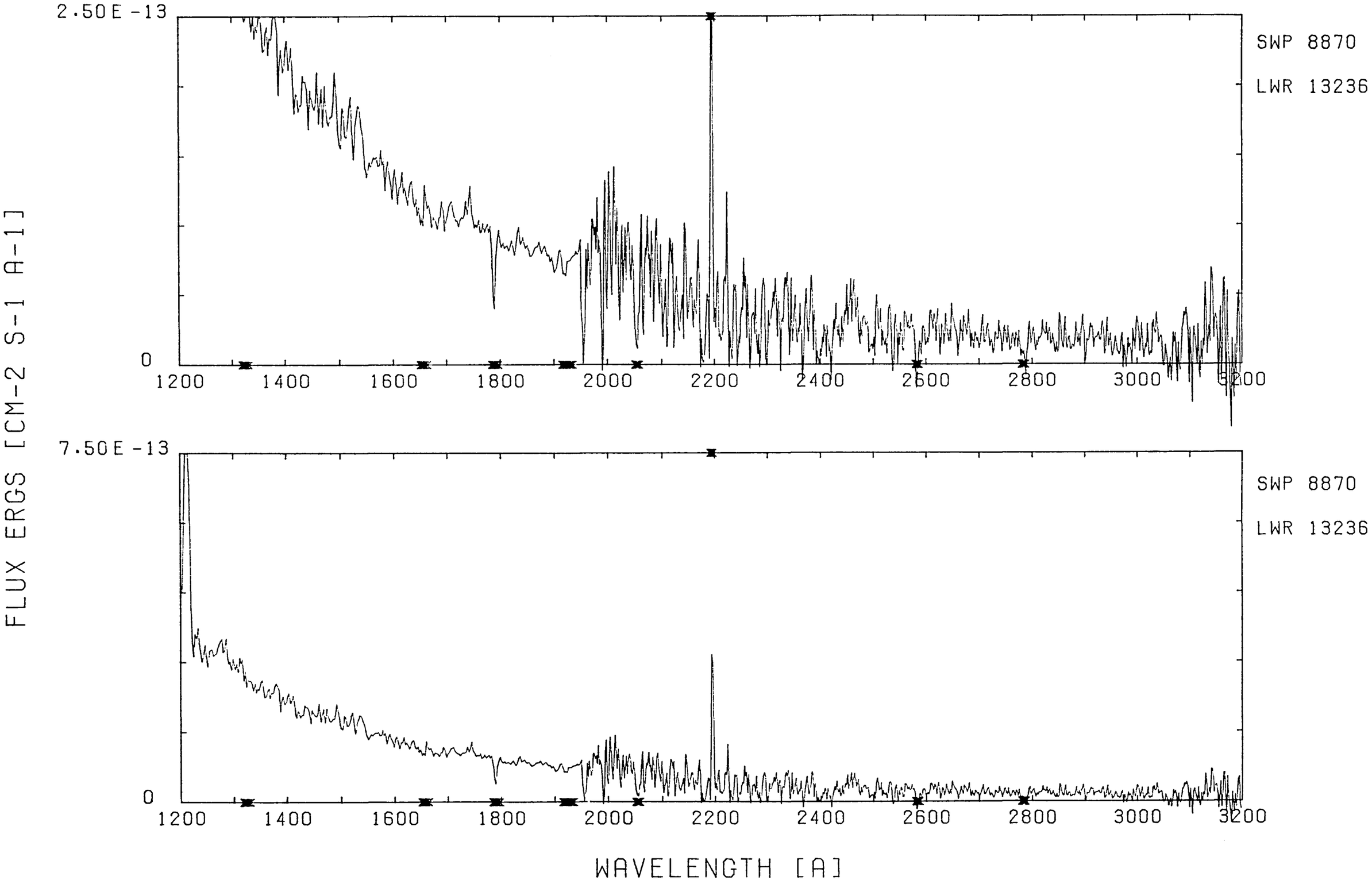
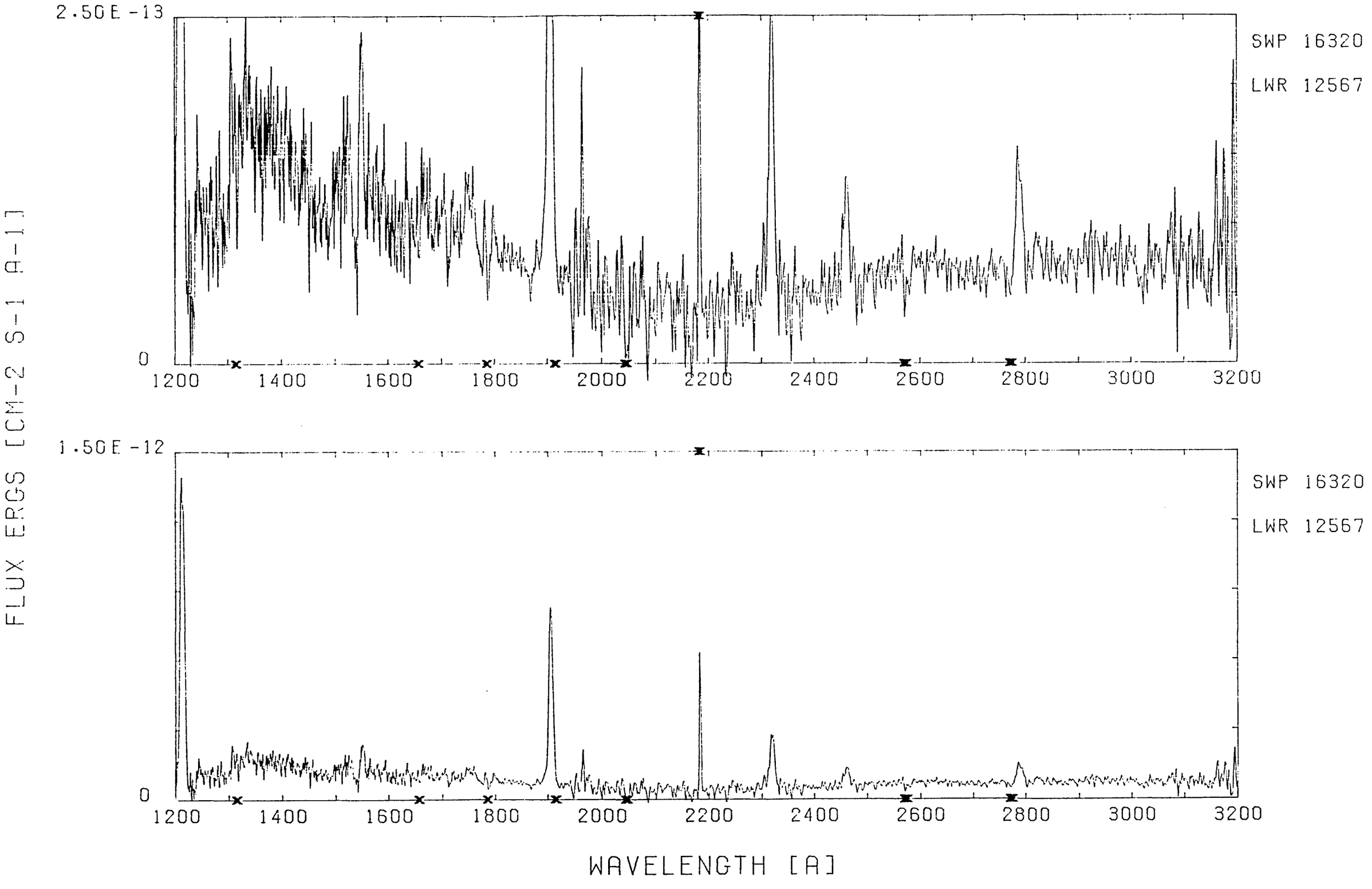
SWP 5234
LWR 4518
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
5.00E-12
0
SWP 5234
LWR 4518
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

A-33


2.50E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 8870
LWR 13236
7.50E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 8870
LWR 13236
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

IC 2501


2.50E-13
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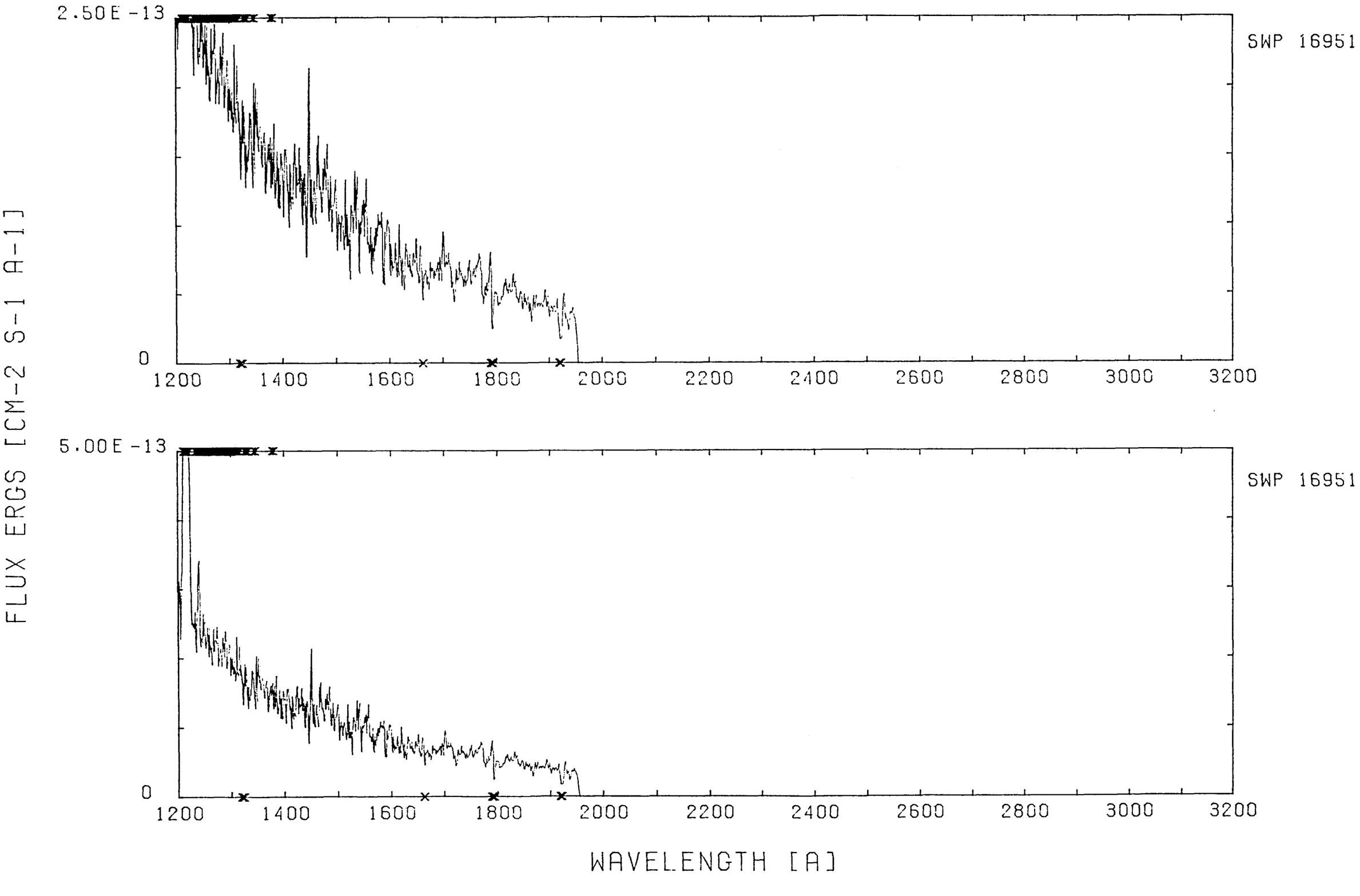
SWP 16320
LWR 12567
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
1.50E-12
0
SWP 16320
LWR 12567
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

A-34


2.50E-13
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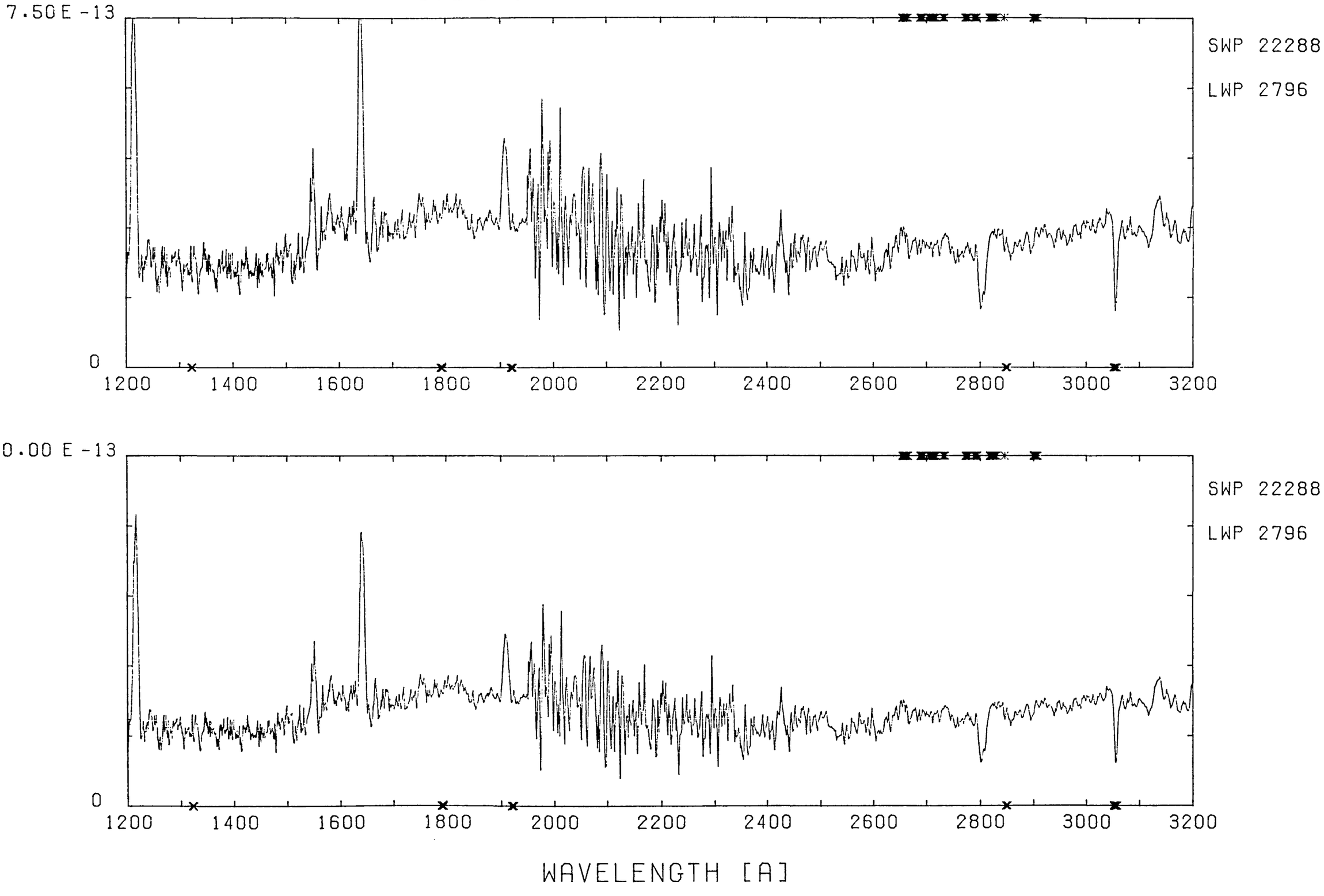
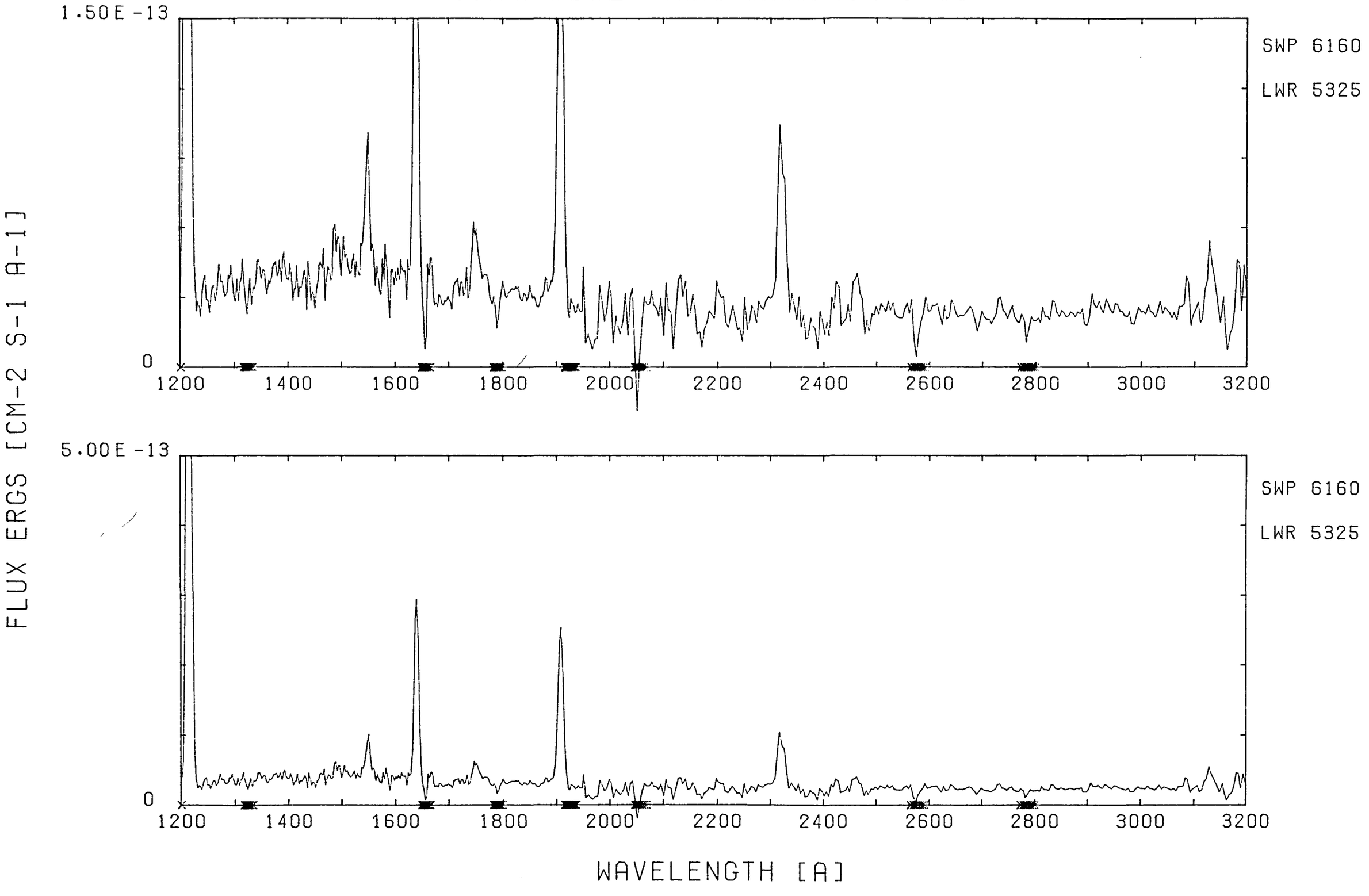
SWP 16951
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
5.00E-13
0
SWP 16951
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

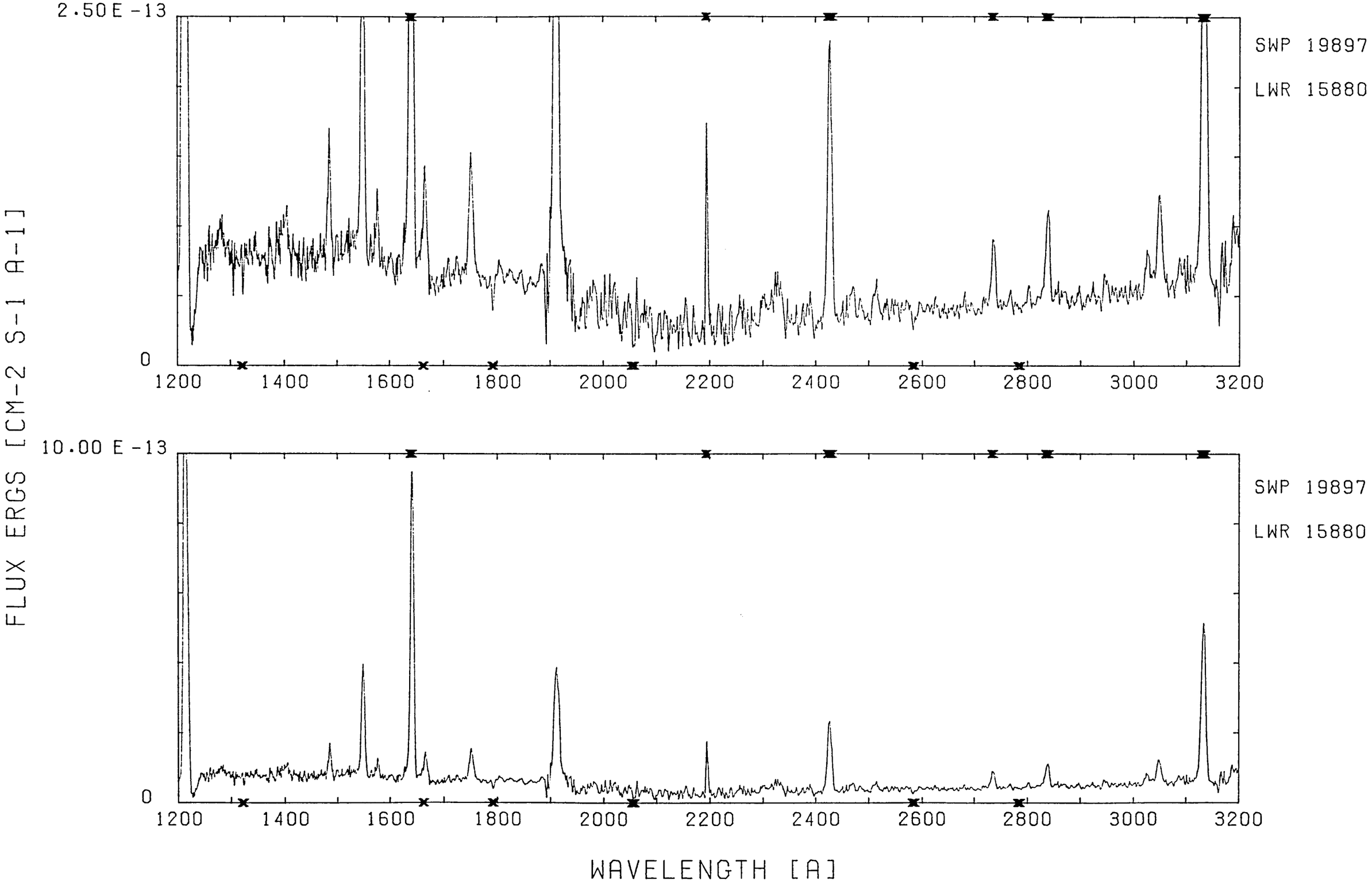
NGC 3132 - LGAP centered on CS



NGC 3132 - LGAP offset 15″E of CS



IC 2553


2.50E-13
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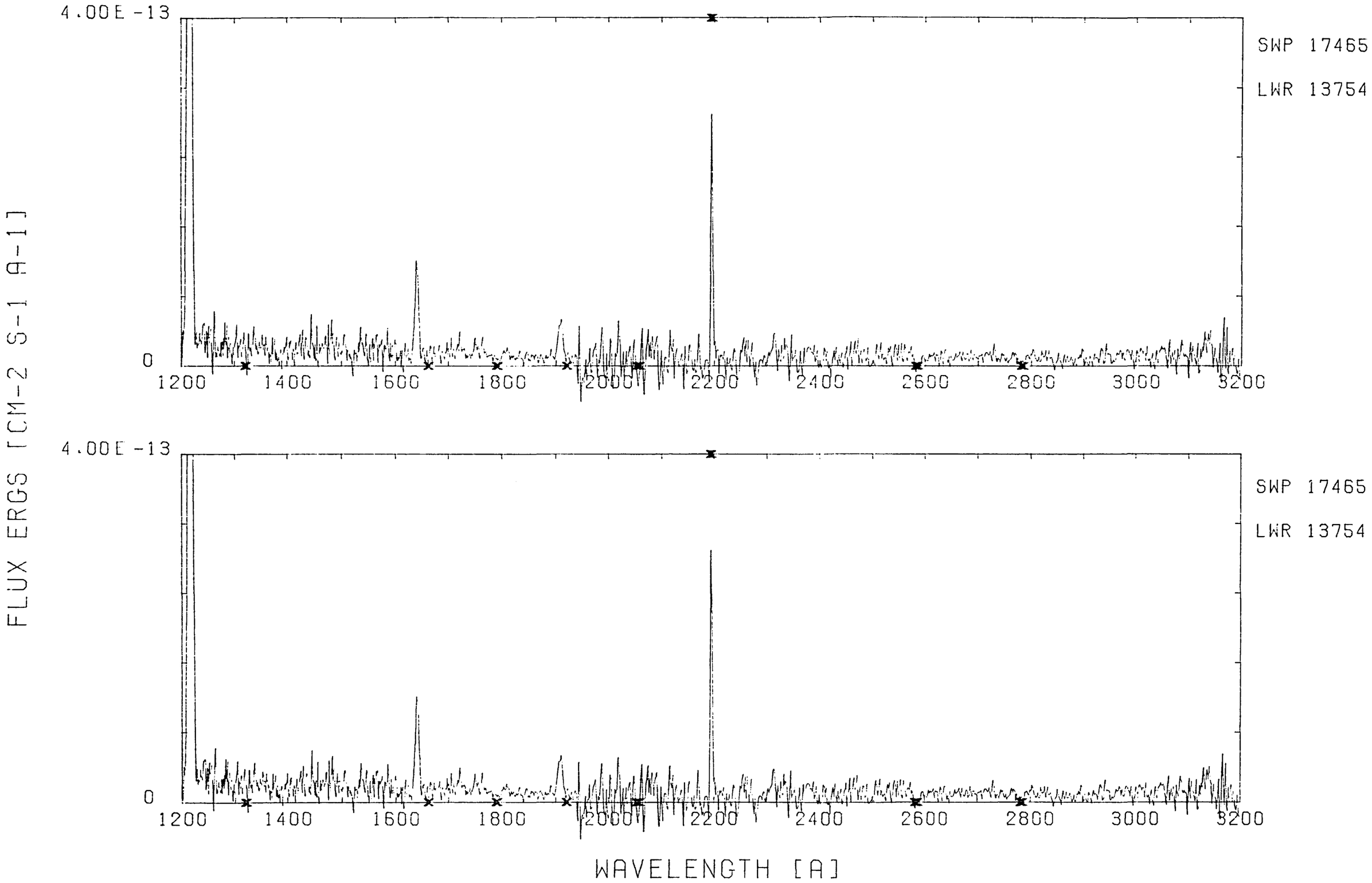
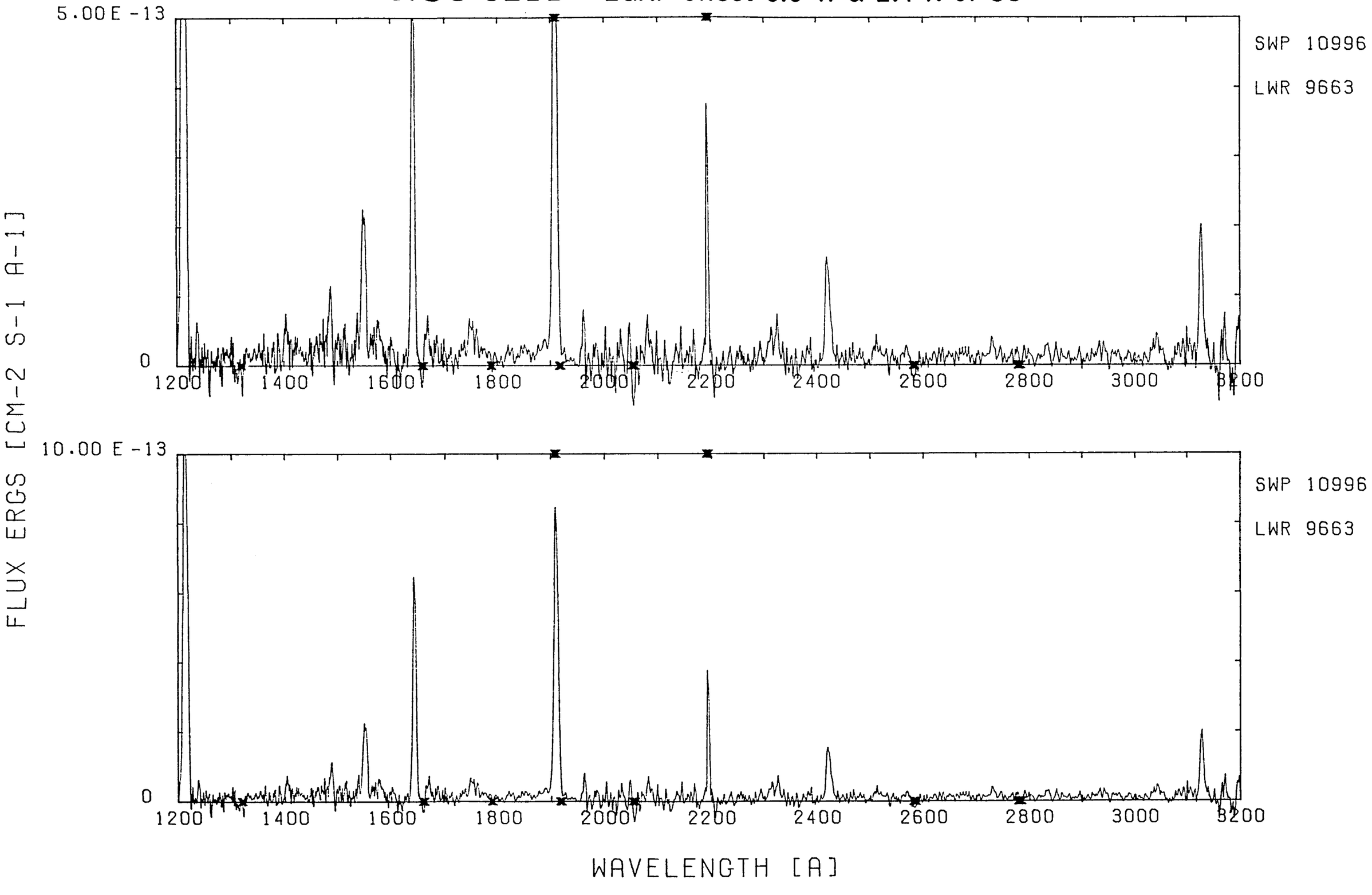
SWP 19897
LWR 15880
10.00 E-13
0
SWP 19897
LWR 15880
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

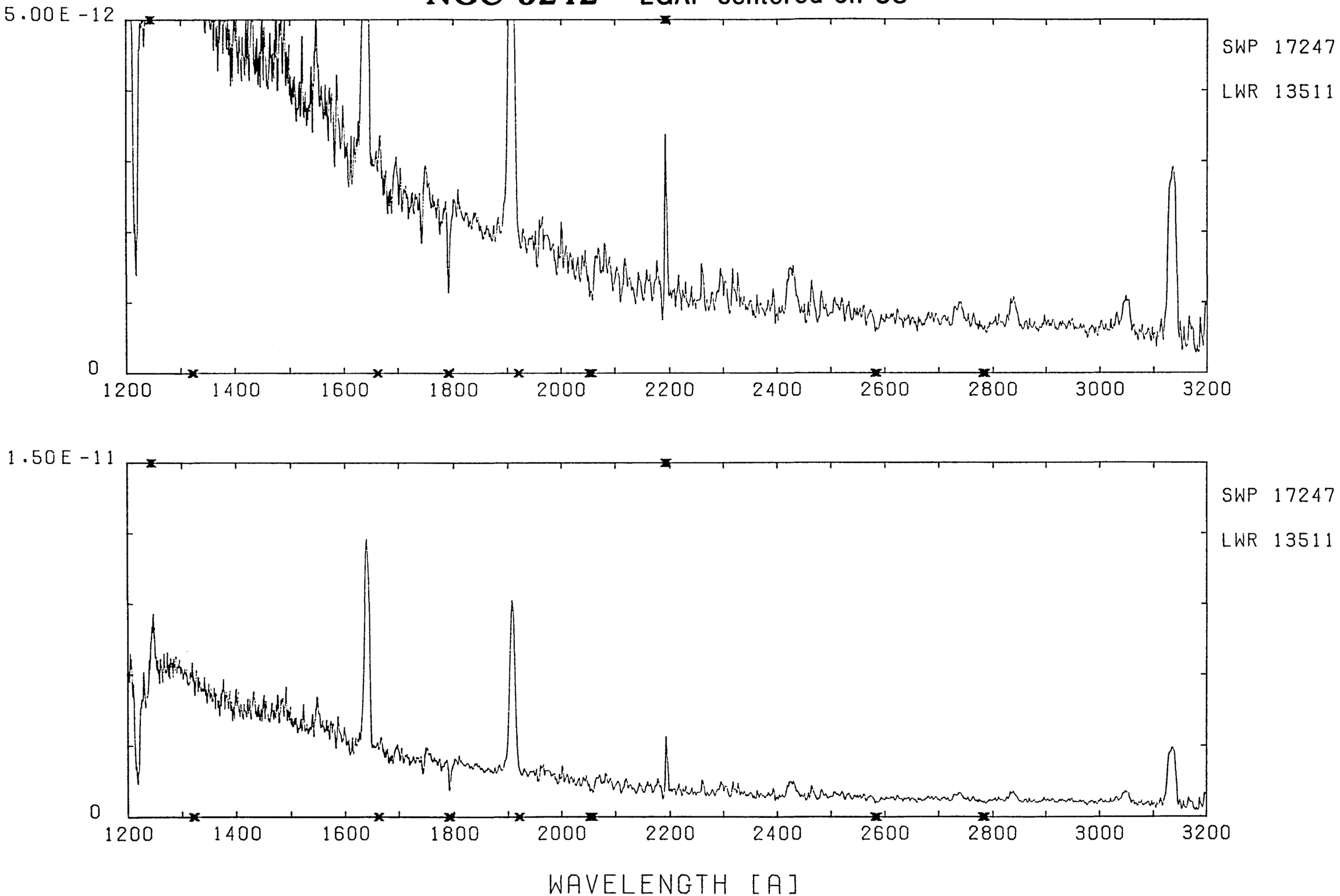
NGC 3195


4.00E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 17465
LWR 13754
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

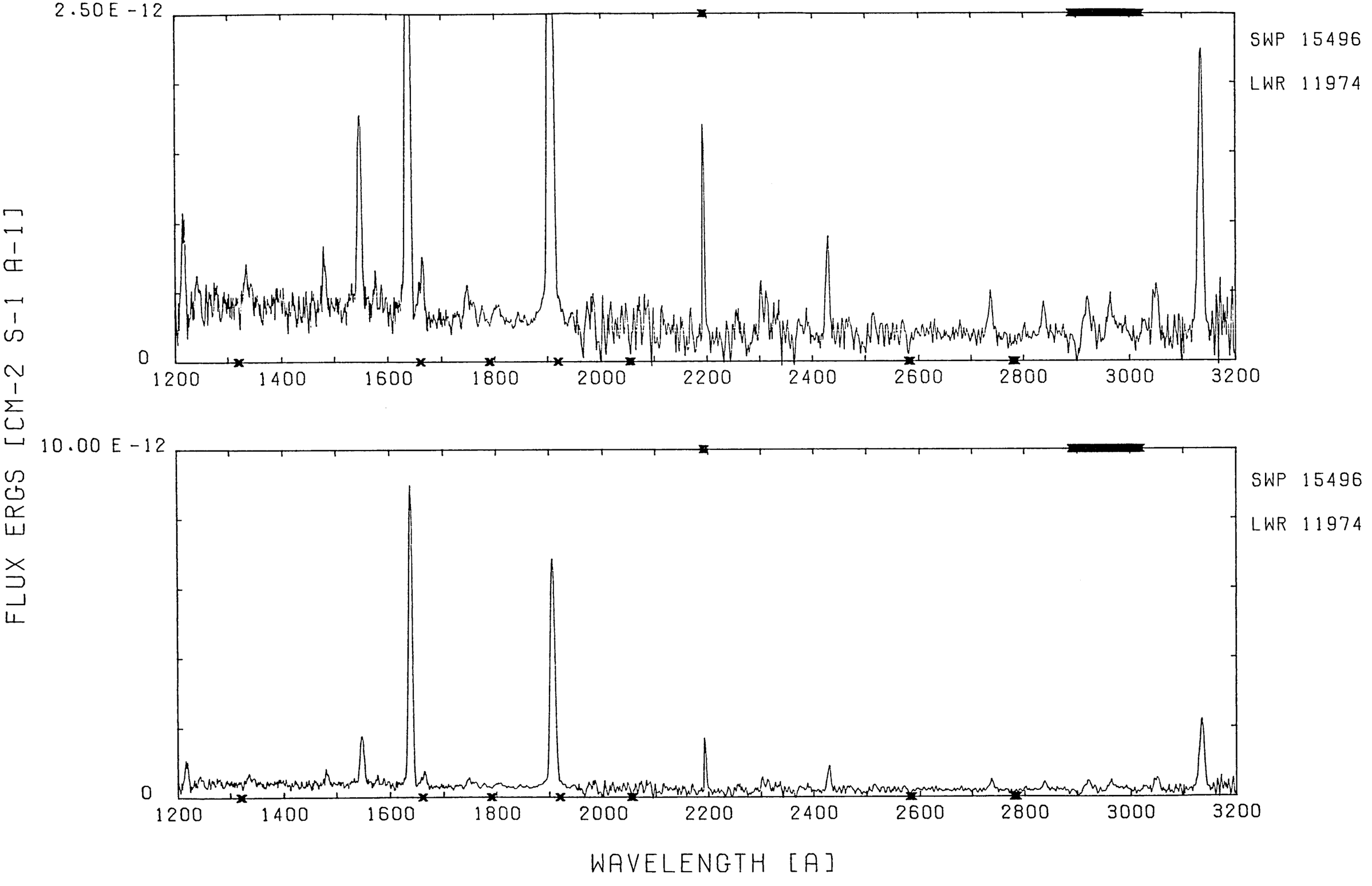
NGC 3211 - LGAP offset 6.6″W & 2.4″N of CS



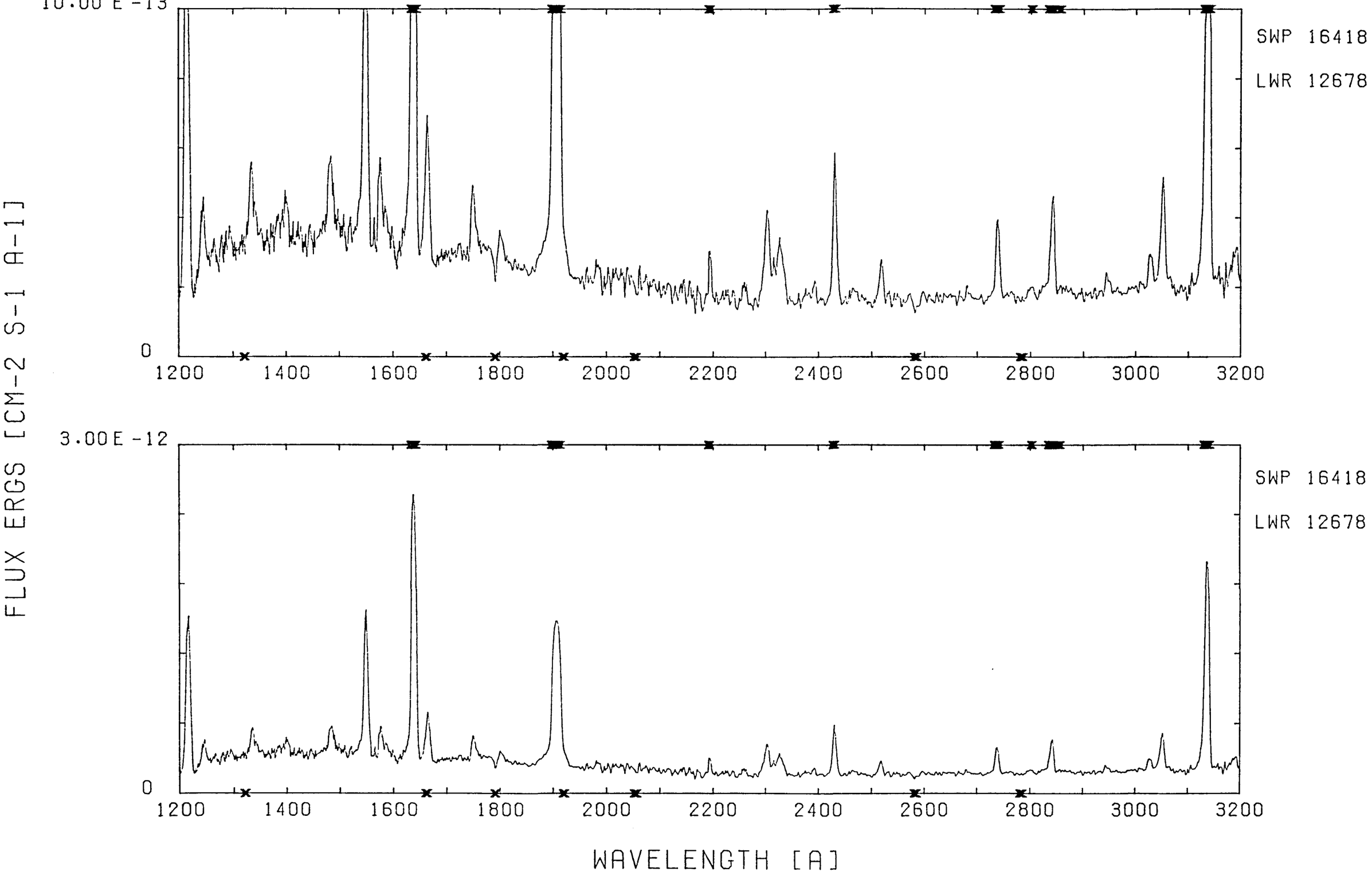
NGC 3242 - LGAP centered on CS



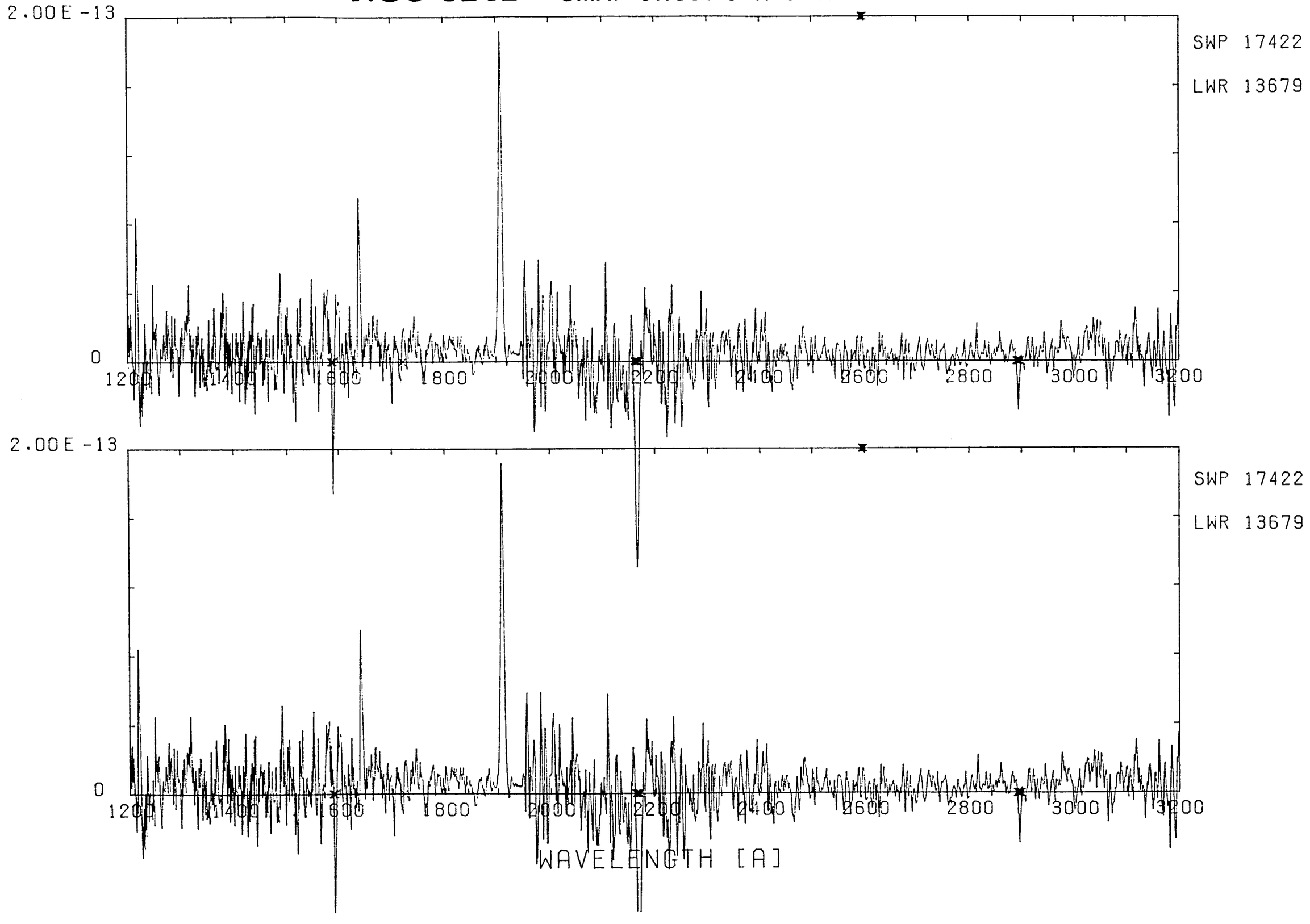
NGC 3242 - LGAP offset 7.2″E & 2″N of CS



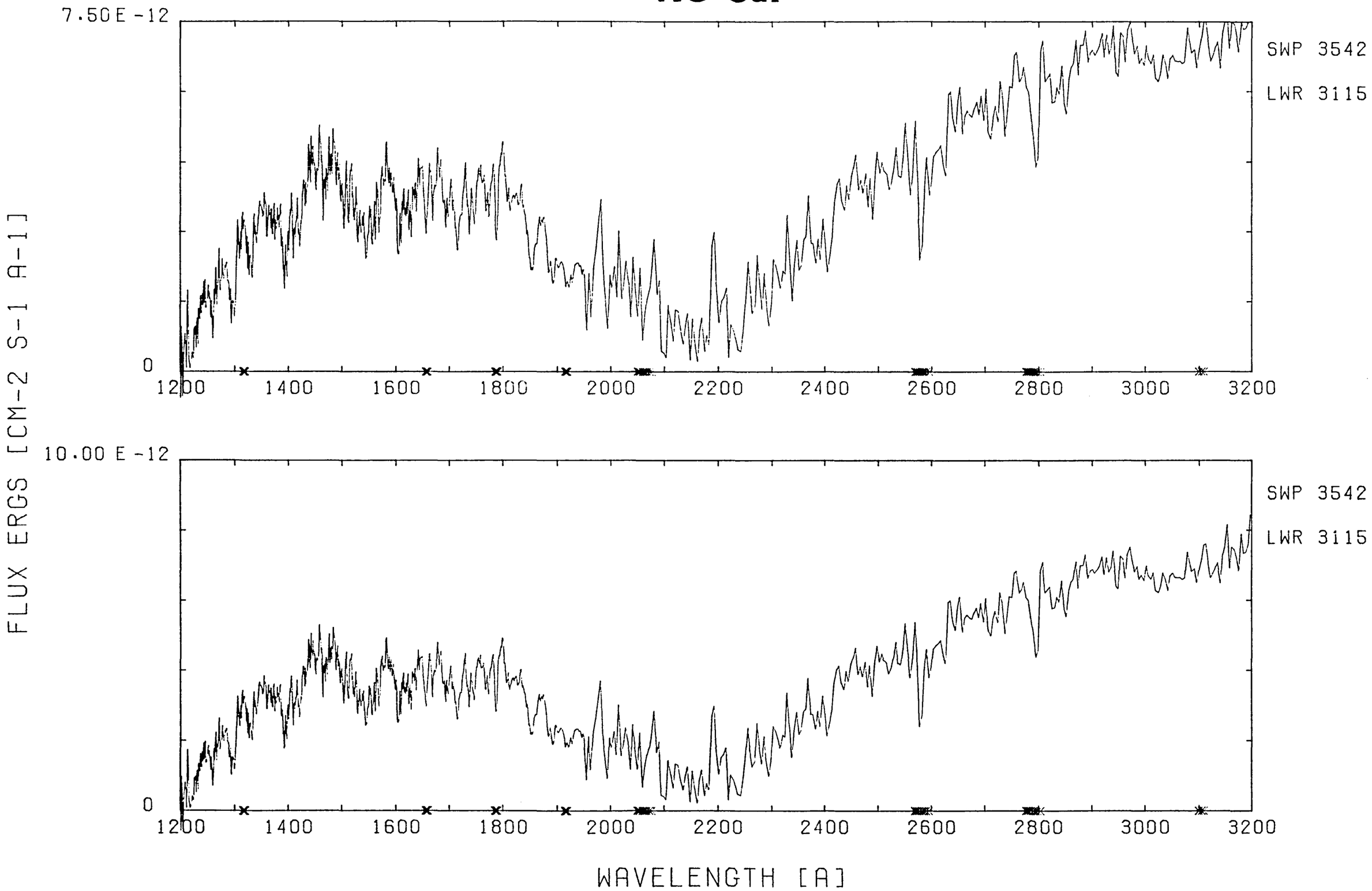
NGC 3242 - LGAP offset 3.3″W & 7.3″S of CS



NGC 3242 - SMAP offset 9″W & 12″N of CS



AG Car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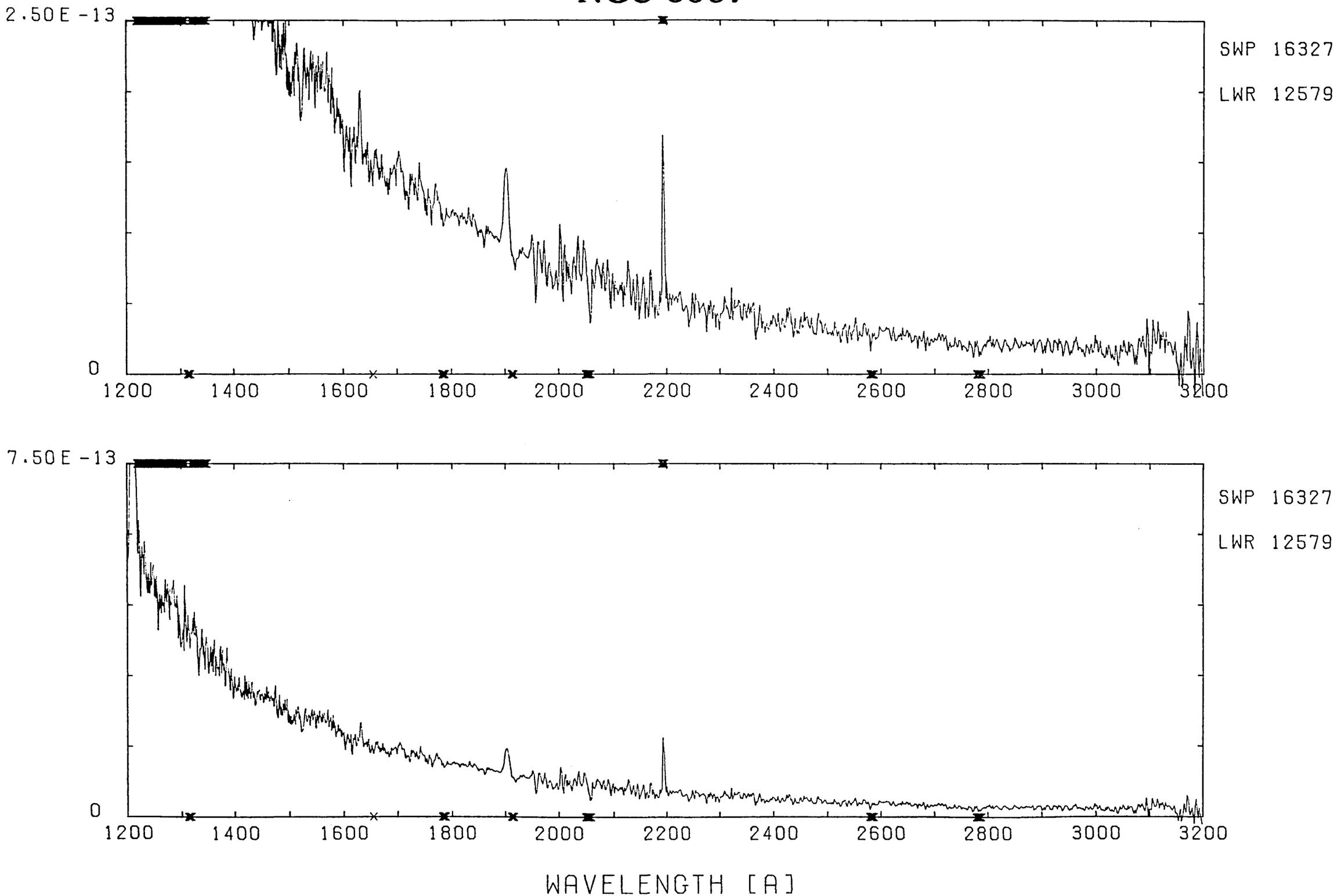
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 3542
LWR 3115
FLUX ERGS [CM-2 S-1 A-1]
10.00 E-12
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 3542
LWR 3115
WAVELENGTH [A]

NGC 3587


2.50E-13
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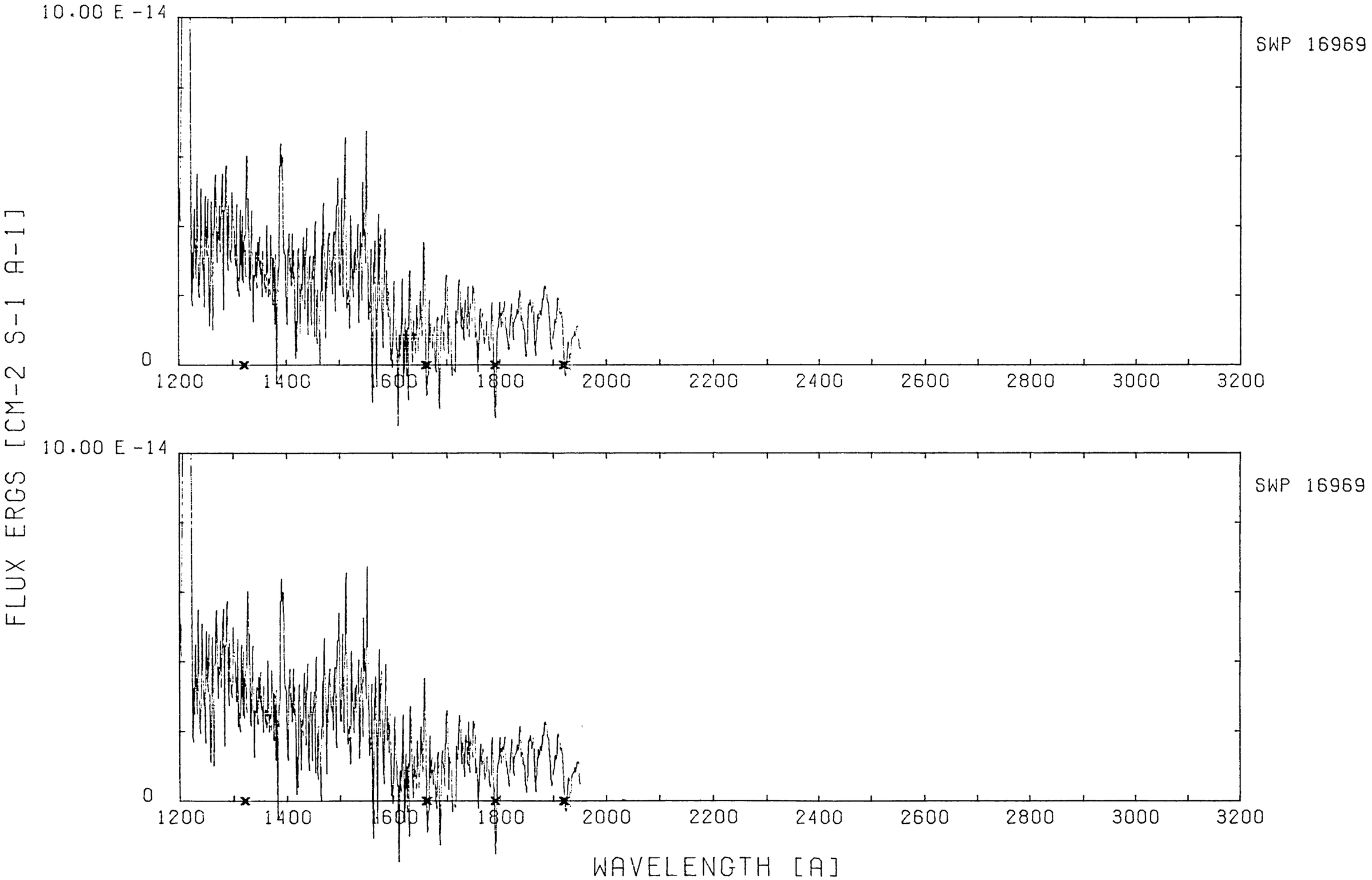
SWP 16327
LWR 12579
7.50E-13
0
SWP 16327
LWR 12579
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

K1-22


10.00 E -14
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SWP 16969
FLUX ERGS CM-2 S-1 A-1]
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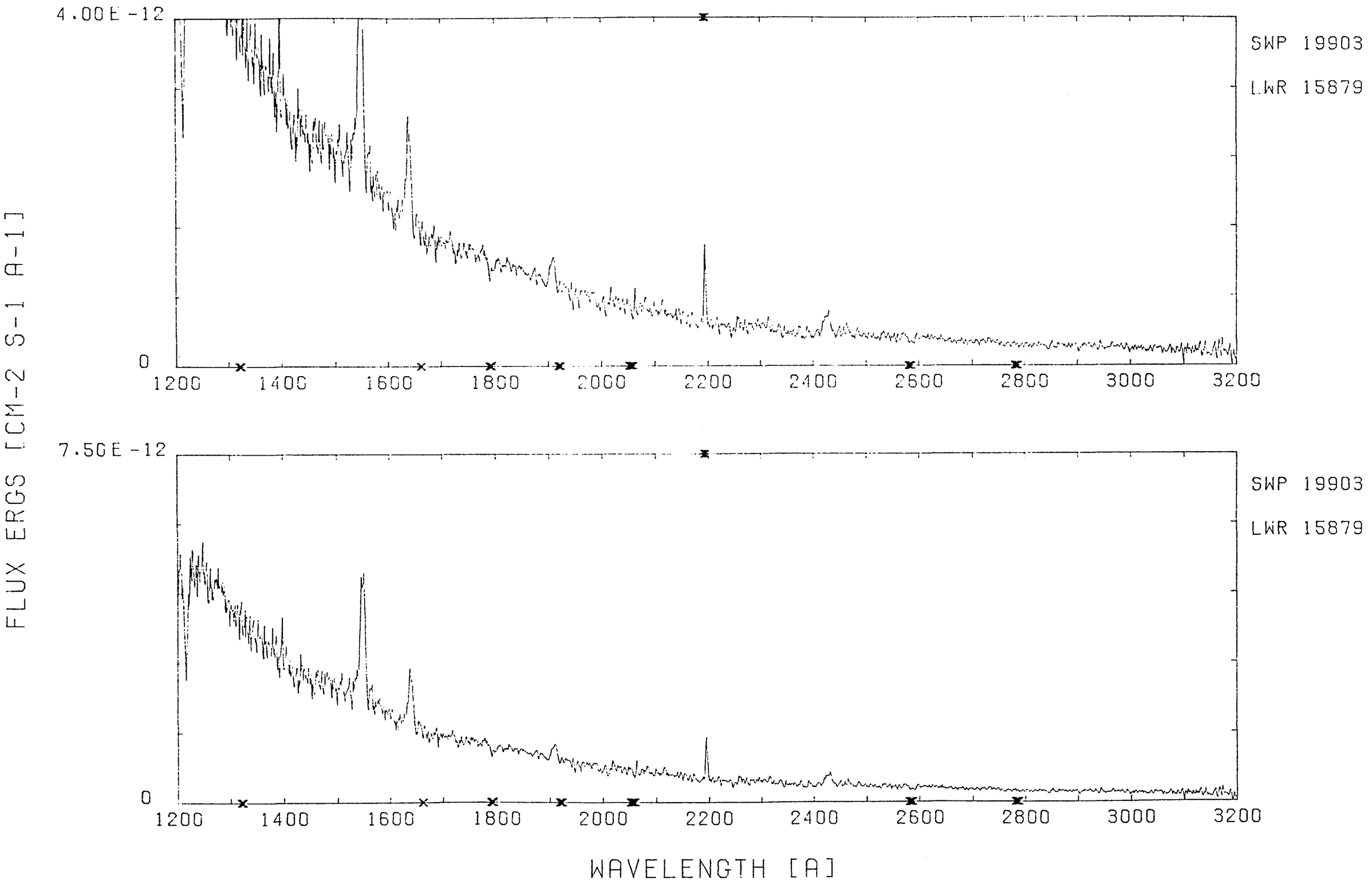
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

NGC 4361


4.00E-12
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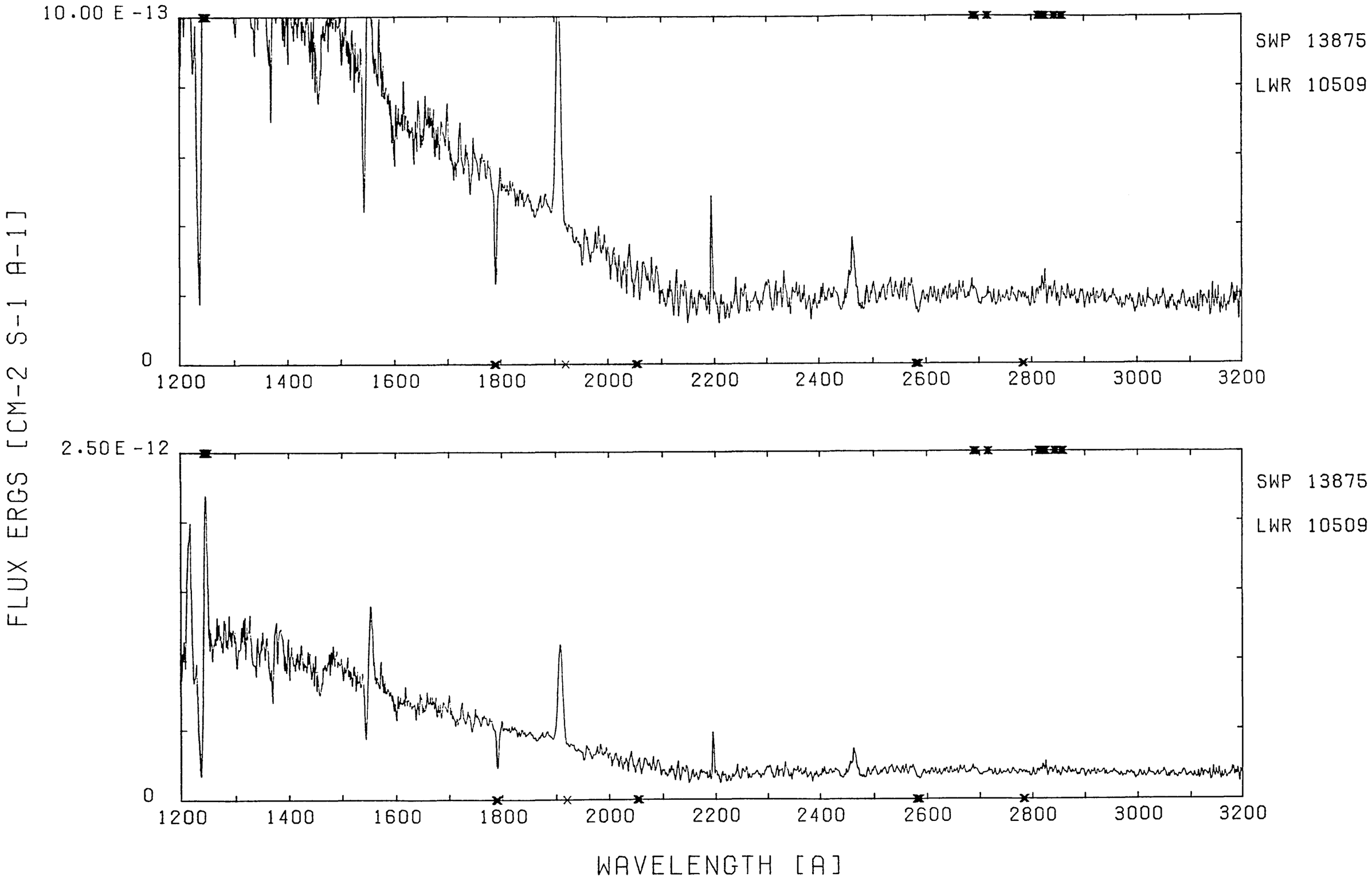
SWP 19903
LWR 15879
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
7.50E-12
0
SWP 19903
LWR 15879
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

IC 3568


10.00 E -13
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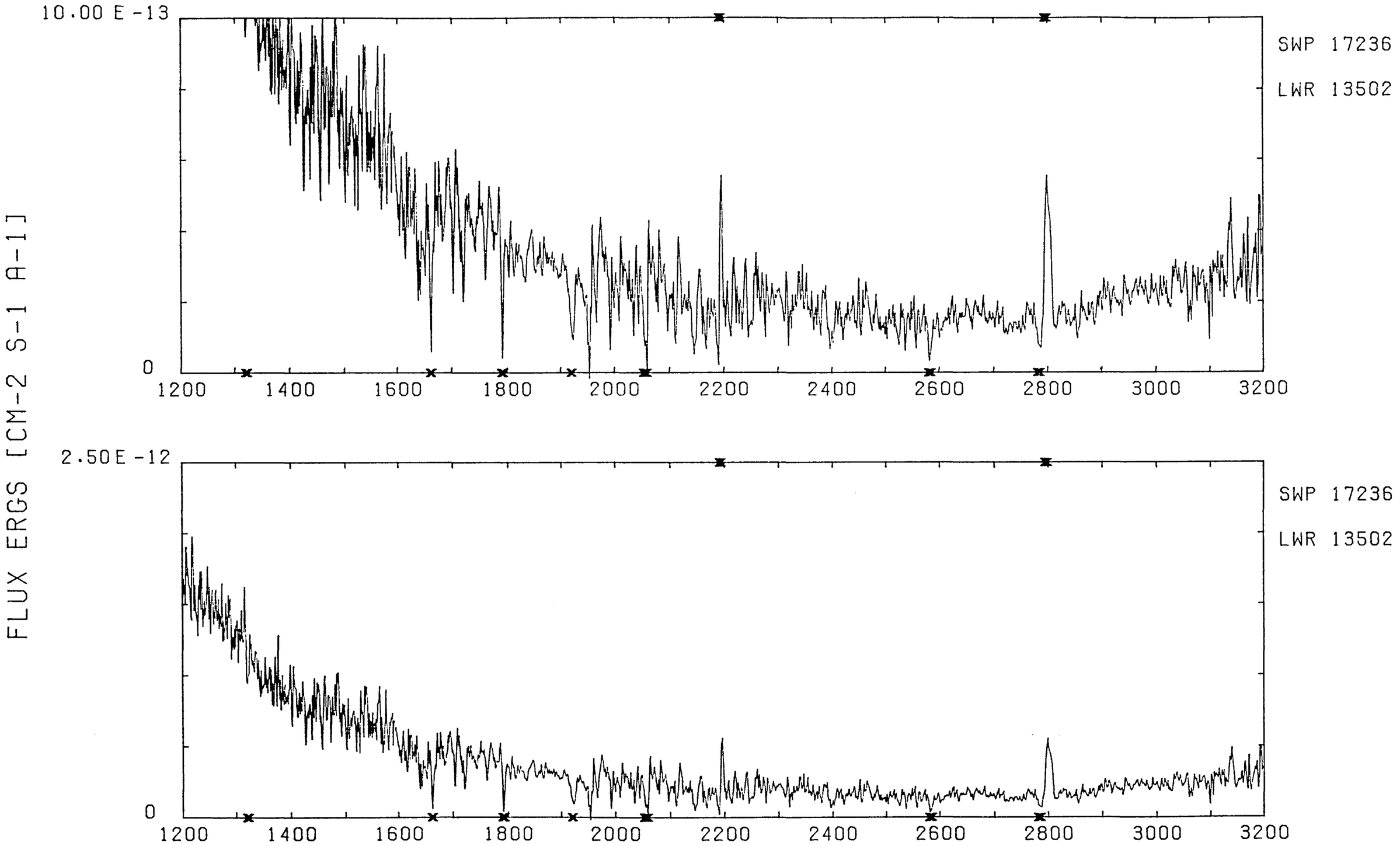
SWP 13875
LWR 10509
2.50E-12
0
SWP 13875
LWR 10509
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

LT-5


10.00 E -13
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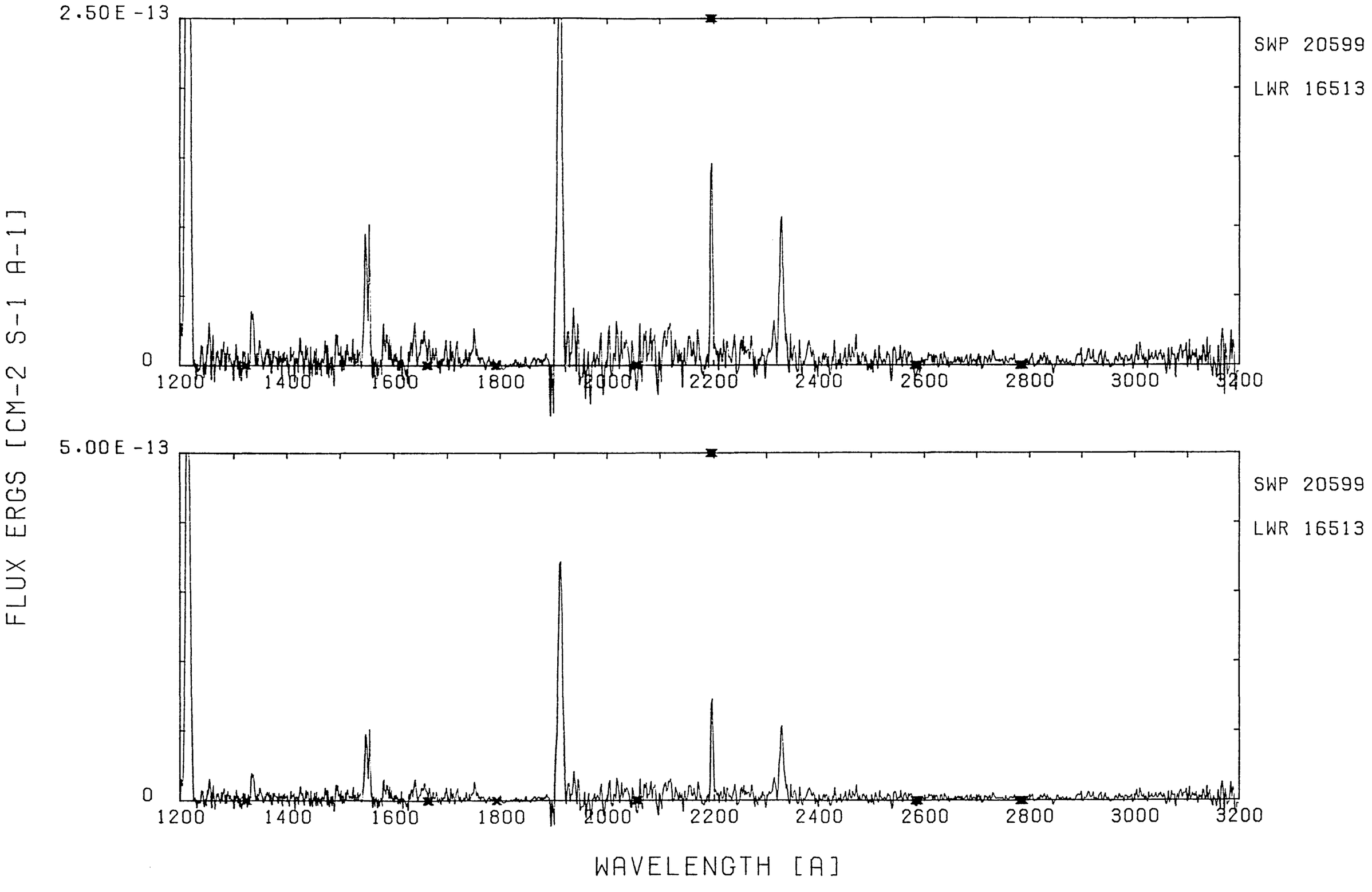
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 17236
LWR 13502
FLUX ERGS CM-2 S-1 A-1]
2.50E -12
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 17236
LWR 13502
WAVELENGTH [A]

H4-1


2.50E-13
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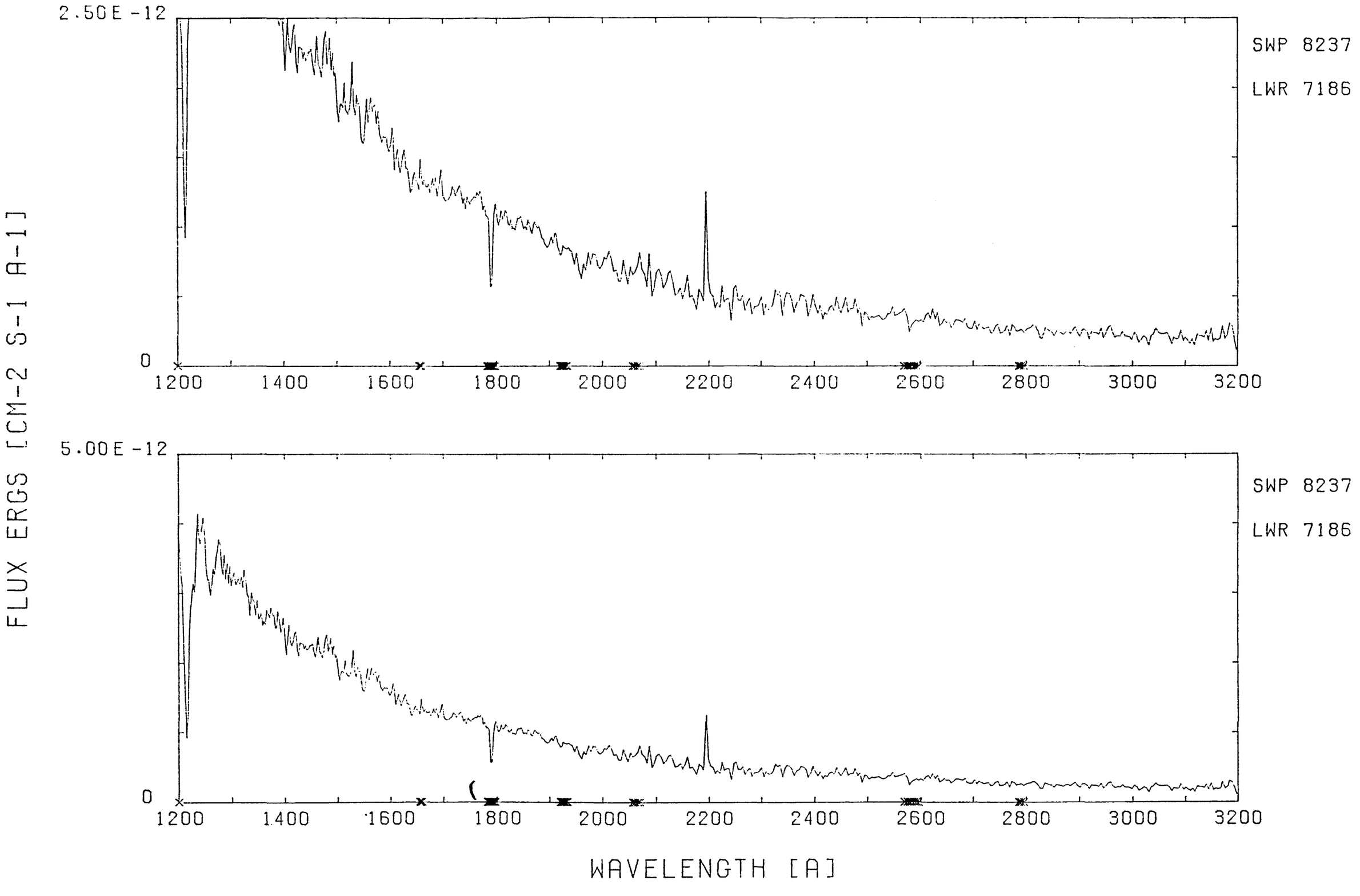
SWP 20599
LWR 16513
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
5.00E-13
0
SWP 20599
LWR 16513
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

LO-8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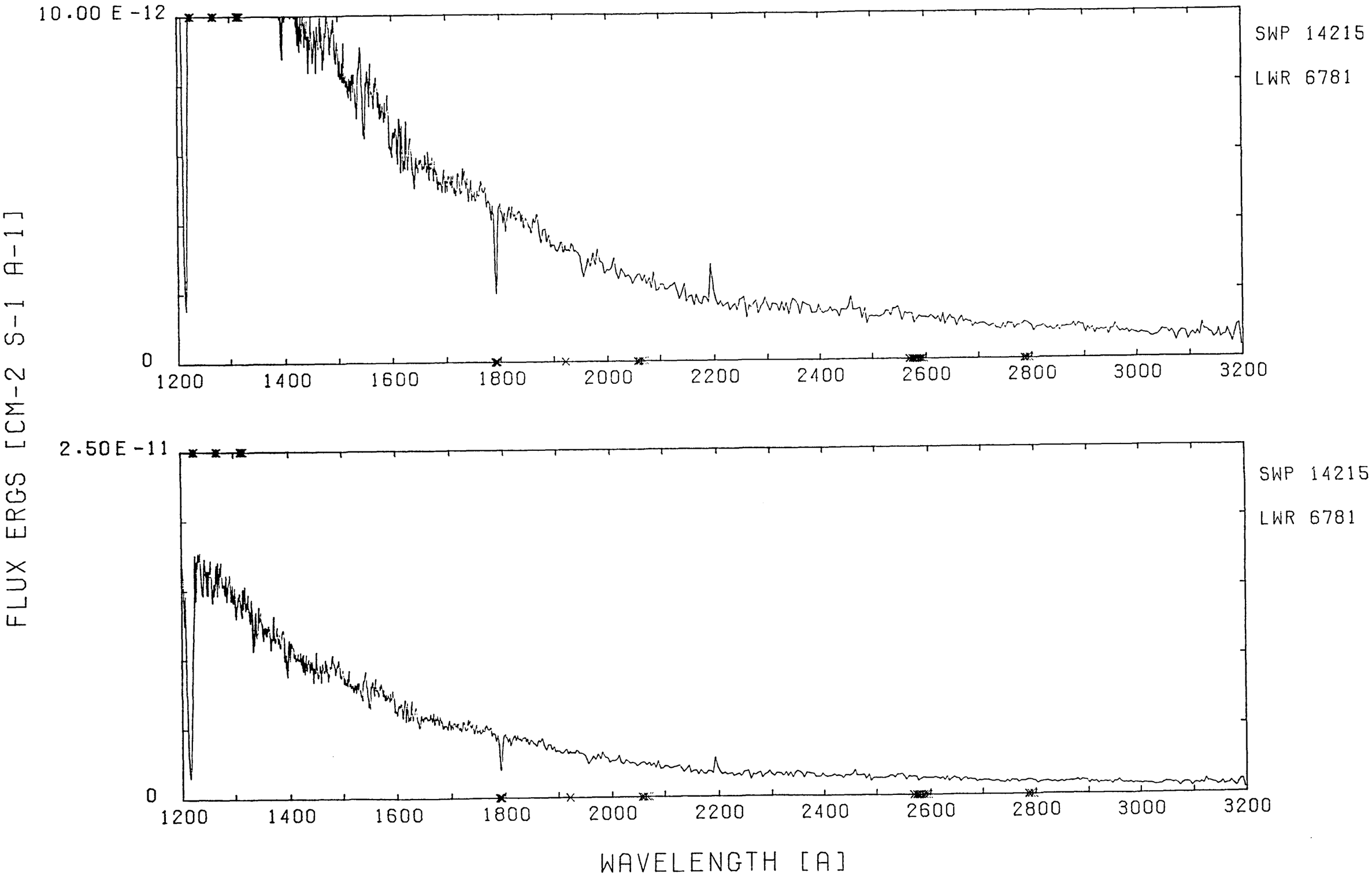
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 8237
LWR 7186
FLUX ERGS CM-2 S-1 A-1]
5.00E-12
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 8237
LWR 7186
WAVELENGTH [A]

A-36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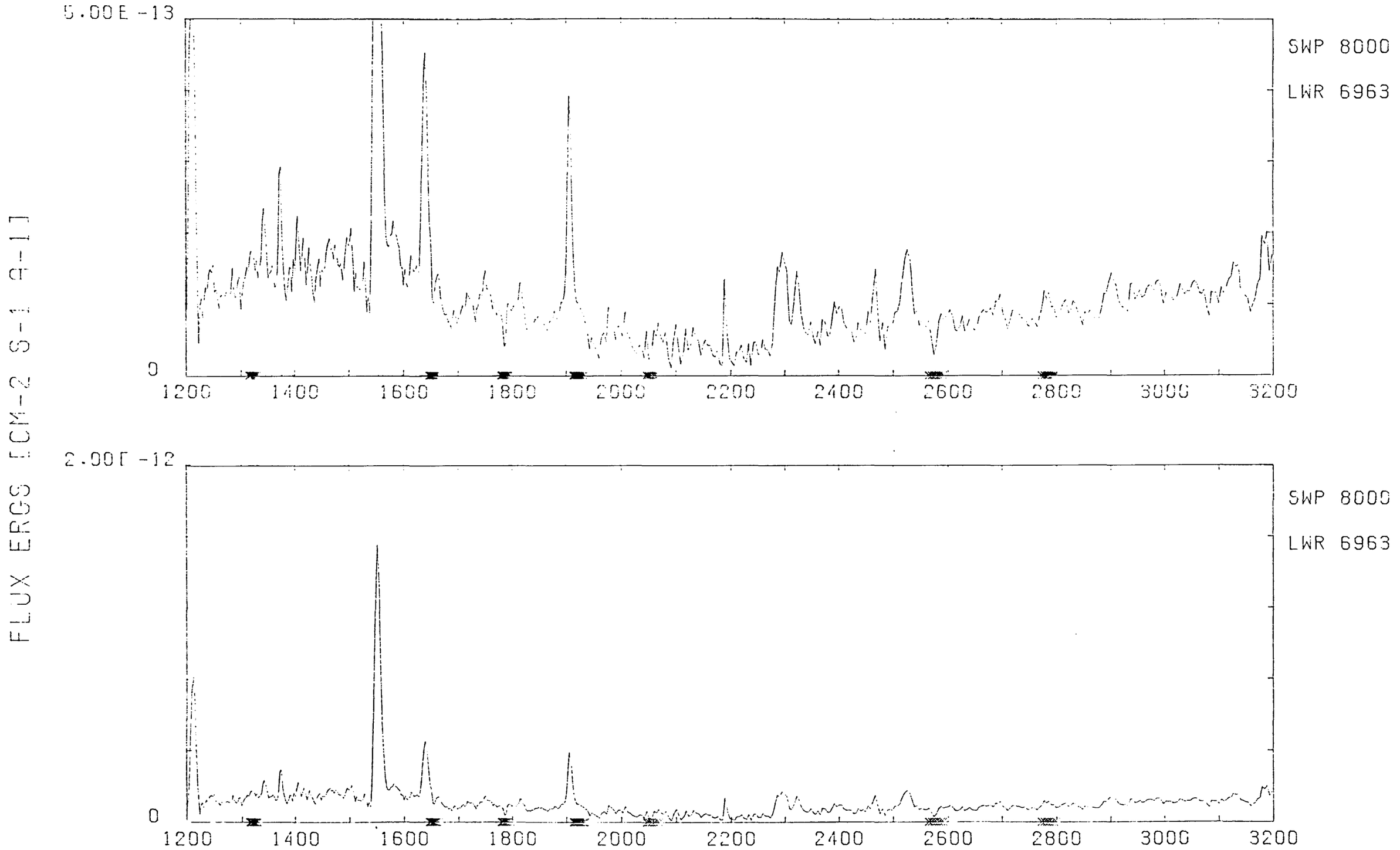
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 14215
LWR 6781
FLUX ERGS CM-2 S-1 A-1]
2.50E-11
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 14215
LWR 6781
WAVELENGTH [A]

VV-68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SWP 8000
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1400
1600
1800
2000
2200
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2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1
2.00E-12
0
SWP 8000
LWR 6963
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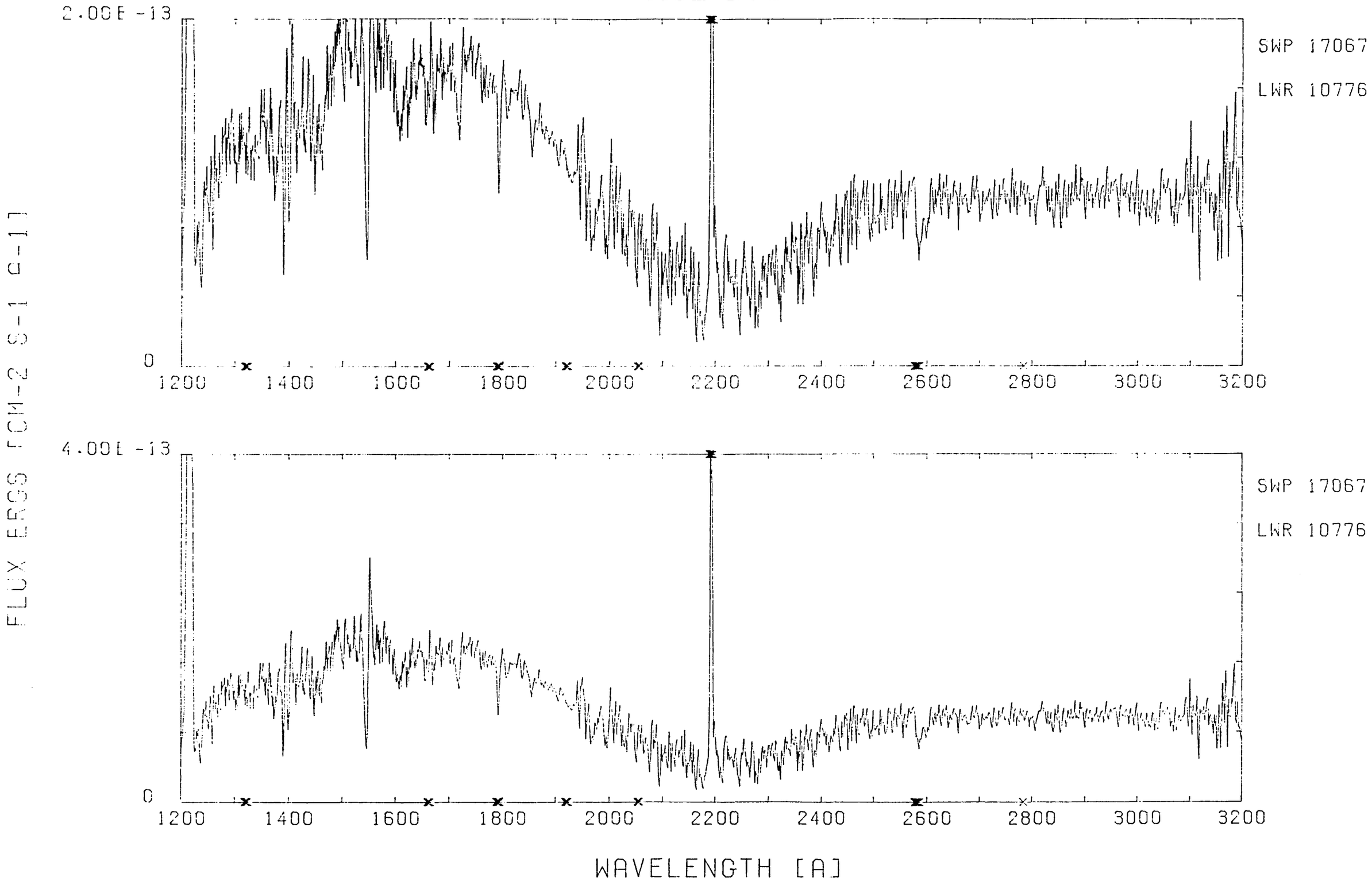
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

He2-108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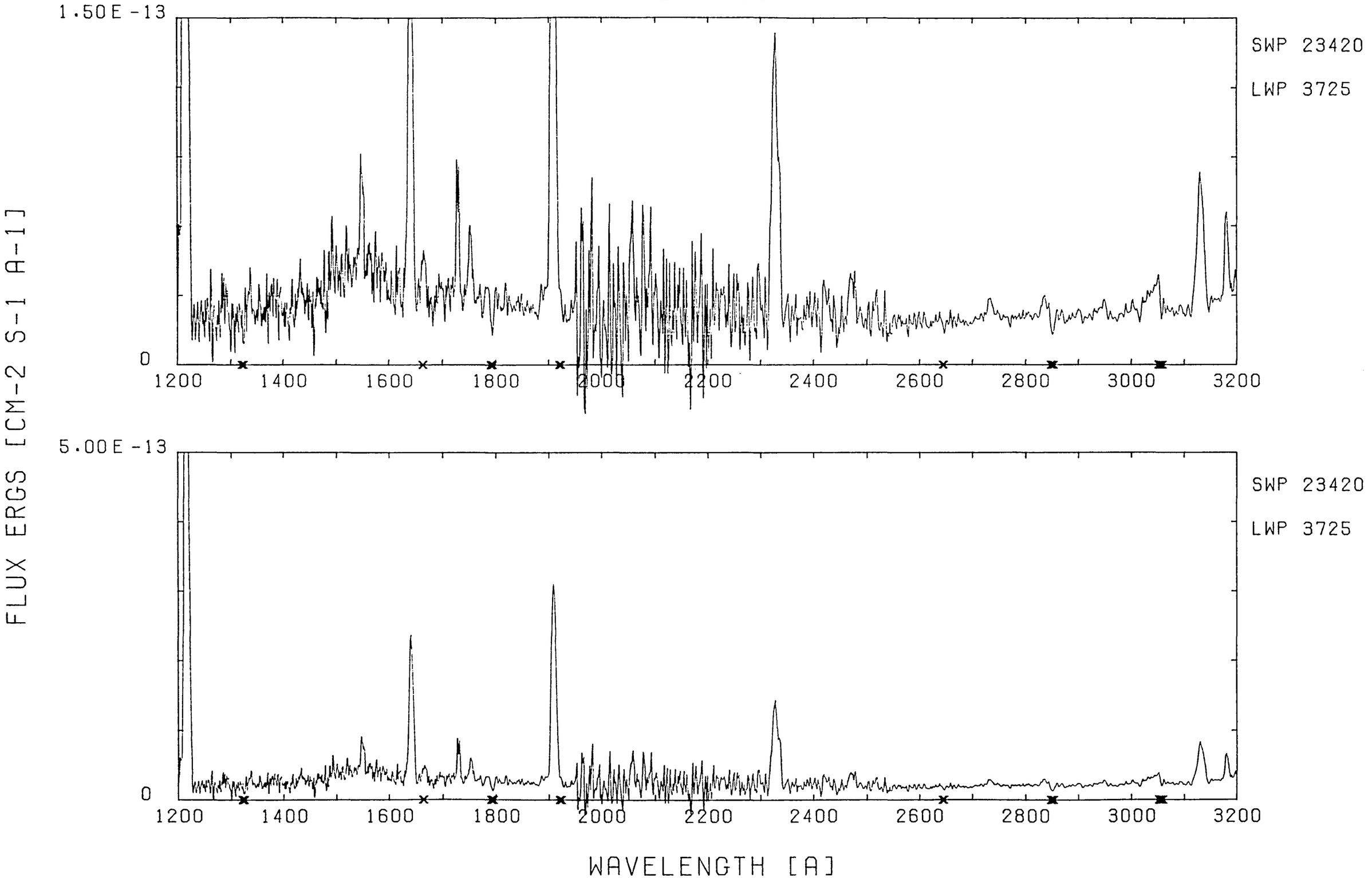
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 17067
LWR 10776
4.00E -13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 17067
LWR 10776
FLUX ERGS CM-2 S-1 C-11
WAVELENGTH [A]

IC 4406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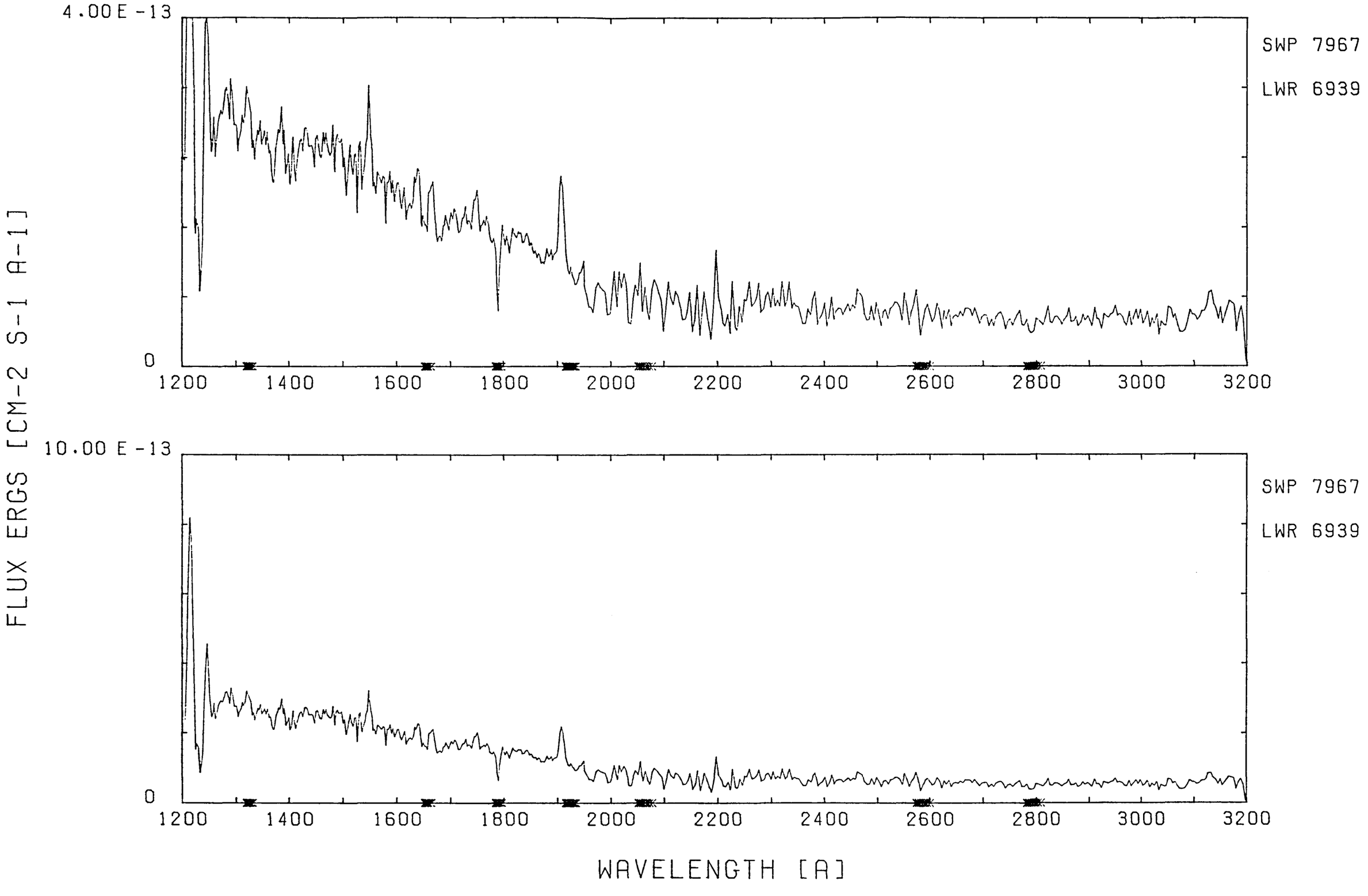
LWP 3725
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
5.00E-13
0
SWP 23420
LWP 3725
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

J-320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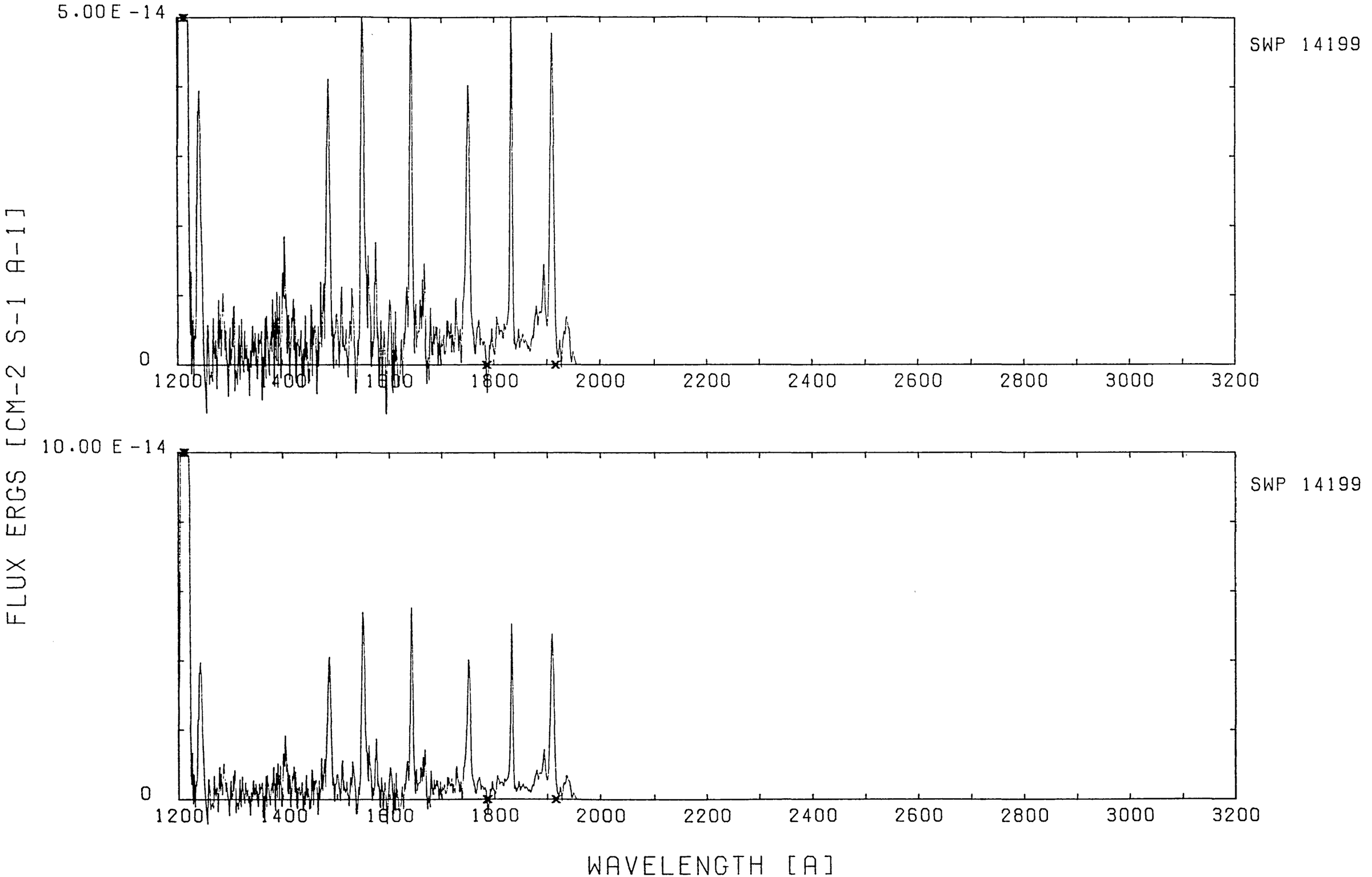
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 7967
LWR 6939
FLUX ERGS CM-2 S-1 A-1]
10.00 E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 7967
LWR 6939
WAVELENGTH [A]

LMC N97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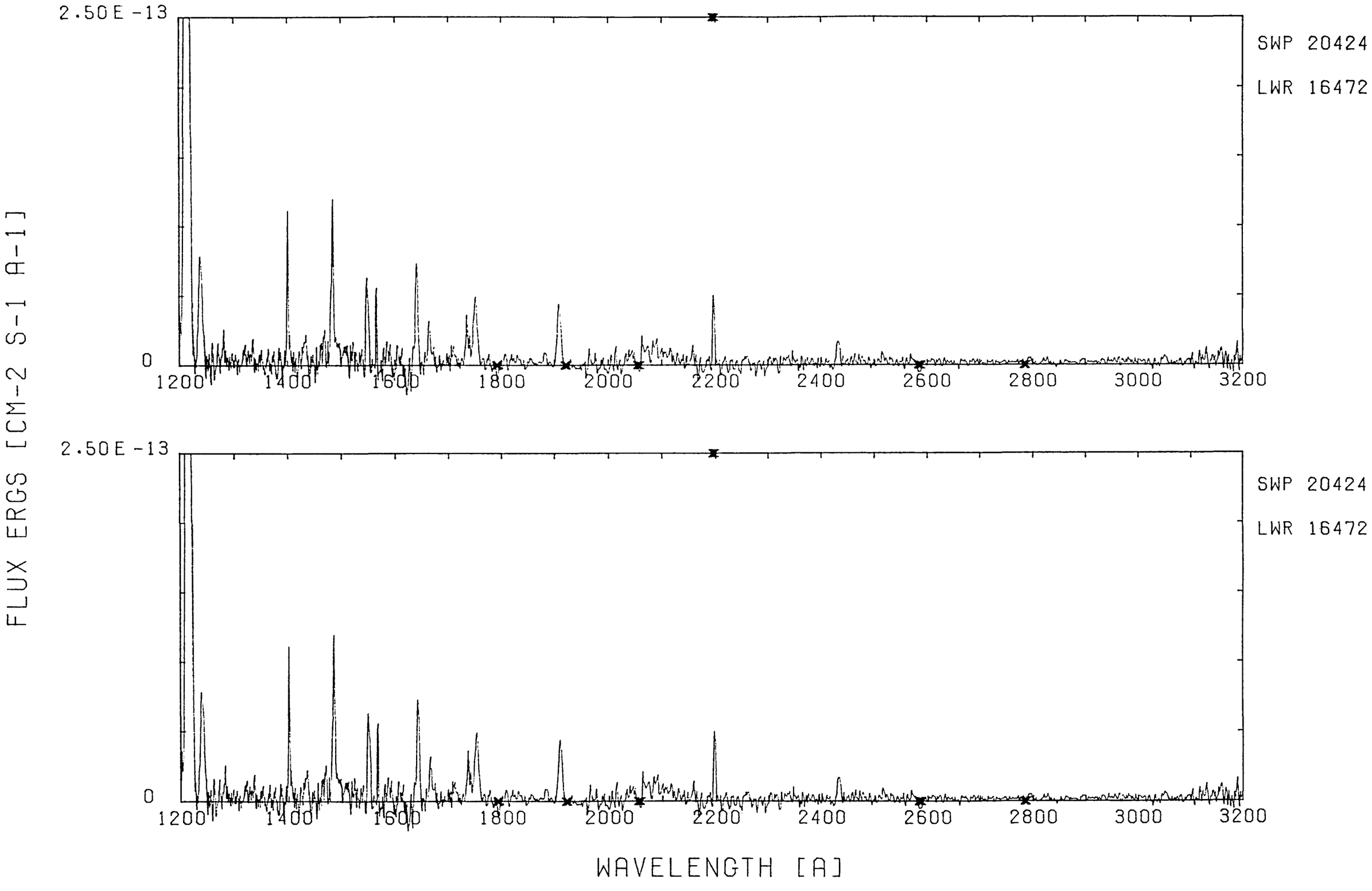
SWP 14199
10.00 E-14
0
SWP 14199
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

LMC P9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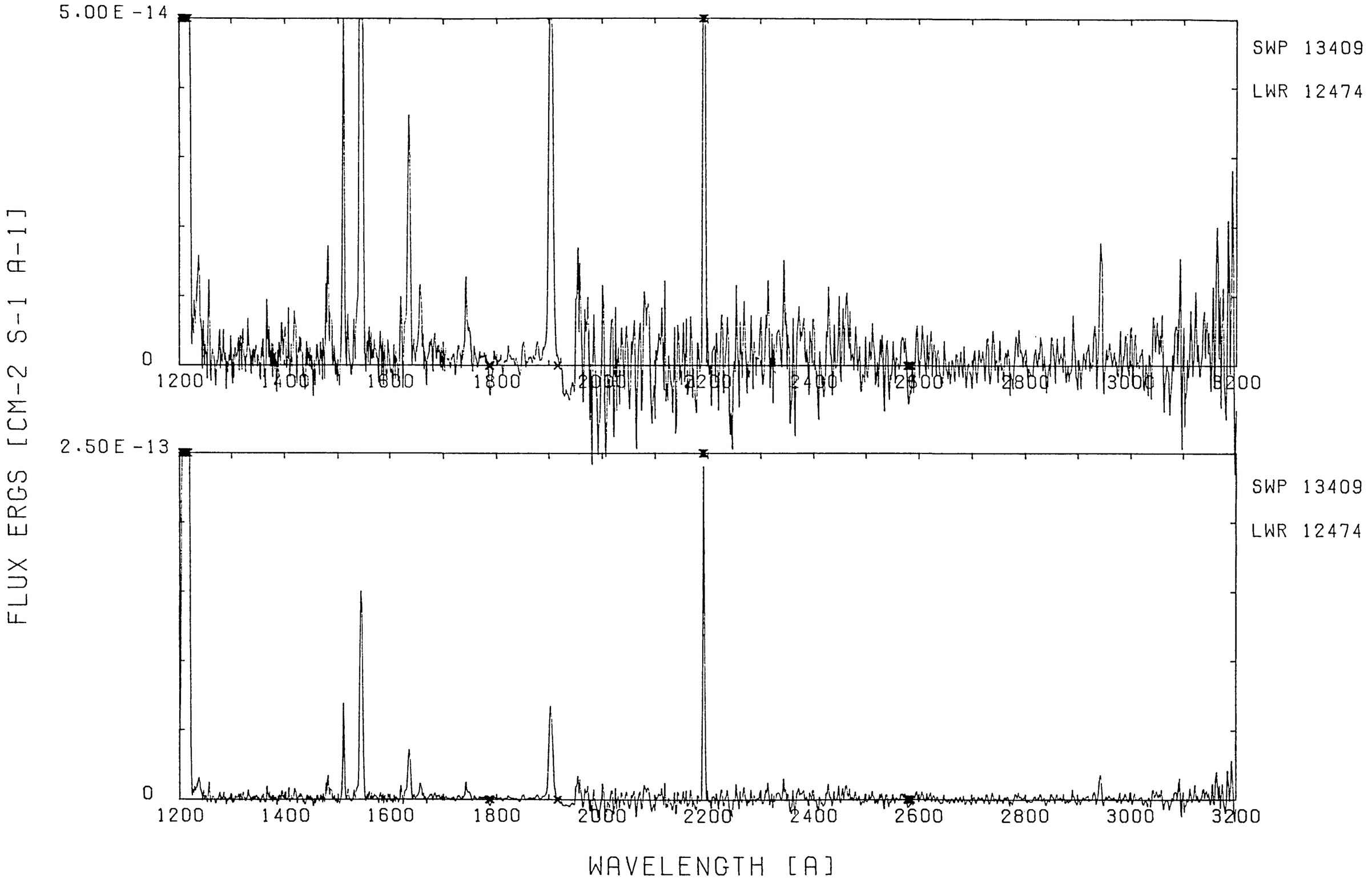
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 20424
LWR 16472
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

LMC N28


5.00E-14
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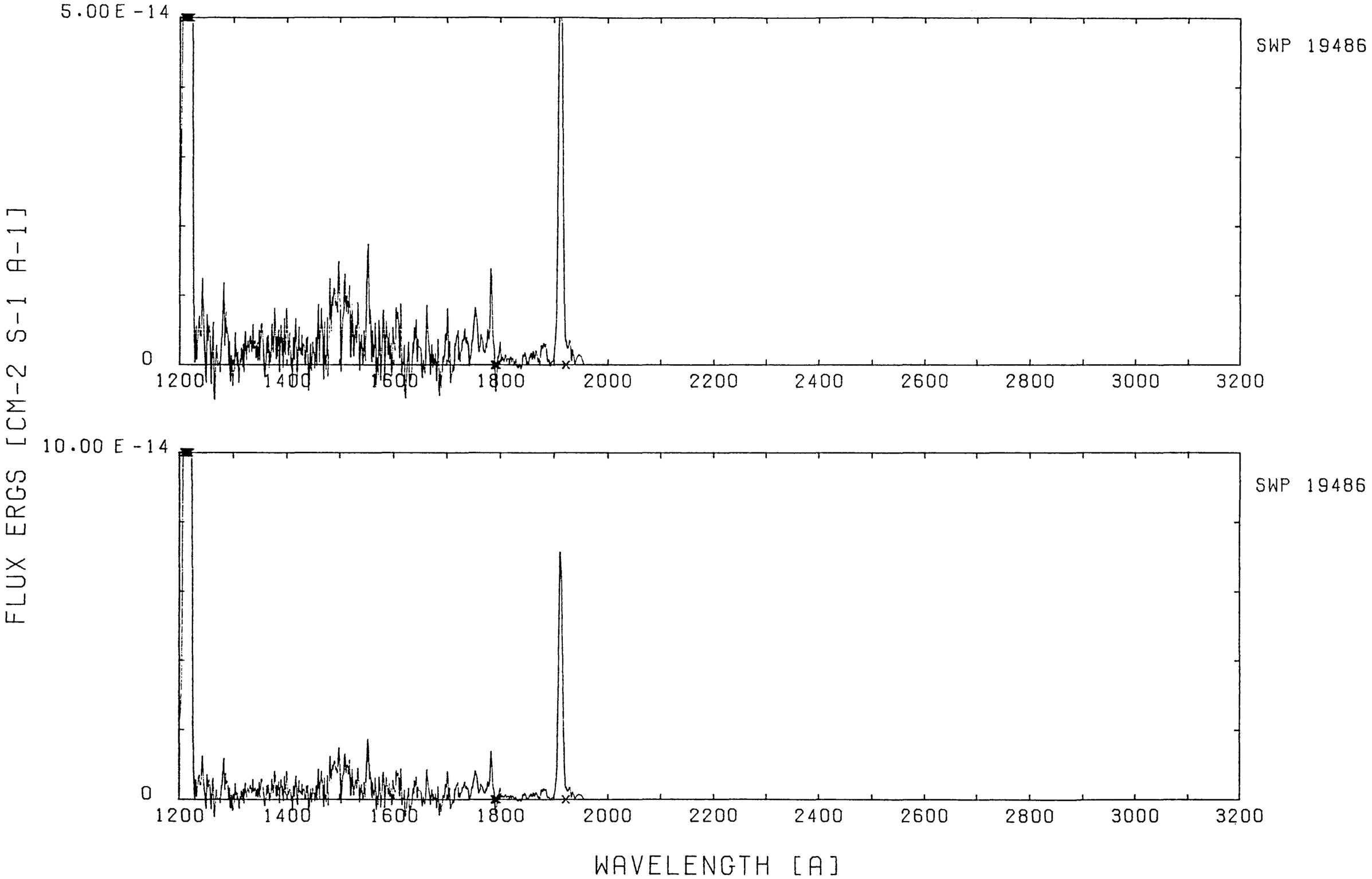
SWP 13409
LWR 12474
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
2.50E-13
0
SWP 13409
LWR 12474
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

LMC N110


5.00E-14
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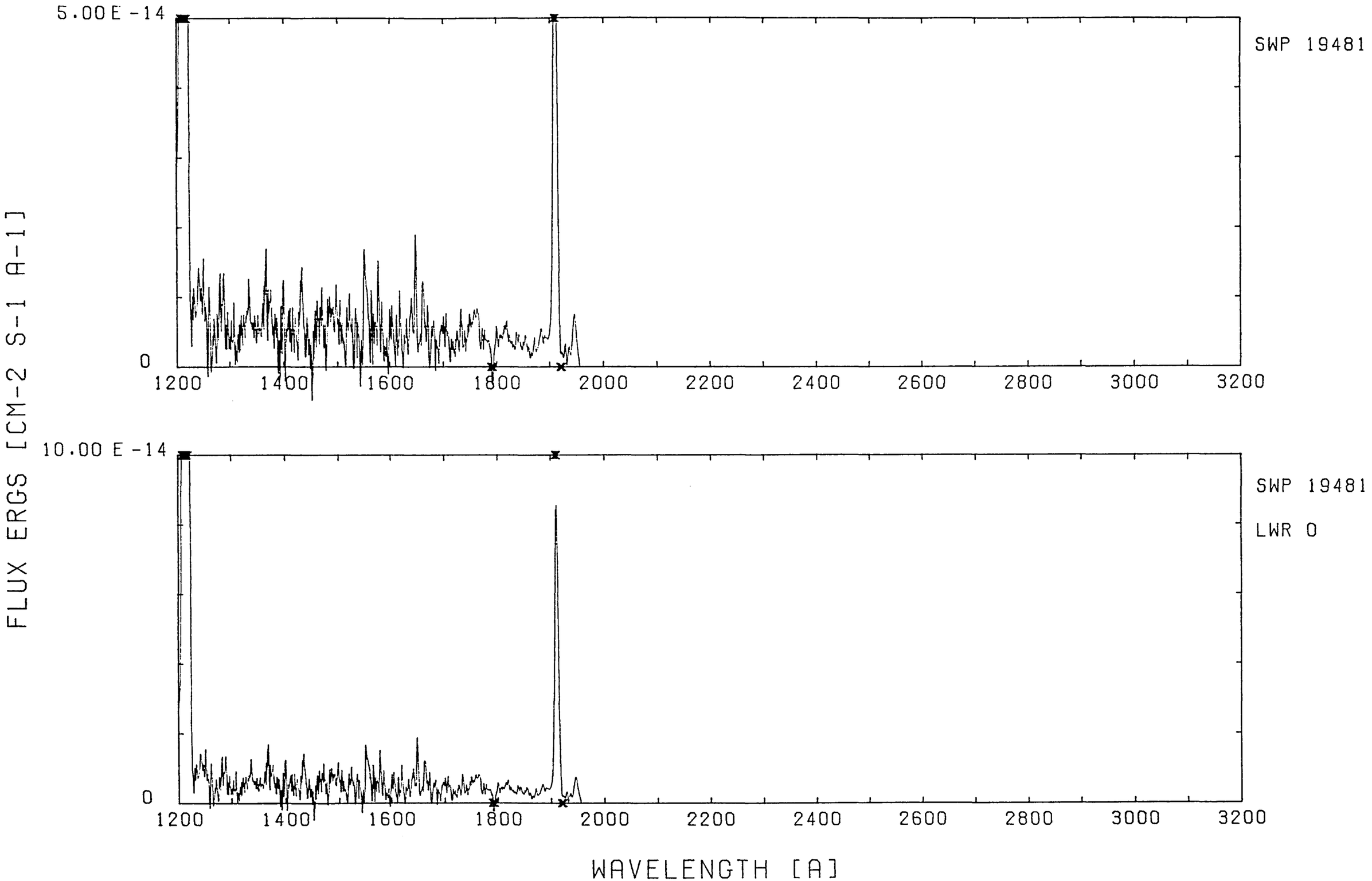
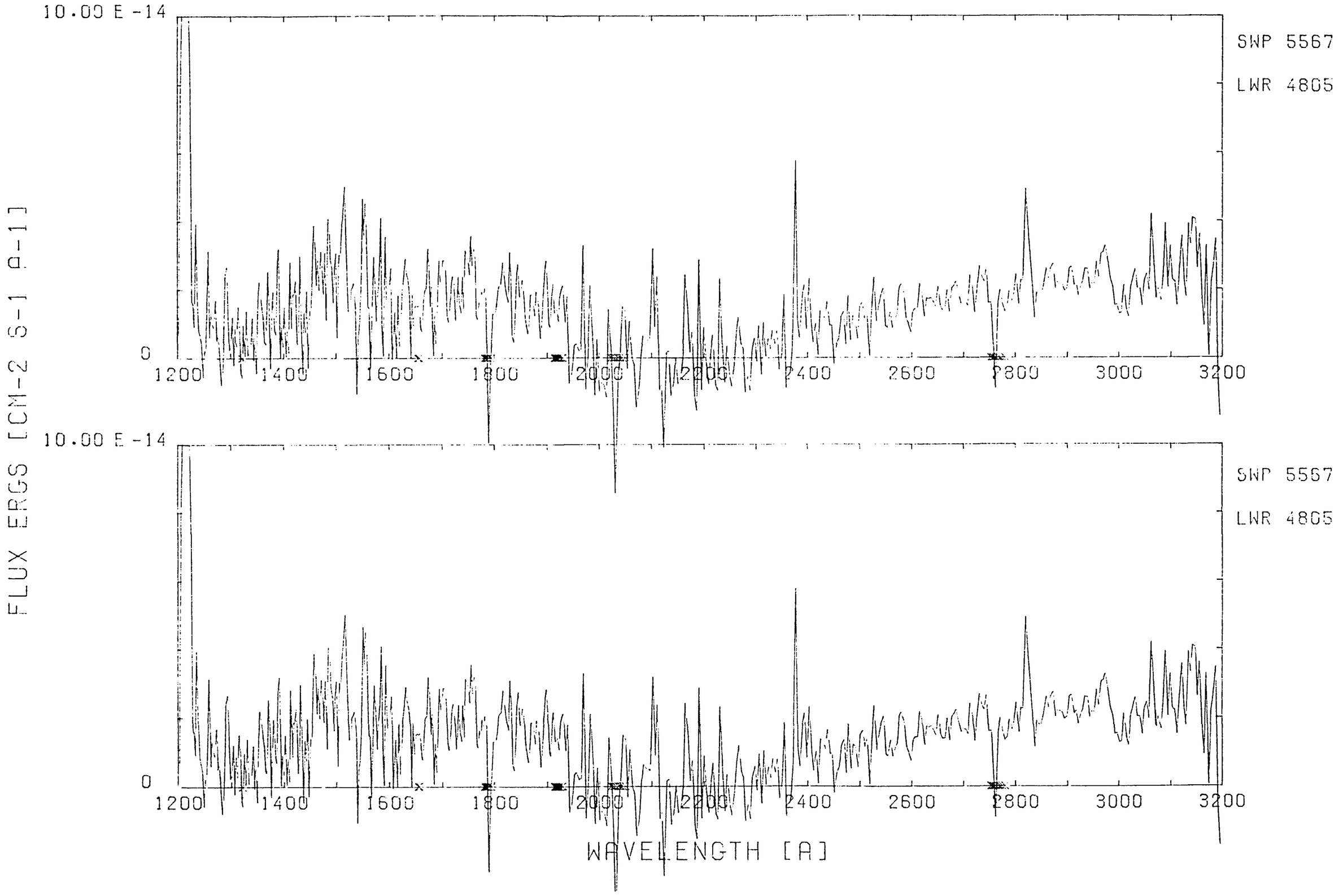
SWP 19486
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
10.00 E-14
0
SWP 19486
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

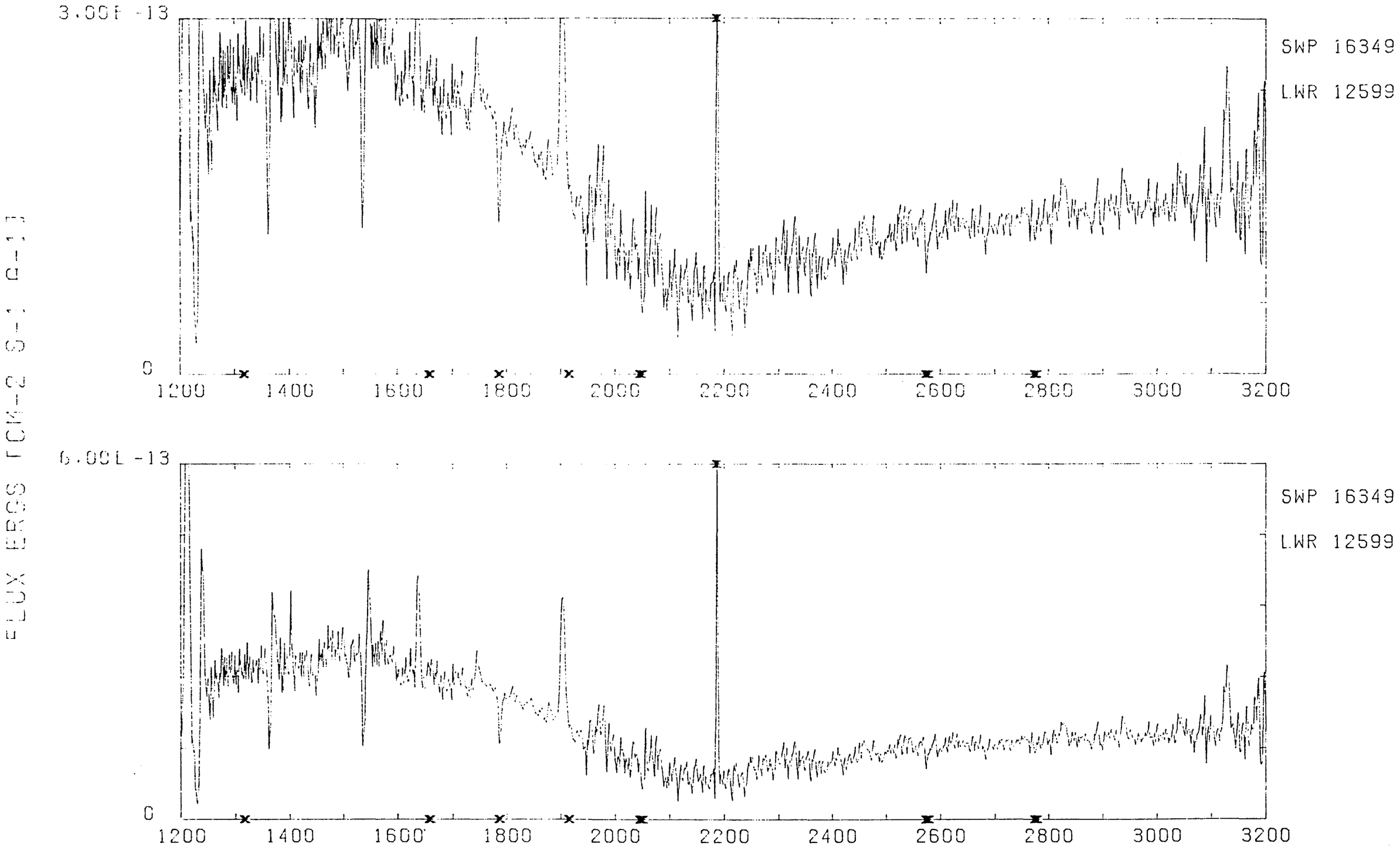
LMC N133


5.00E-14
0
SWP 19481
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
10.00 E-14
0
SWP 19481
LWR 0
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

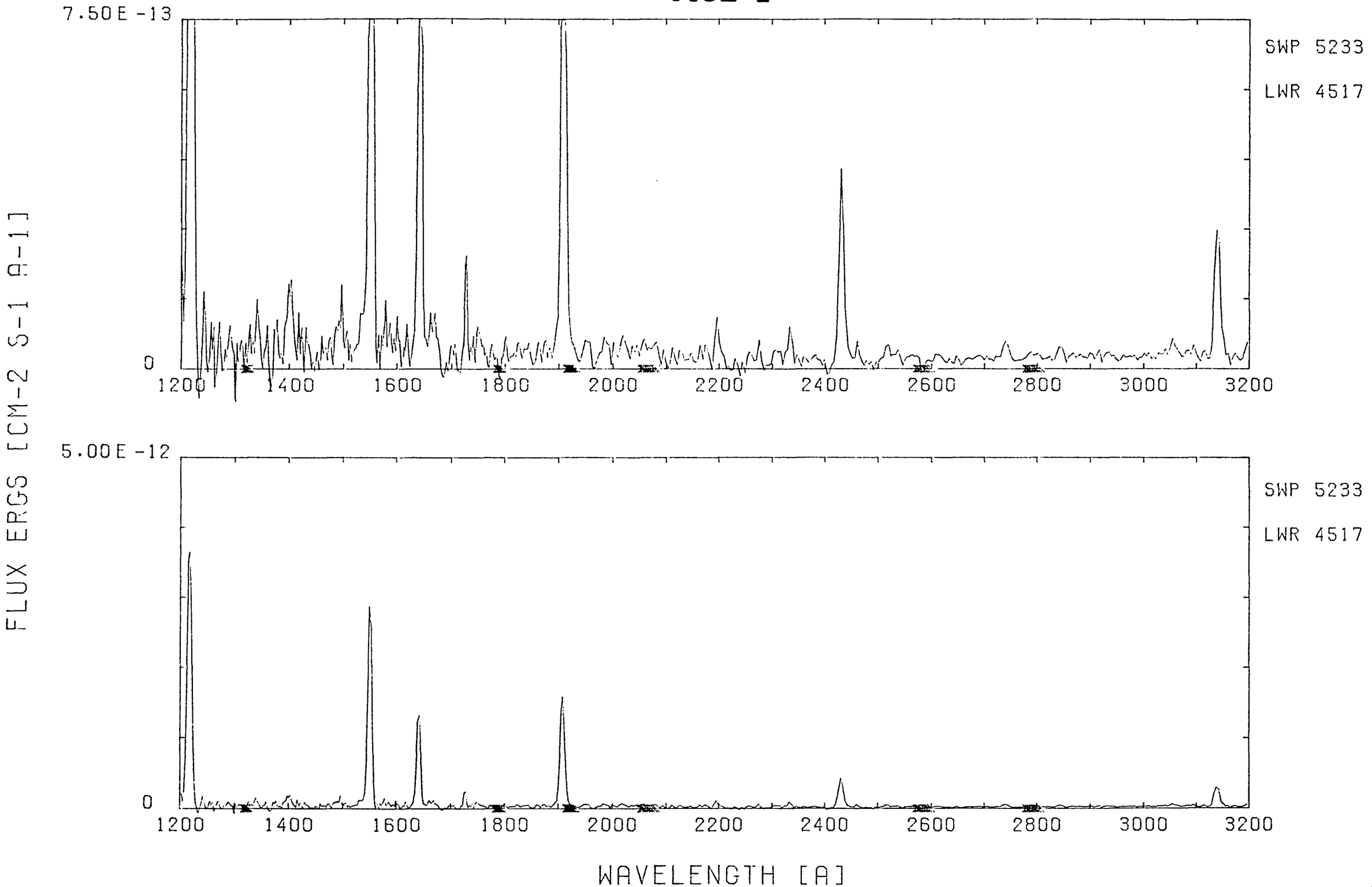
Hen 1044


10.00 E -14
SWP 5567
LWR 4805
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
10.00 E -14
SWP 5567
LWR 4805
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 5882


3.00E -13
0
SWP 16349
LWR 12599
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX (ERGS CM-2 S-1 A-1)
6.00E -13
0
SWP 16349
LWR 12599
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

Me2-1


7.50E-13
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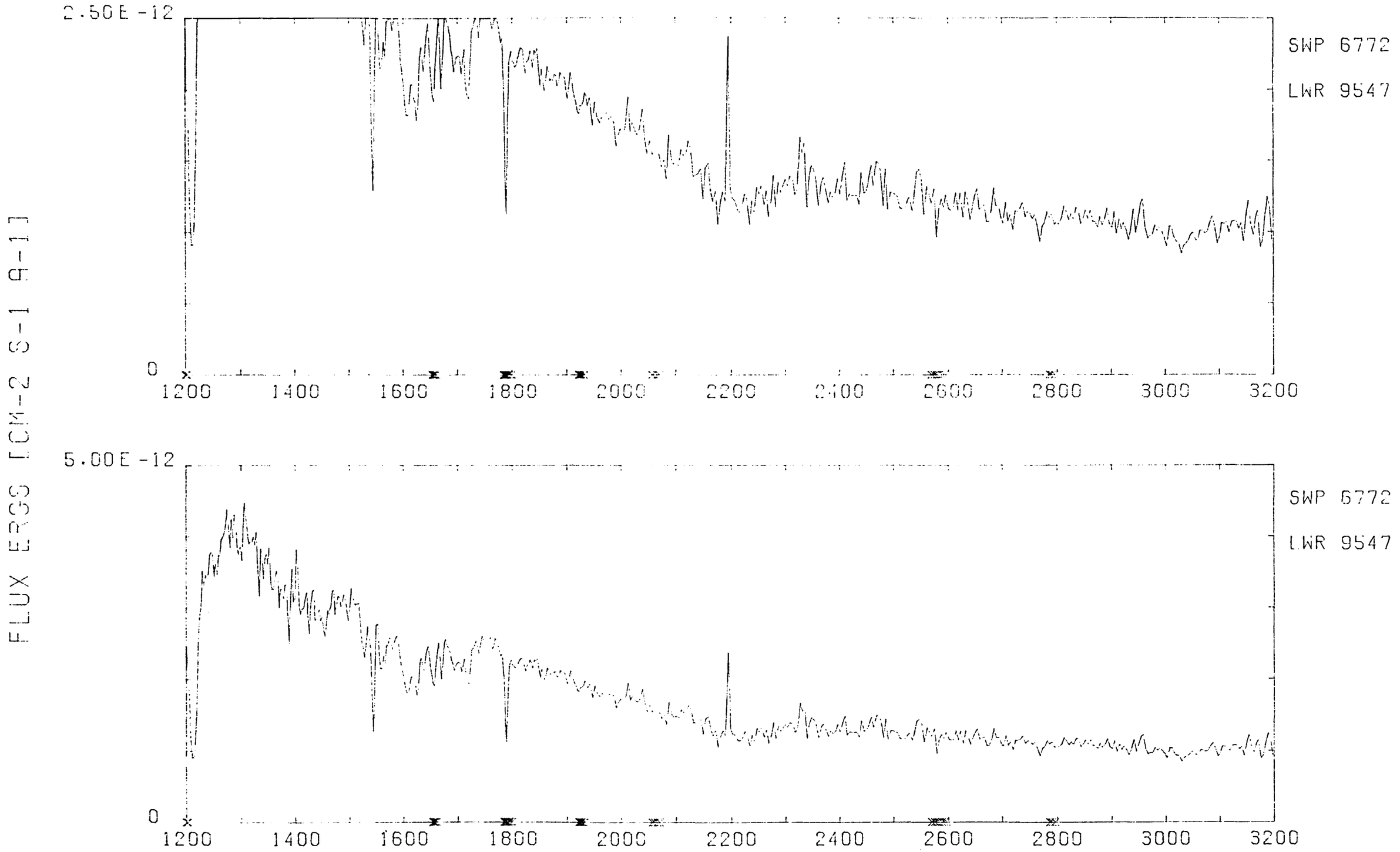
SWP 5233
LWR 4517
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
5.00E-12
0
SWP 5233
LWR 4517
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

He2-131


2.50E-12
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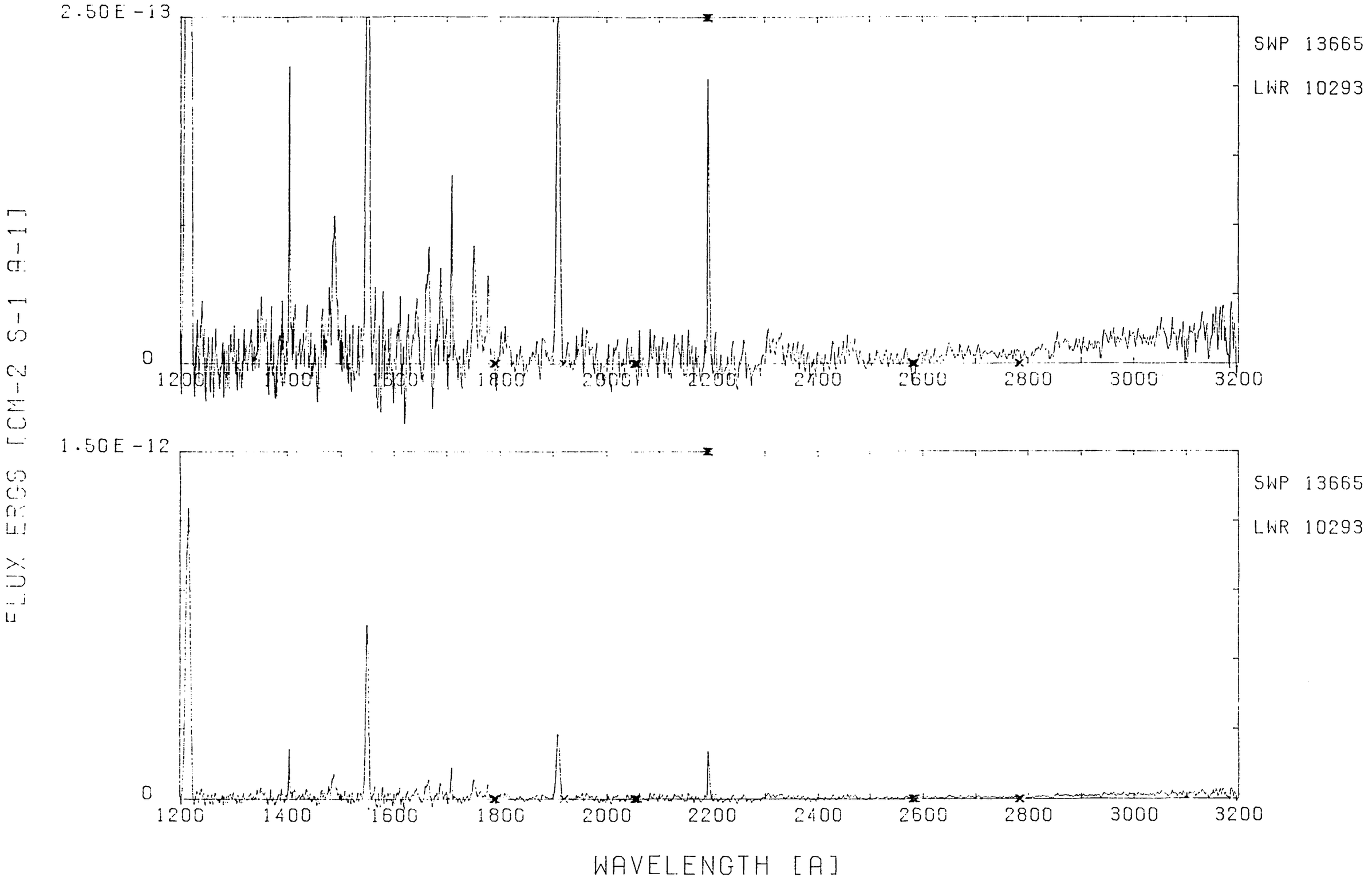
SWP 6772
LWR 9547
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1
5.00E-12
0
SWP 6772
LWR 9547
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

CN 1-1


2.50E-13
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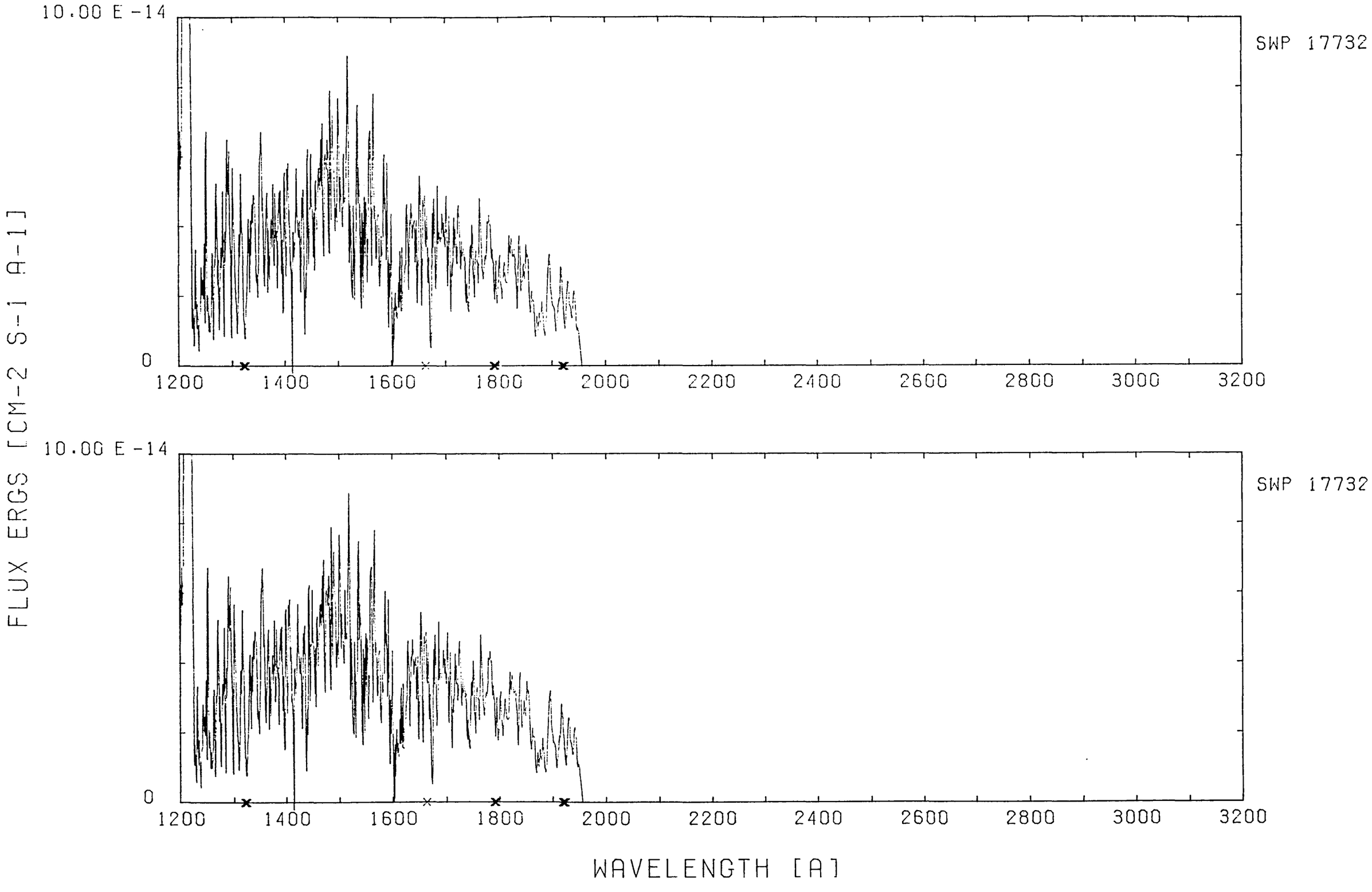
SWP 13665
LWR 10293
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
1.50E-12
0
SWP 13665
LWR 10293
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

SP-1


10.00 E -14
SWP 17732
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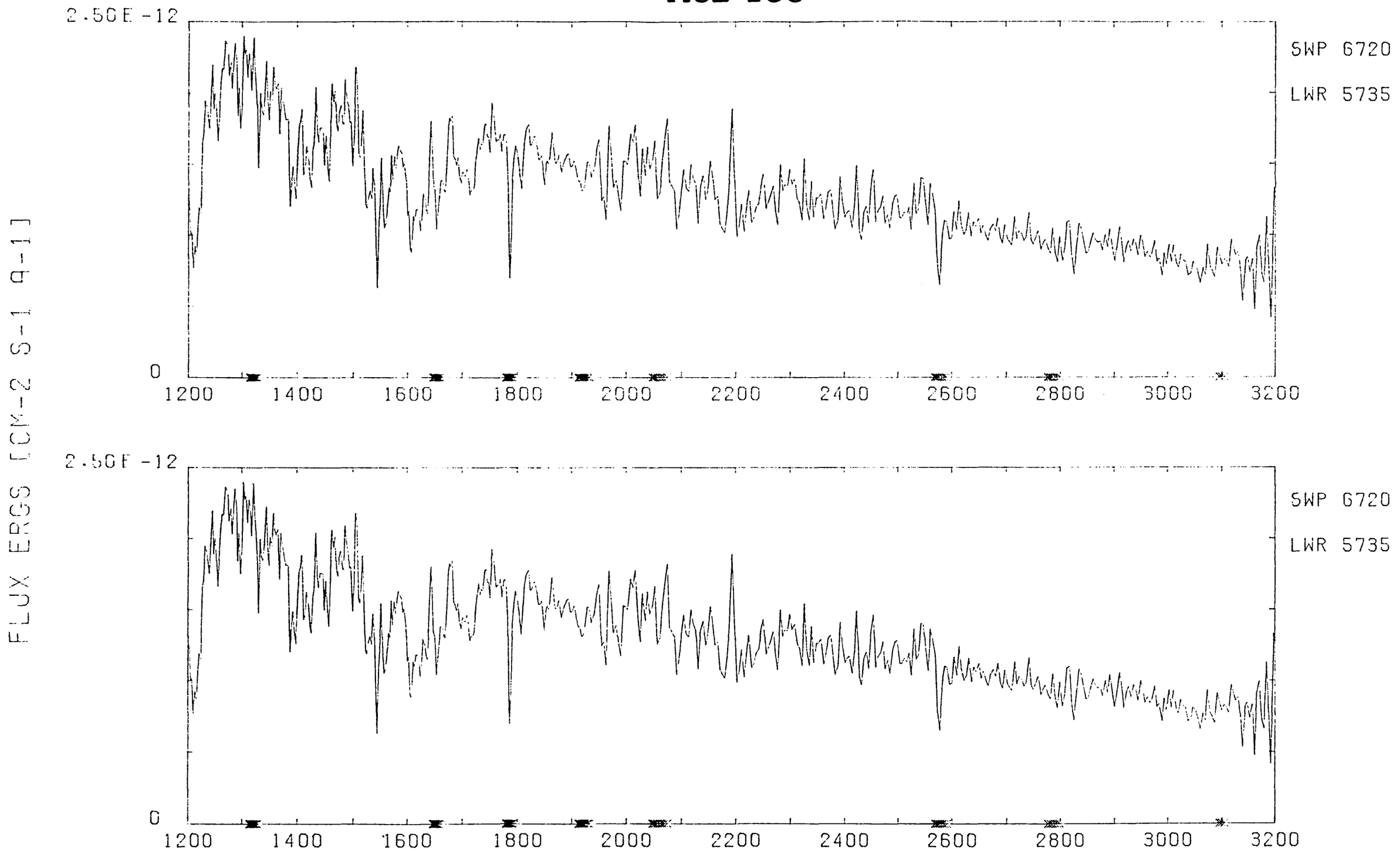
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

He2-138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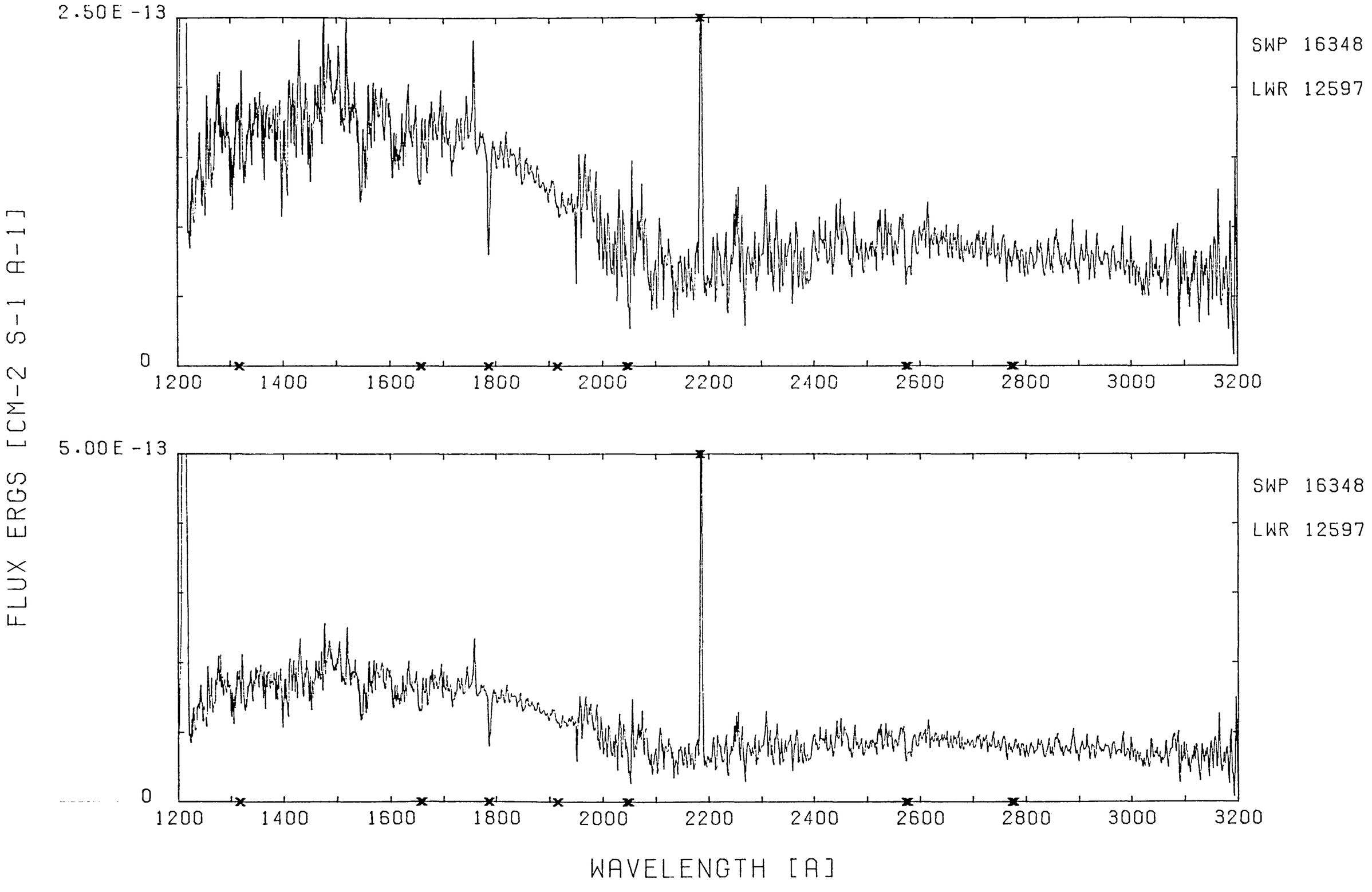
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 6720
LWR 5735
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 6026


2.50E-13
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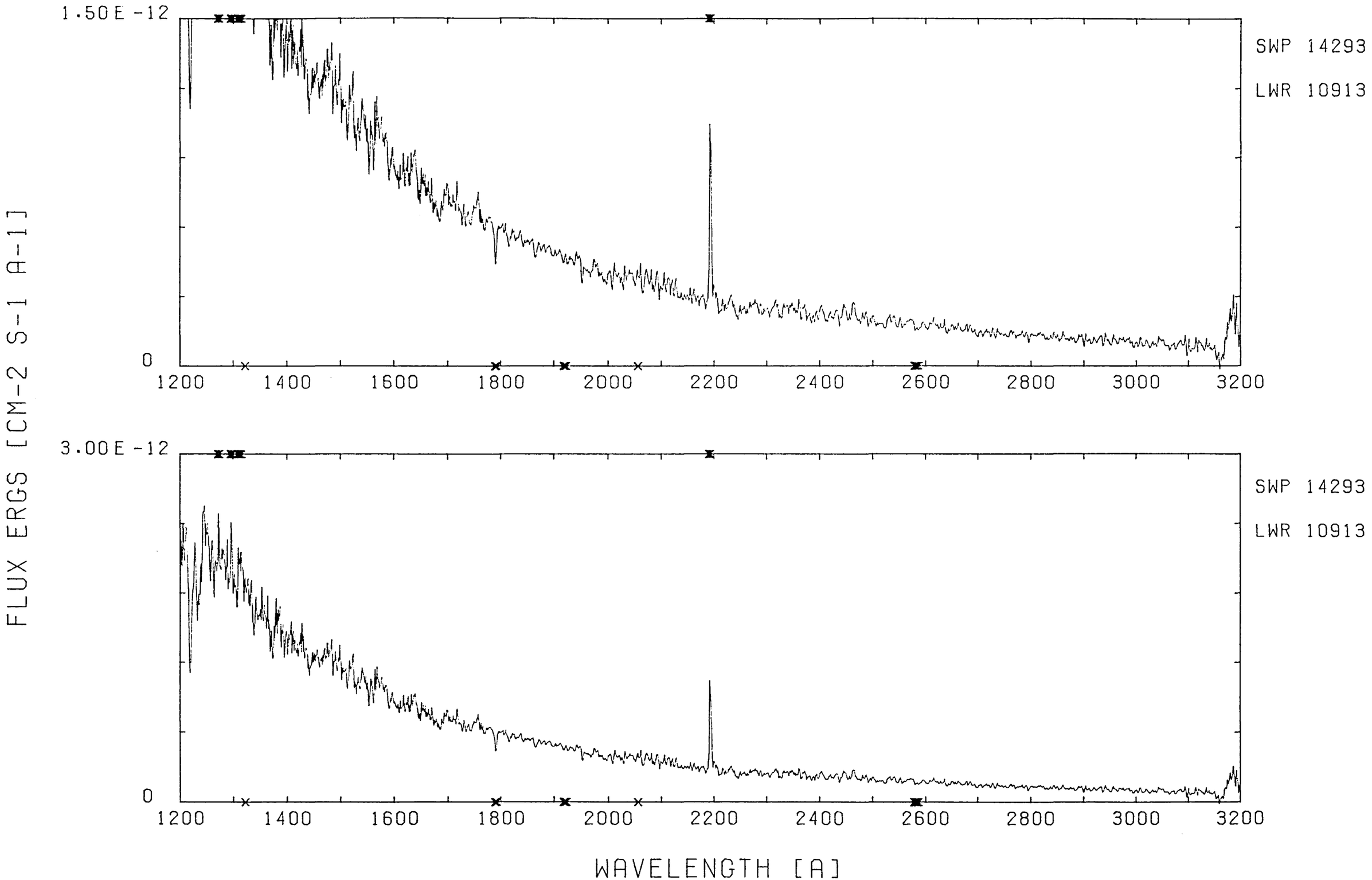
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 16348
LWR 12597
FLUX ERGS CM-2 S-1 A-1]
5.00E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 16348
LWR 12597
WAVELENGTH [A]

NGC 6058


1.50E-12
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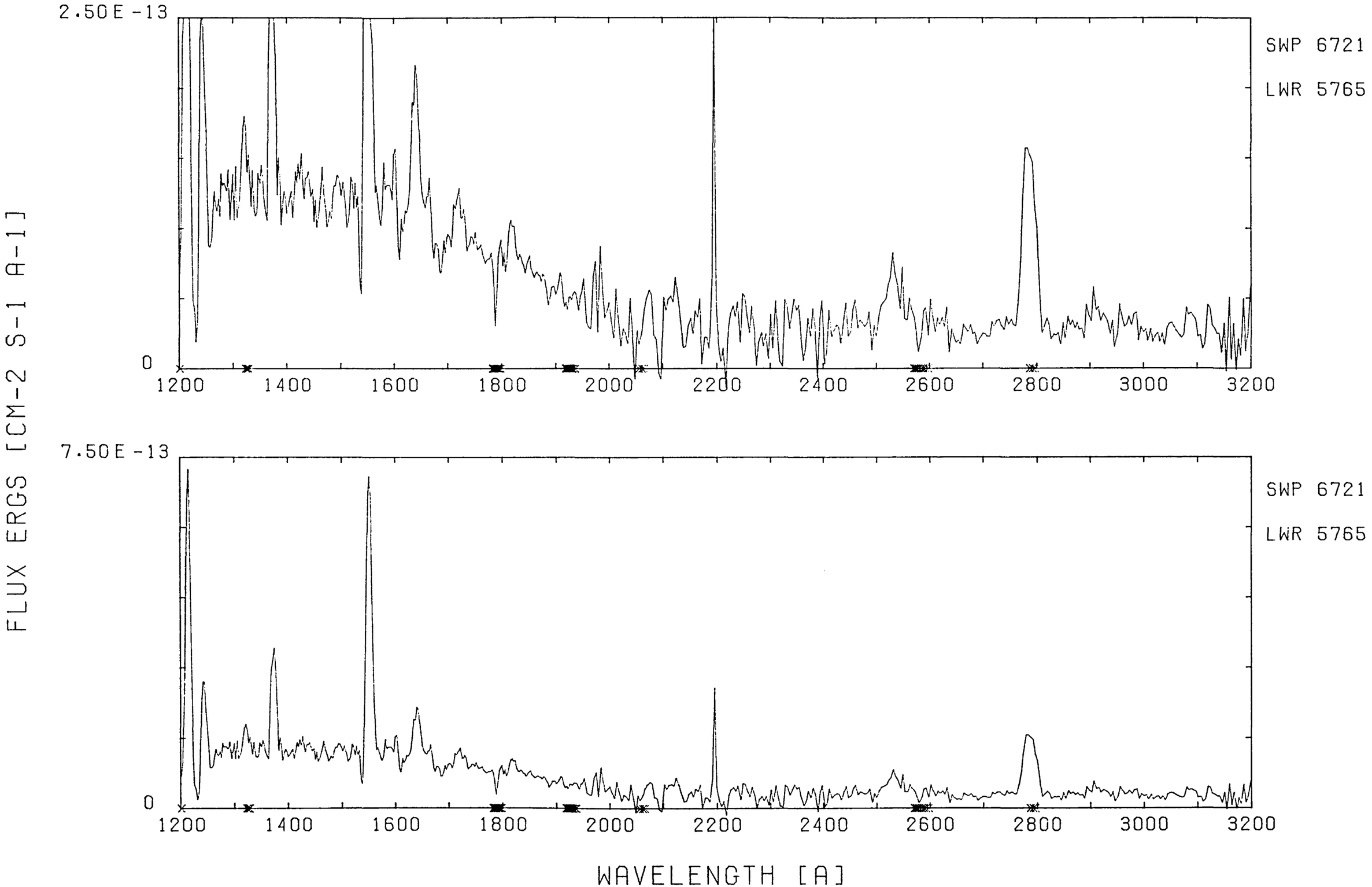
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 14293
LWR 10913
FLUX ERGS [CM-2 S-1 A-1]
3.00E-12
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 14293
LWR 10913
WAVELENGTH [A]

Sand 3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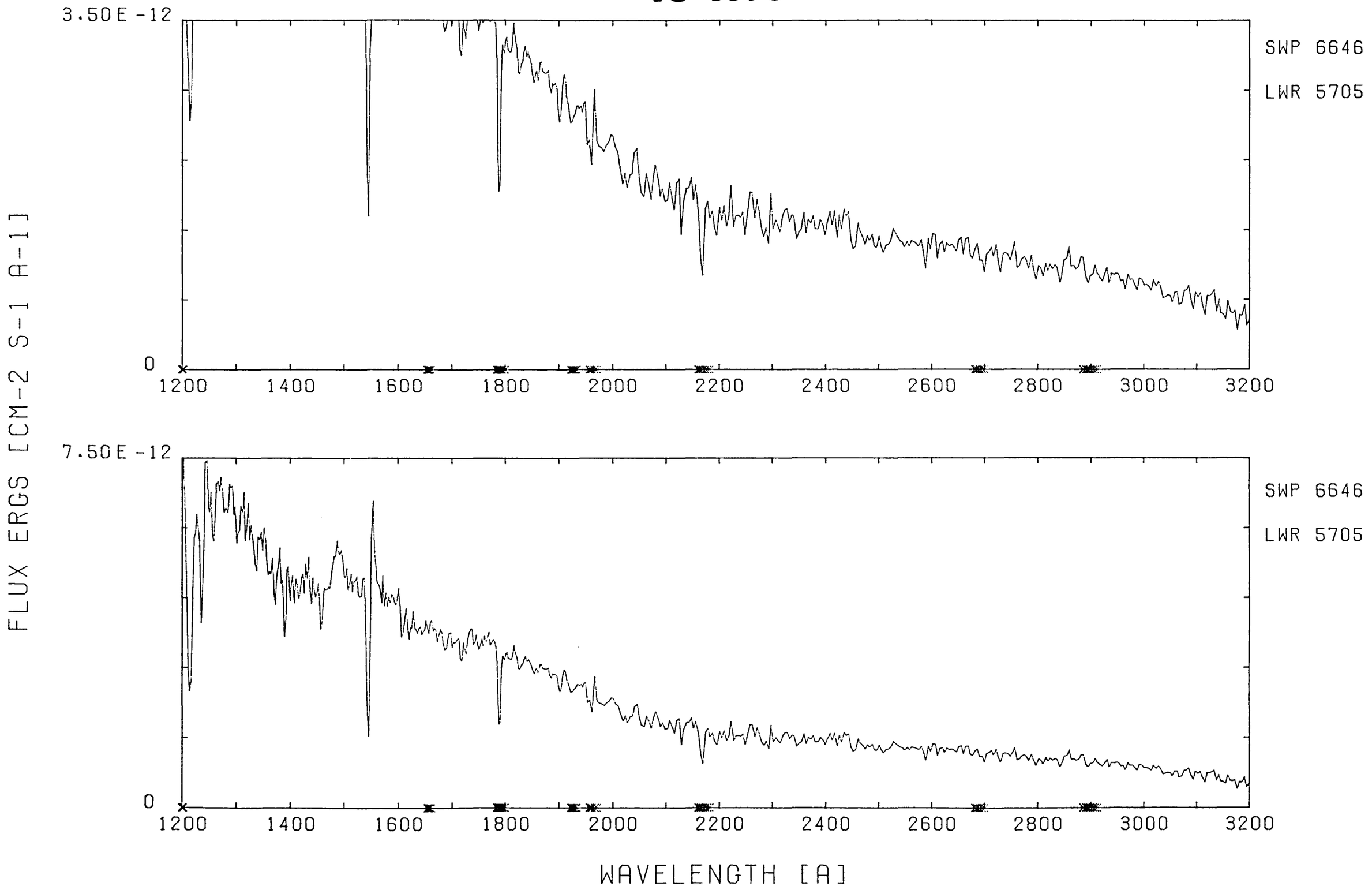
SWP 6721
LWR 5765
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
7.50E-13
0
SWP 6721
LWR 5765
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

IC 4593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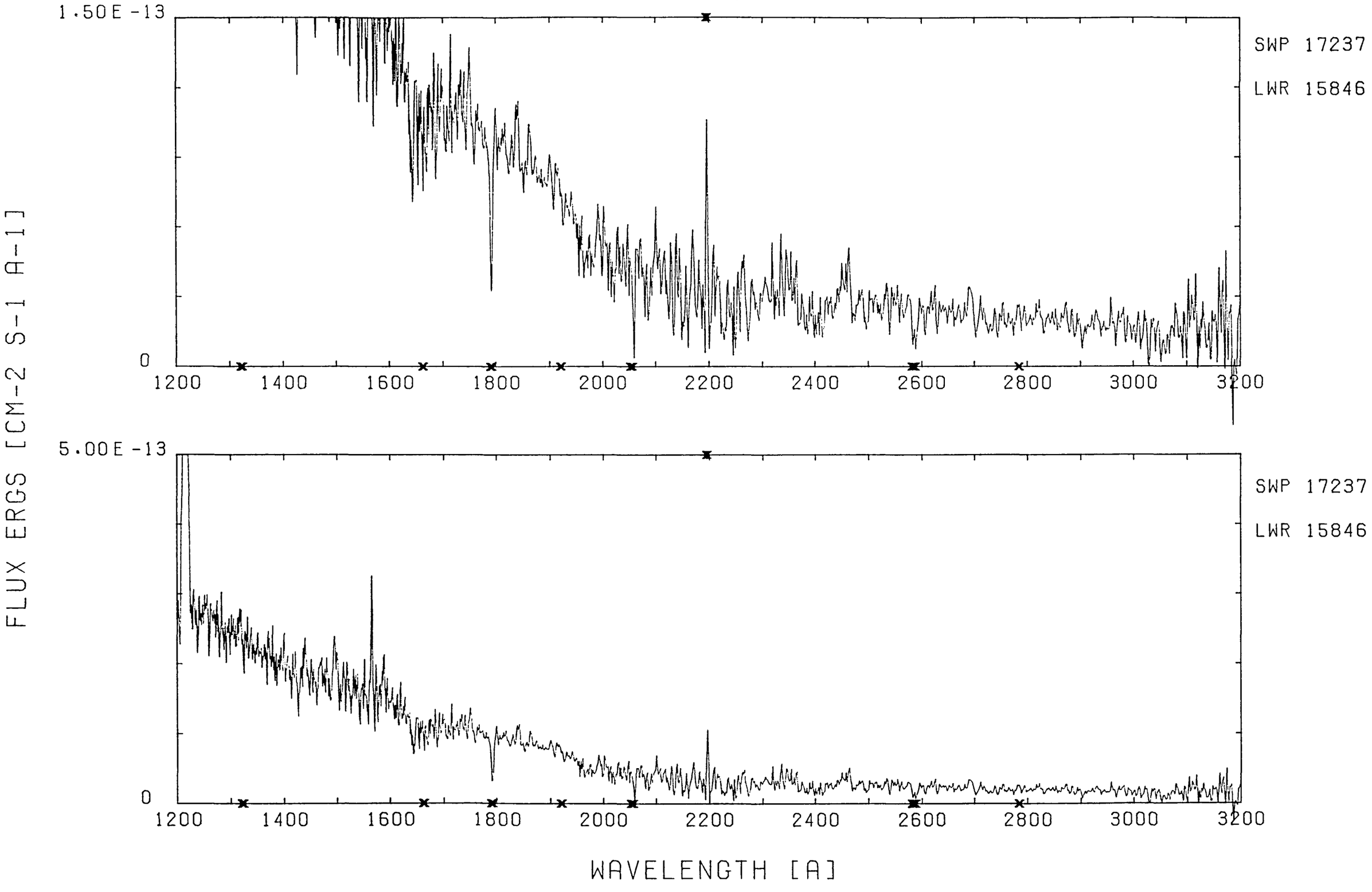
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 6646
LWR 5705
FLUX ERGS CM-2 S-1 A-1]
7.50E-12
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 6646
LWR 5705
WAVELENGTH [A]

A-39


1.50E-13
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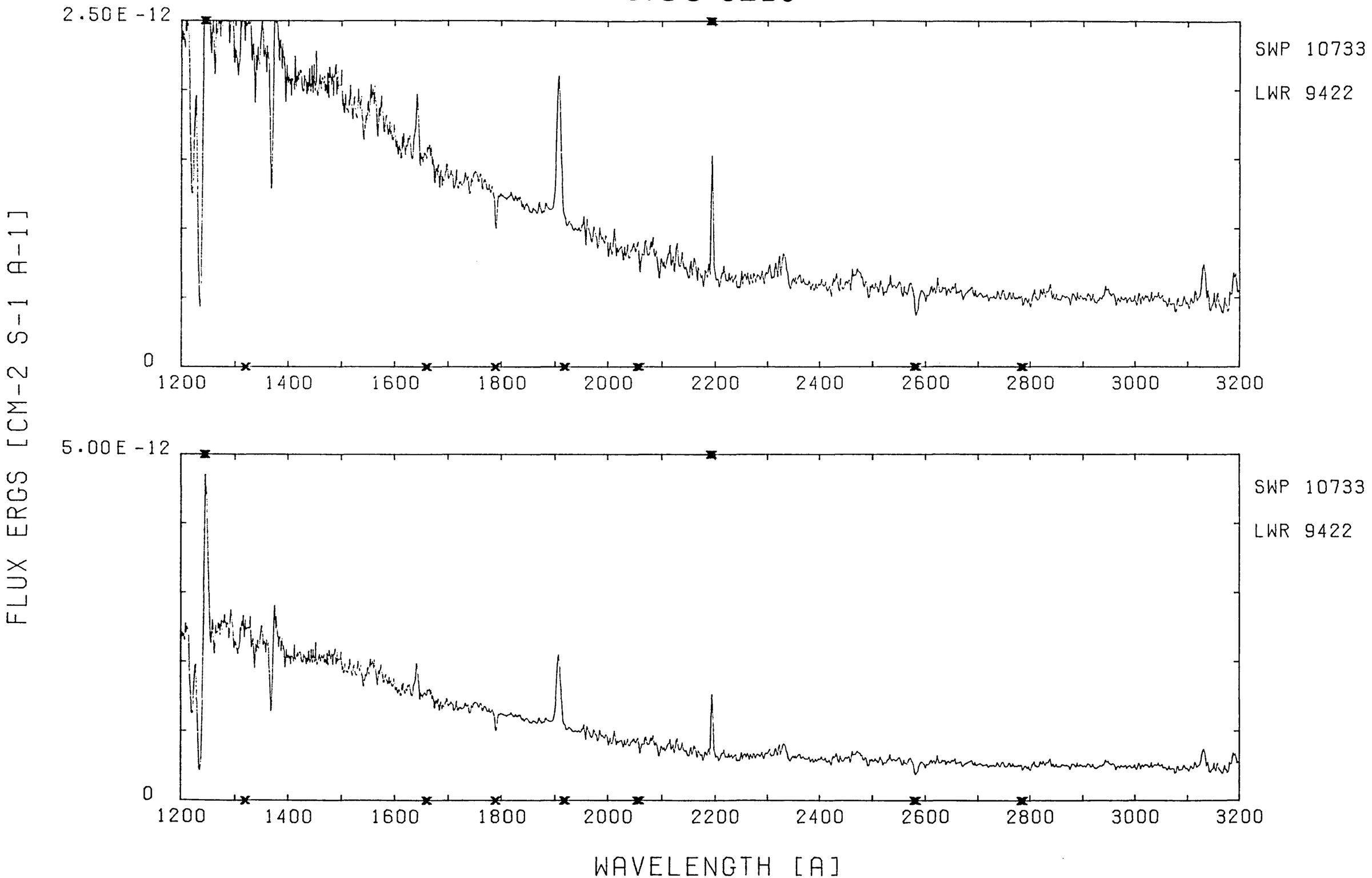
SWP 17237
LWR 15846
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
5.00E-13
0
SWP 17237
LWR 15846
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

NGC 6210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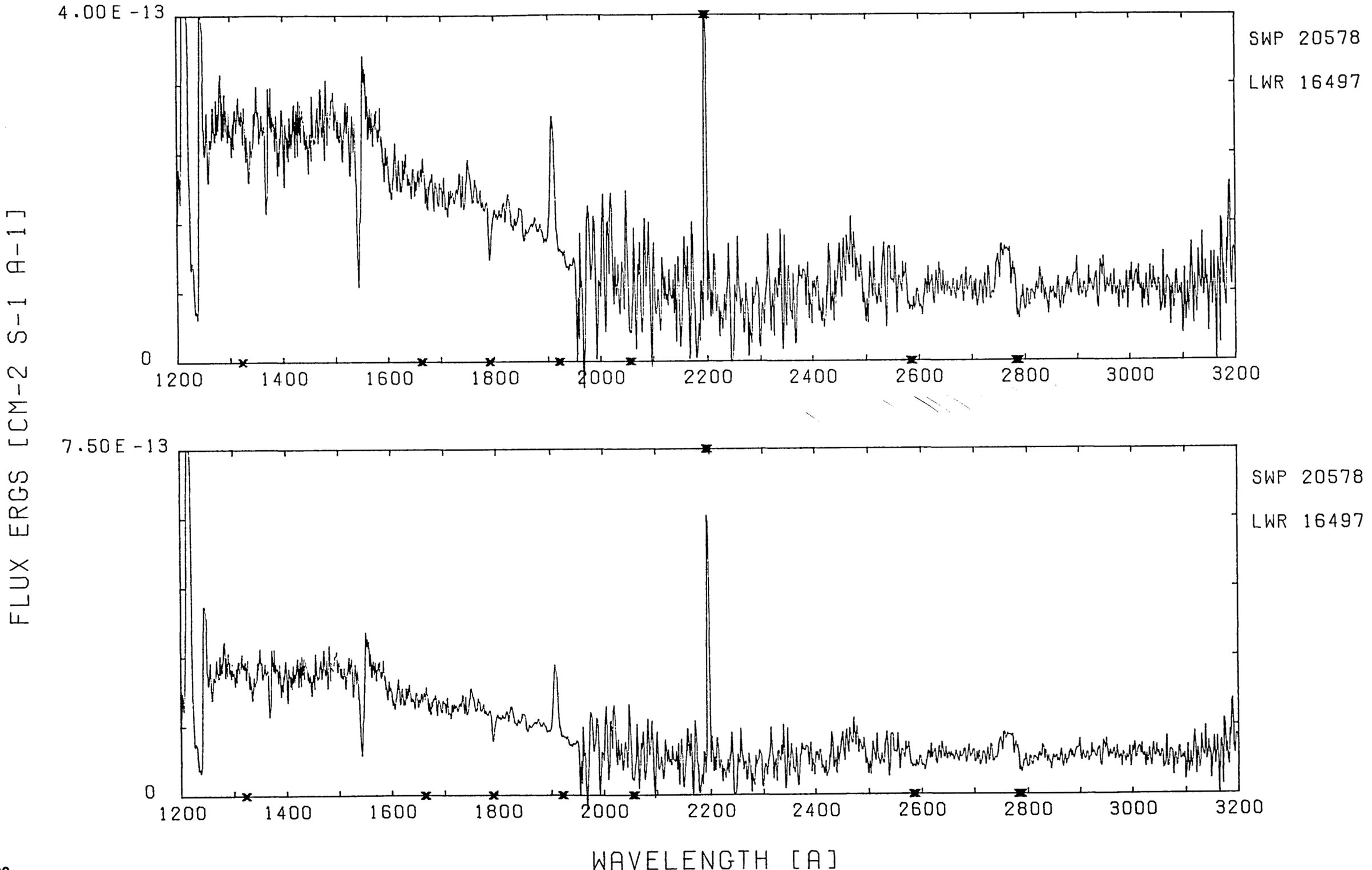
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 10733
LWR 9422
FLUX ERGS CM-2 S-1 A-1]
5.00E-12
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 10733
LWR 9422
WAVELENGTH [A]

IC 4634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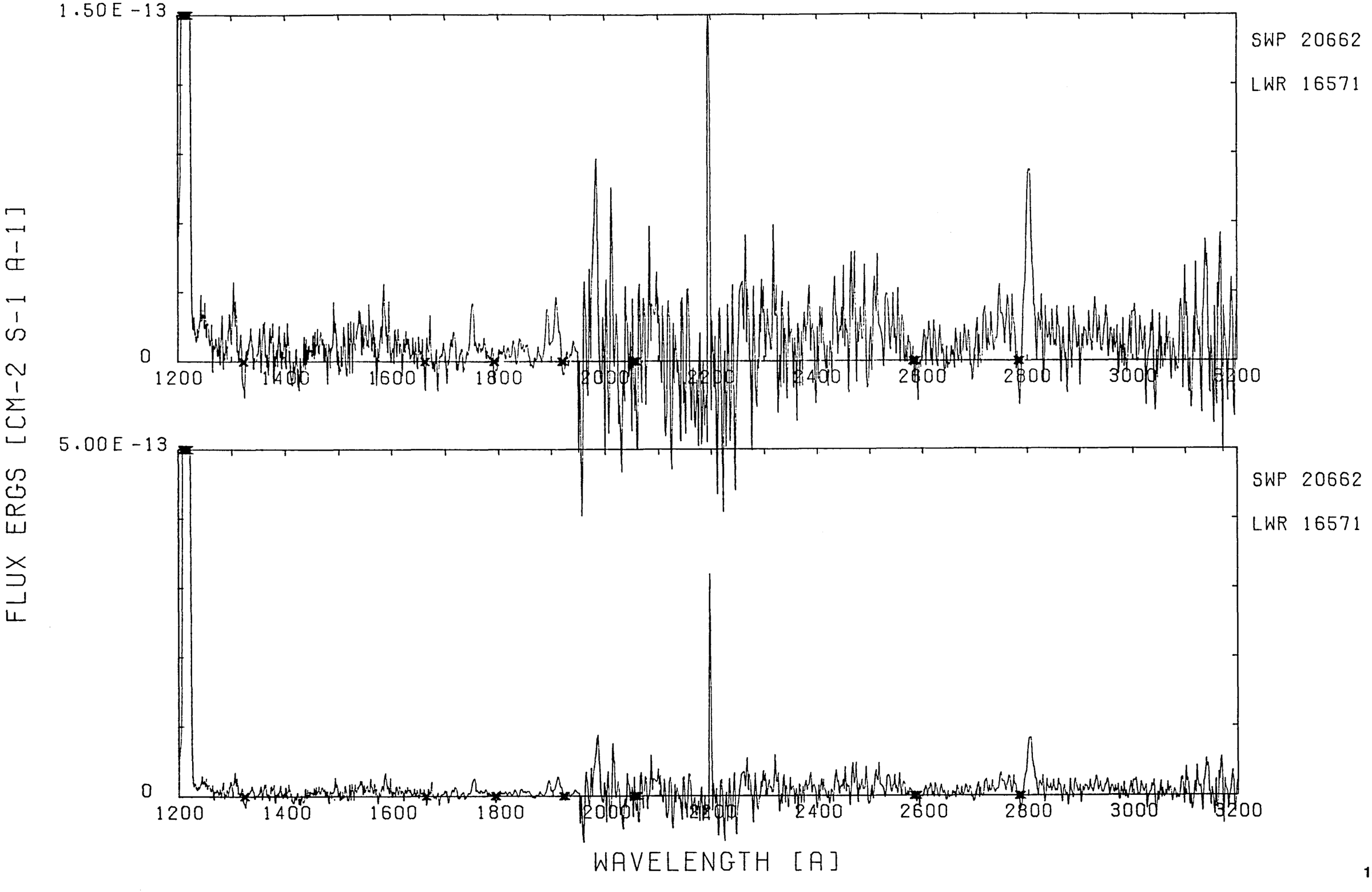
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 20578
LWR 16497
FLUX ERGS [CM-2 S-1 A-1]
7.50E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 20578
LWR 16497
WAVELENGTH [A]

M2-9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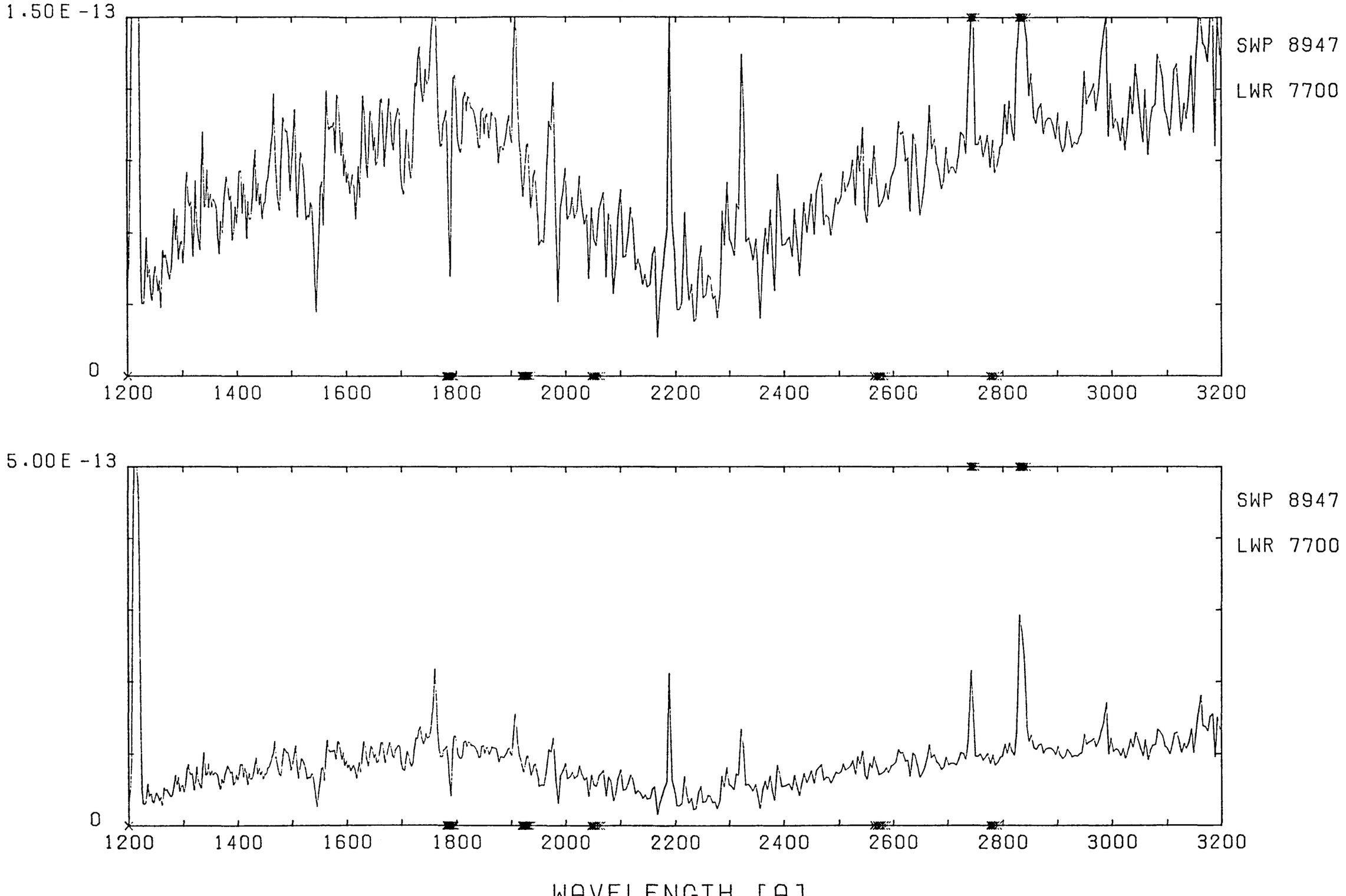
SWP 20662
LWR 16571
SWP 20662
LWR 16571
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

CPD-56 8032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SWP 8947
LWR 7700
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1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
5.00E-13
0
SWP 8947
LWR 7700
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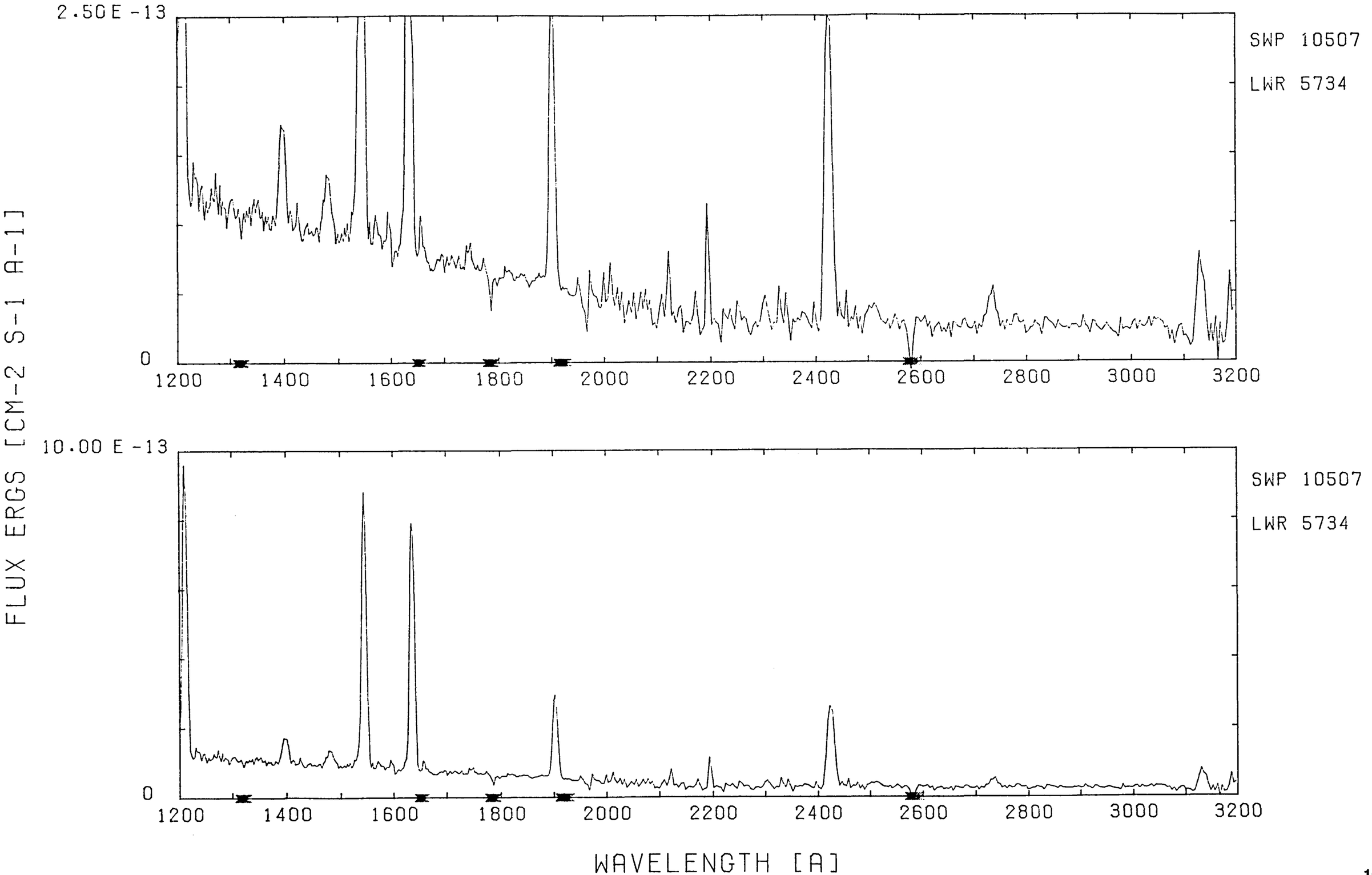
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

IC 4642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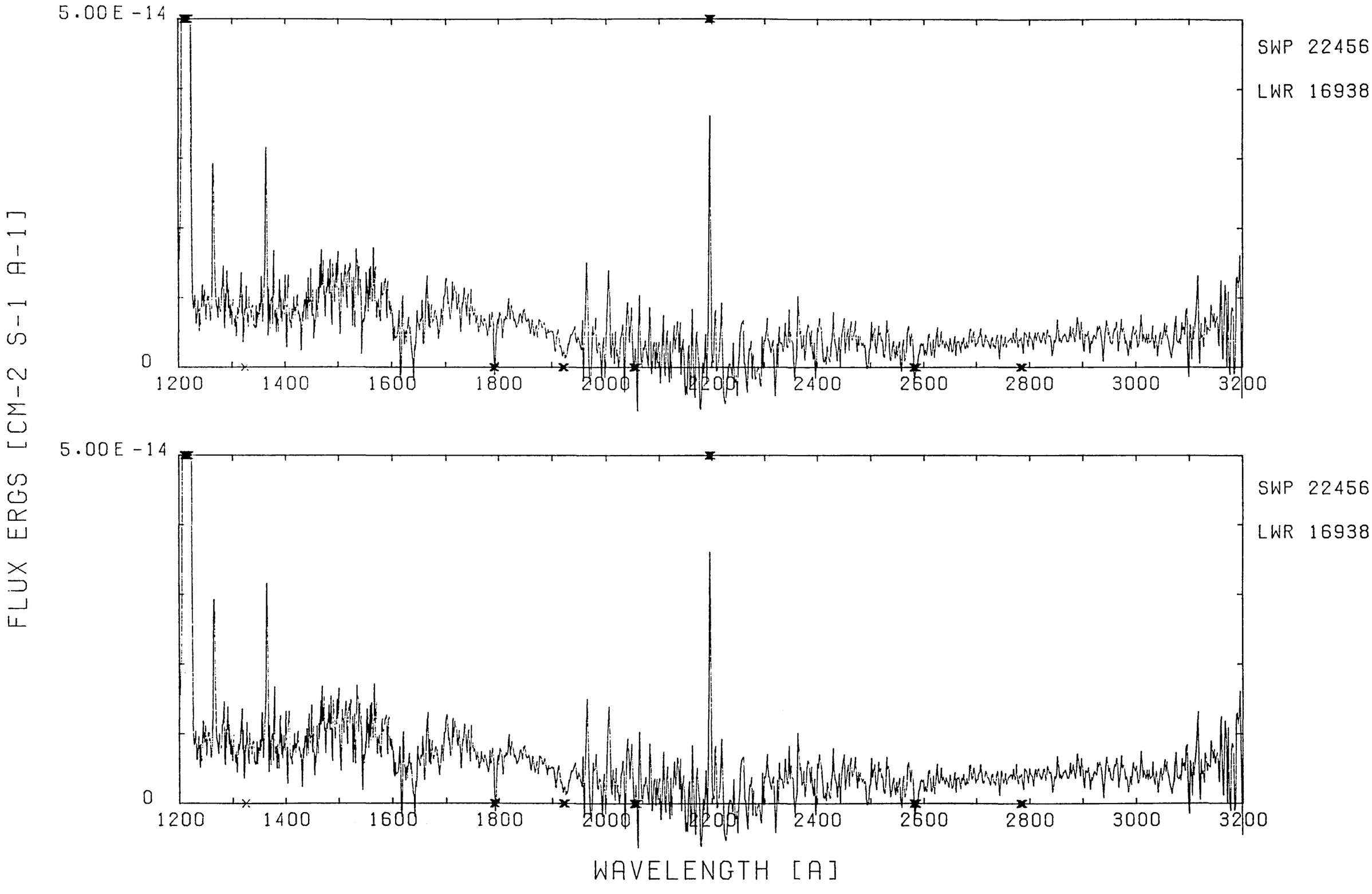
LWR 5734
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
10.00 E-13
0
SWP 10507
LWR 5734
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

A-41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1400
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1800
2000
2200
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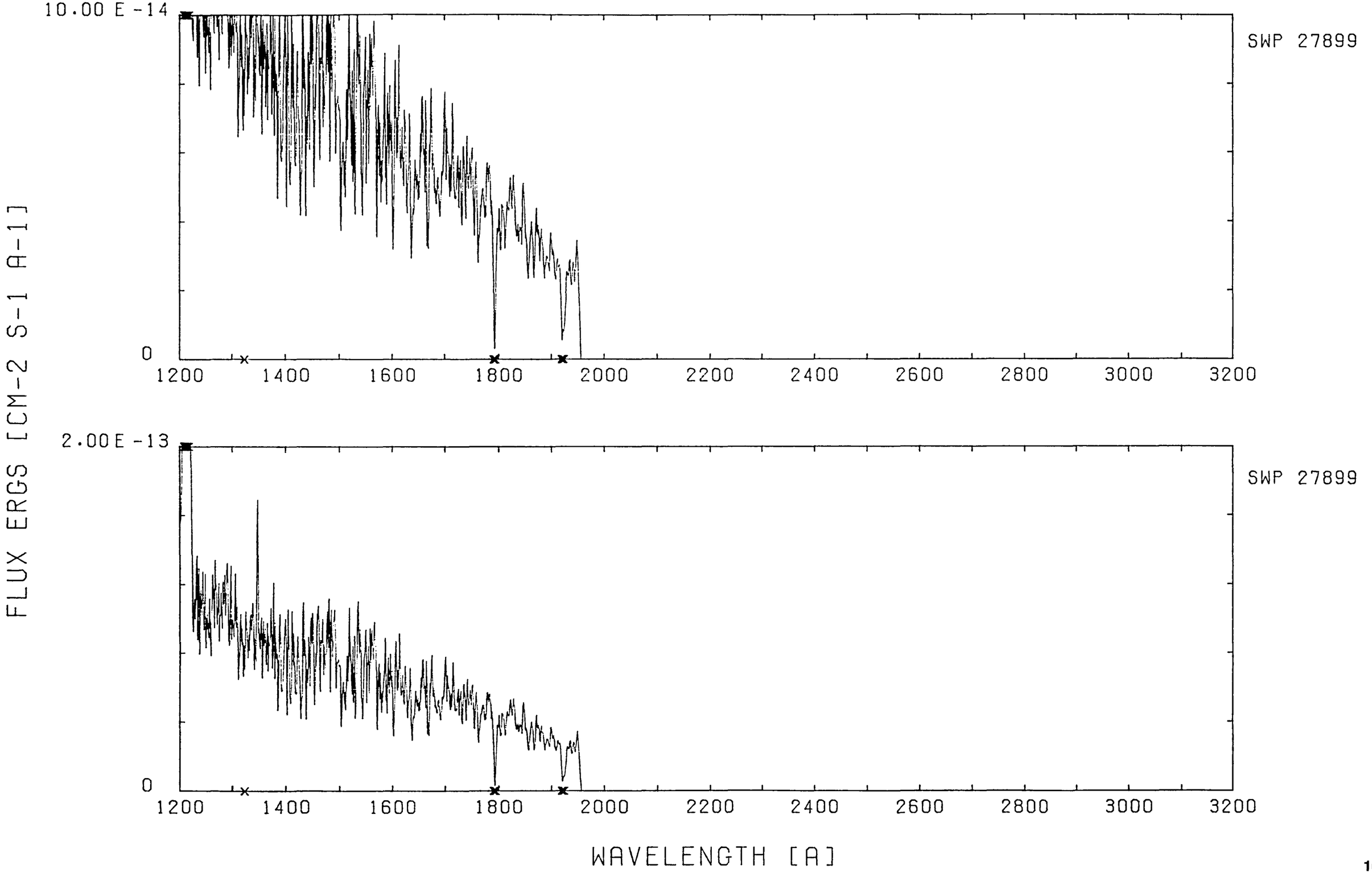
2600
2800
3000
3200
SWP 22456
LWR 16938
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

K1-14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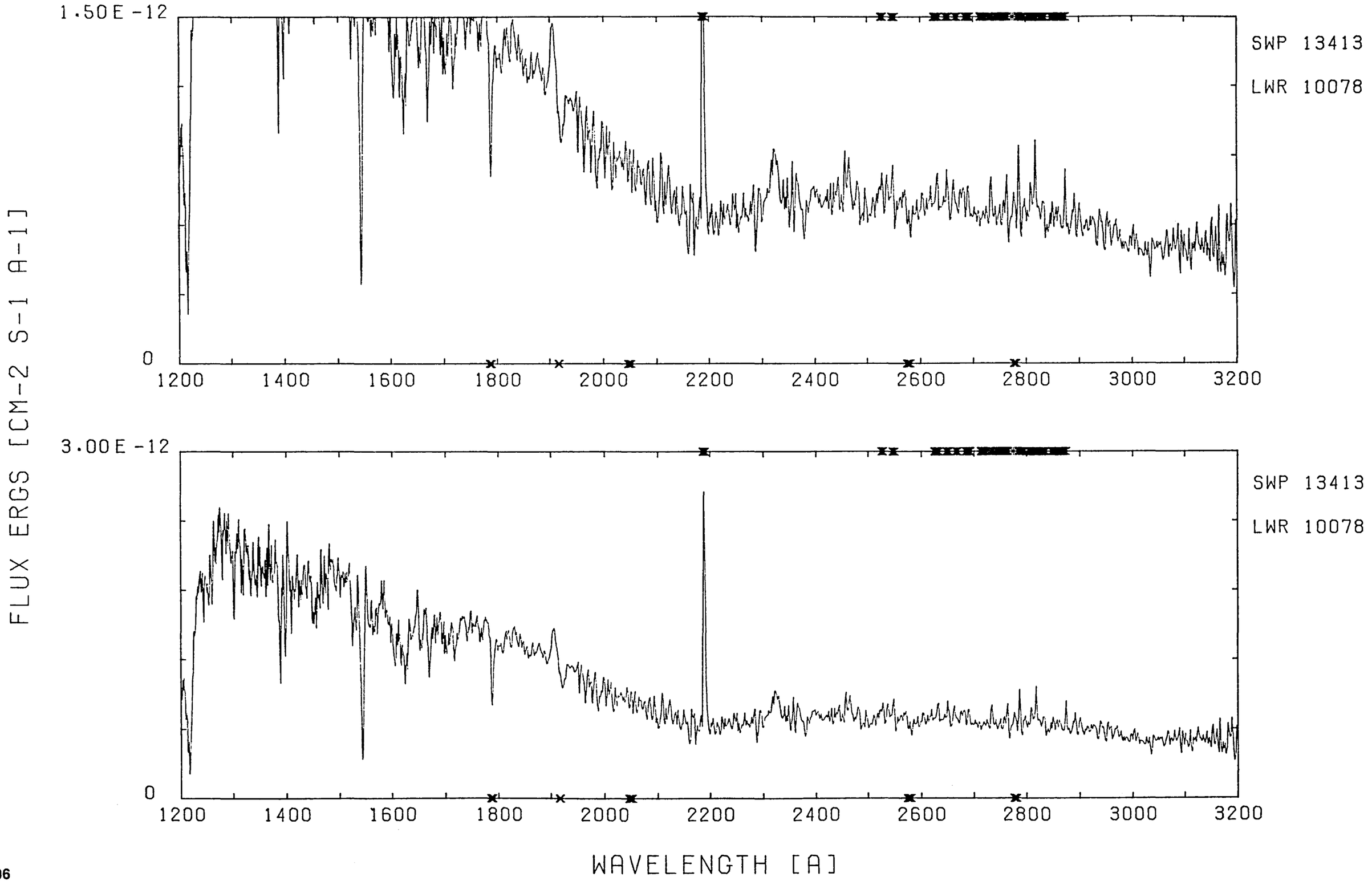
SWP 27899
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
2.00E -13
0
SWP 27899
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

He2-274


1.50E-12
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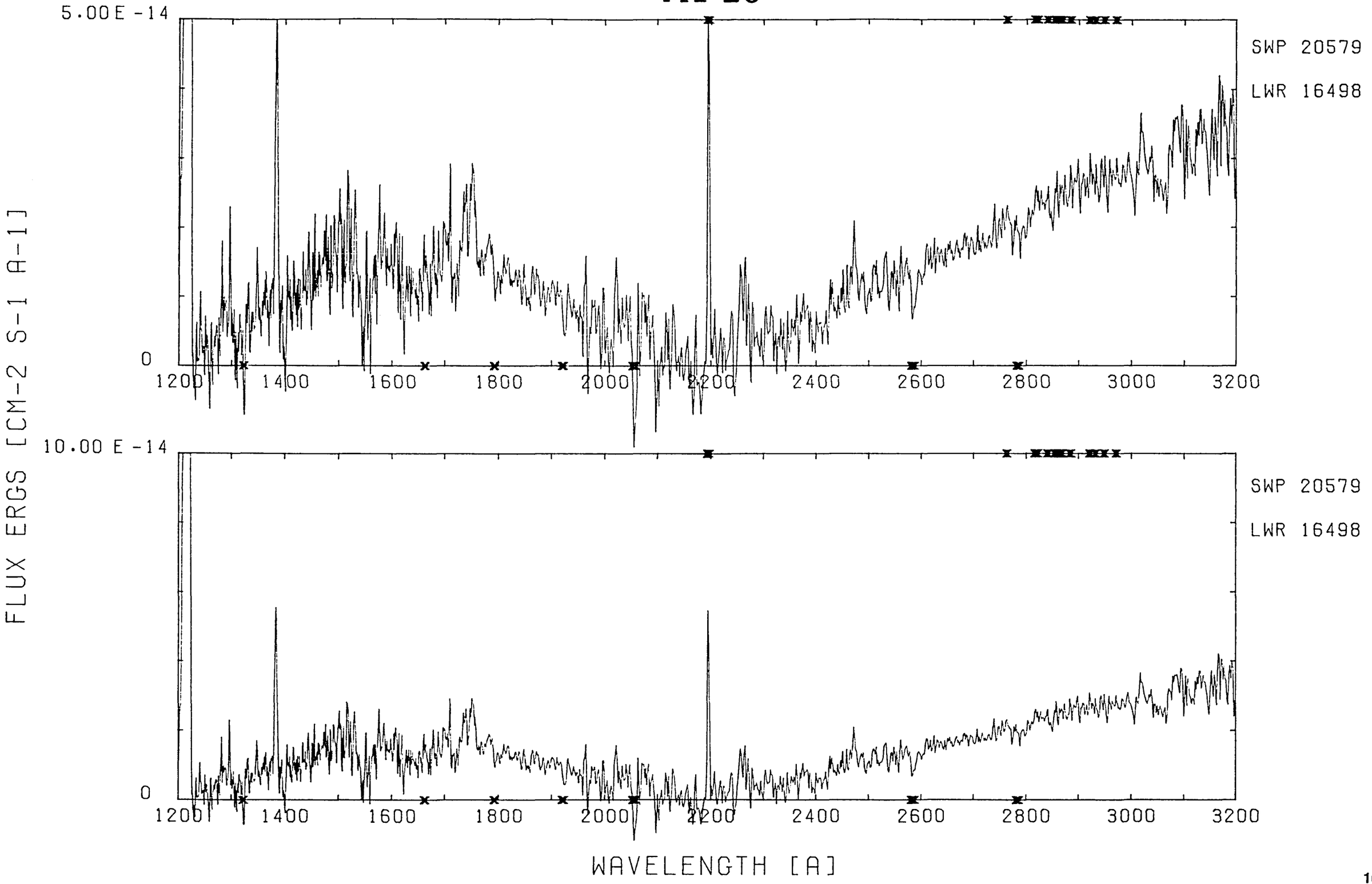
SWP 13413
LWR 10078
FLUX ERGS CM-2 S-1 A-1]
3.00E-12
0
SWP 13413
LWR 10078
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

M1-26


5.00E-14
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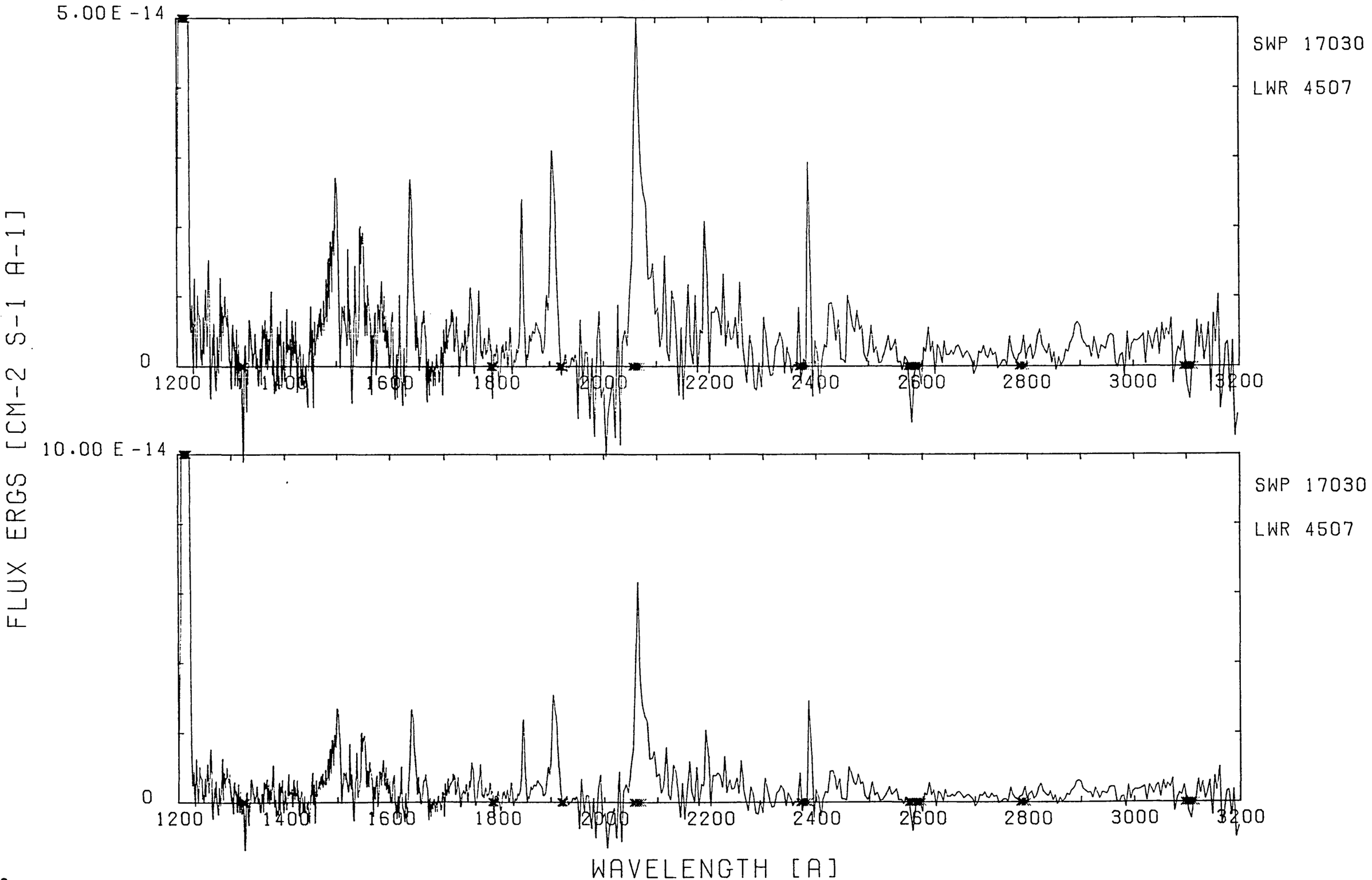
10.00 E-14
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 20579
LWR 16498
SWP 20579
LWR 16498
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 6445


5.00E-14
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SWP 17030
LWR 4507
10.00 E-14
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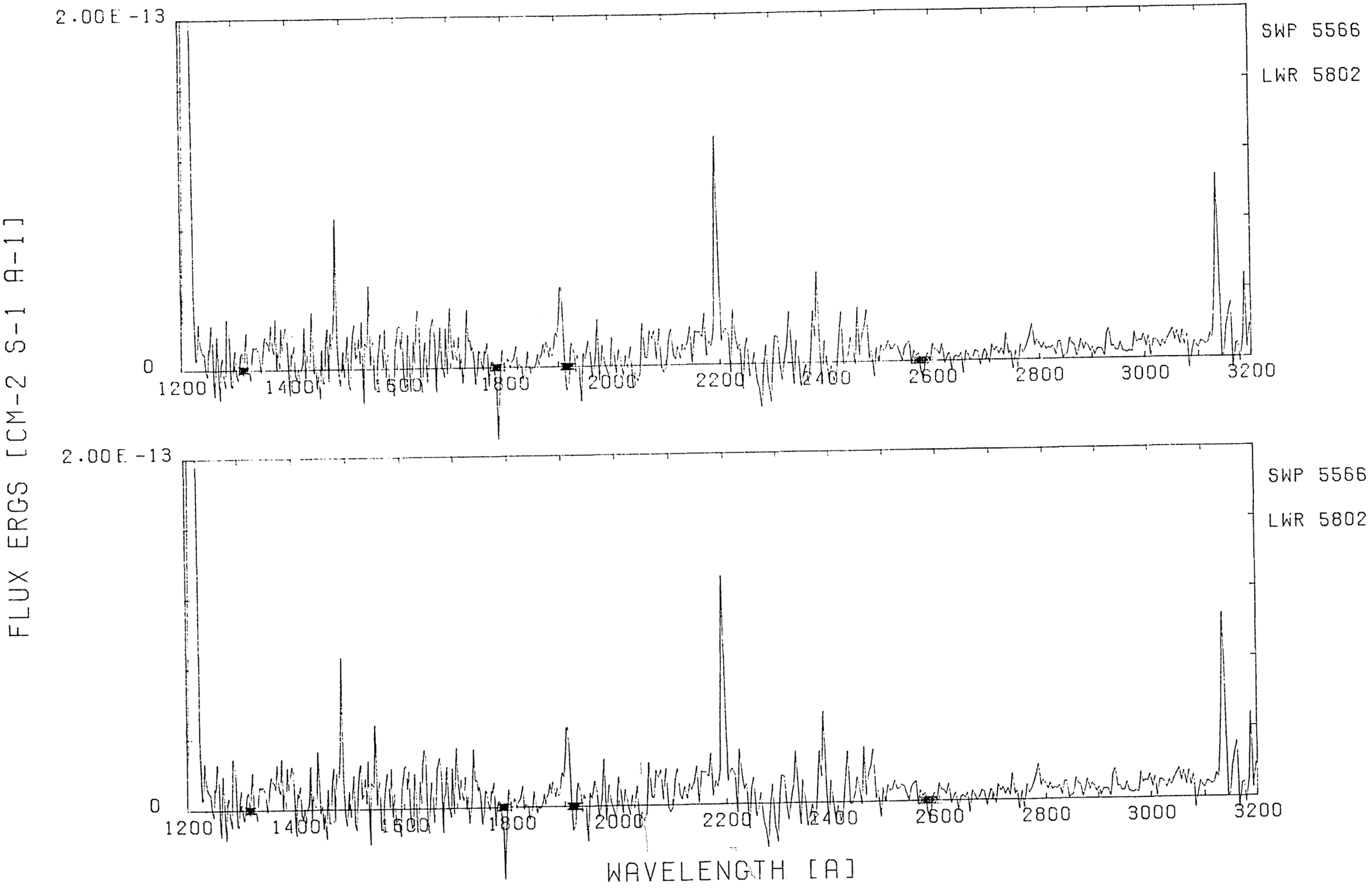
SWP 17030
LWR 4507
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

H1-36


2.00E-13
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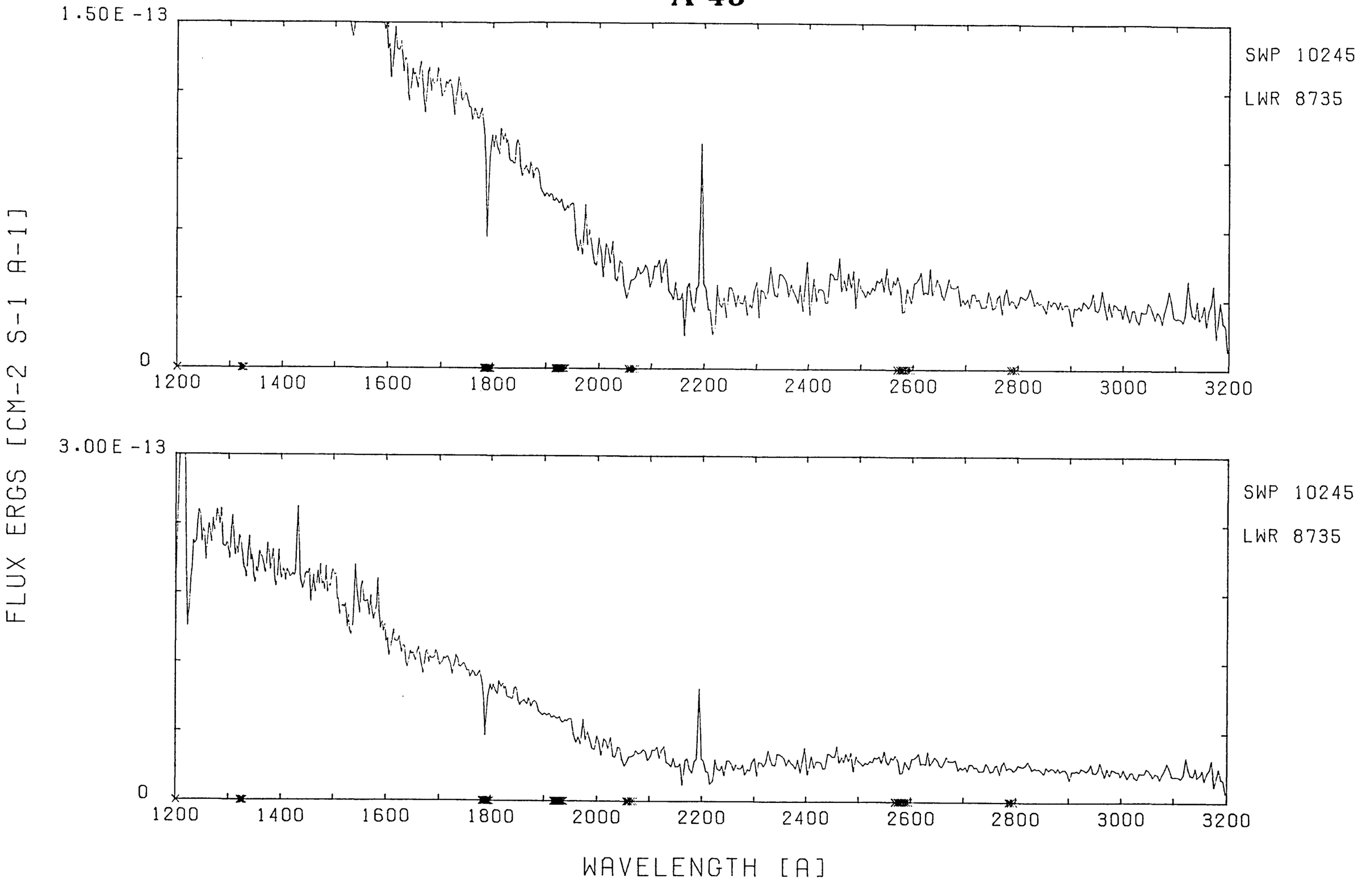
SWP 5566
LWR 5802
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

A-43


1.50E -13
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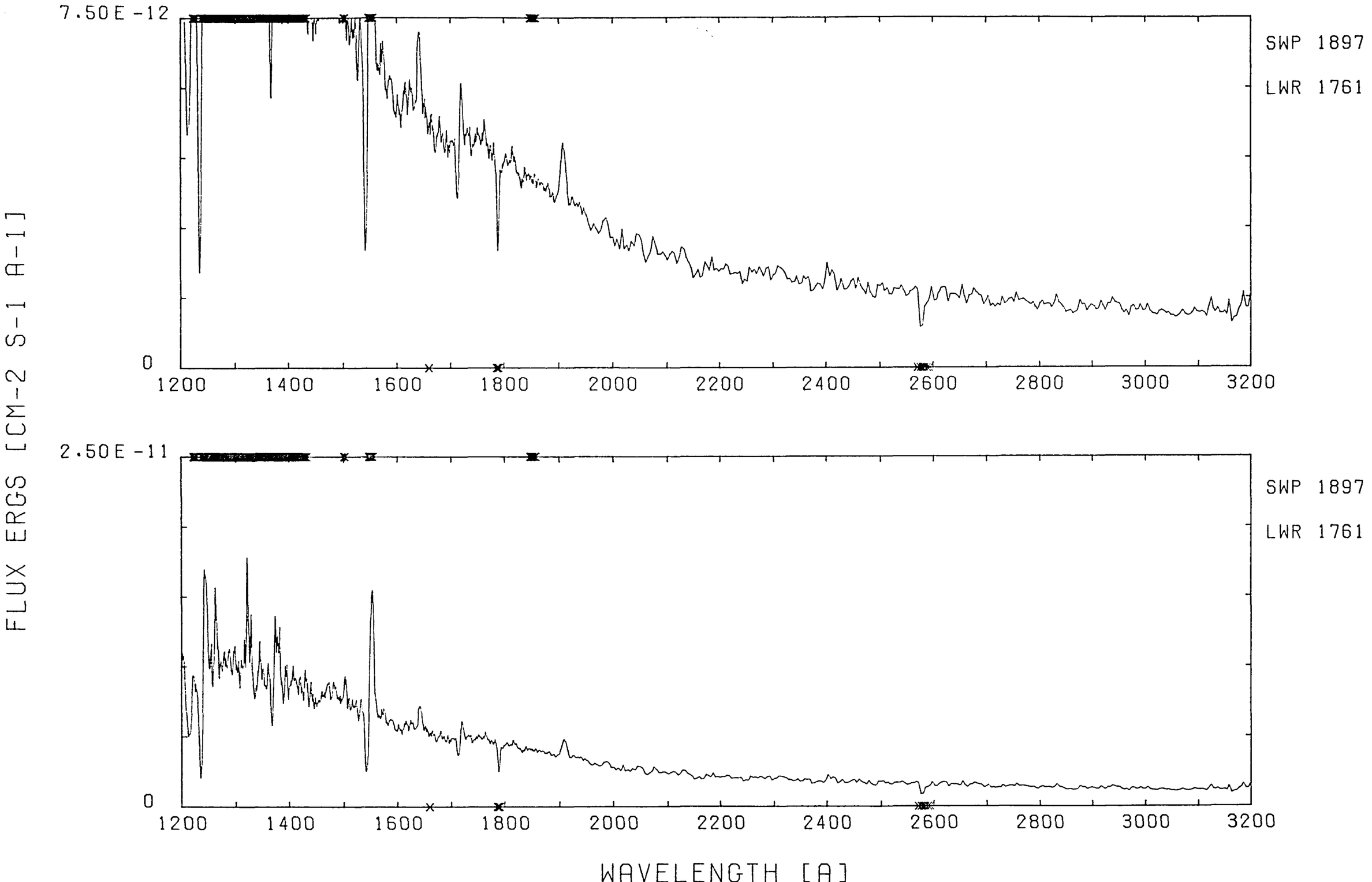
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 10245
LWR 8735
FLUX ERGS CM-2 S-1 A-1]
3.00E -13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 10245
LWR 8735
WAVELENGTH [A]

NGC 6543


7.50E-12
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SWP 1897
LWR 1761
2.50E-11
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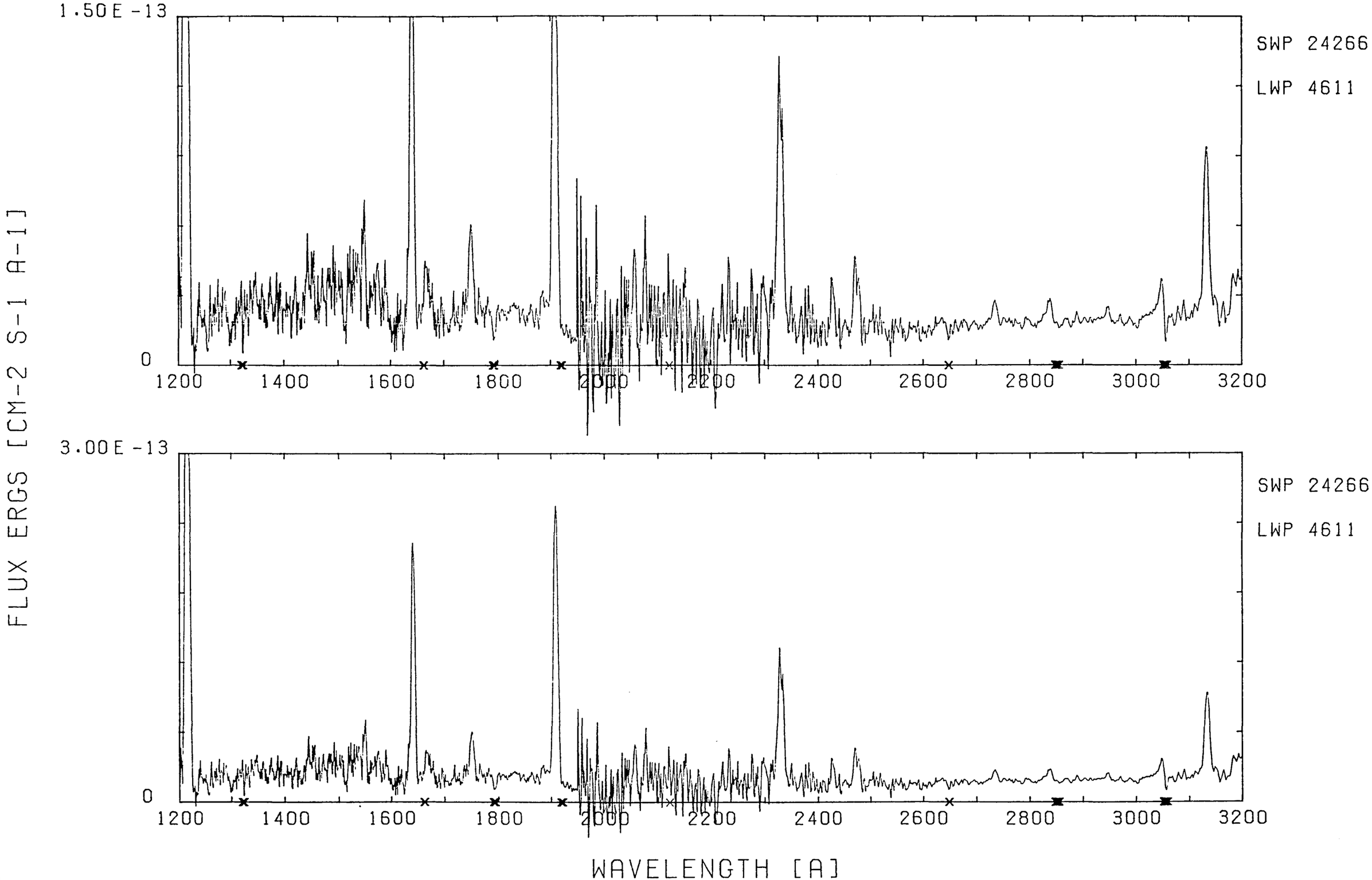
SWP 1897
LWR 1761
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 6565


1.50E-13
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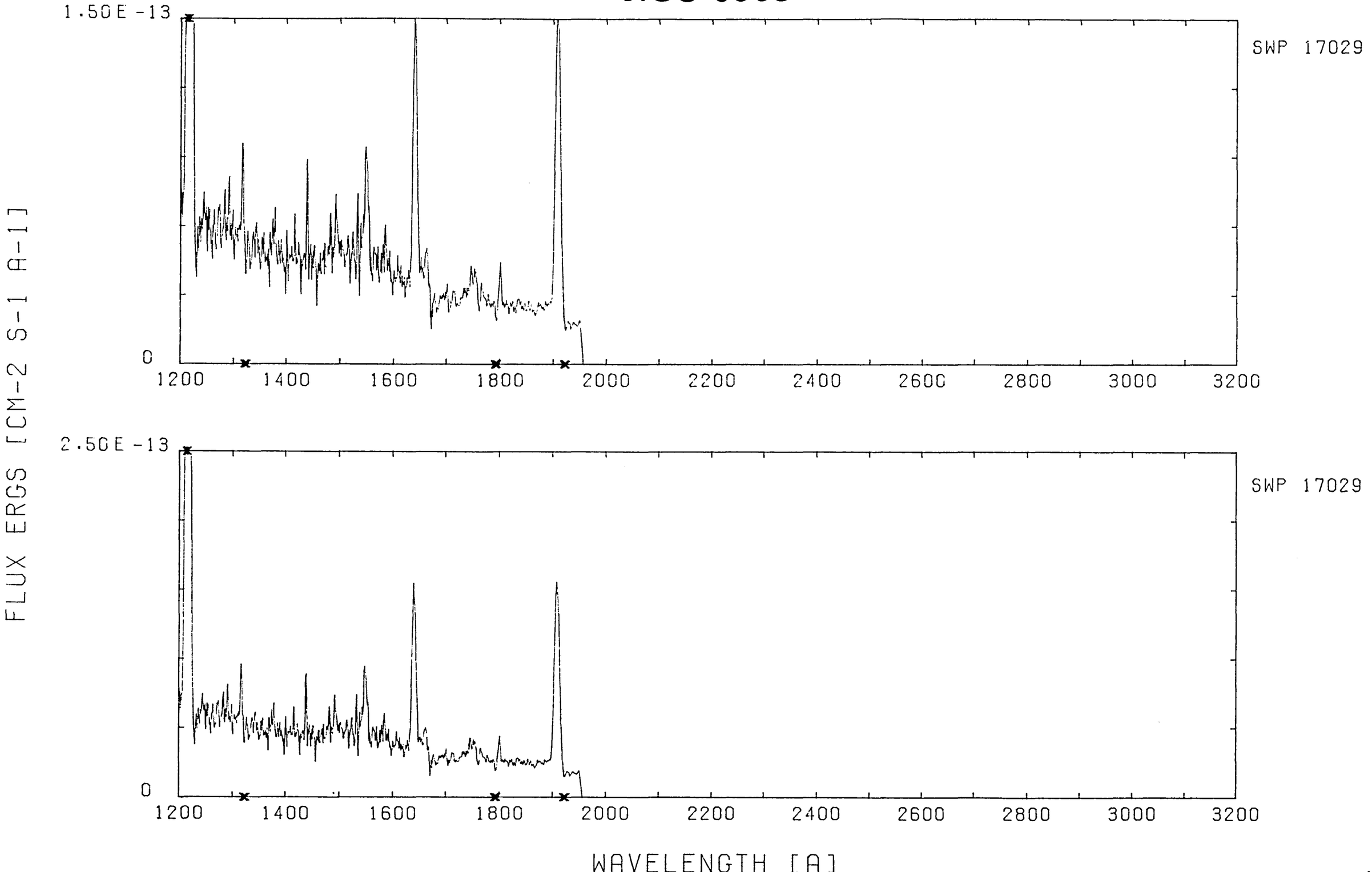
SWP 24266
LWP 4611
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
3.00E-13
0
SWP 24266
LWP 4611
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

NGC 6563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SWP 17029
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SWP 17029
1200
1400
1600
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2000
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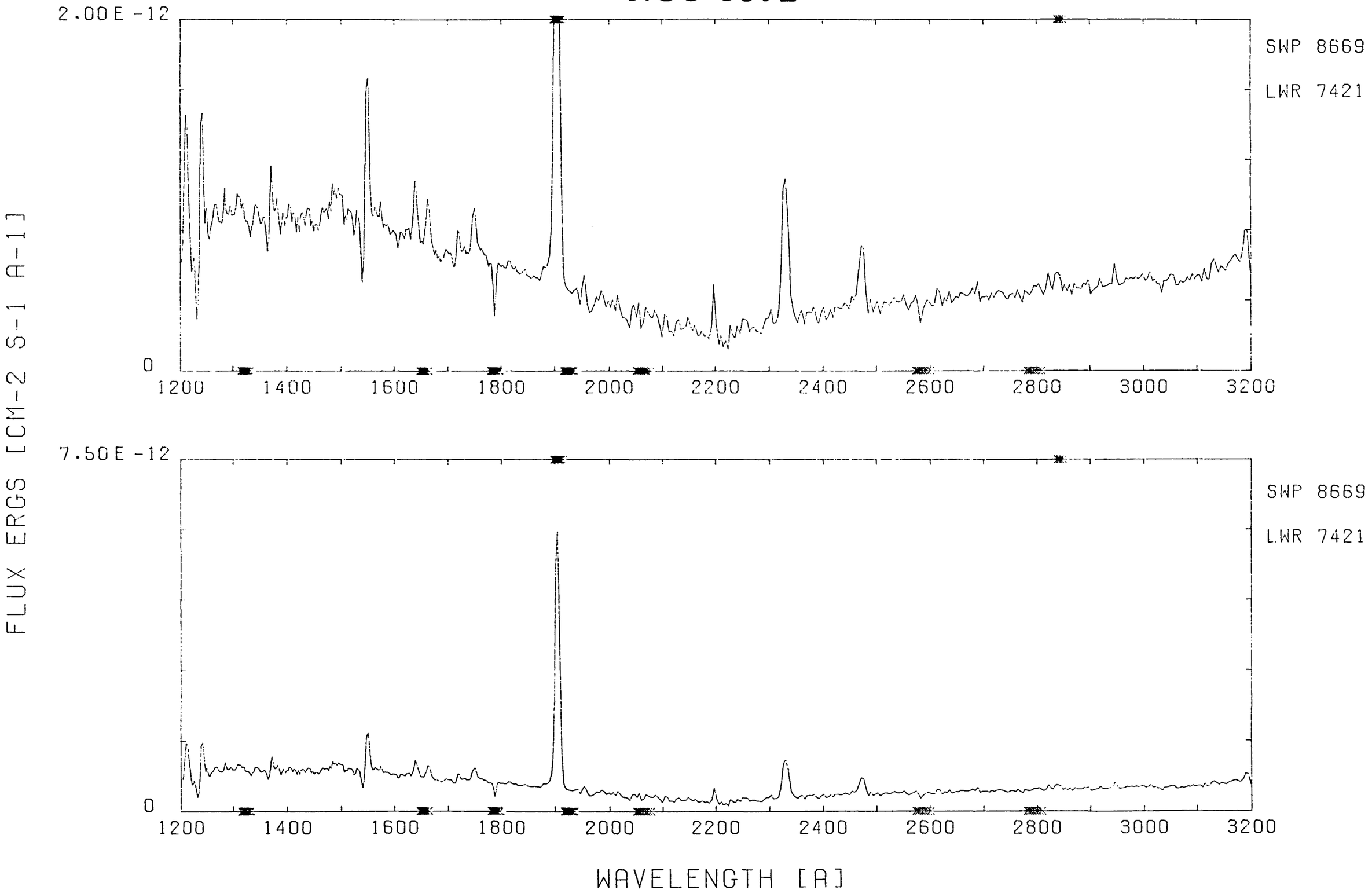
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 6572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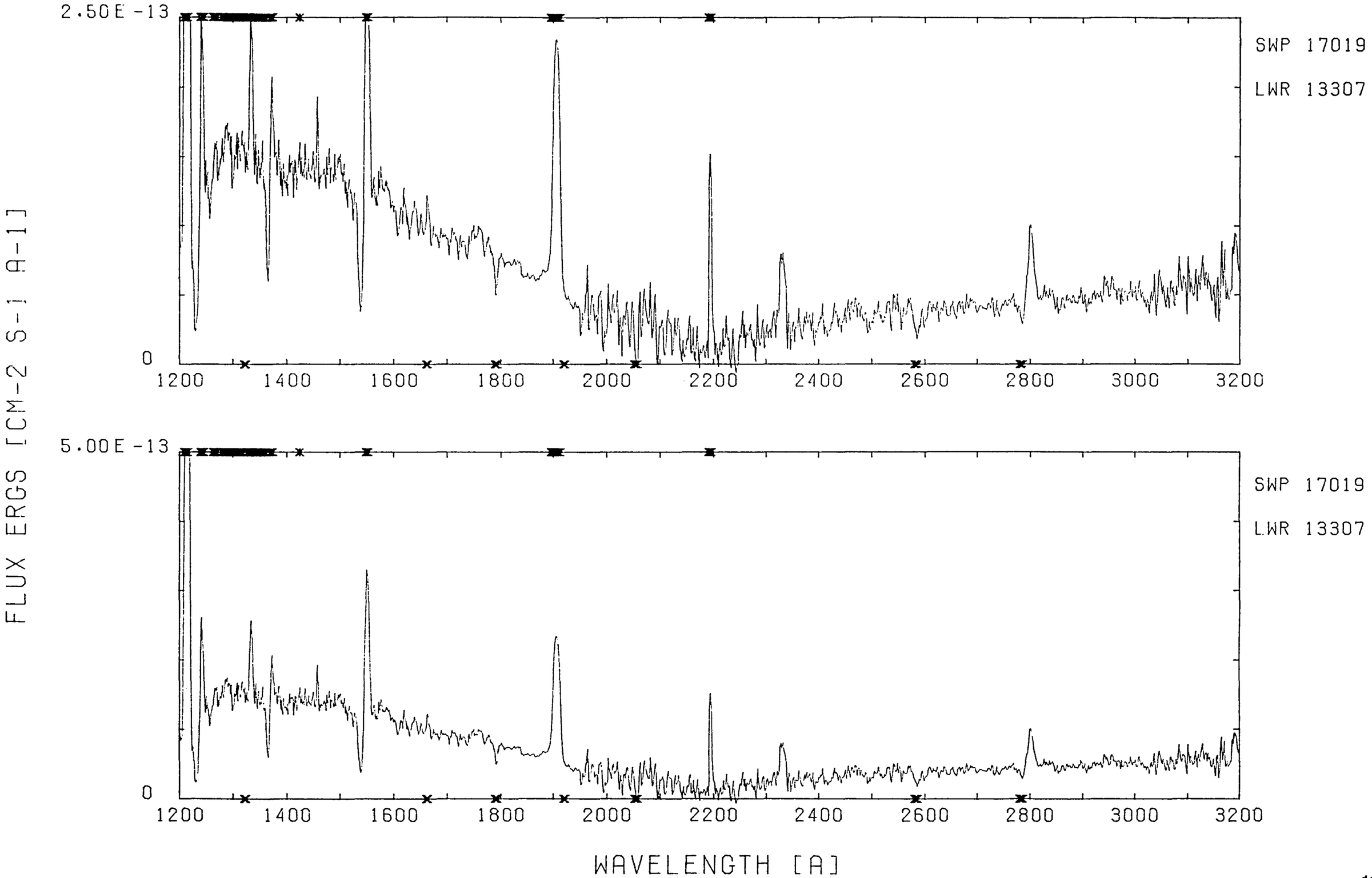
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 8669
LWR 7421
7.50E-12
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 8669
LWR 7421
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 6567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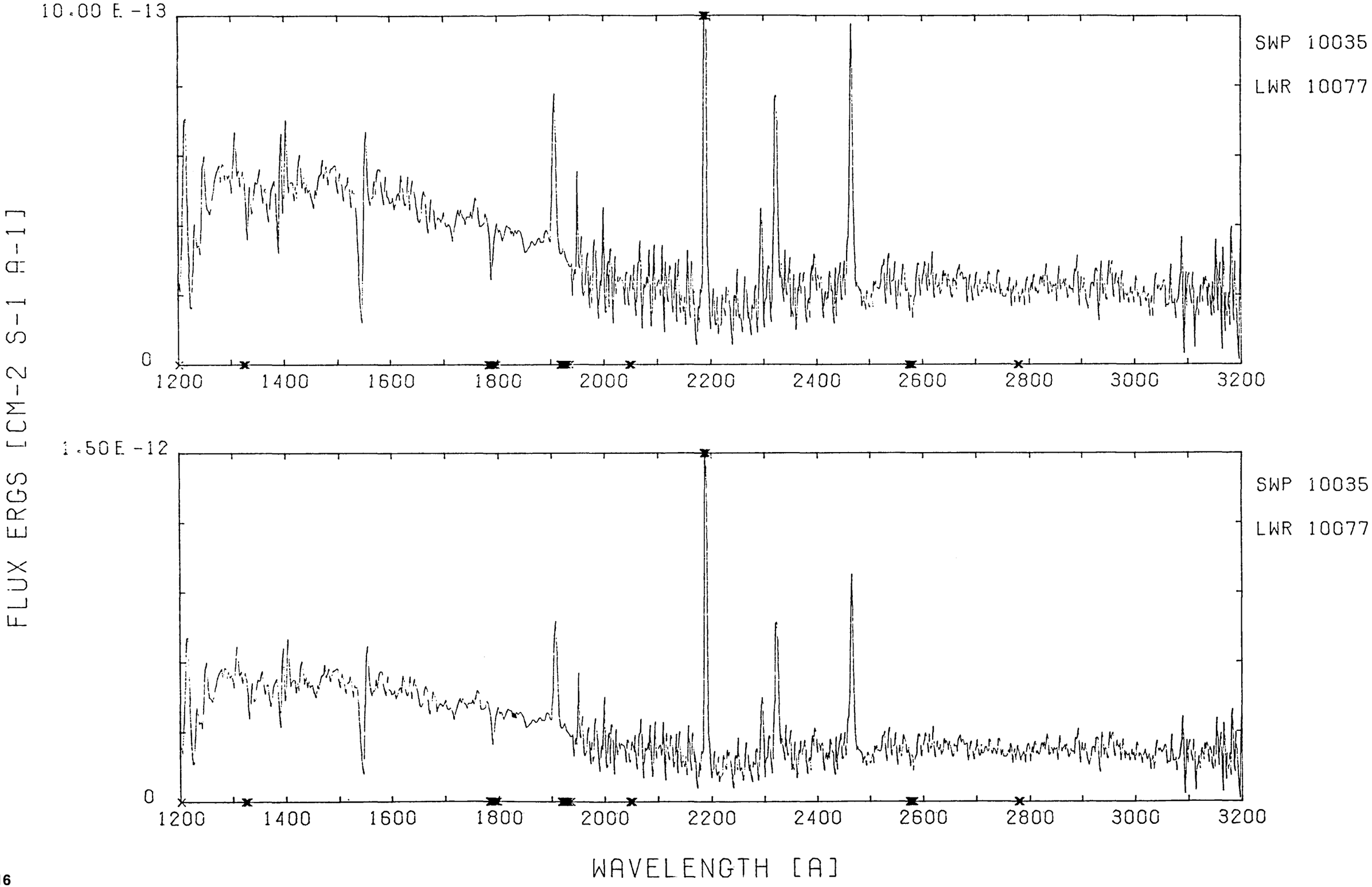
5.00E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 17019
LWR 13307
SWP 17019
LWR 13307
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

SWST 1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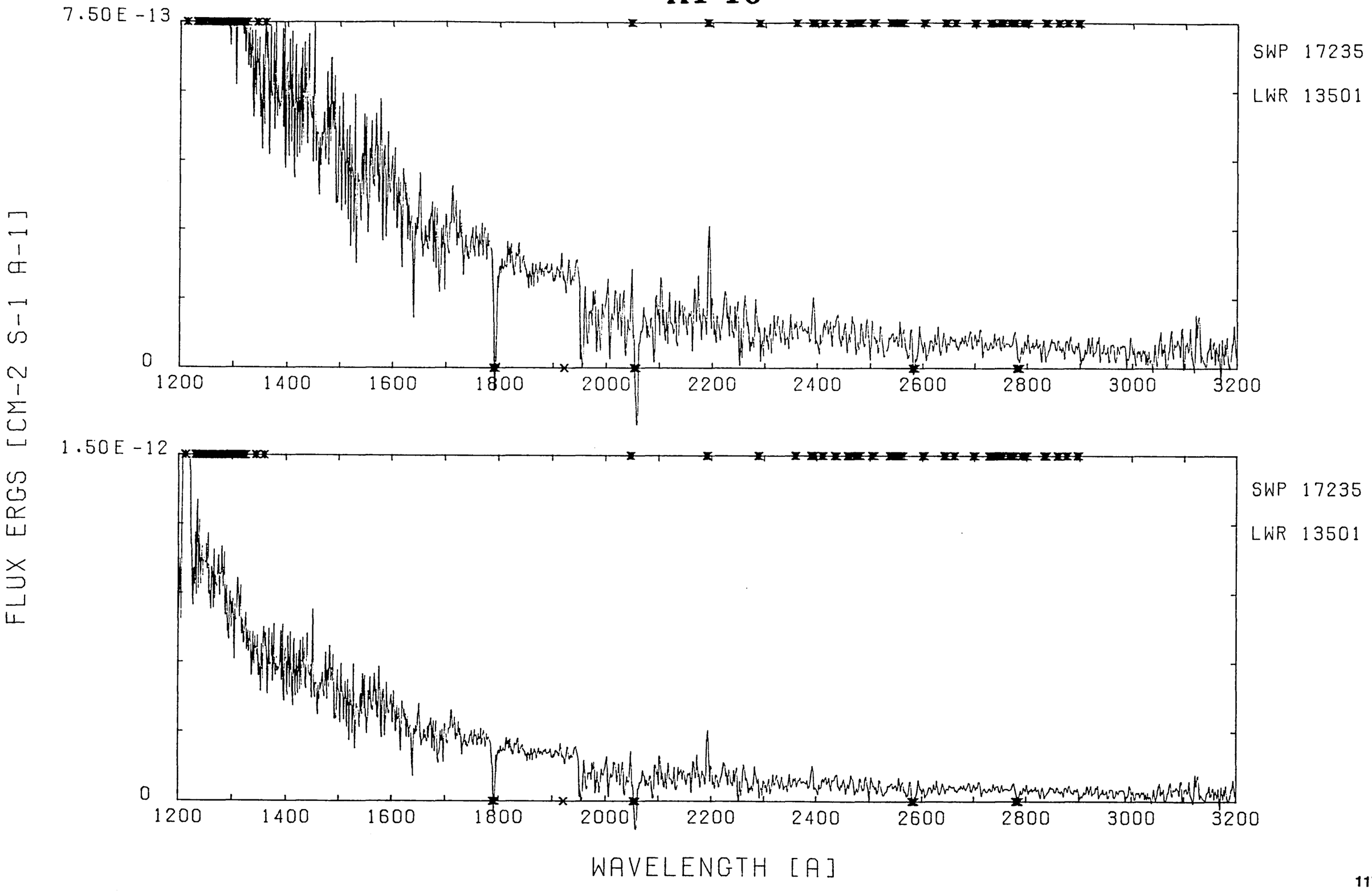
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 10035
LWR 10077
FLUX ERGS CM-2 S-1 A-1]
1.50E-12
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 10035
LWR 10077
WAVELENGTH [A]

K1-16


7.50E-13
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SWP 17235
LWR 13501
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
1.50E-12
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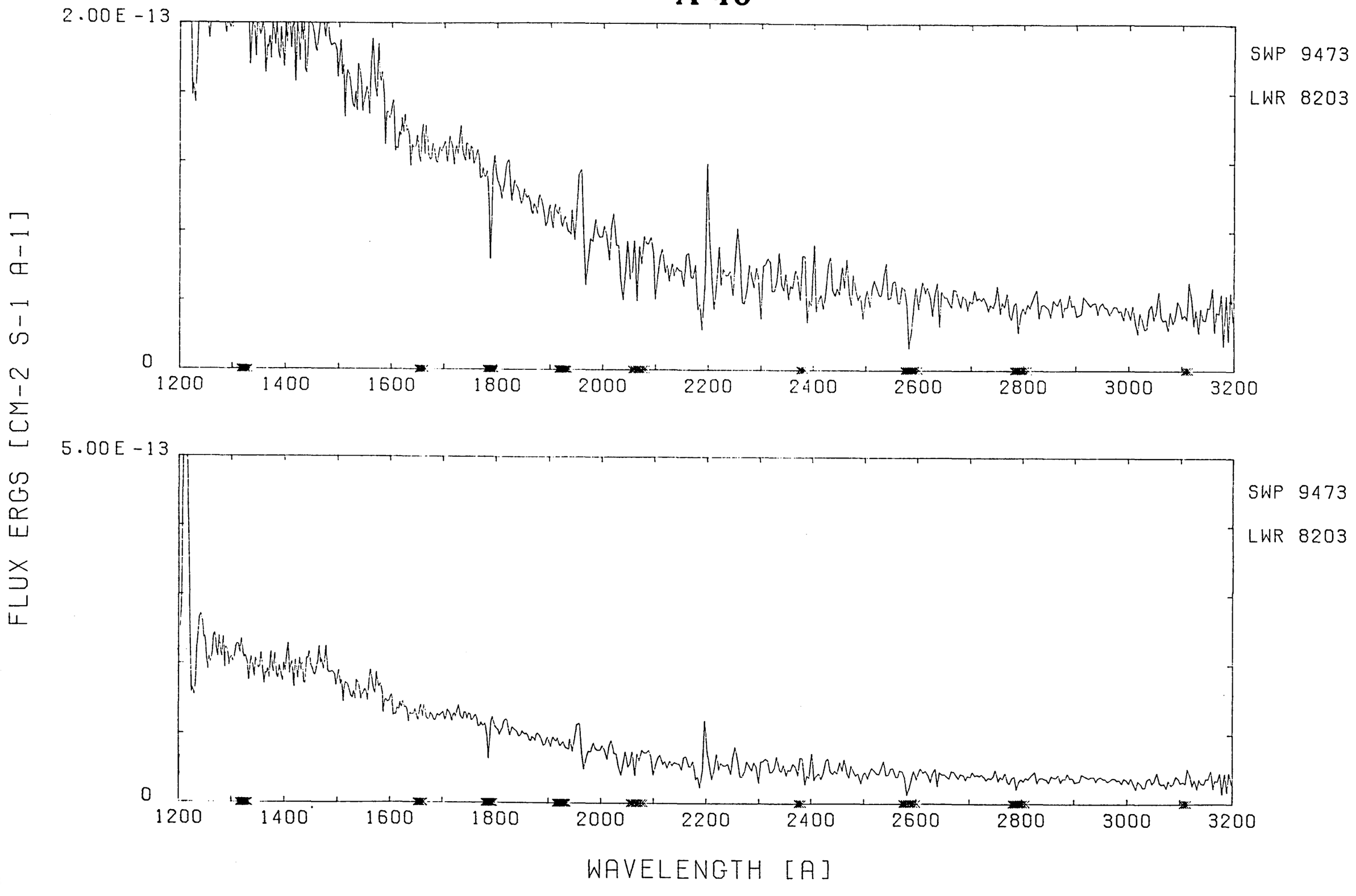
SWP 17235
LWR 13501
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]


2.00E-13
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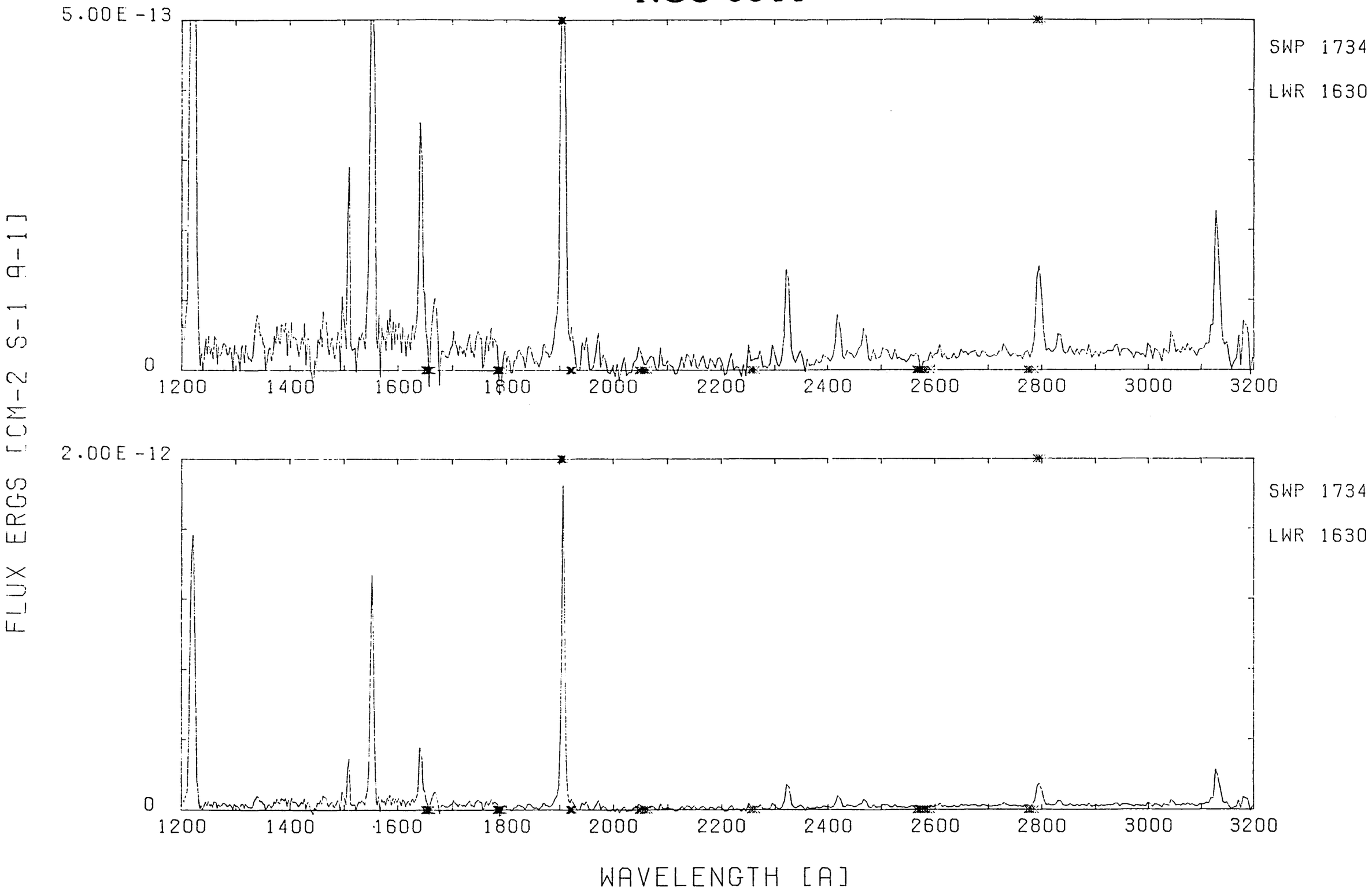
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 9473
LWR 8203
FLUX ERGS CM-2 S-1 A-1]
5.00E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 9473
LWR 8203
WAVELENGTH [A]

NGC 6644


5.00E-13
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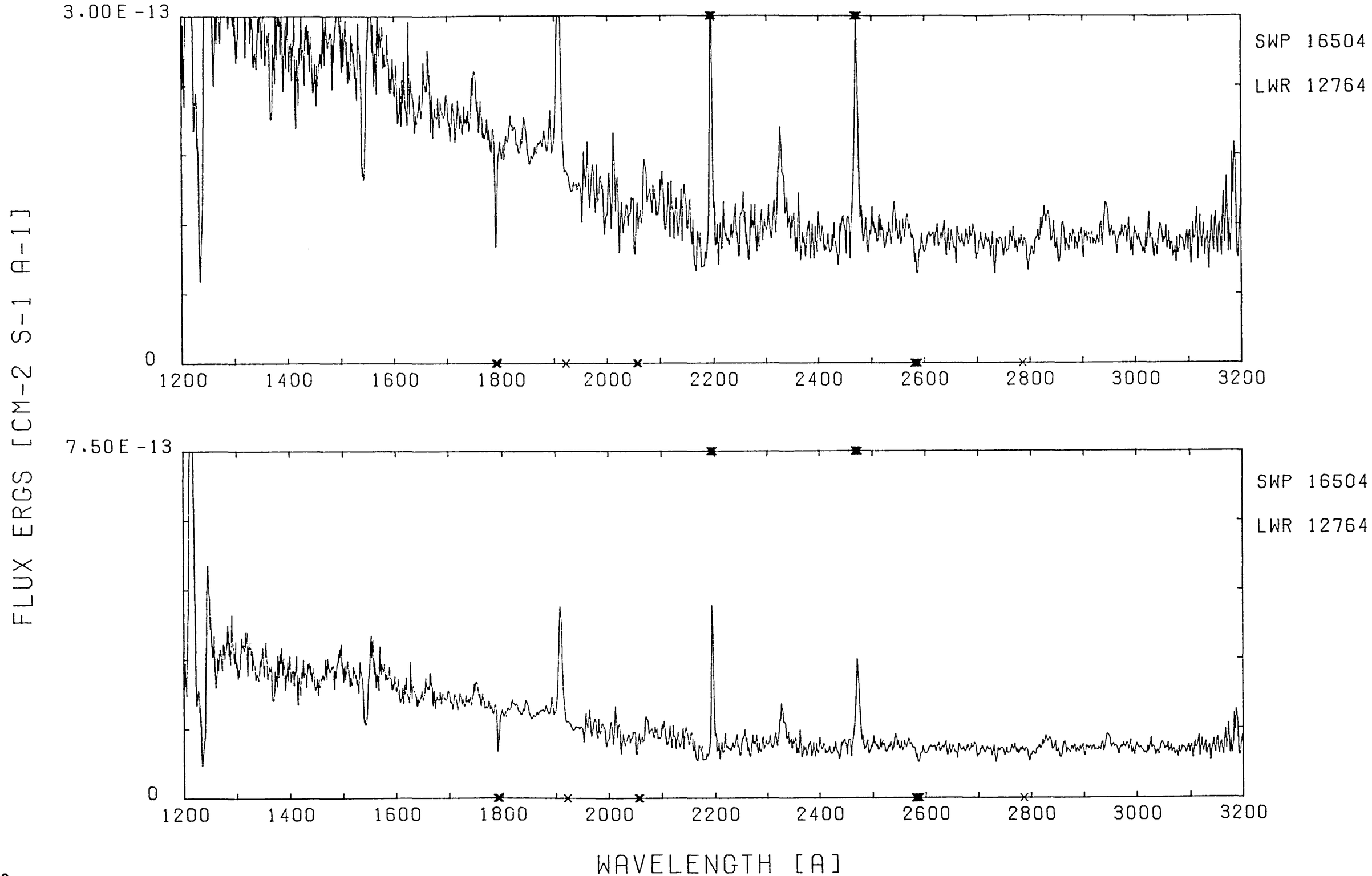
SWP 1734
LWR 1630
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1
2.00E-12
0
SWP 1734
LWR 1630
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

IC 4776


3.00E-13
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1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
7.50E-13
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SWP 16504
LWR 12764
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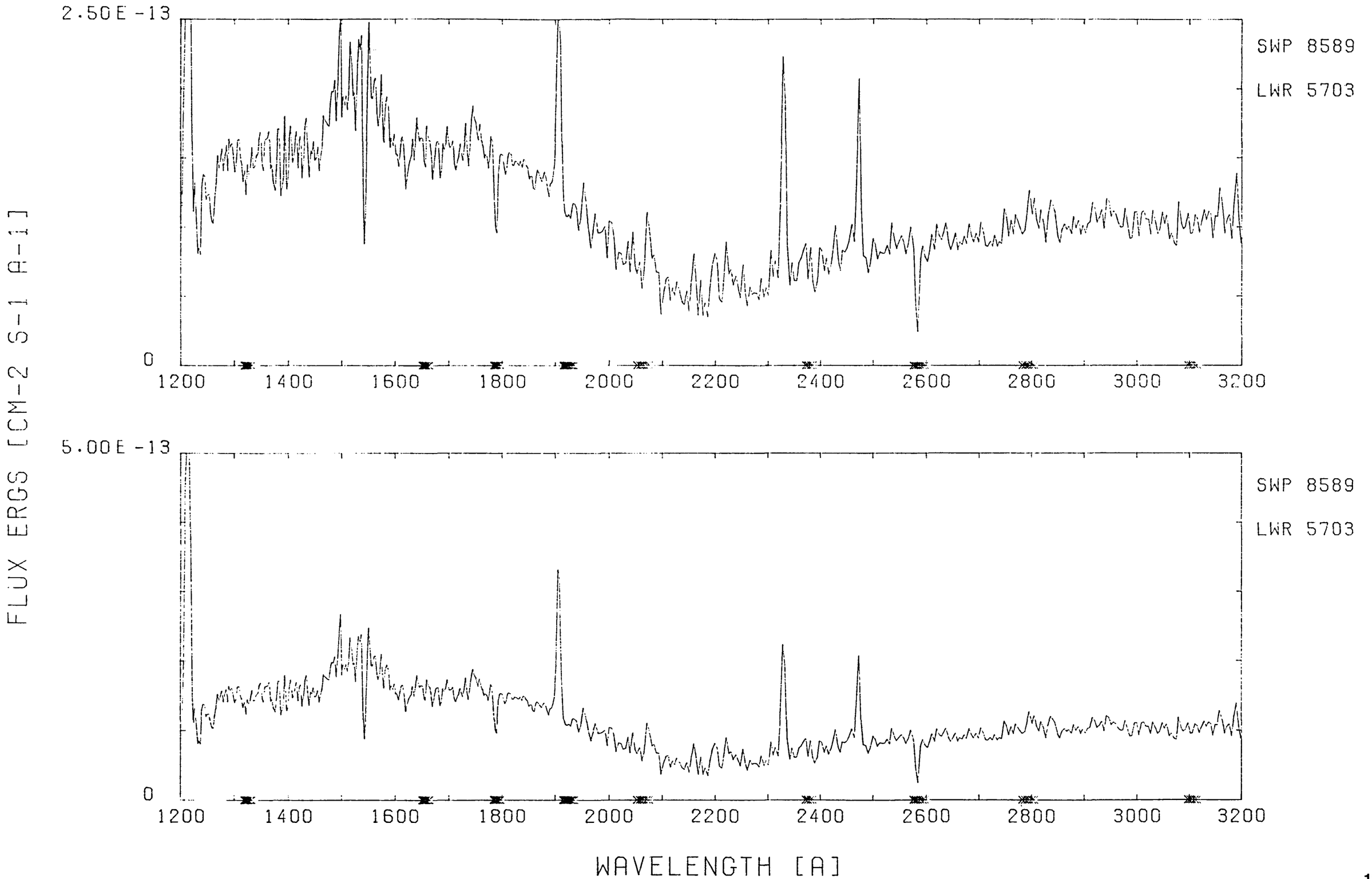
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

Hu 2-1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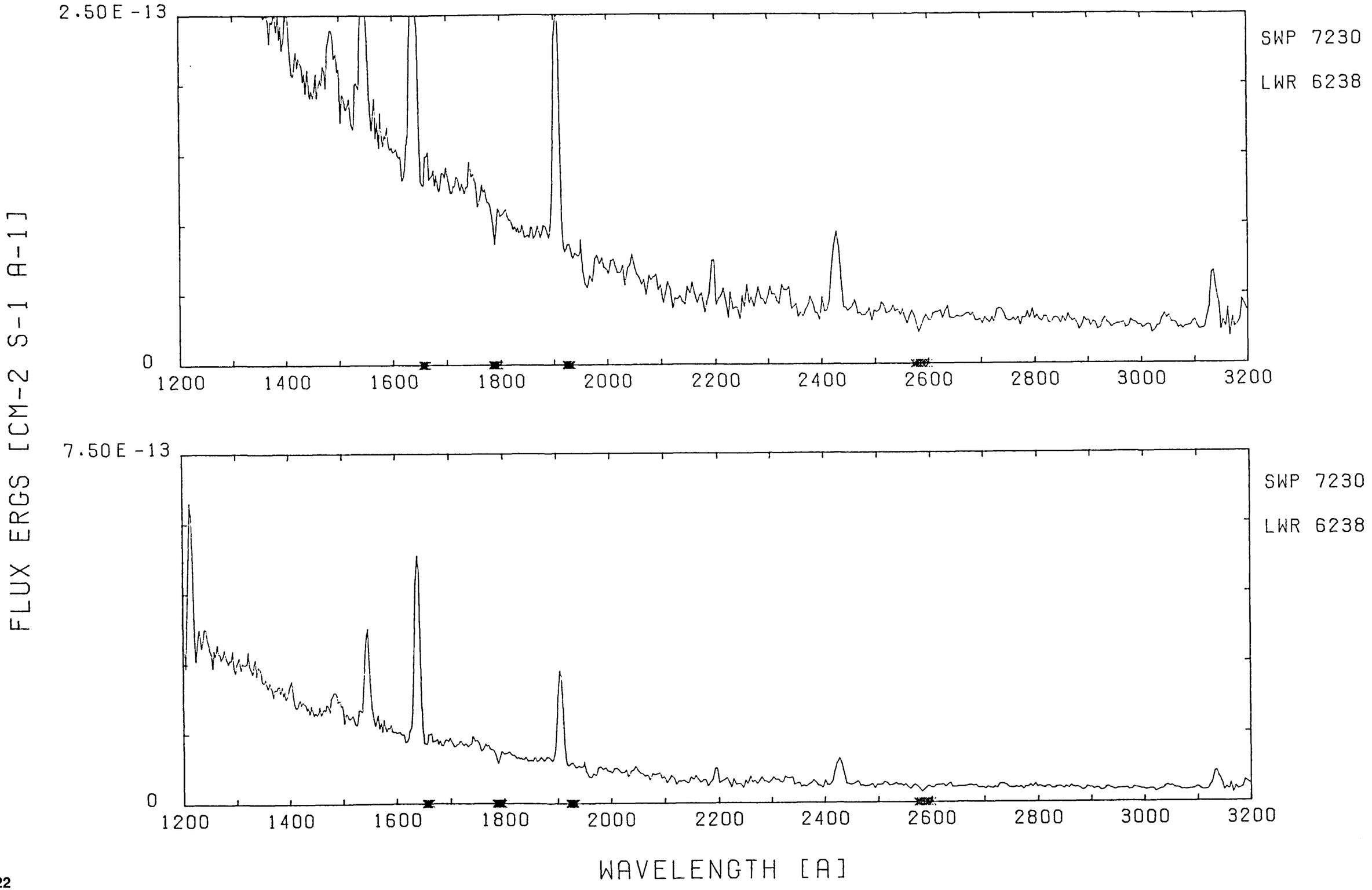
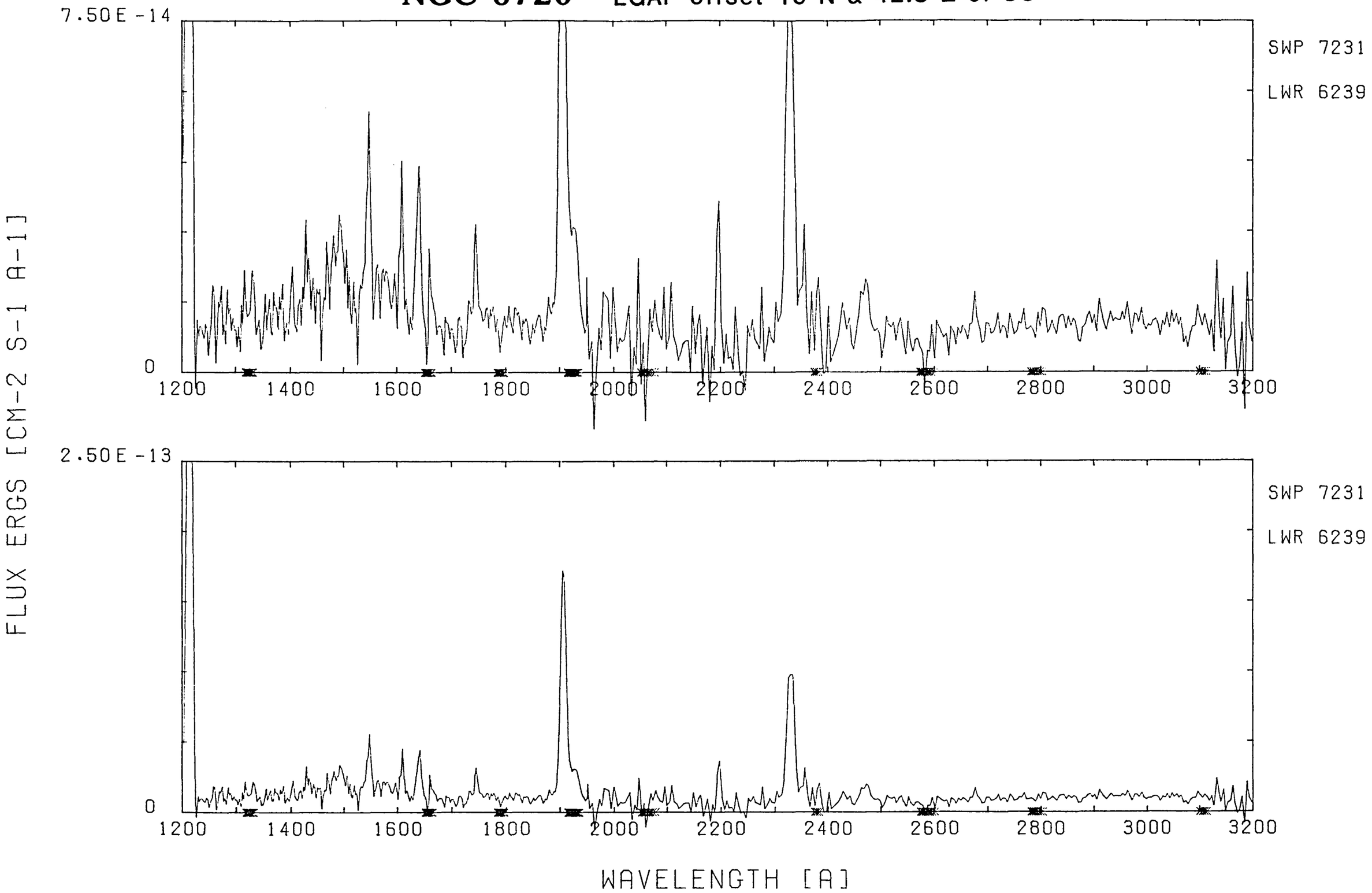
LWR 5703
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
5.00E-13
0
SWP 8589
LWR 5703
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

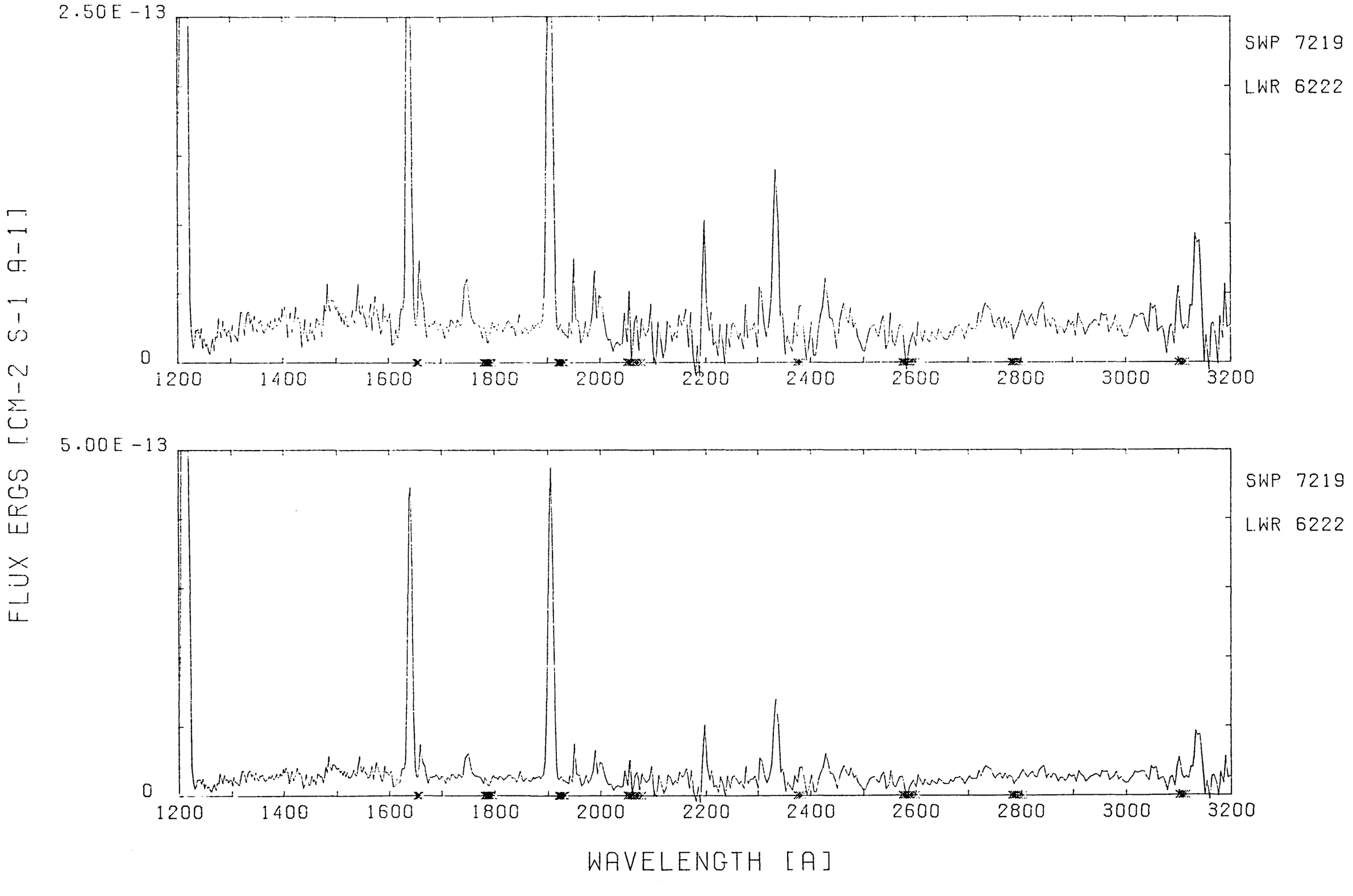
NGC 6720 - LGAP offset 7.4"E & 2.1"S of CS



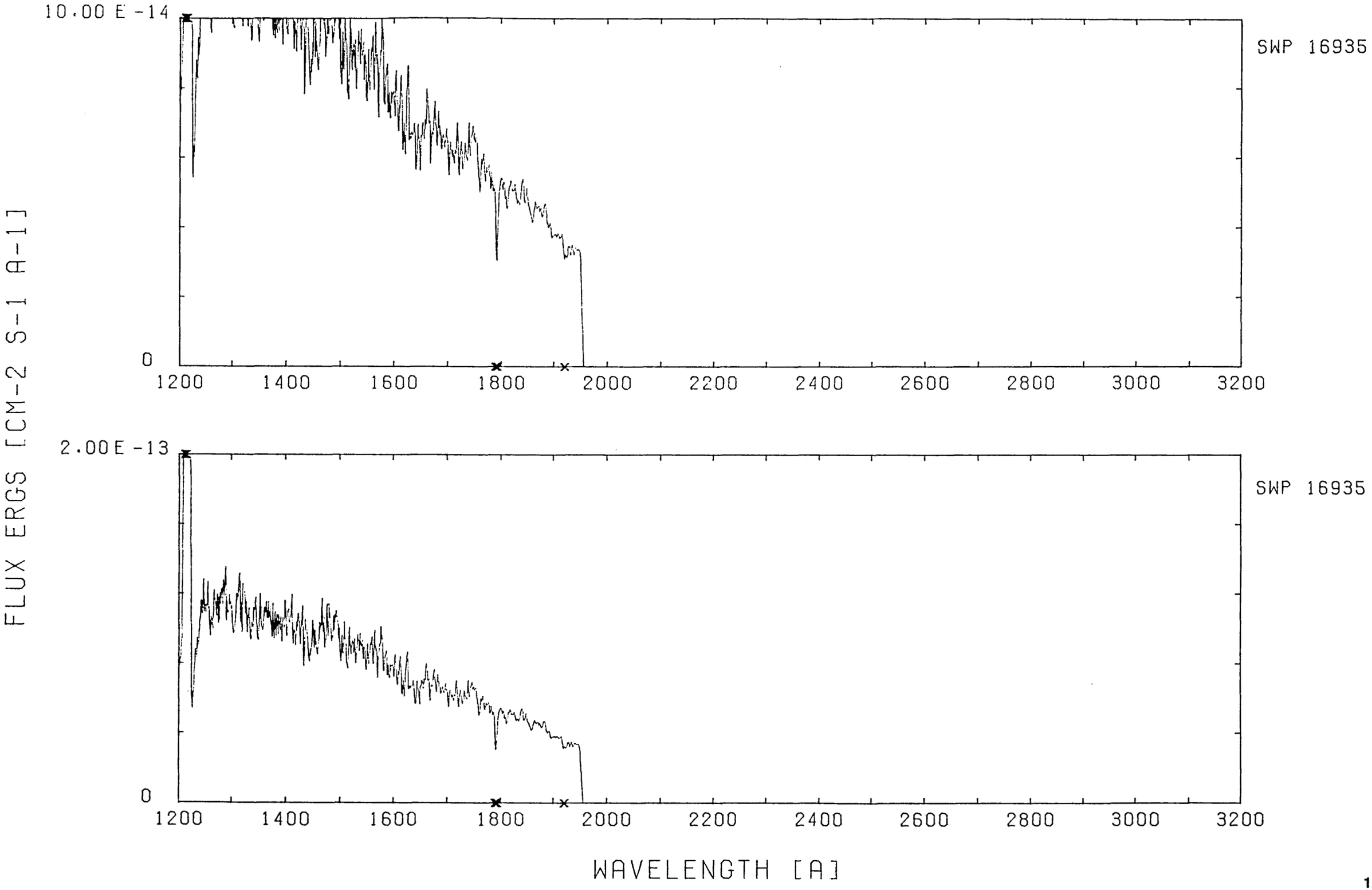
NGC 6720 - LGAP offset 16″N & 42.8″E of CS



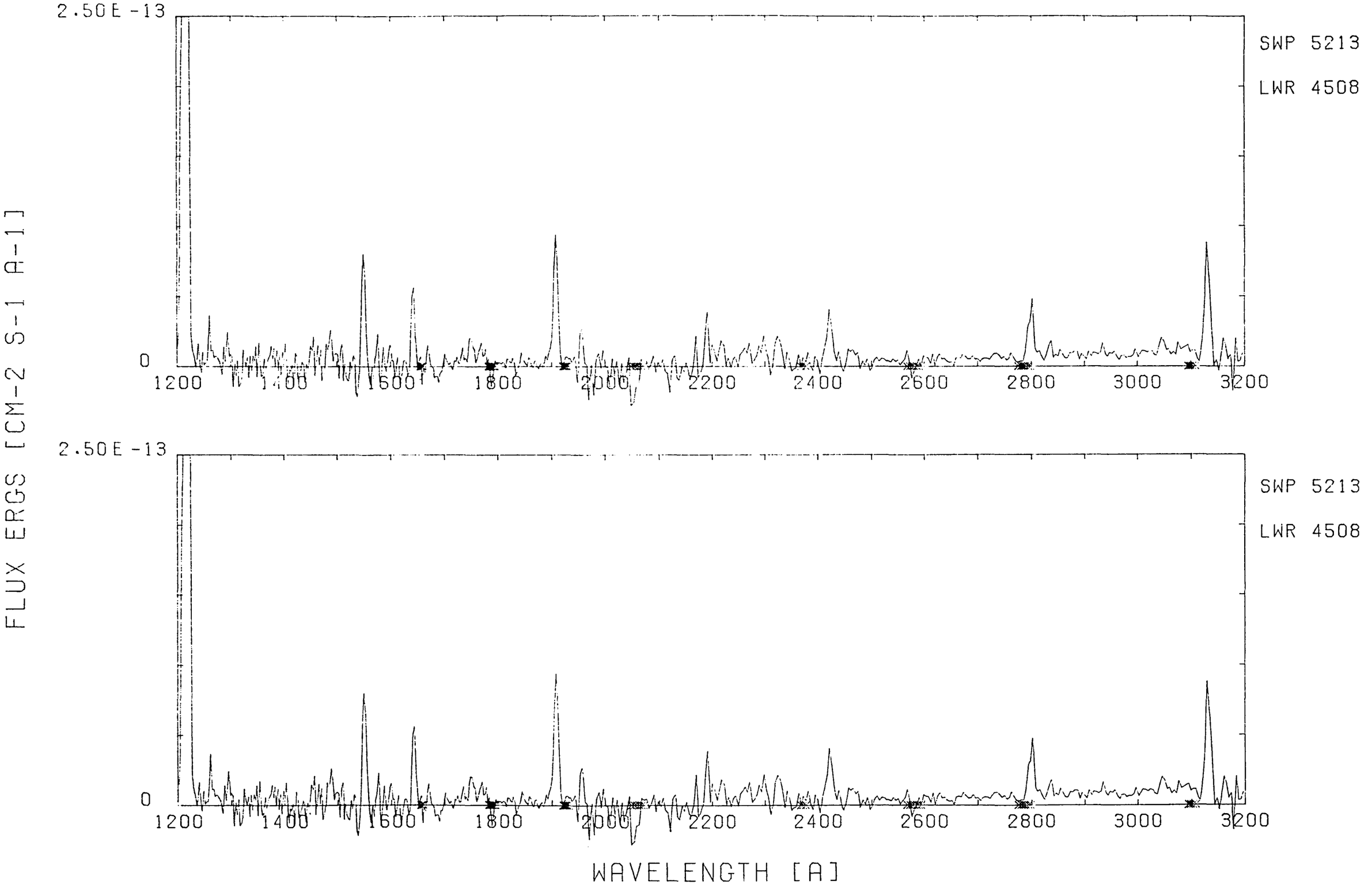
NGC 6720 - LGAP offset 7.8″E & 16″N of CS



A-51


10.00 E -14
0
SWP 16935
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
2.00E -13
0
SWP 16935
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

NGC 6741


2.50E-13
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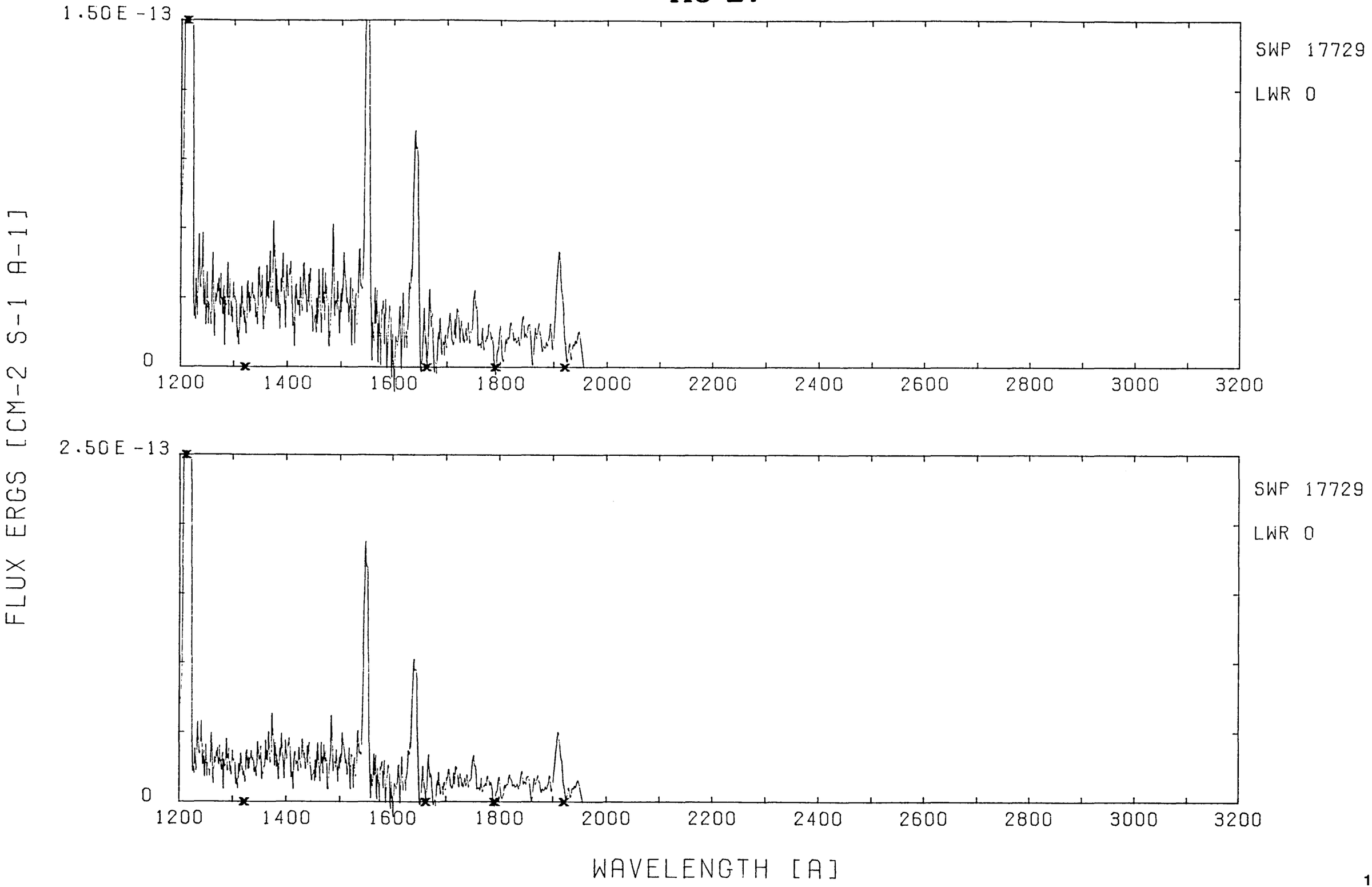
LWR 4508
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

K3-27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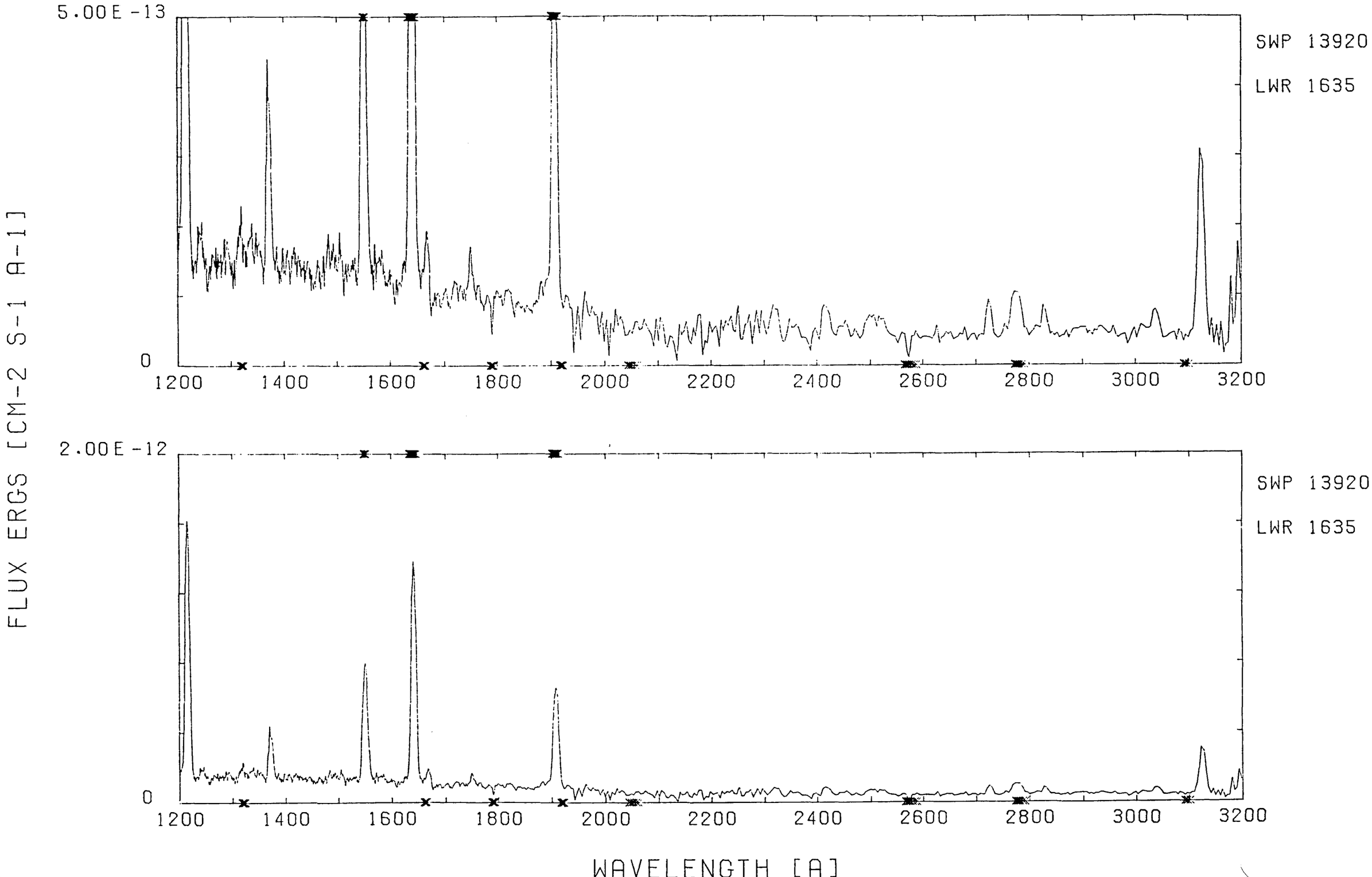
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 17729
LWR 0
FLUX ERGS CM-2 S-1 A-1]
2.50E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 17729
LWR 0
WAVELENGTH [A]

IC 1297


5.00E-13
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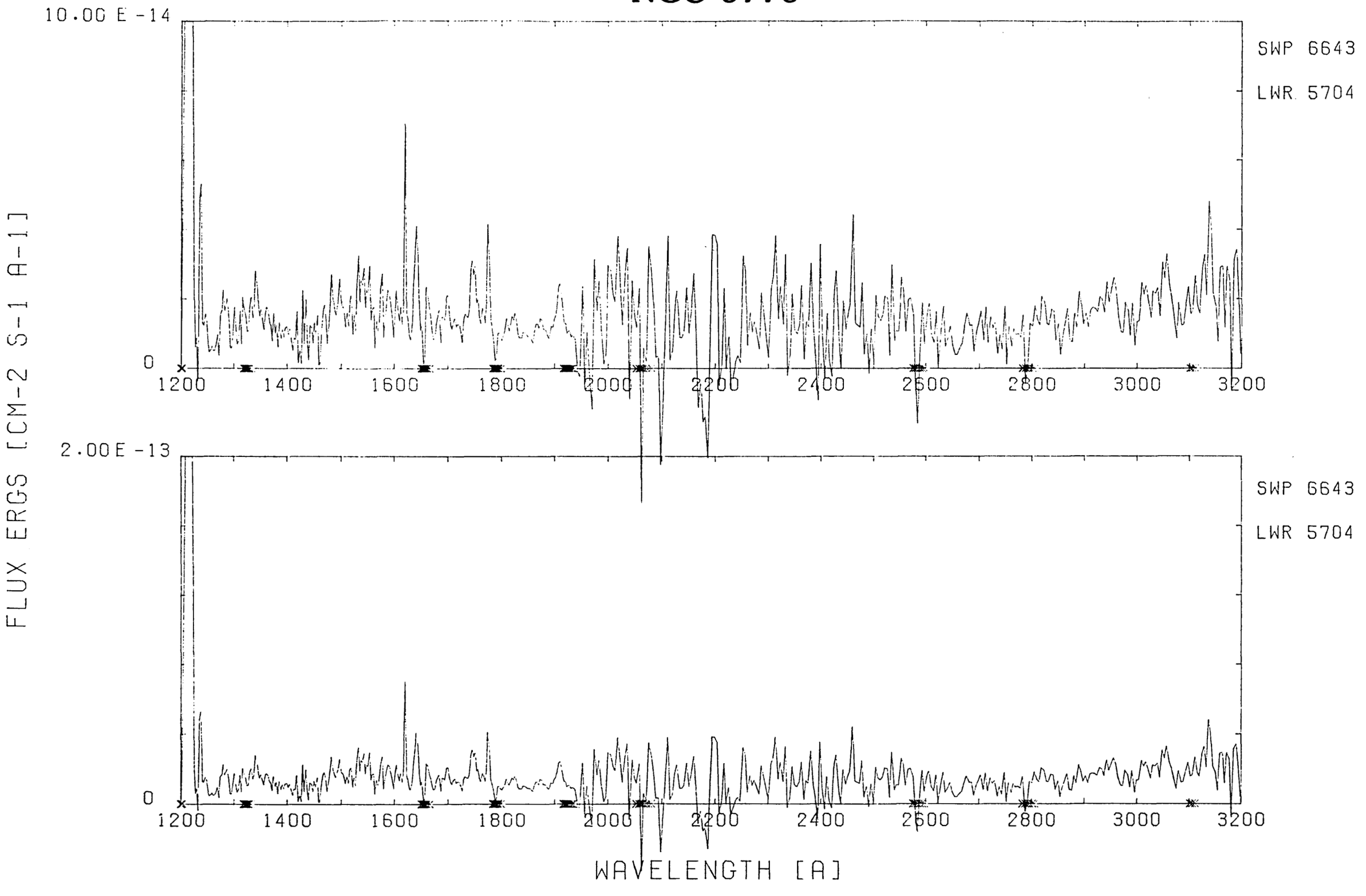
SWP 13920
LWR 1635
2.00E-12
0
SWP 13920
LWR 1635
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 6778


10.00 E -14
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SWP 6643
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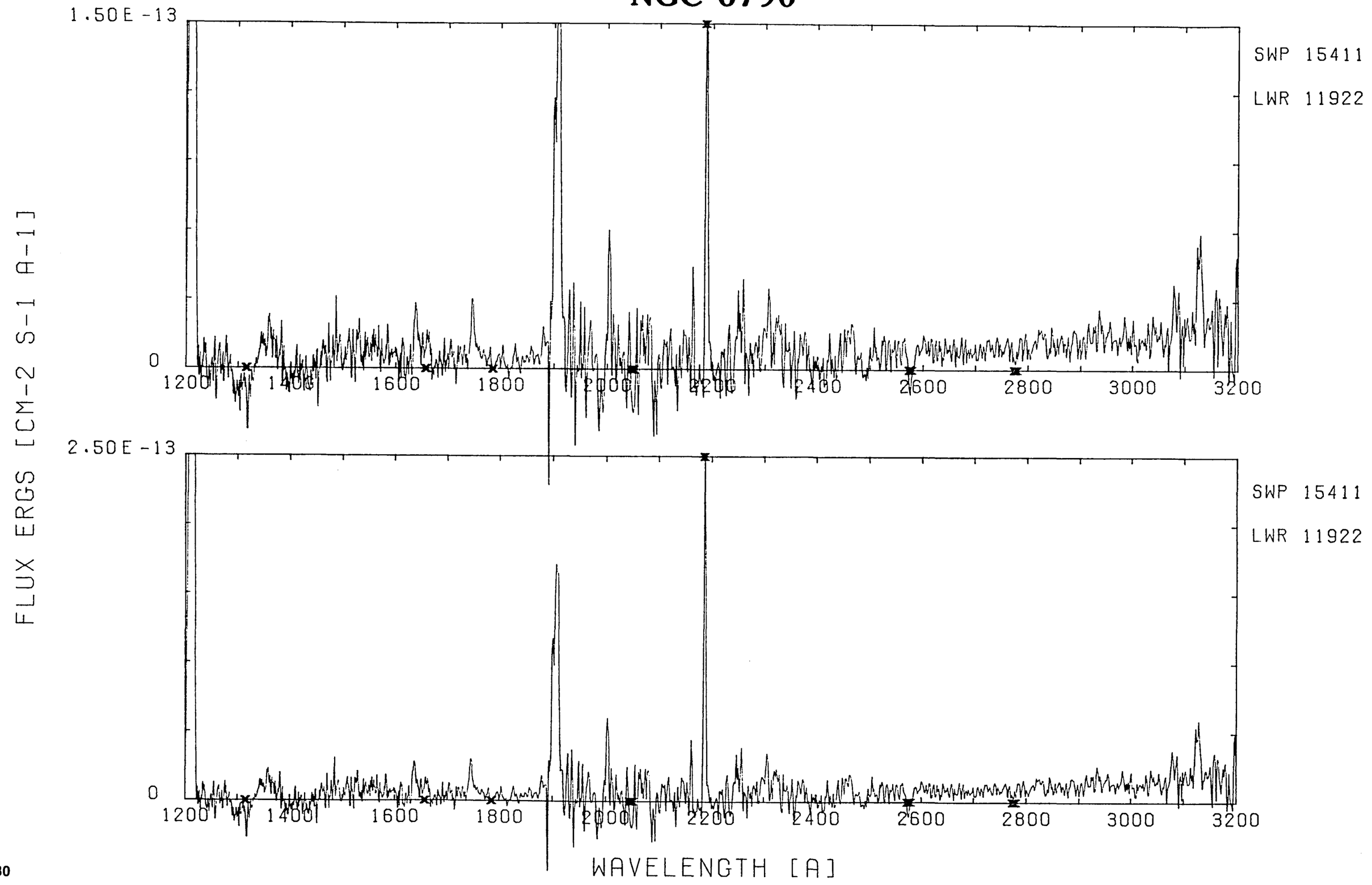
2.00E -13
0
SWP 6643
LWR 5704
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 6790


1.50E-13
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2.50E-13
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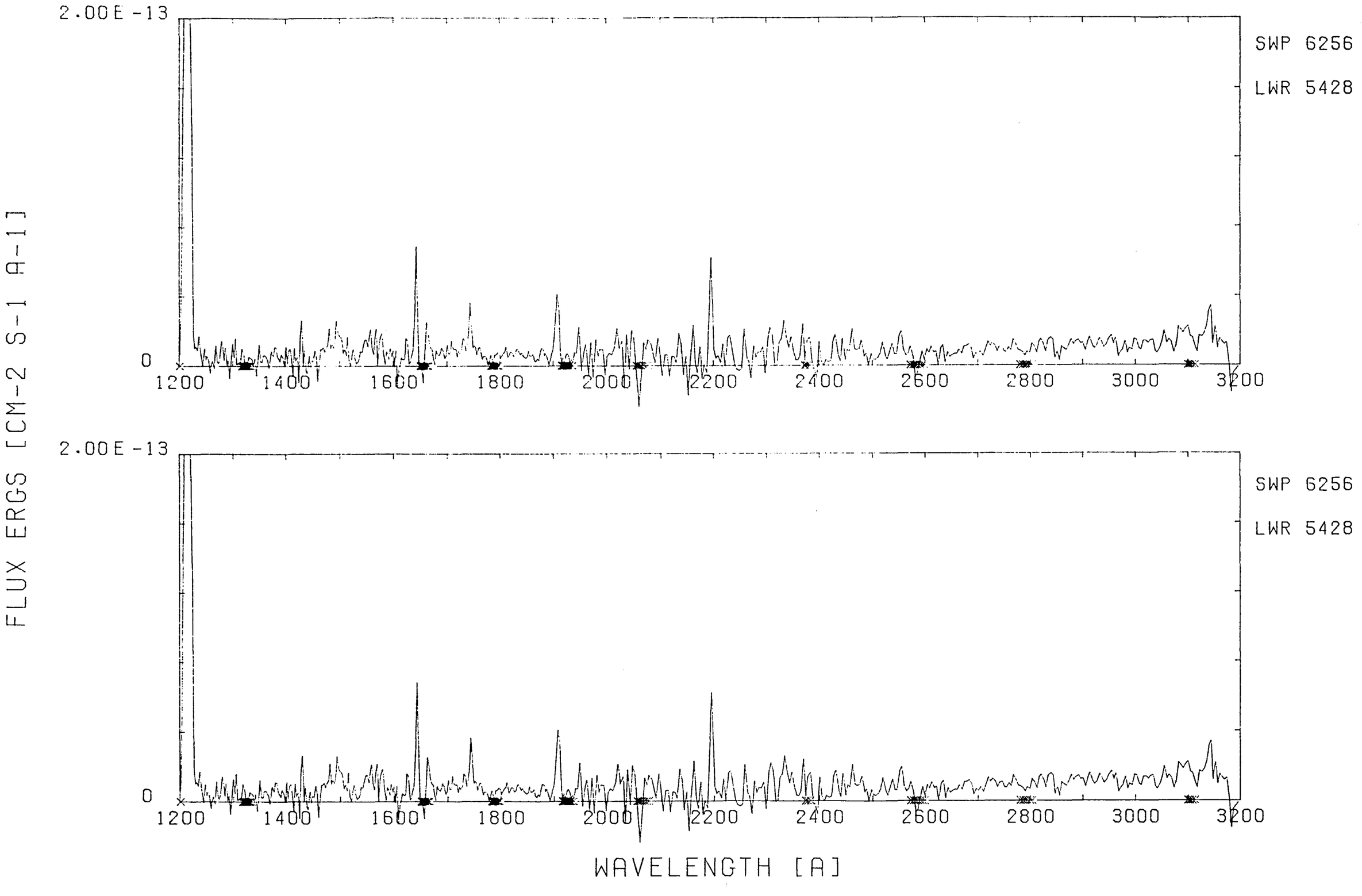
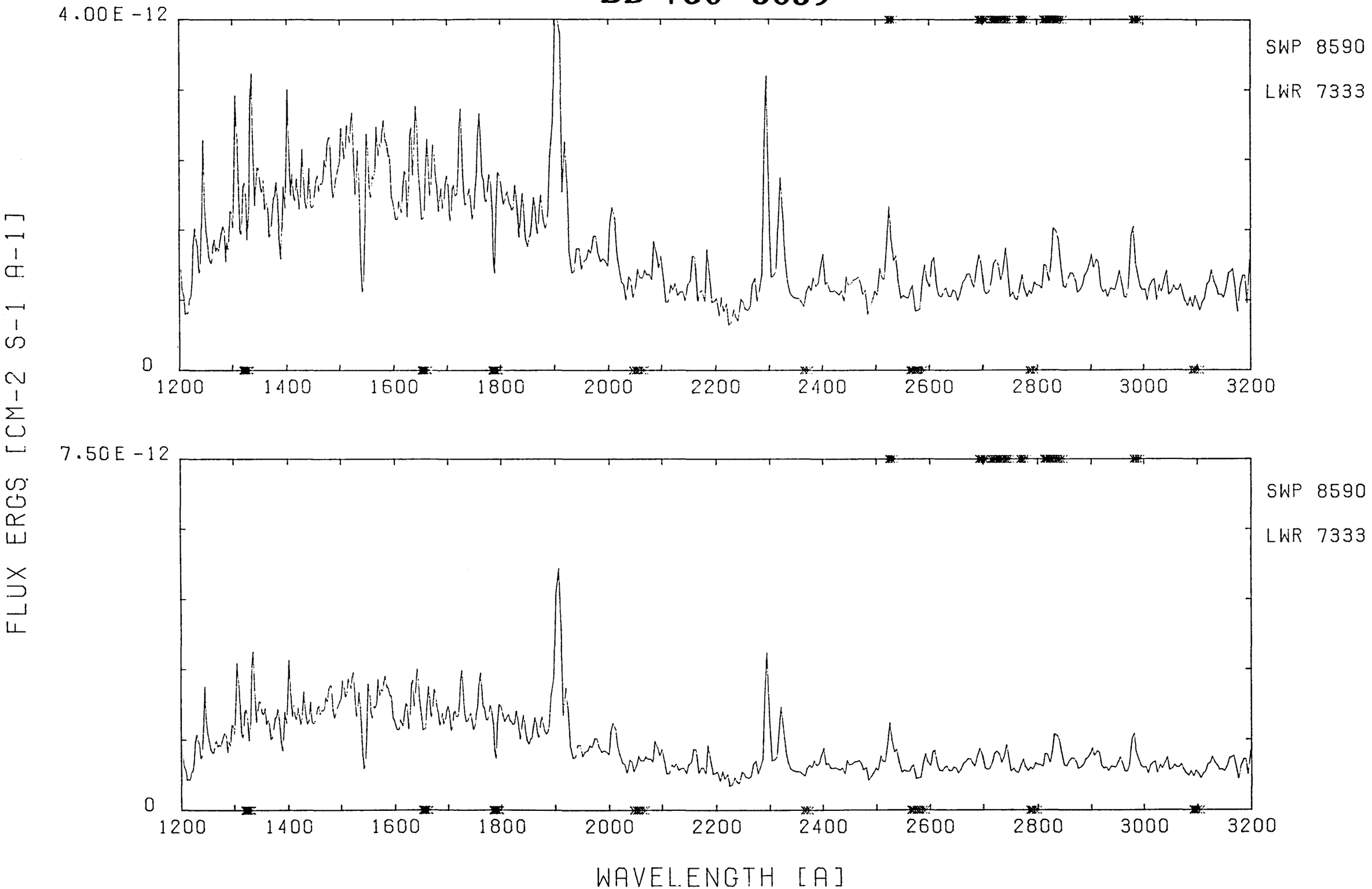
FLUX ERGS [CM-2 S-1 A-1]
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 15411
LWR 11922
SWP 15411
LWR 11922
WAVELENGTH [A]

NGC 6803


2.00E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 6256
LWR 5428
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

BD +30° 3639


4.00E-12
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7.50E-12
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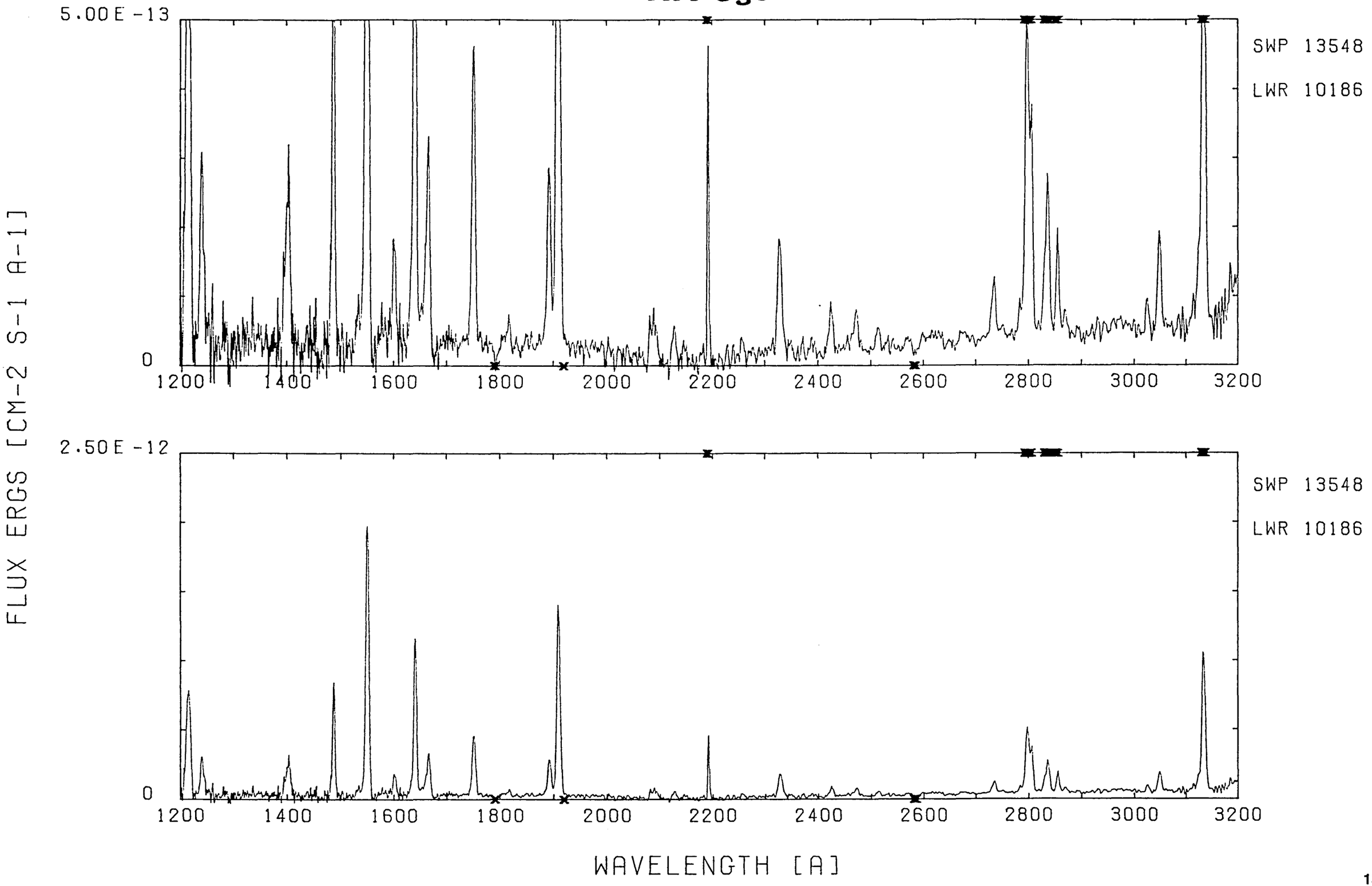
SWP 8590
LWR 7333
SWP 8590
LWR 7333
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

HM Sge


5.00E-13
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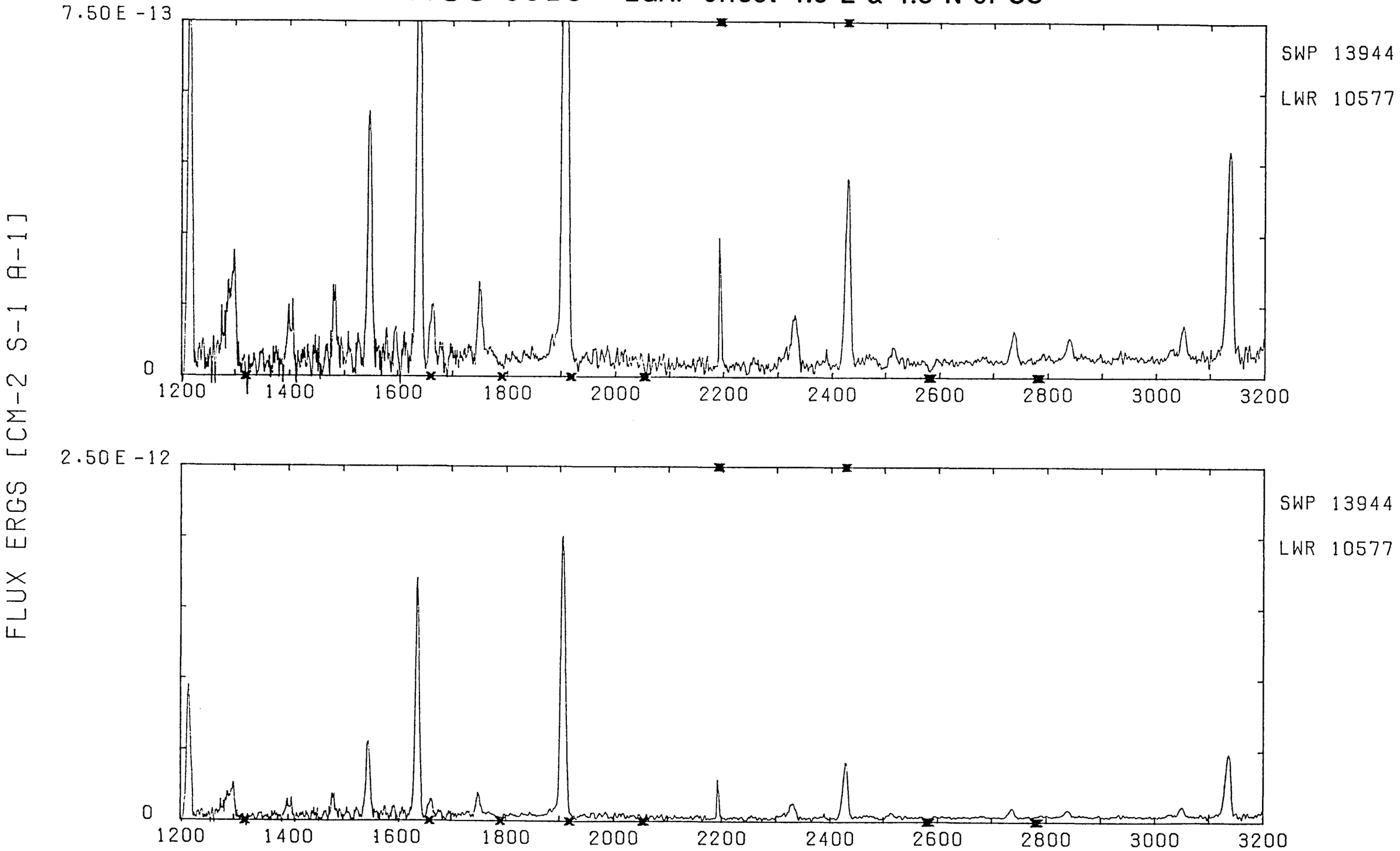
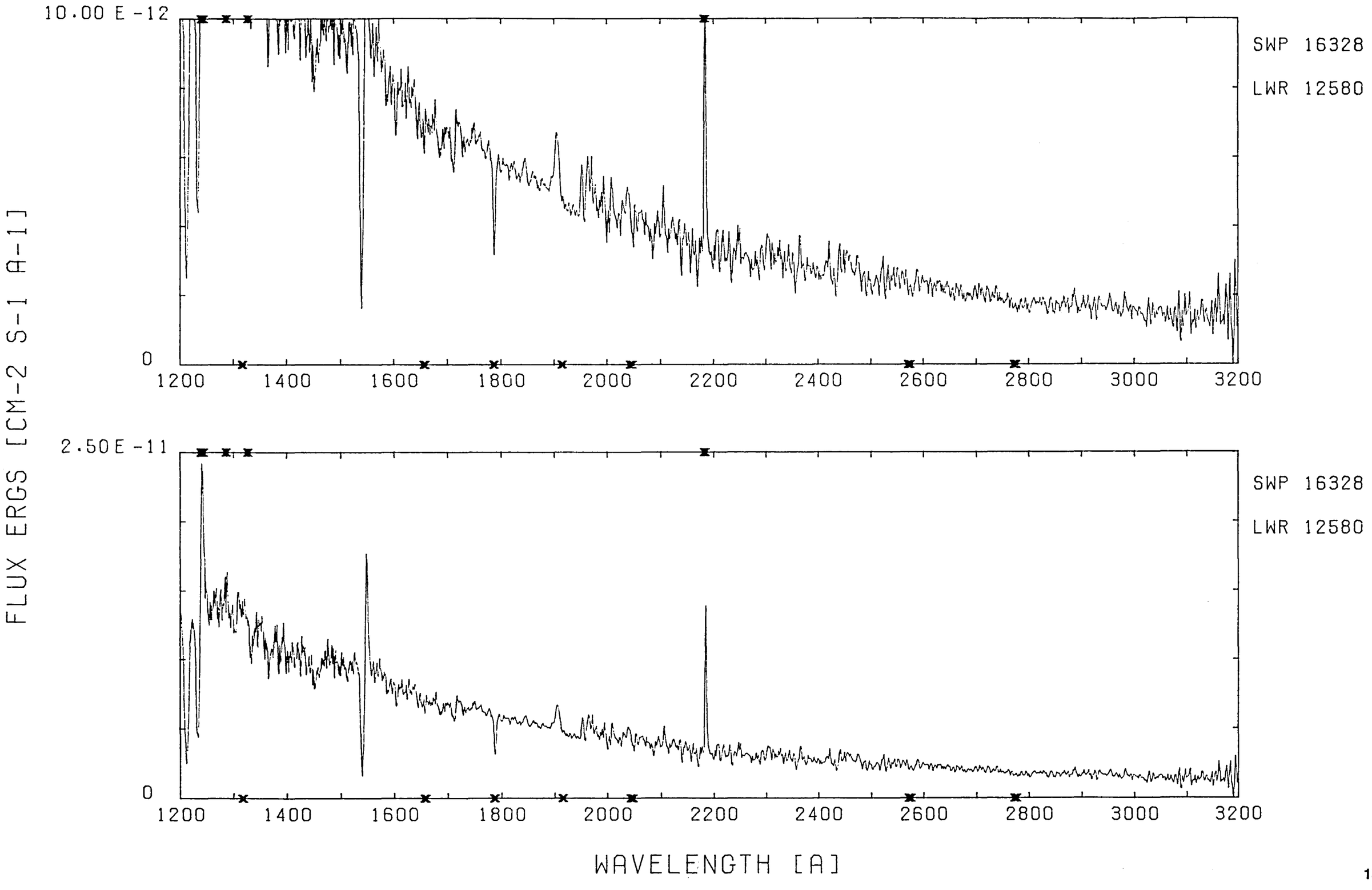
SWP 13548
LWR 10186
2.50E-12
0
SWP 13548
LWR 10186
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

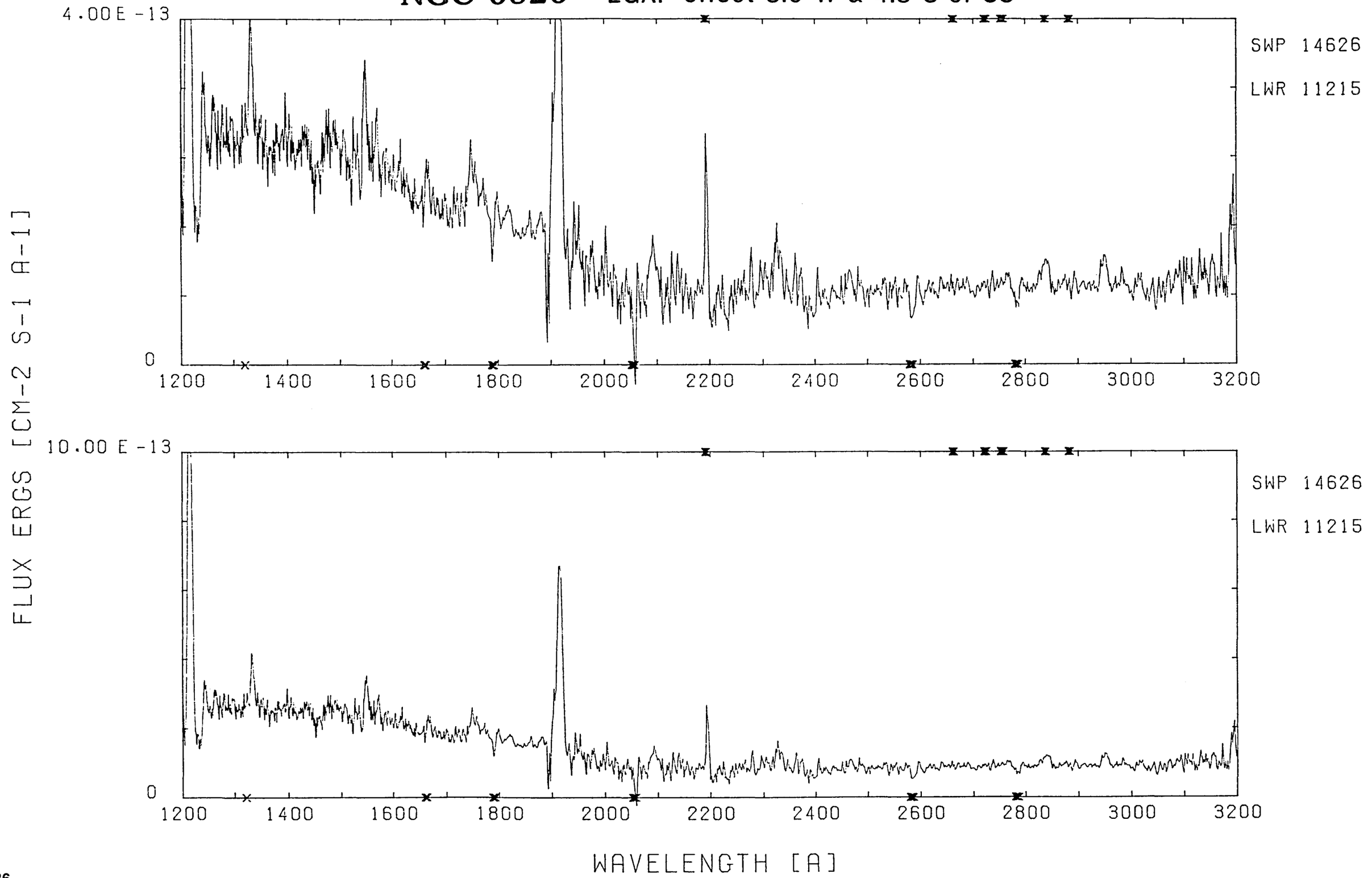
NGC 6818 - LGAP offset 4.9″E & 4.3″N of CS



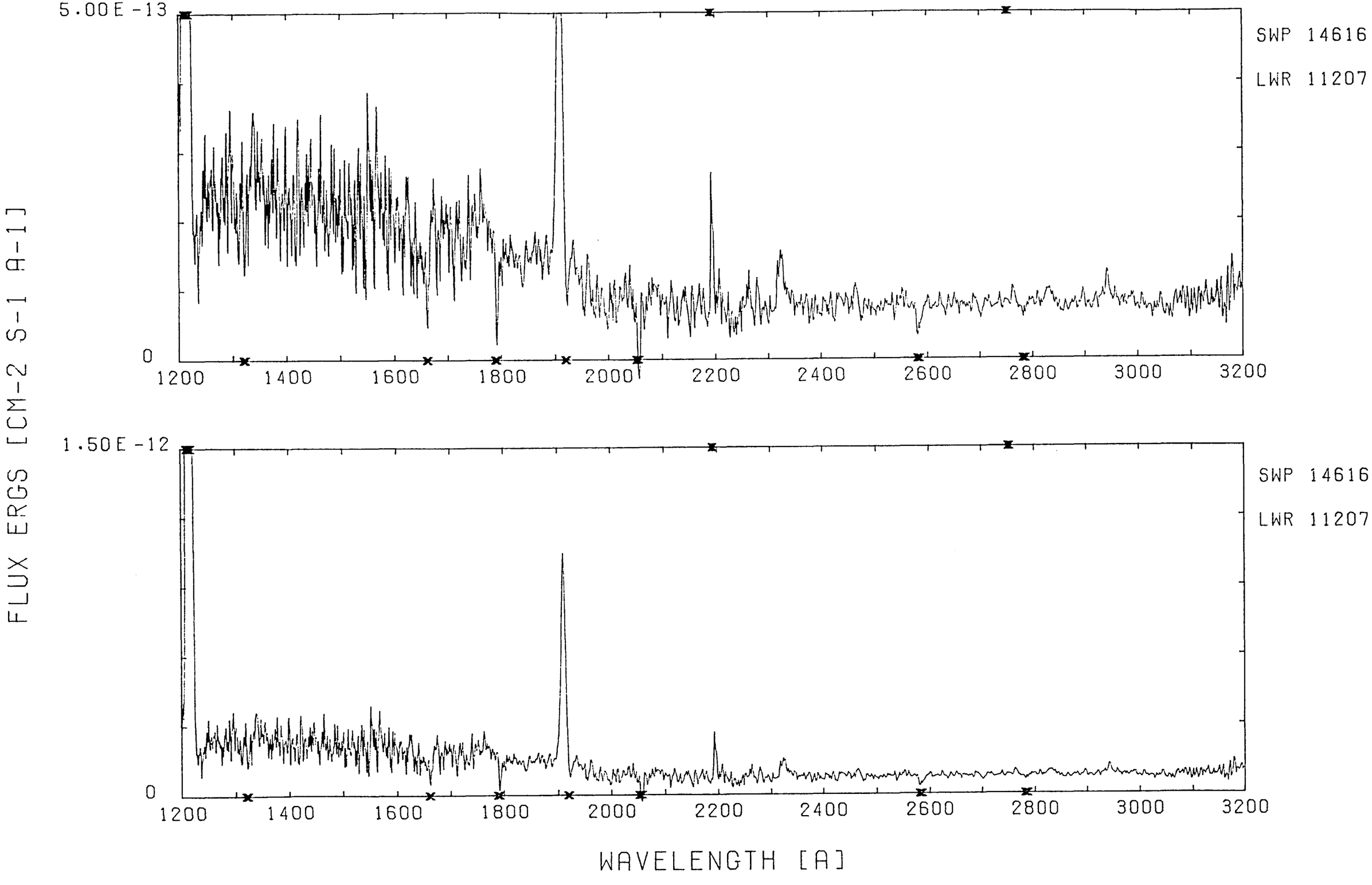
NGC 6826 - LGAP centered on CS



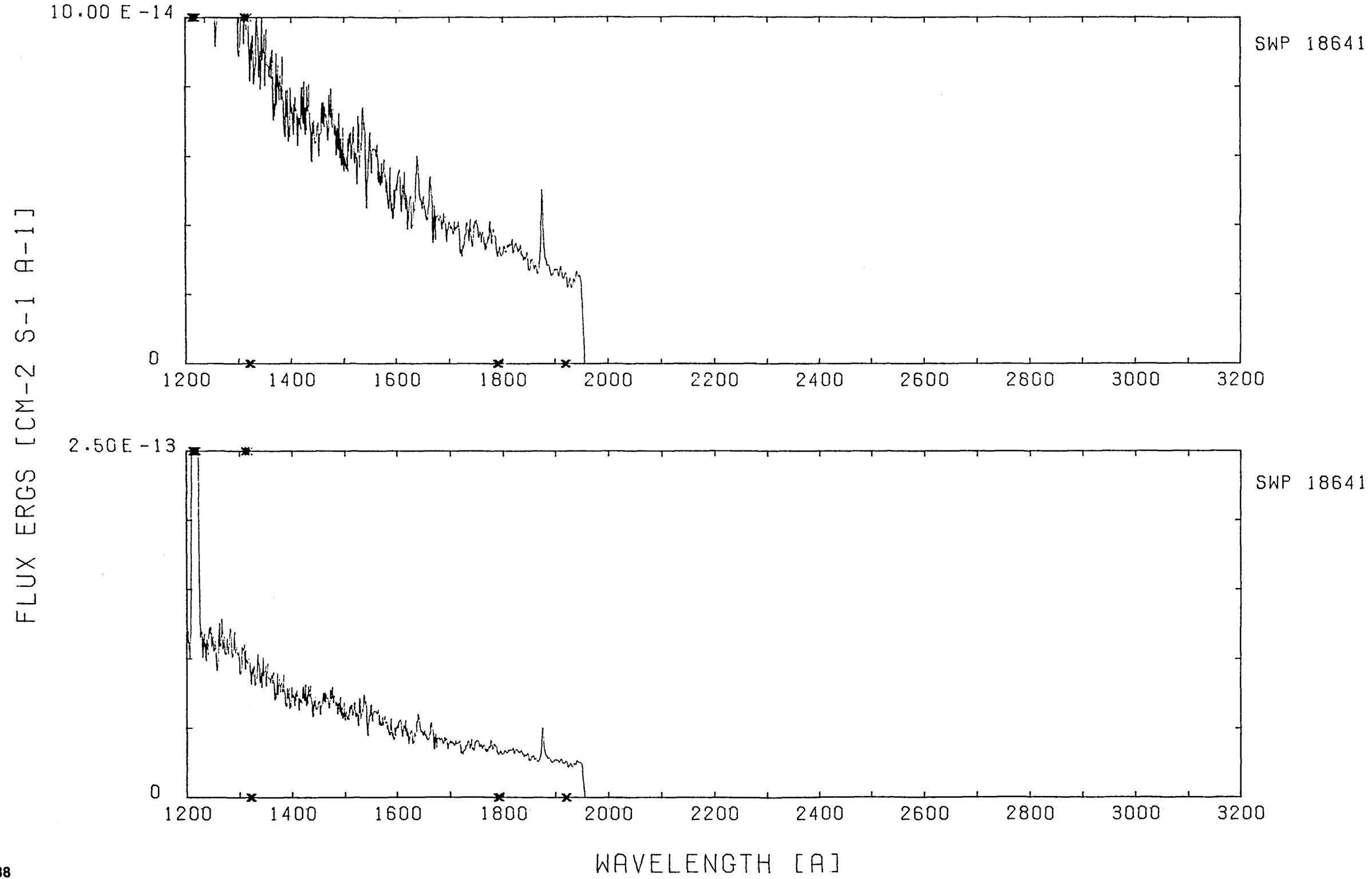
NGC 6826 - LGAP offset 8.6″W & 4.8″S of CS



NGC 6826 - LGAP offset 4.8″E & 8.6″S of CS



A-65


10.00 E -14
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SWP 18641
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
2.50E-13
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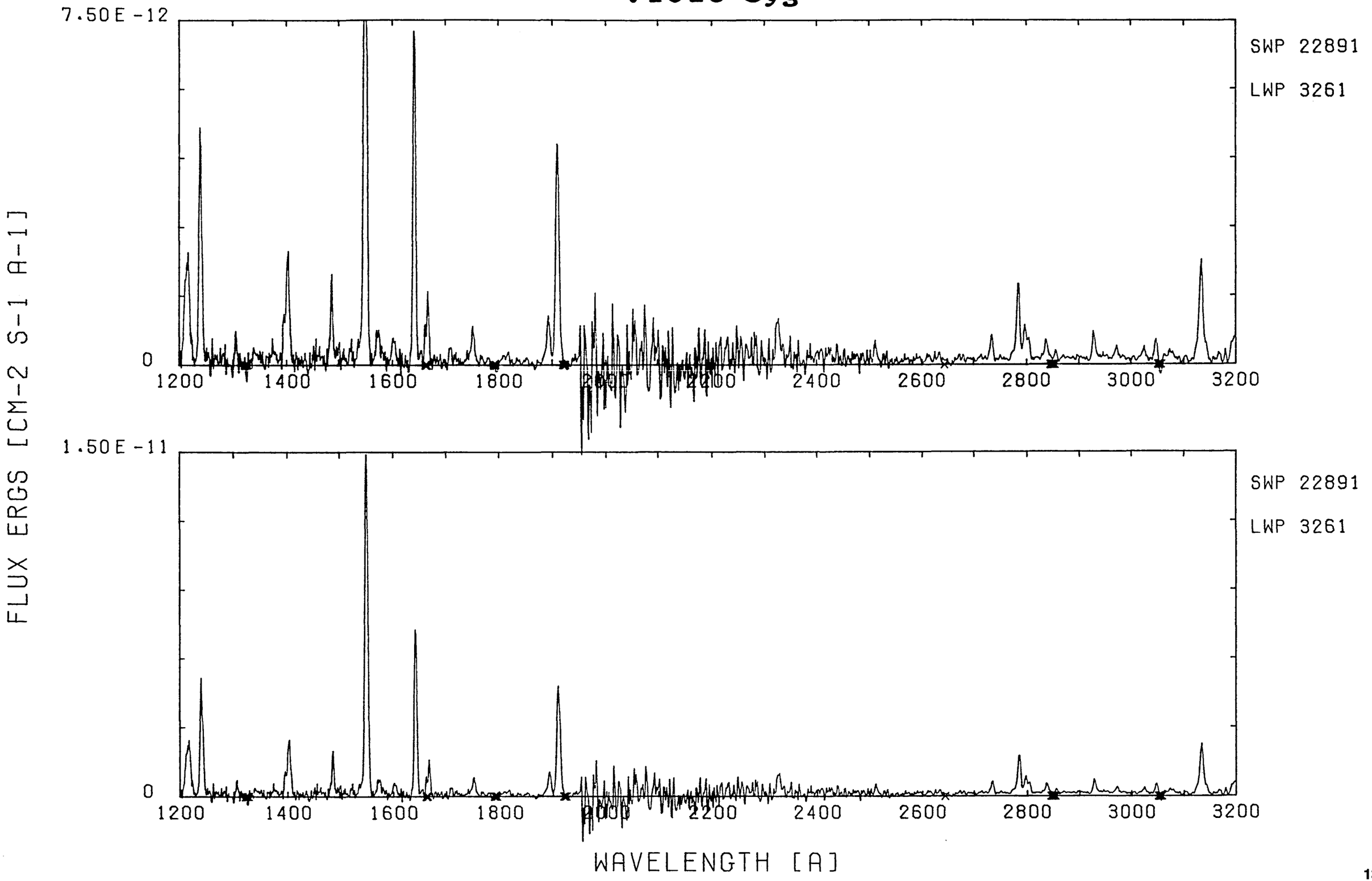
SWP 18641
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

V1016 Cyg


7.50E-12
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1200
1400
1600
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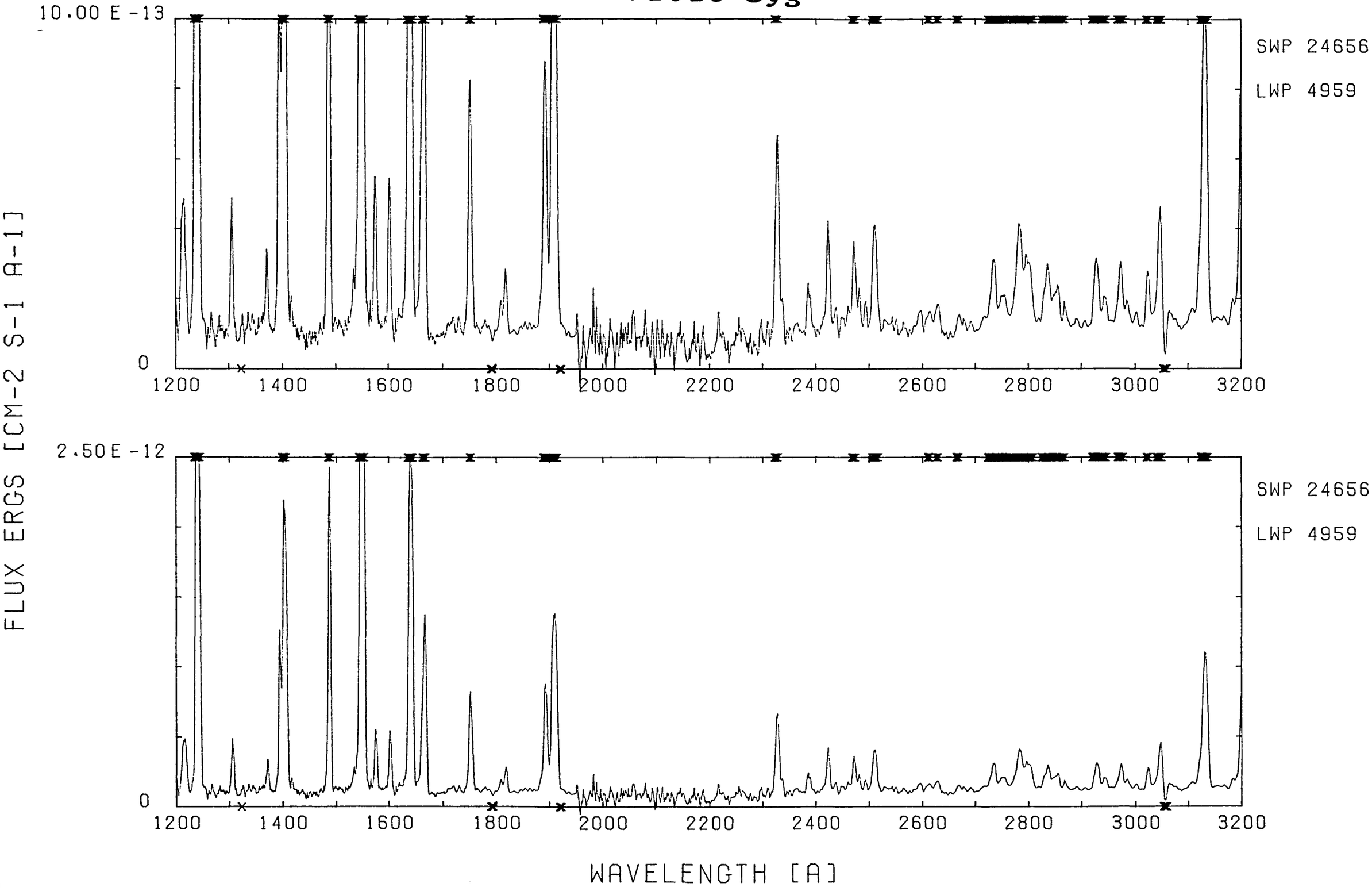
2000
2200
2400
2600
2800
3000
3200
SWP 22891
LWP 3261
1.50E-11
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 22891
LWP 3261
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

V1016 Cyg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SWP 24656
LWP 4959
2.50E -12
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SWP 24656
LWP 4959
1200
1400
1600
1800
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2800
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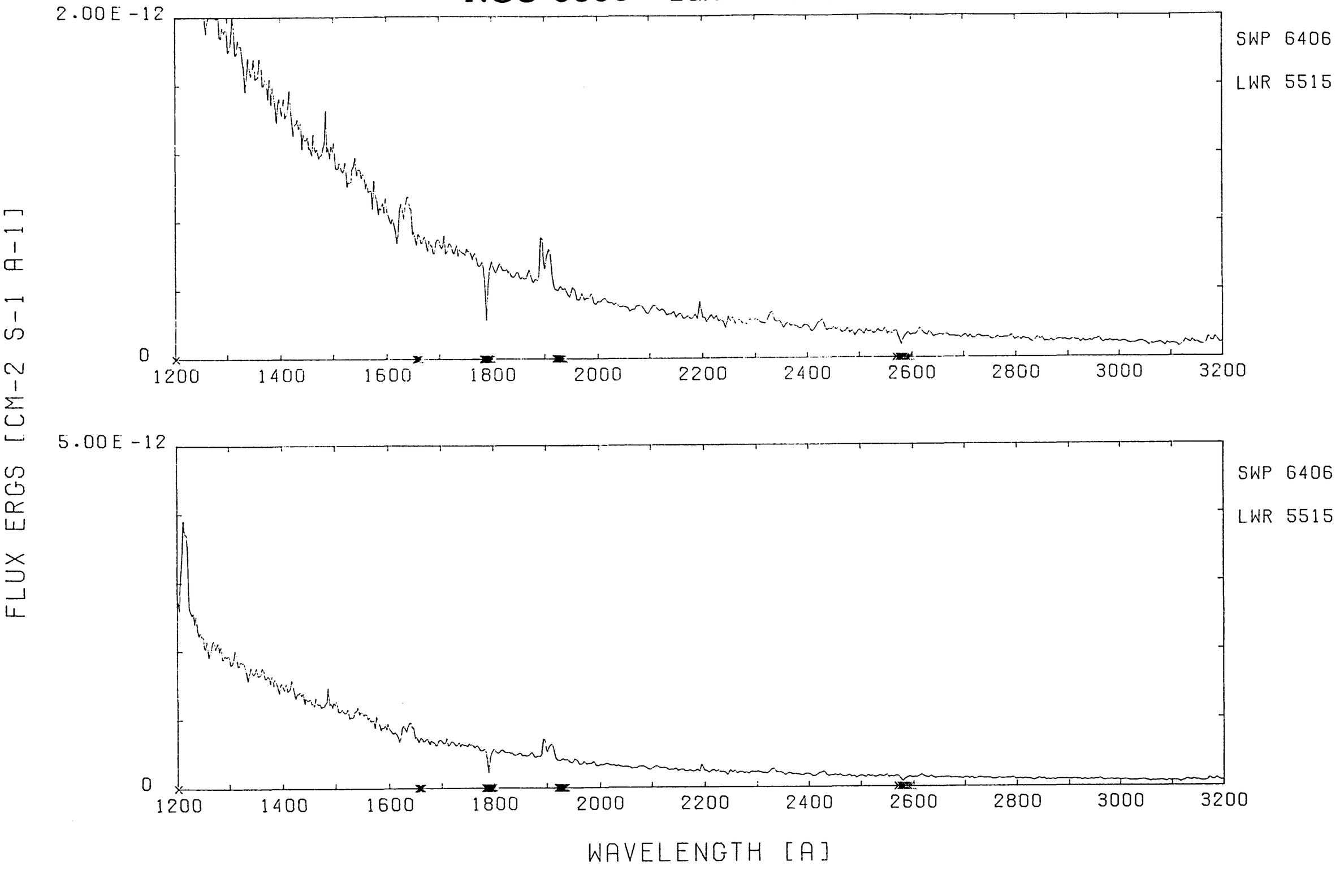
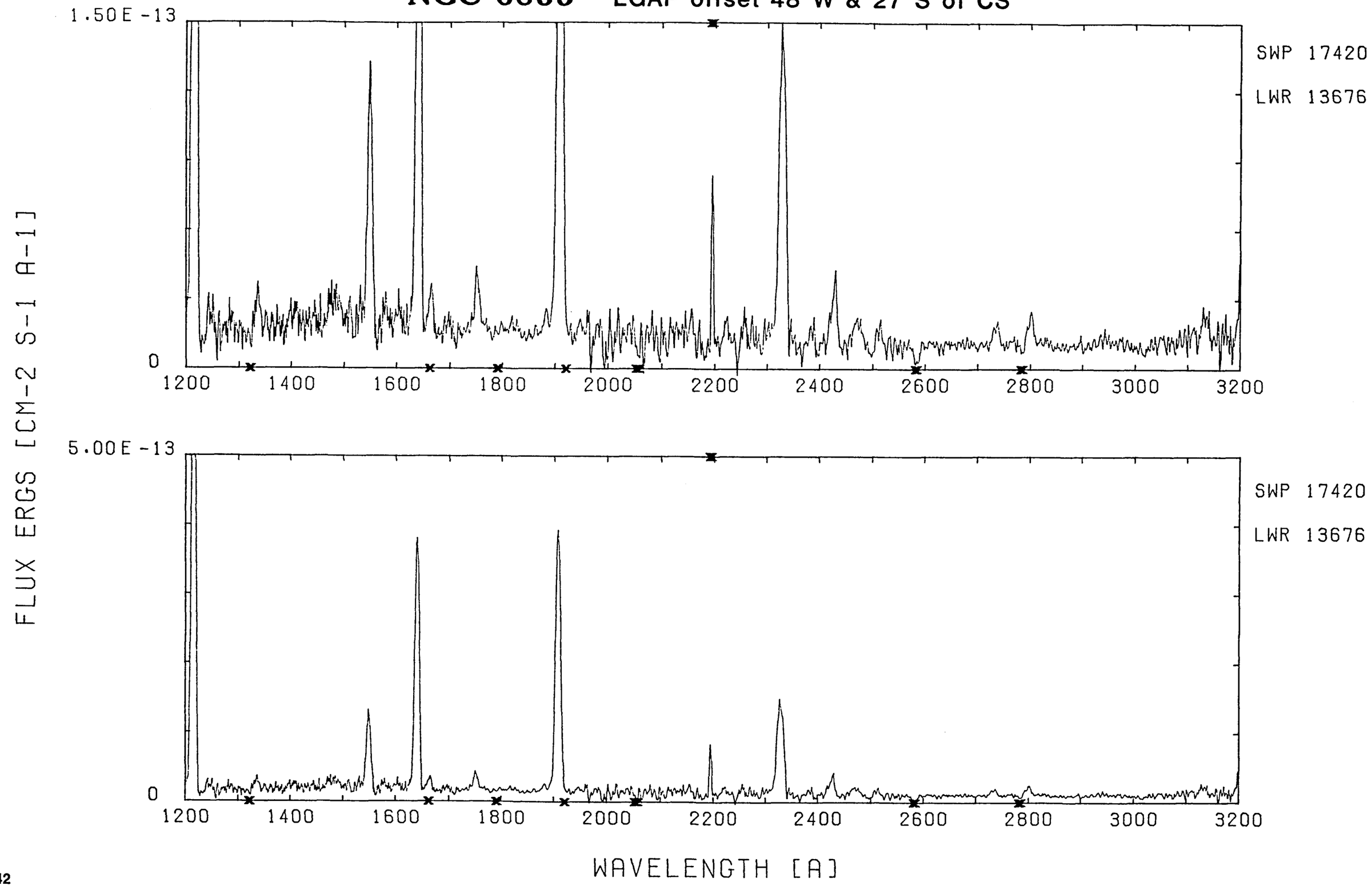
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

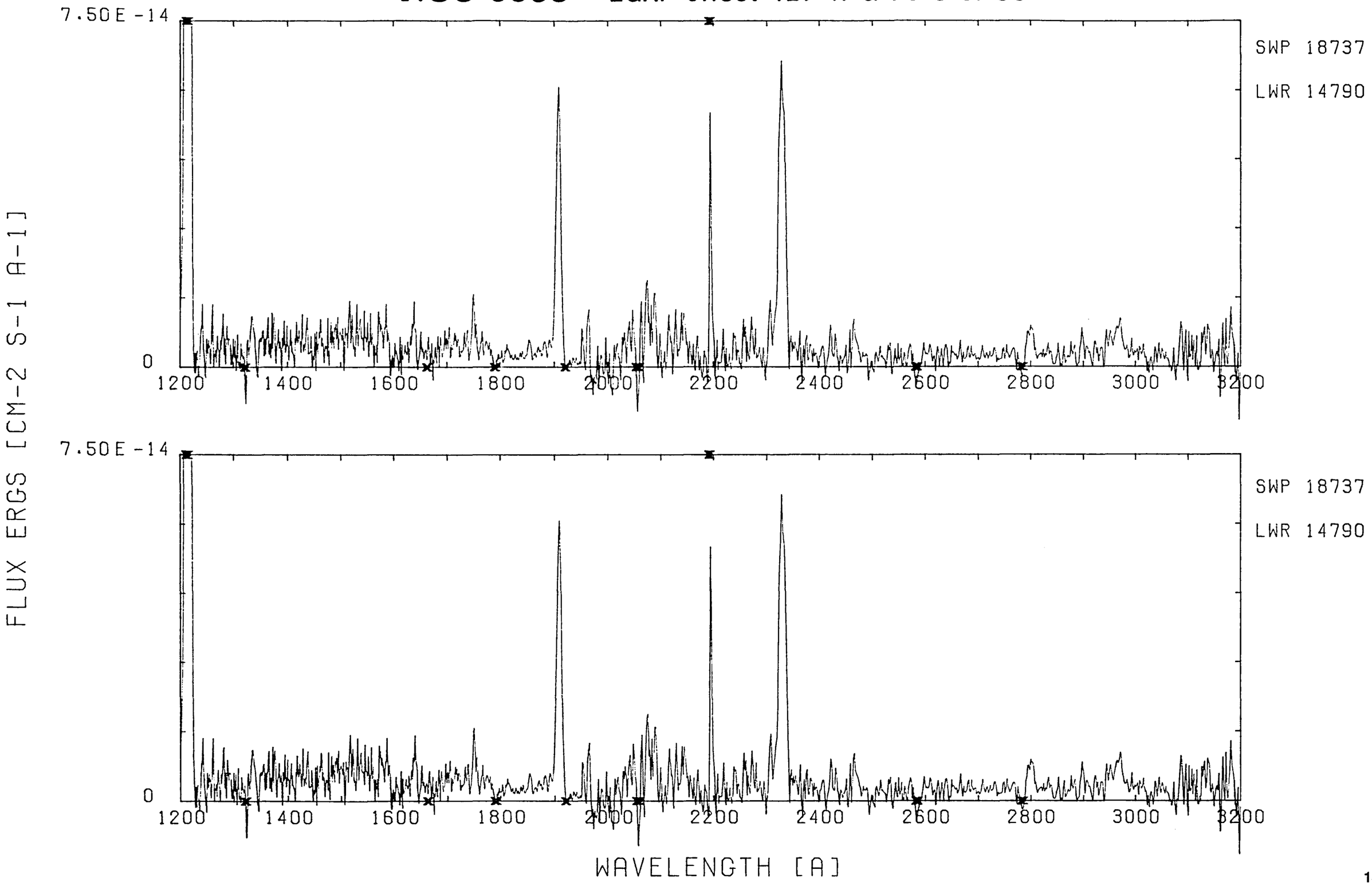
NGC 6853 - LGAP centered on CS



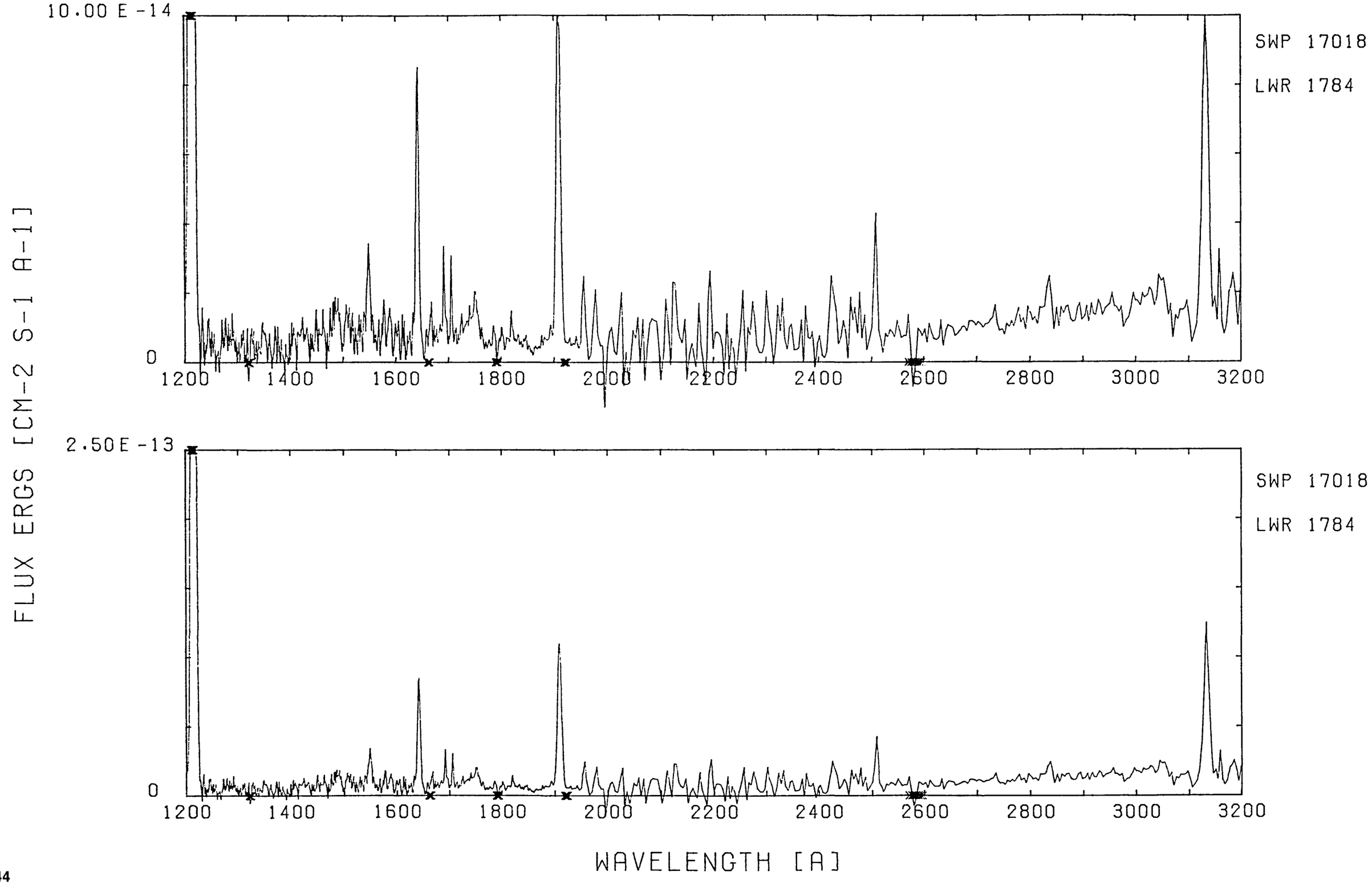
NGC 6853 - LGAP offset 48″W & 27″S of CS



NGC 6853 - LGAP offset 127"W & 70"S of CS



NGC 6884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1400
1600
1800
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2200
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2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
2.50E -13
0
SWP 17018
LWR 1784
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1400
1600
1800
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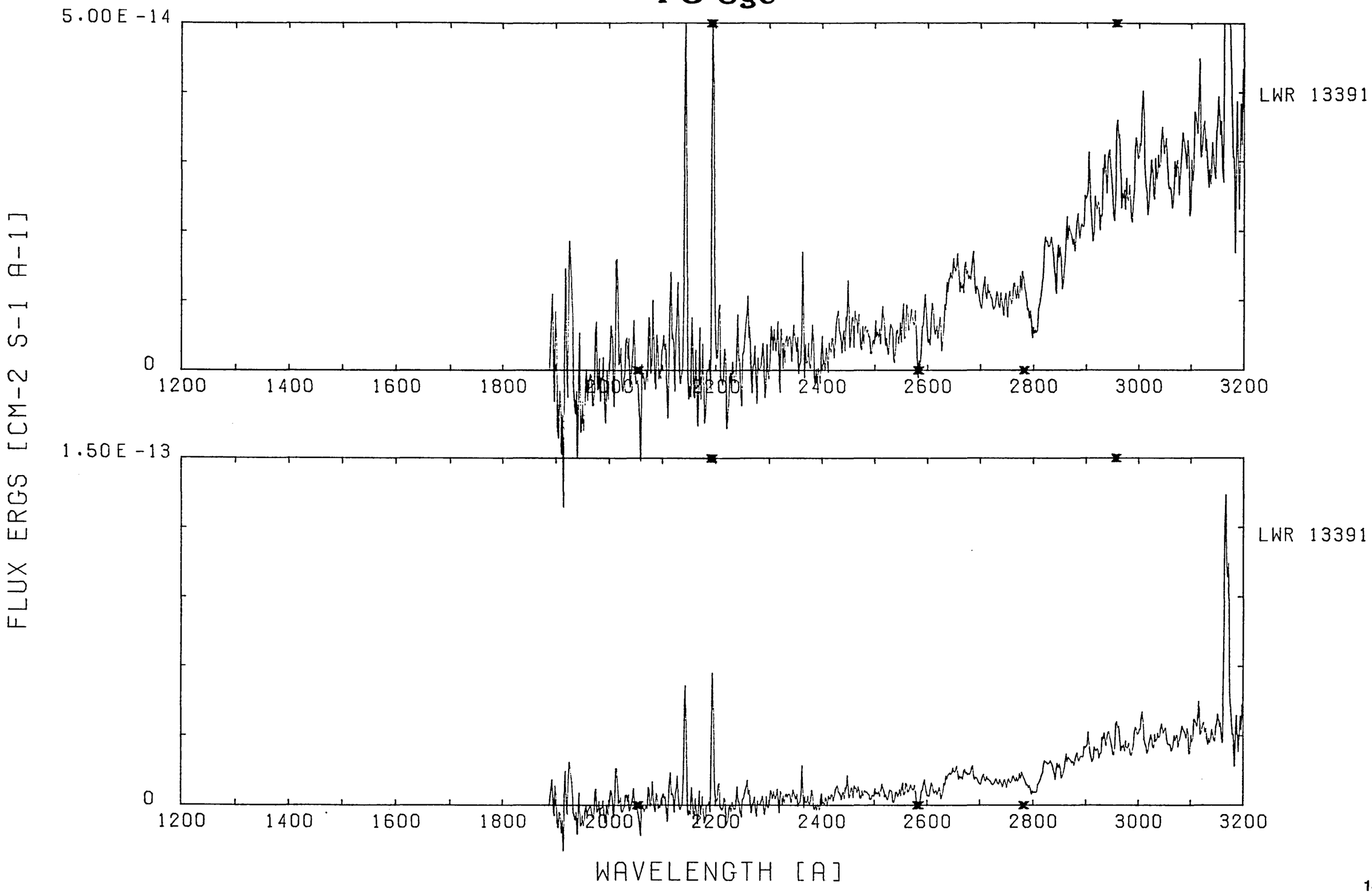
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

FG Sge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LWR 13391
1.50E-13
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LWR 13391
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1400
1600
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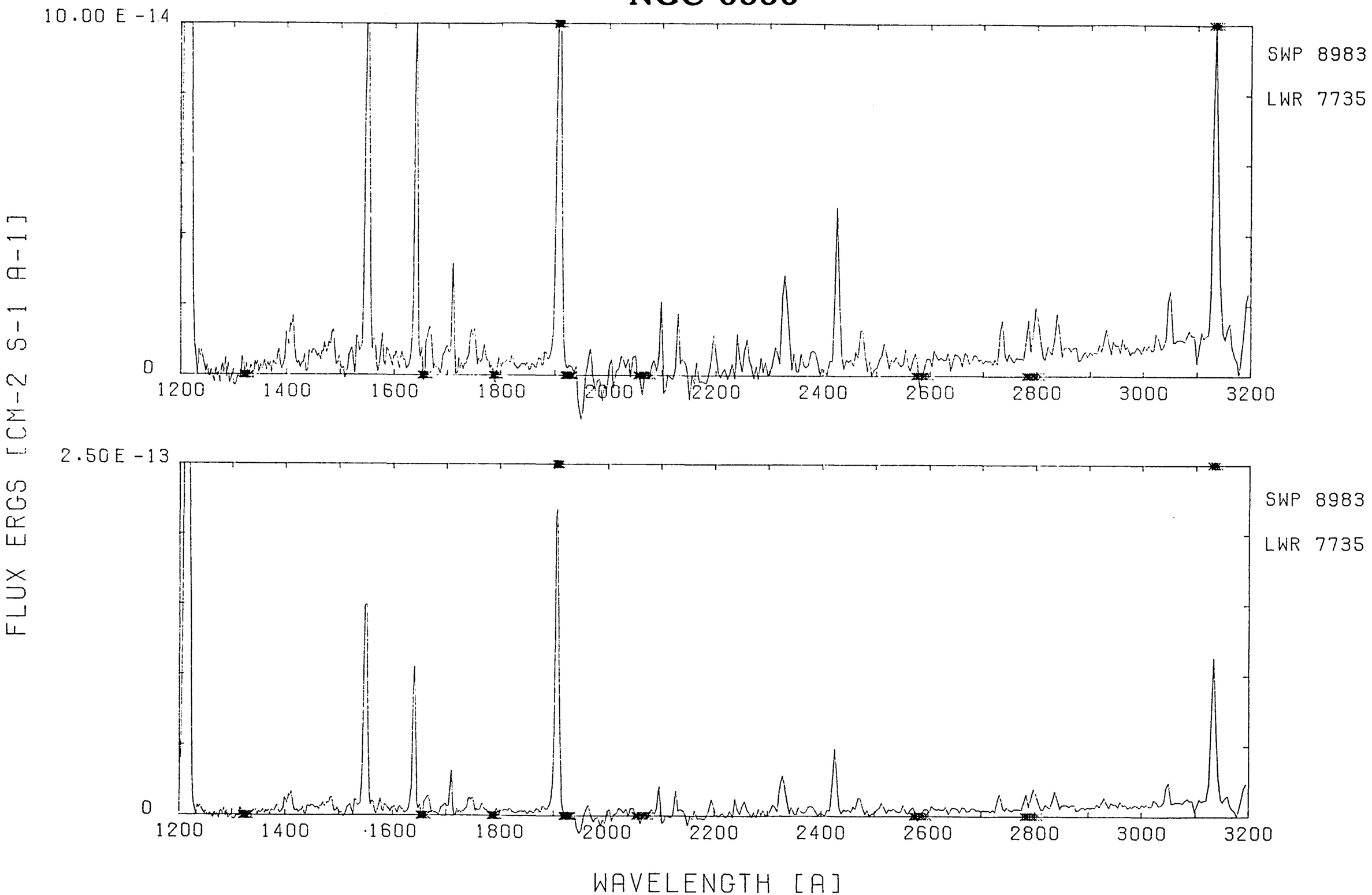
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 6886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1600
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2200
2400
2600
2800
3000
3200
SWP 8983
LWR 7735
FLUX ERGS CM-2 S-1 A-1]
2.50E -13
0
1200
1400
1600
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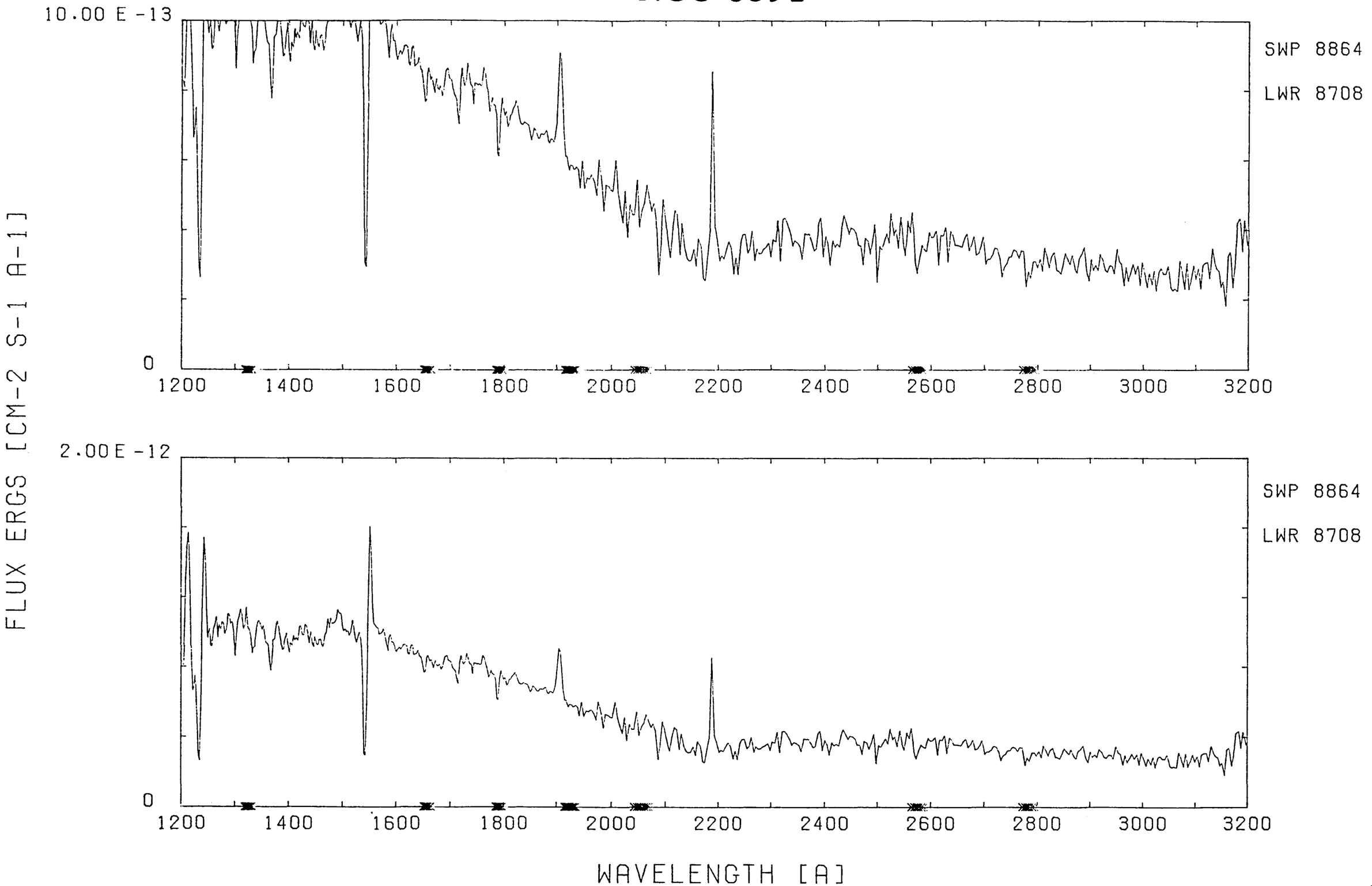
2200
2400
2600
2800
3000
3200
SWP 8983
LWR 7735
WAVELENGTH [A]

NGC 6891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1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
2.00E -12
0
SWP 8864
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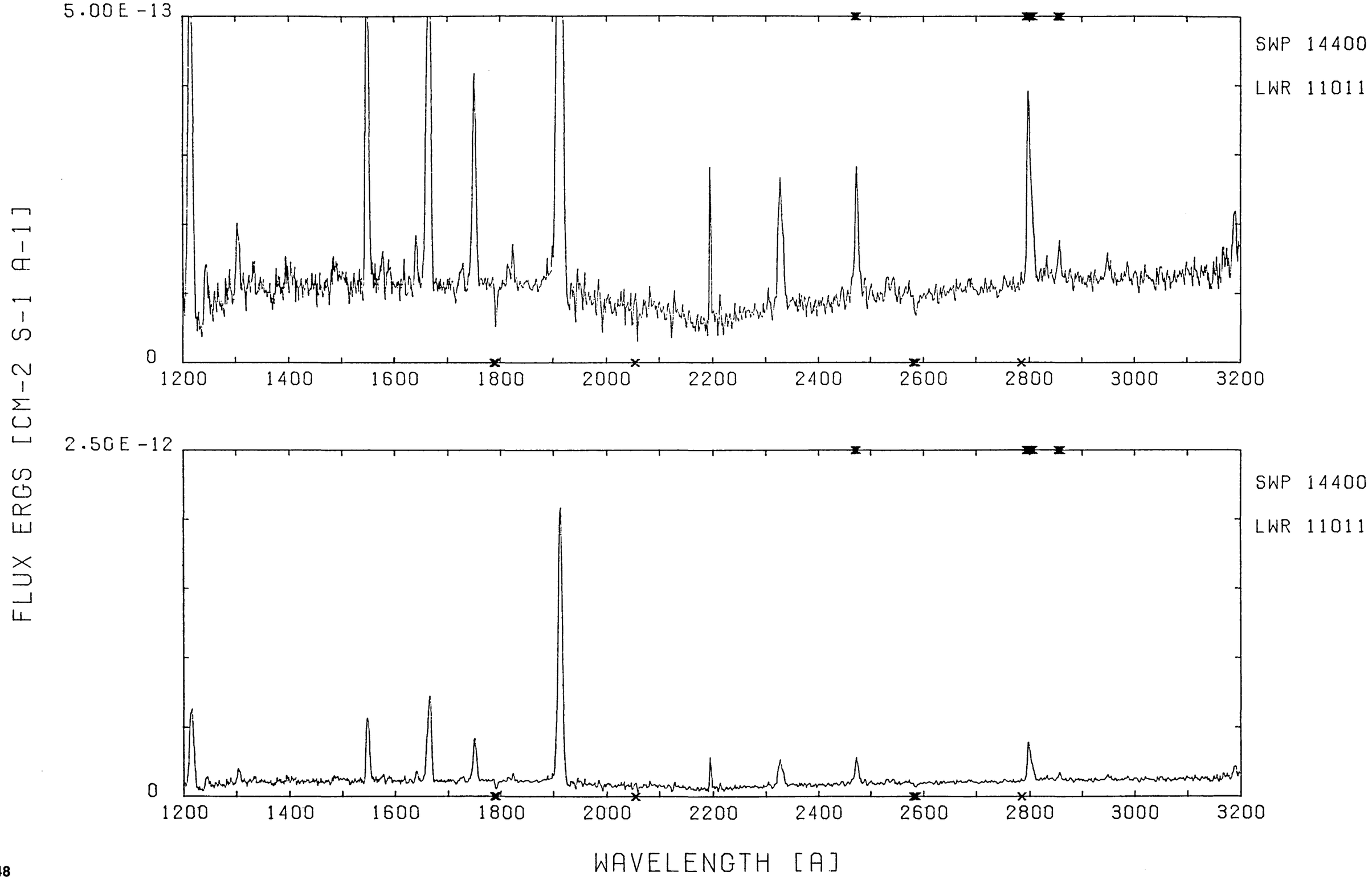
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

IC 4997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1200
1400
1600
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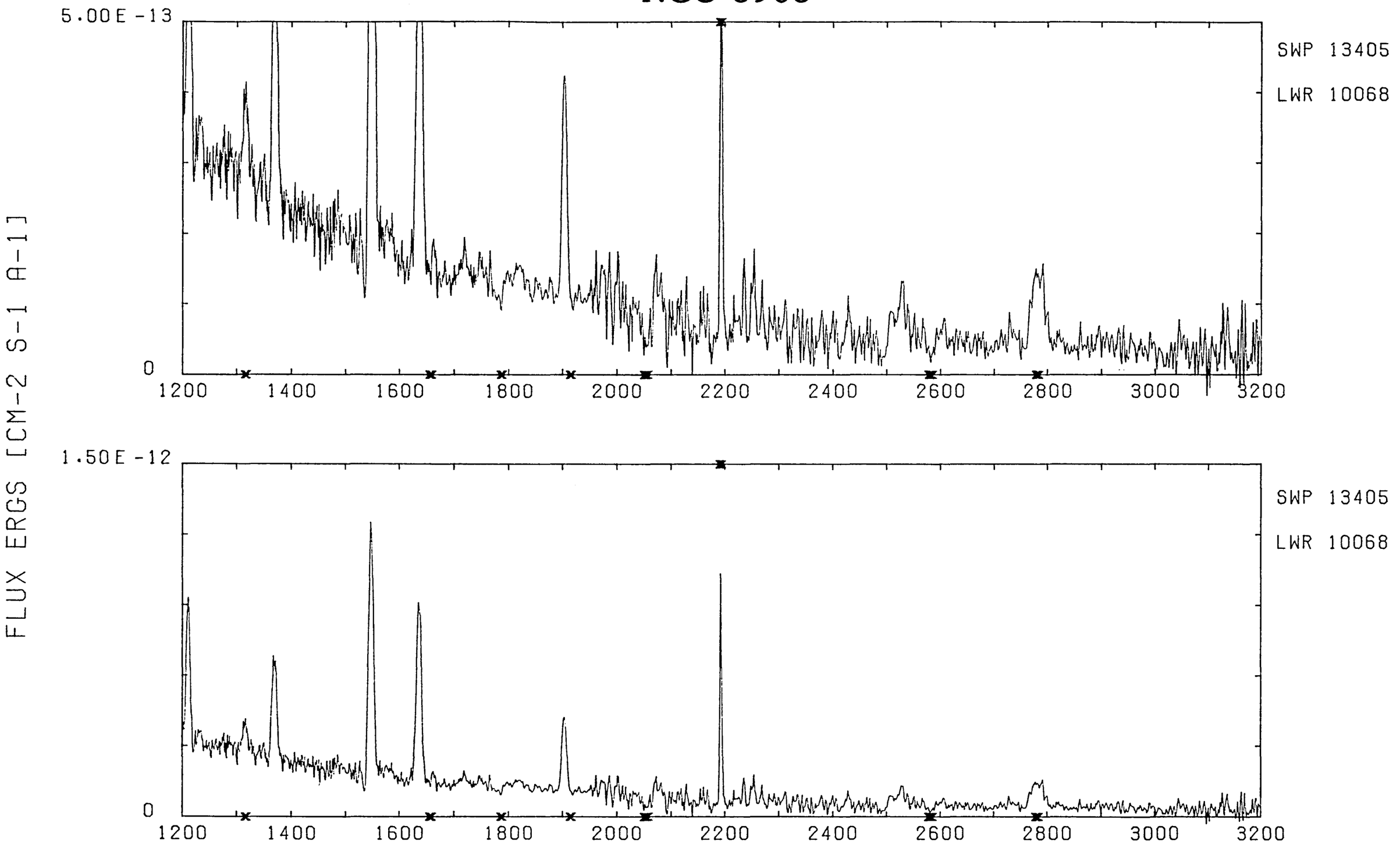
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 6905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1400
1600
1800
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2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
1.50E-12
0
SWP 13405
LWR 10068
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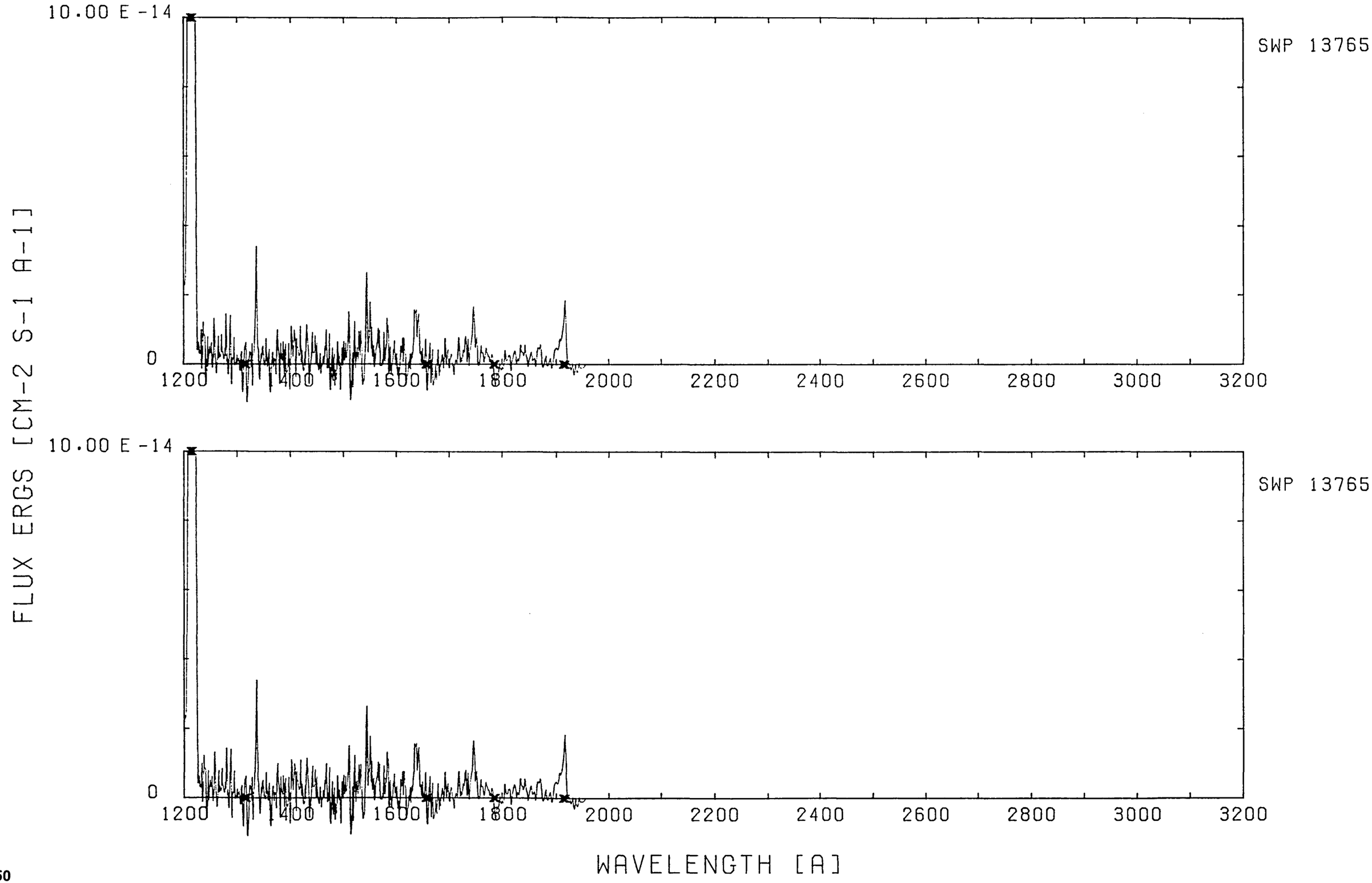
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

A-70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FLUX ERGS [CM-2 S-1 A-1]
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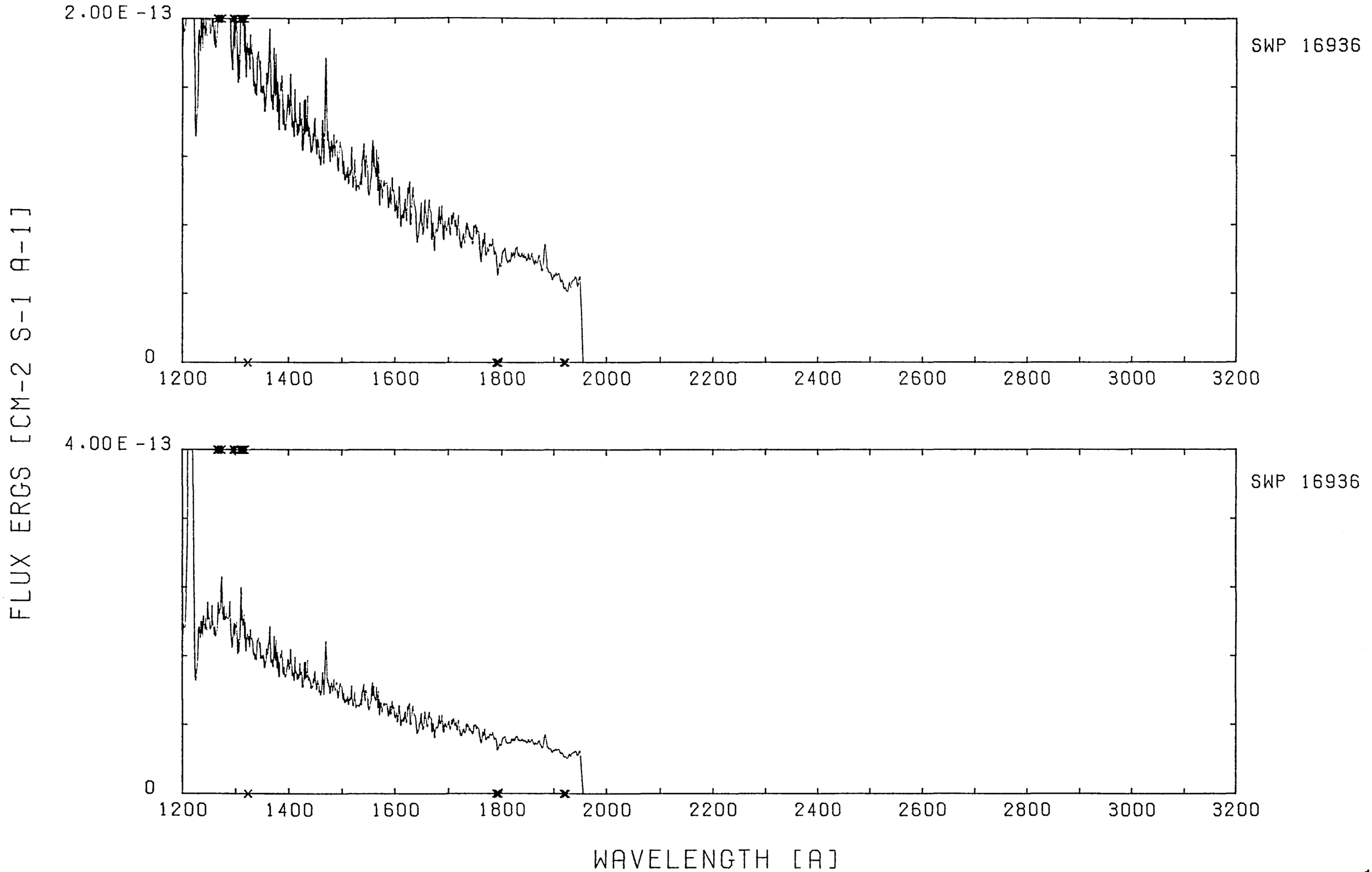
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

A-72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SWP 16936
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1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
4.00E-13
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SWP 16936
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1400
1600
1800
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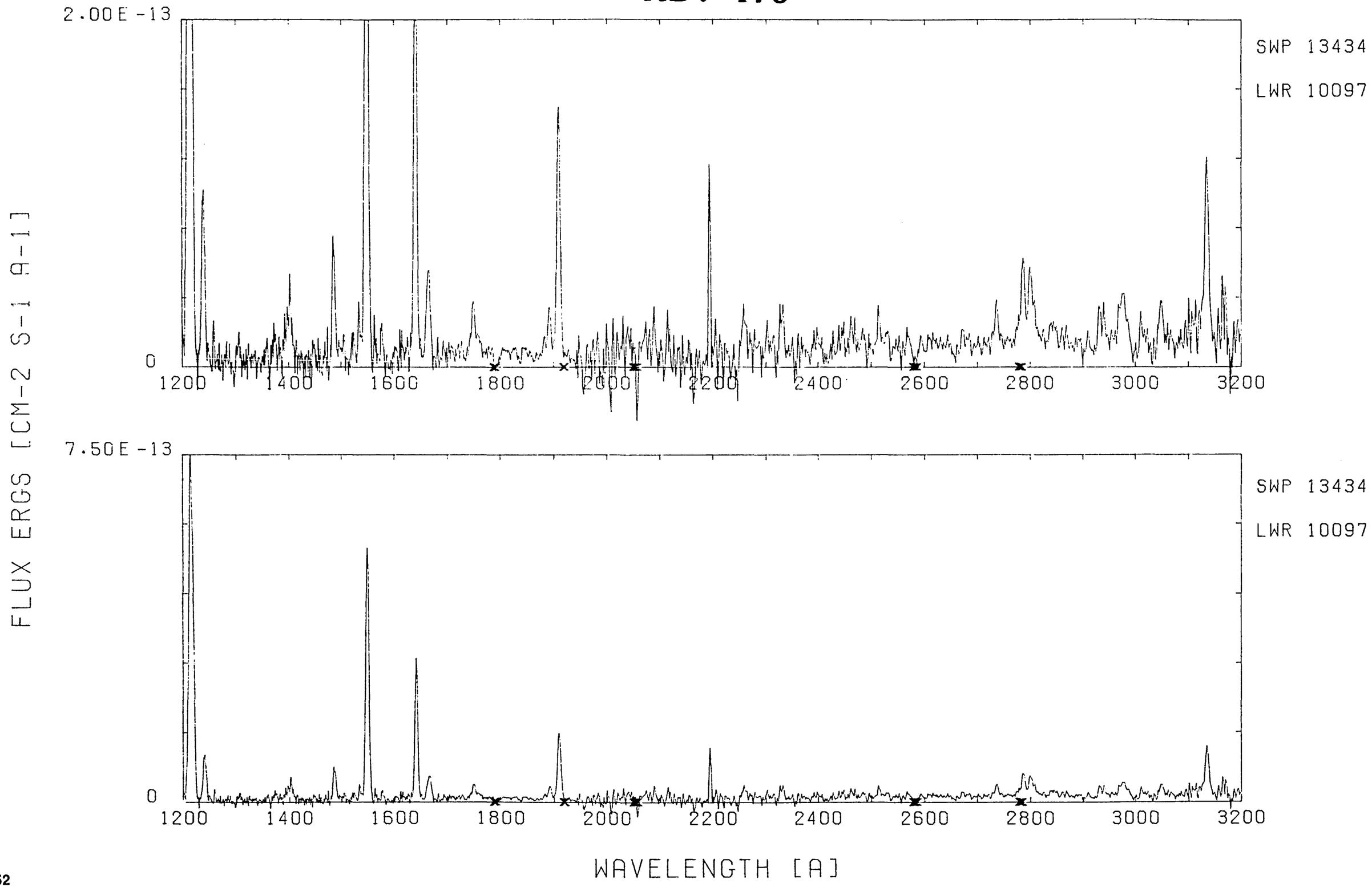
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

HBV 475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LWR 10097
7.50E-13
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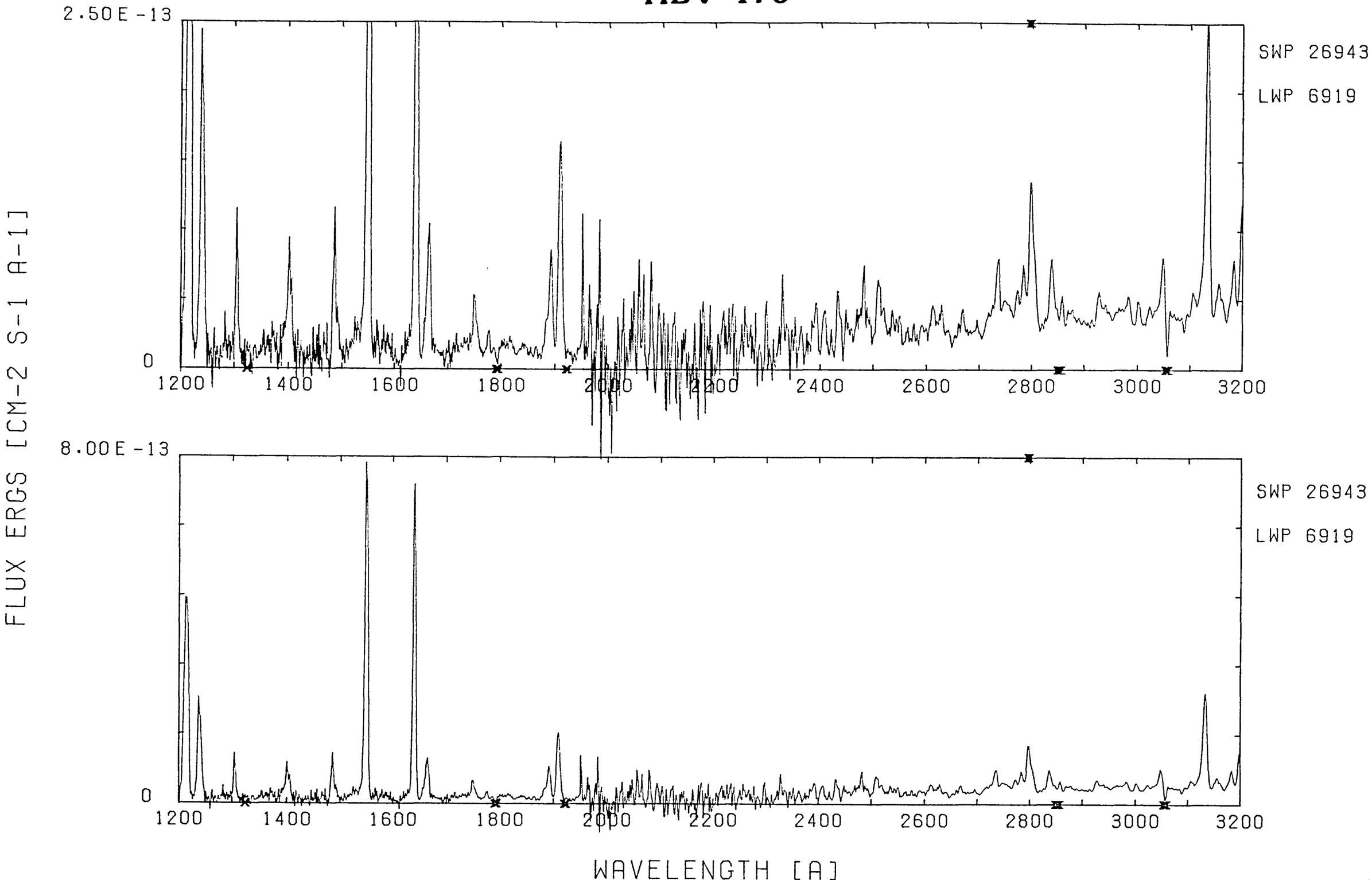
SWP 13434
LWR 10097
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1
WAVELENGTH [A]

HBV 475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LWP 6919
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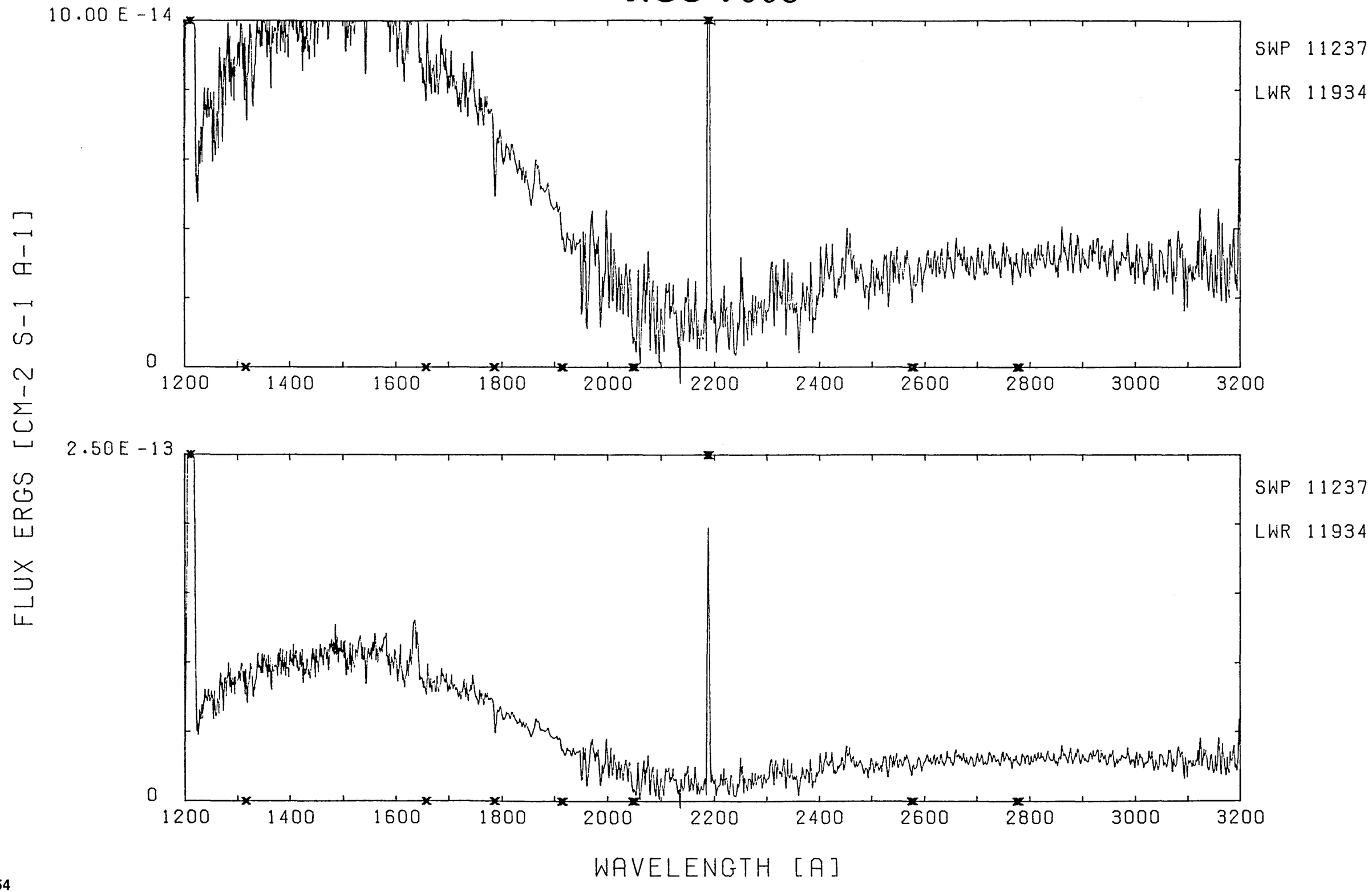
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
8.00E-13
0
SWP 26943
LWP 6919
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 7008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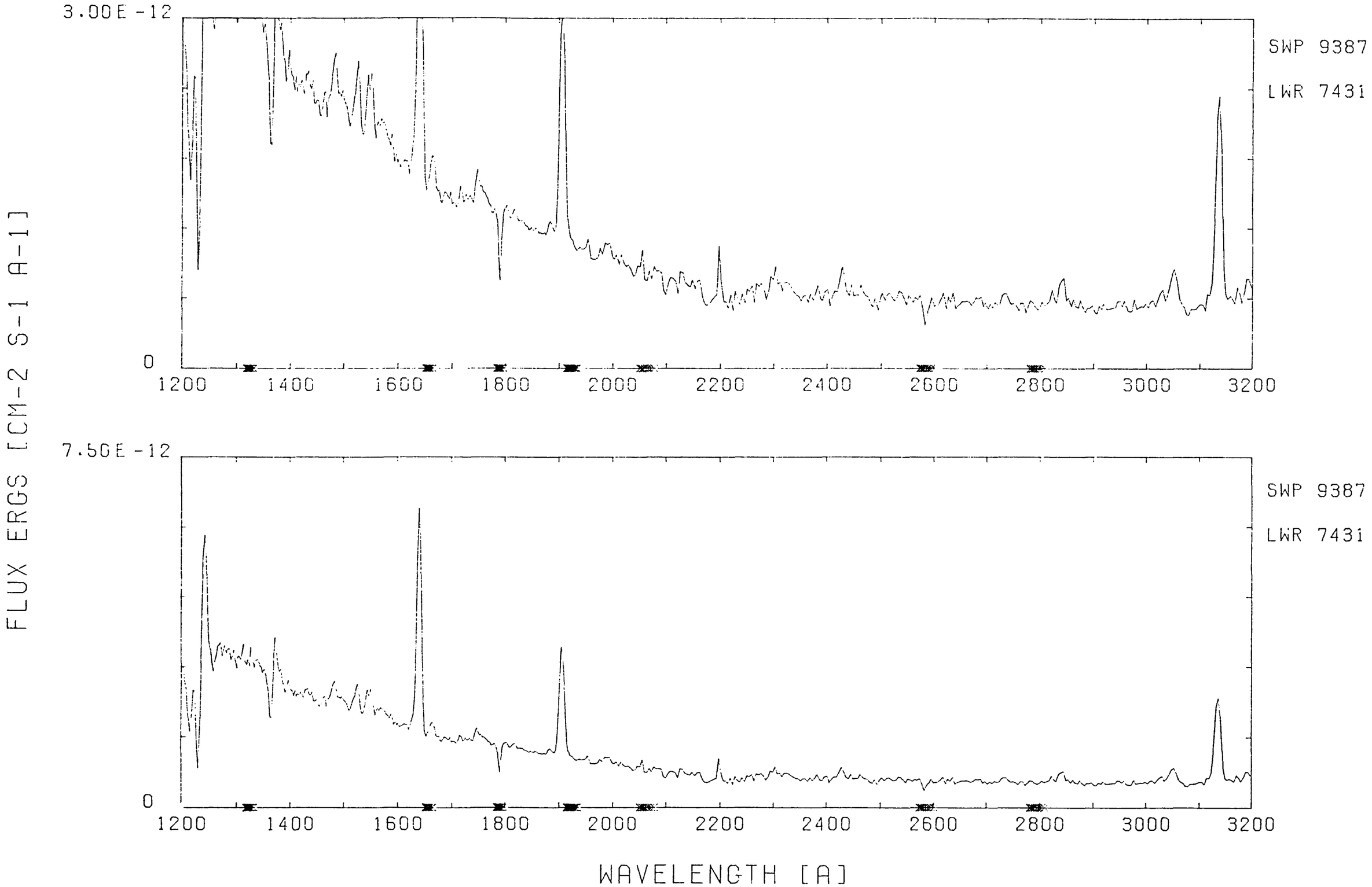
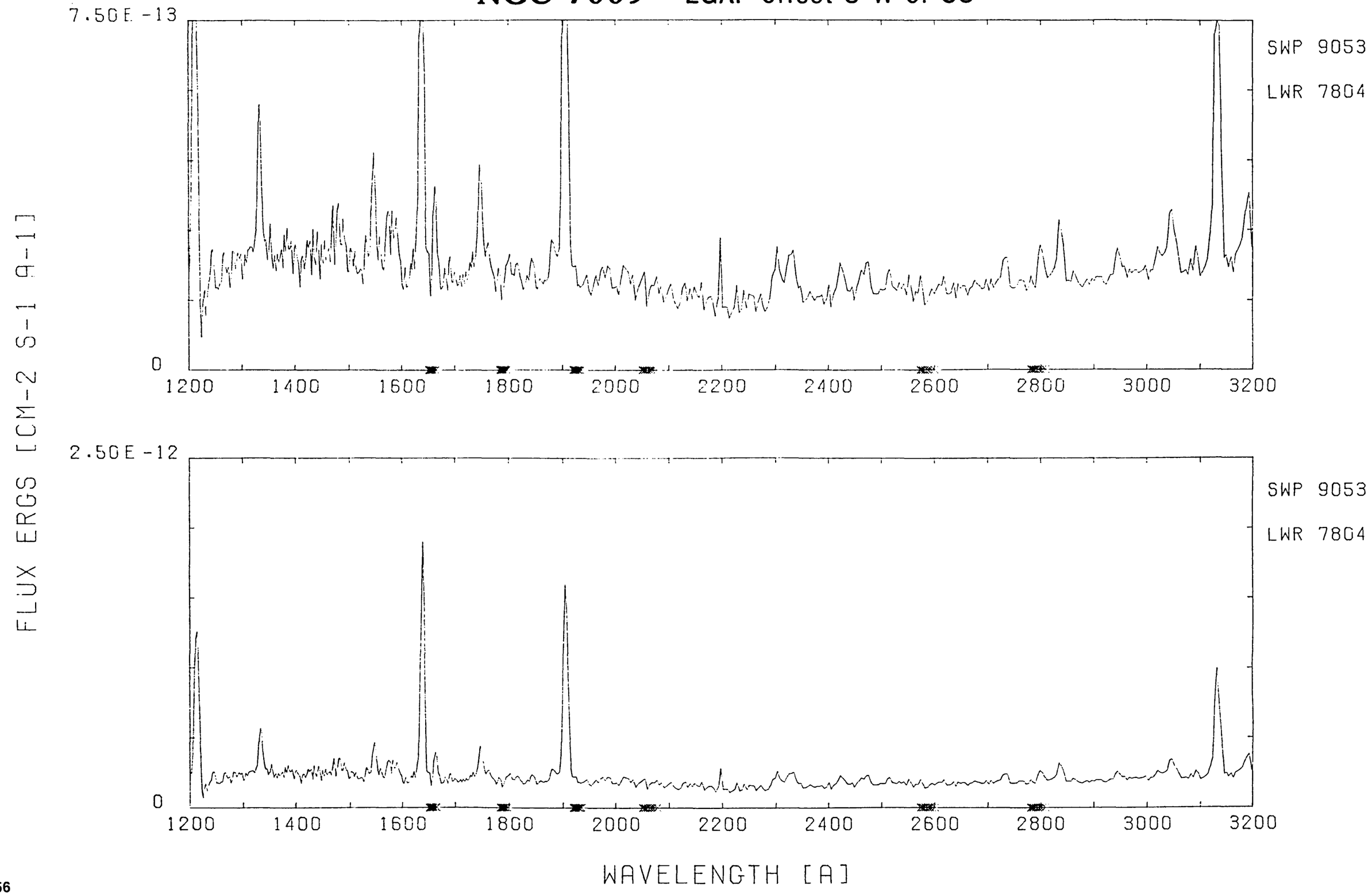
SWP 11237
LWR 11934
2.50E -13
0
SWP 11237
LWR 11934
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

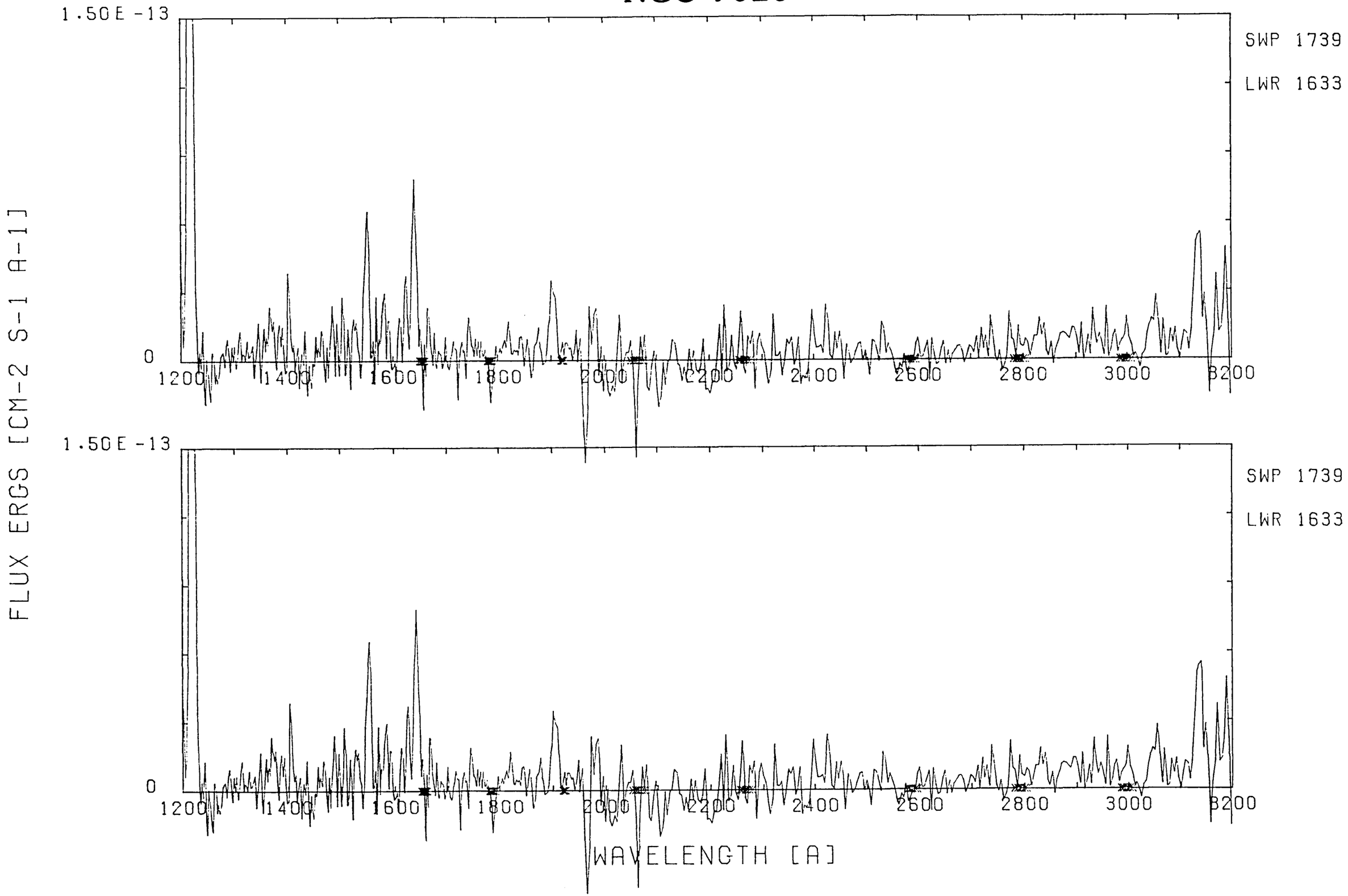
NGC 7009 - LGAP centered on CS



NGC 7009 - LGAP offset 8"W of CS



NGC 7026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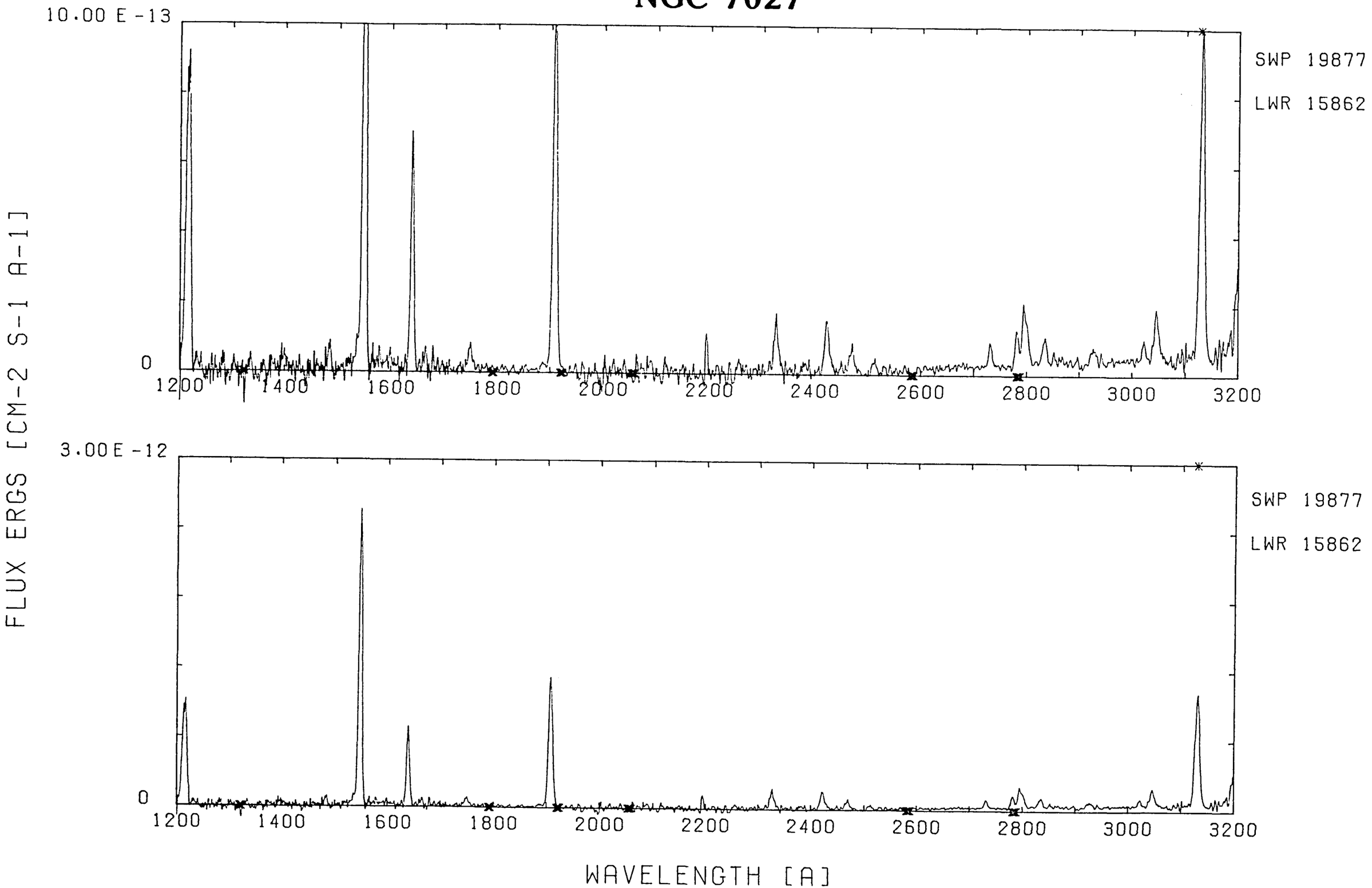
SWP 1739
LWR 1633
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

NGC 7027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1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
3.00E -12
0
SWP 19877
LWR 15862
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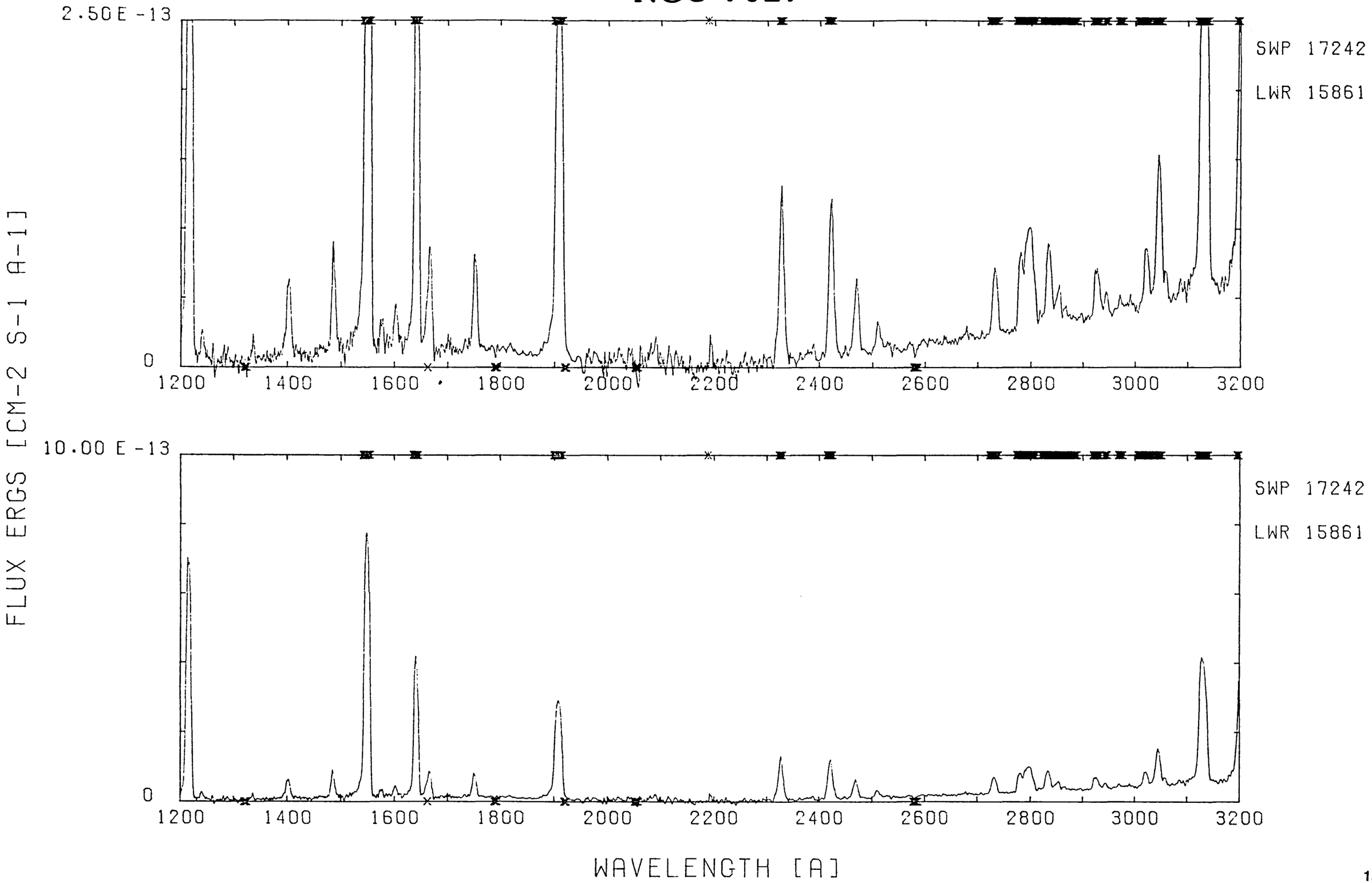
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

NGC 7027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1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 17242
LWR 15861
FLUX ERGS CM-2 S-1 A-1]
10.00 E-13
0
1200
1400
1600
1800
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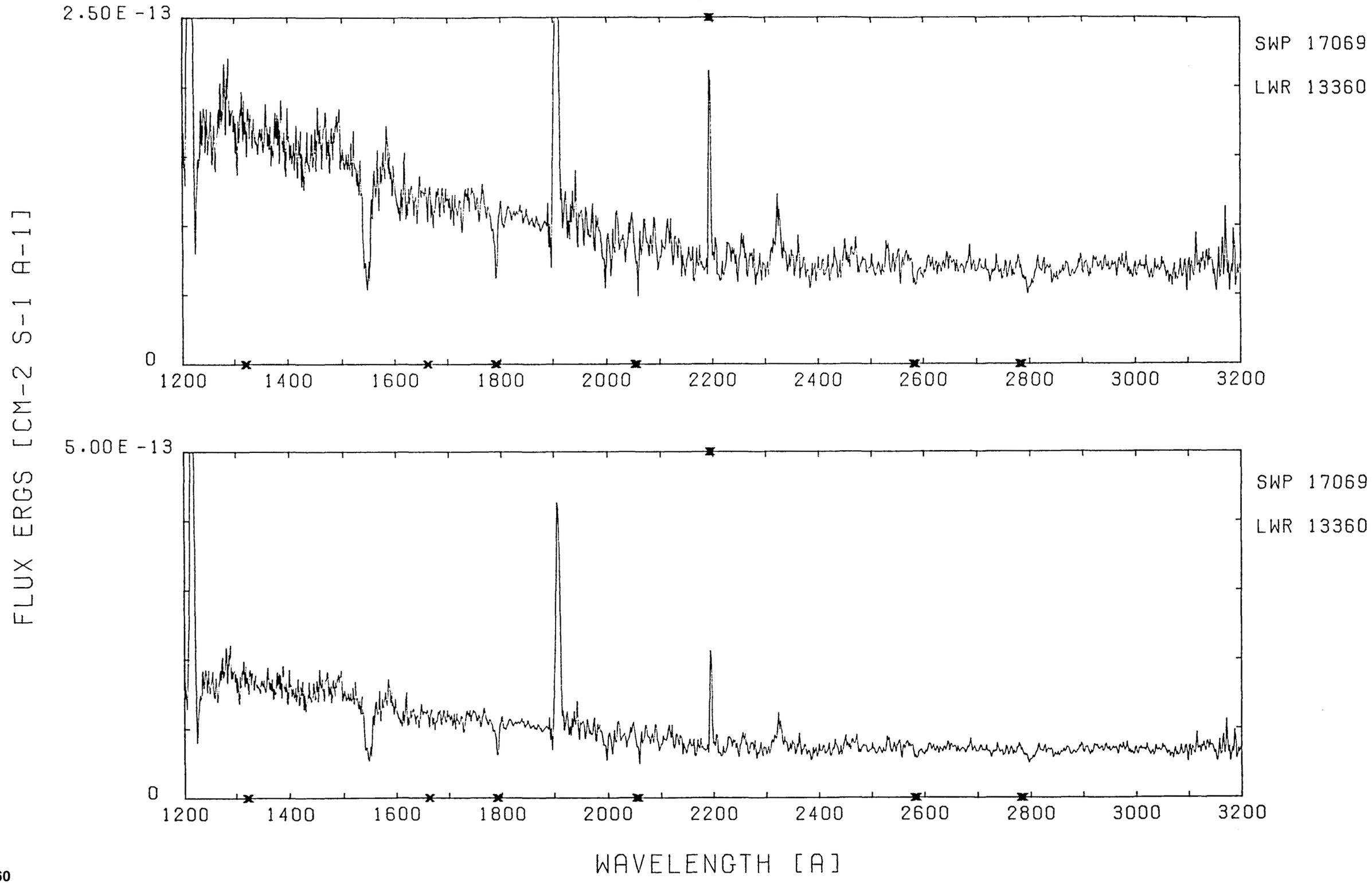
2200
2400
2600
2800
3000
3200
SWP 17242
LWR 15861
WAVELENGTH [A]

K648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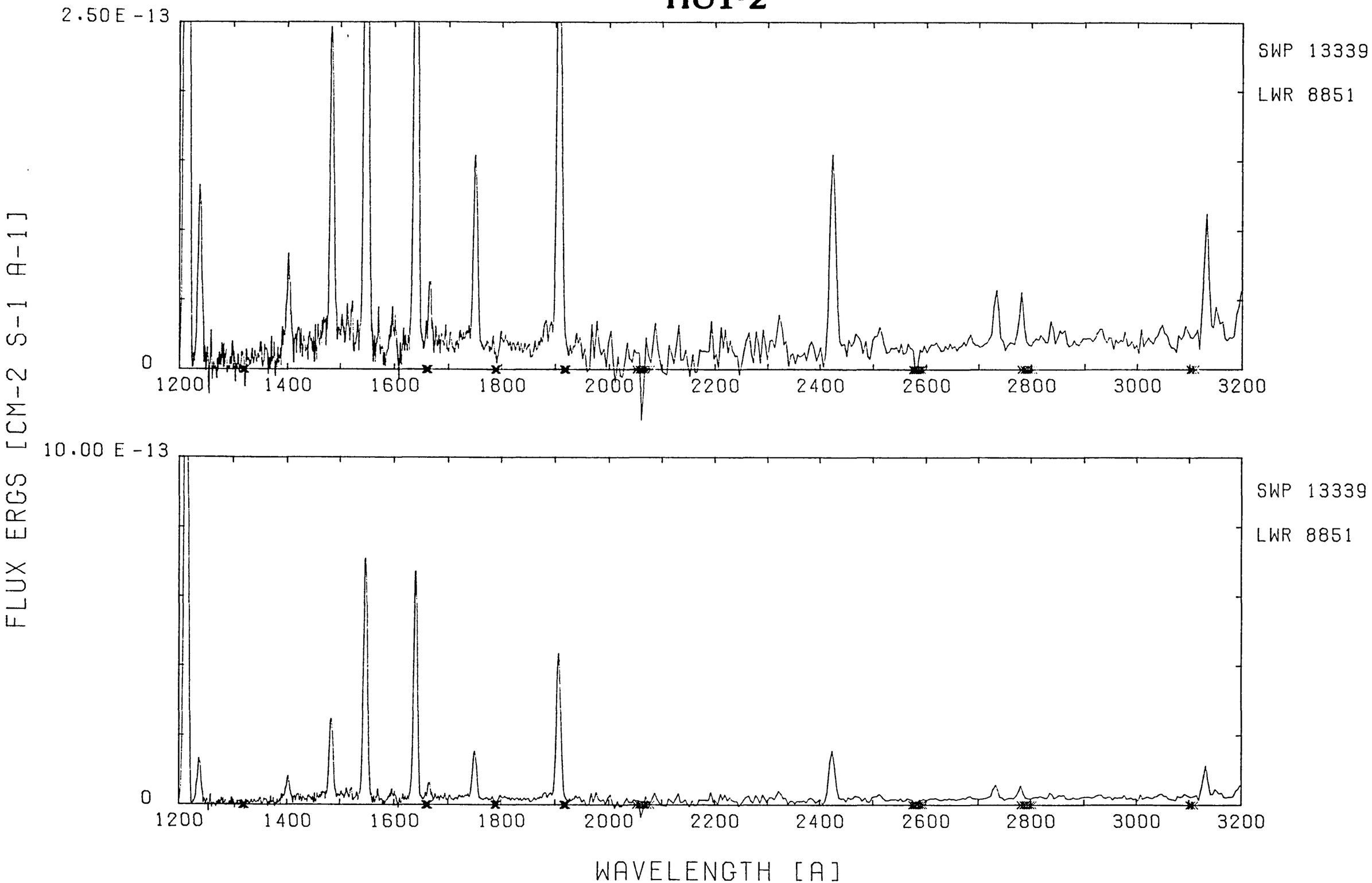
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 17069
LWR 13360
FLUX ERGS CM-2 S-1 A-1]
5.00E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 17069
LWR 13360
WAVELENGTH [A]

HU1-2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LWR 8851
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1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
10.00 E-13
0
SWP 13339
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1400
1600
1800
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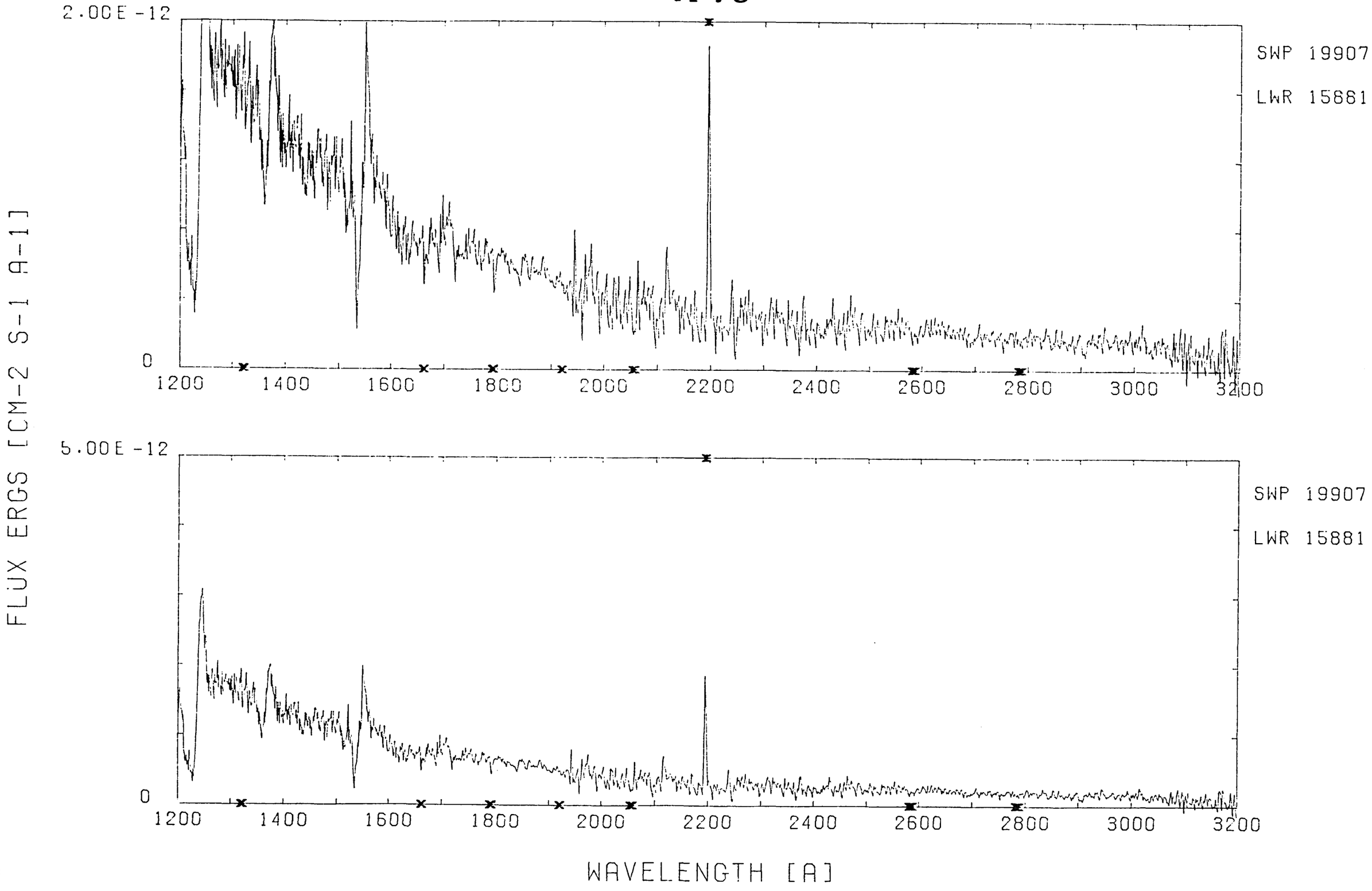
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

A-78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1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
5.00E-12
0
SWP 19907
LWR 15881
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1600
1800
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2200
2400
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2800
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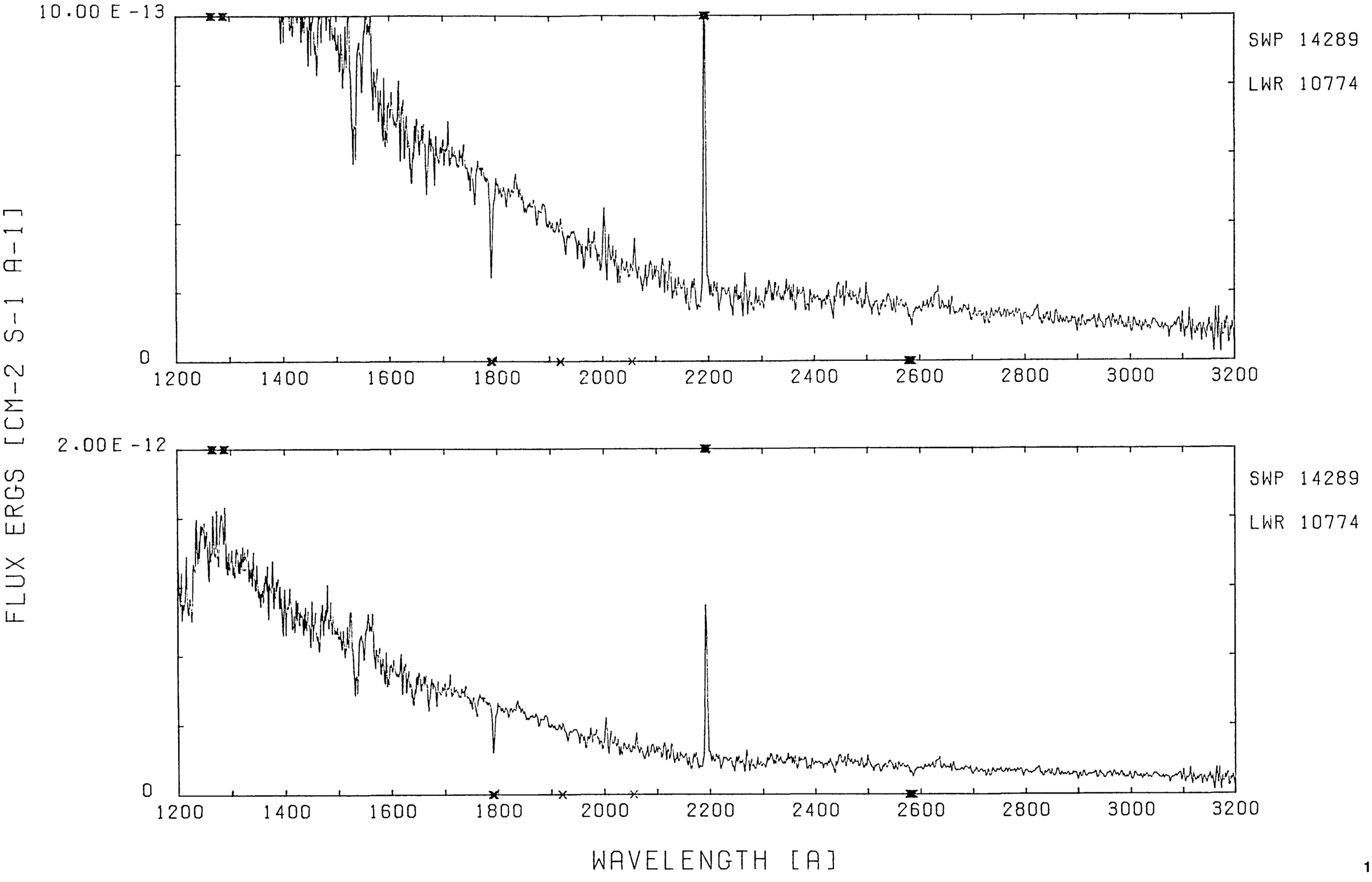
3200
WAVELENGTH [A]

NGC 7094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1400
1600
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2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
2.00E -12
0
SWP 14289
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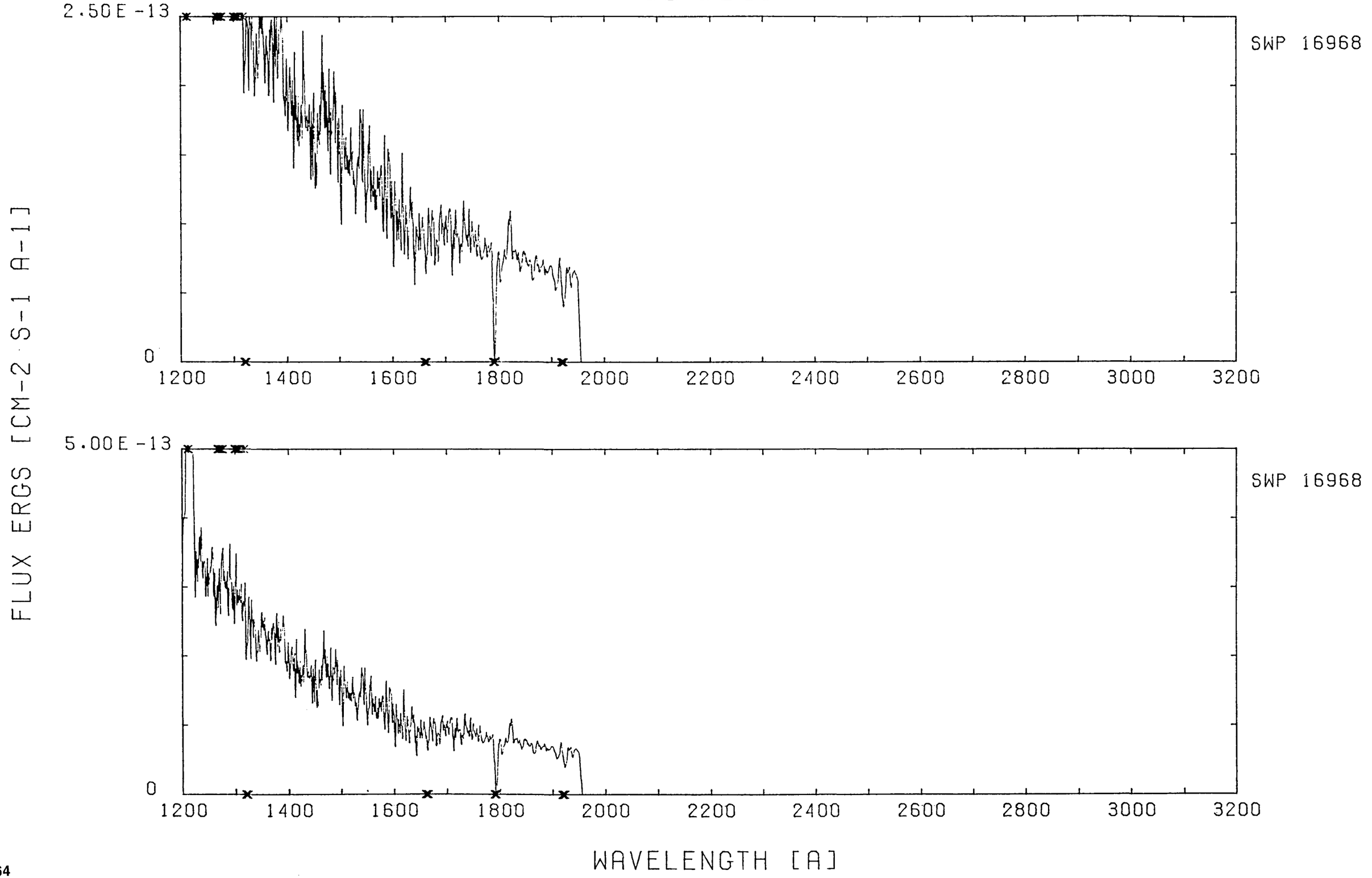
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

IC 5148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SWP 16968
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1400
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2400
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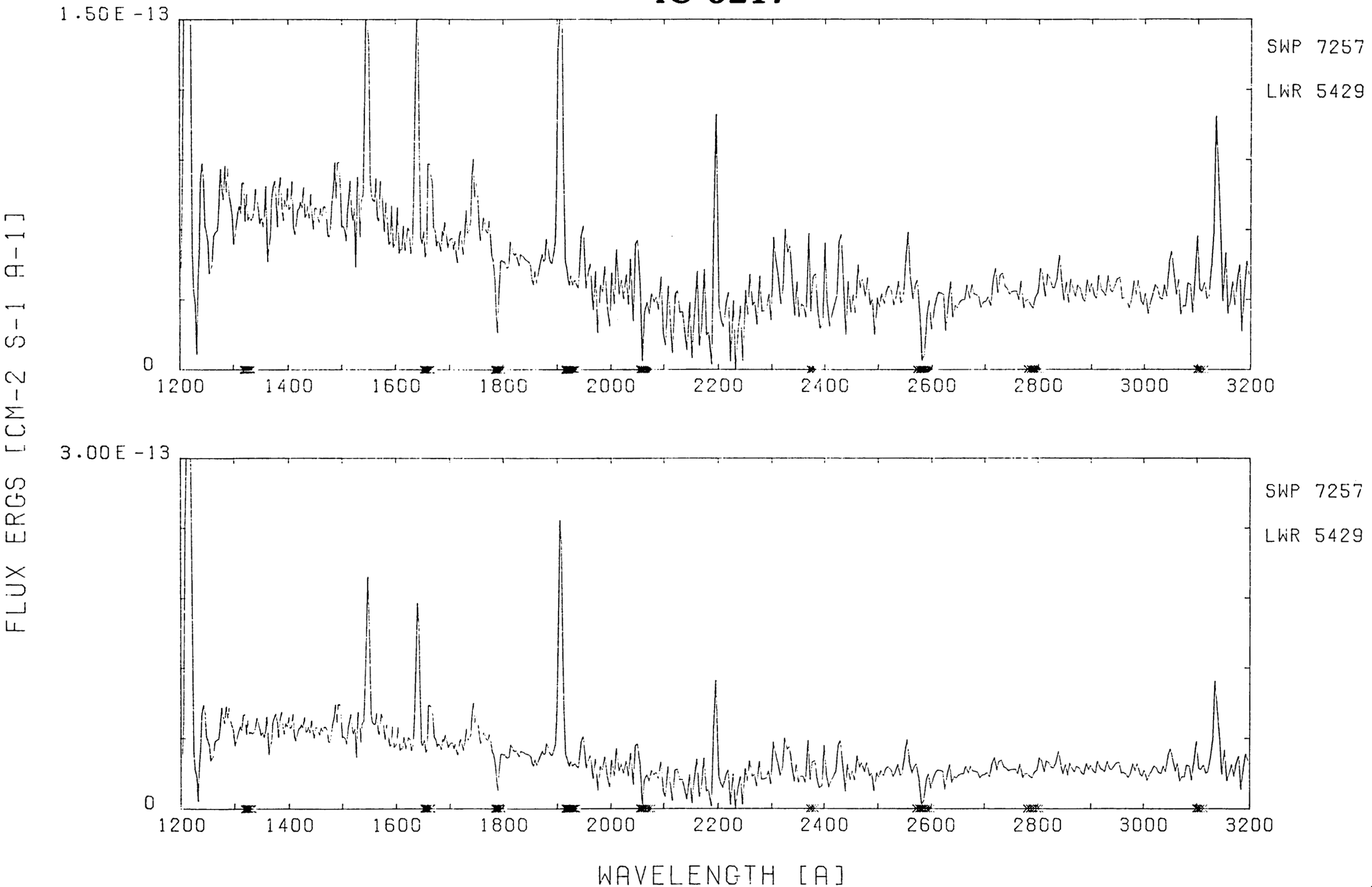
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

IC 5217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1400
1600
1800
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2200
2400
2600
2800
3000
3200
SWP 7257
LWR 5429
FLUX ERGS CM-2 S-1 A-1]
3.00E-13
0
1200
1400
1600
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2200
2400
2600
2800
3000
3200
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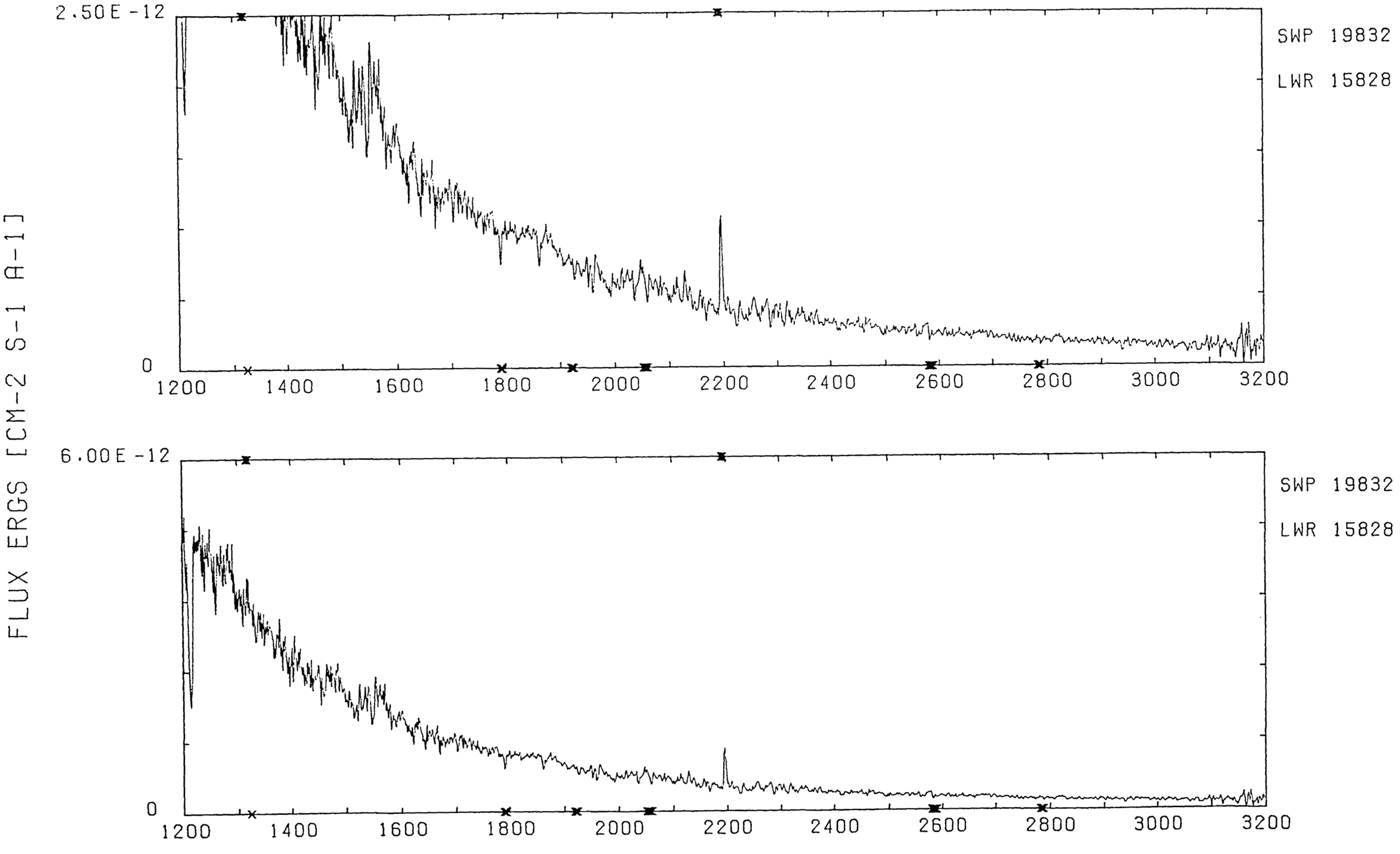
LWR 5429
WAVELENGTH [A]

NGC 7293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1600
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2200
2400
2600
2800
3000
3200
FLUX ERGS [CM-2 S-1 A-1]
6.00E-12
0
SWP 19832
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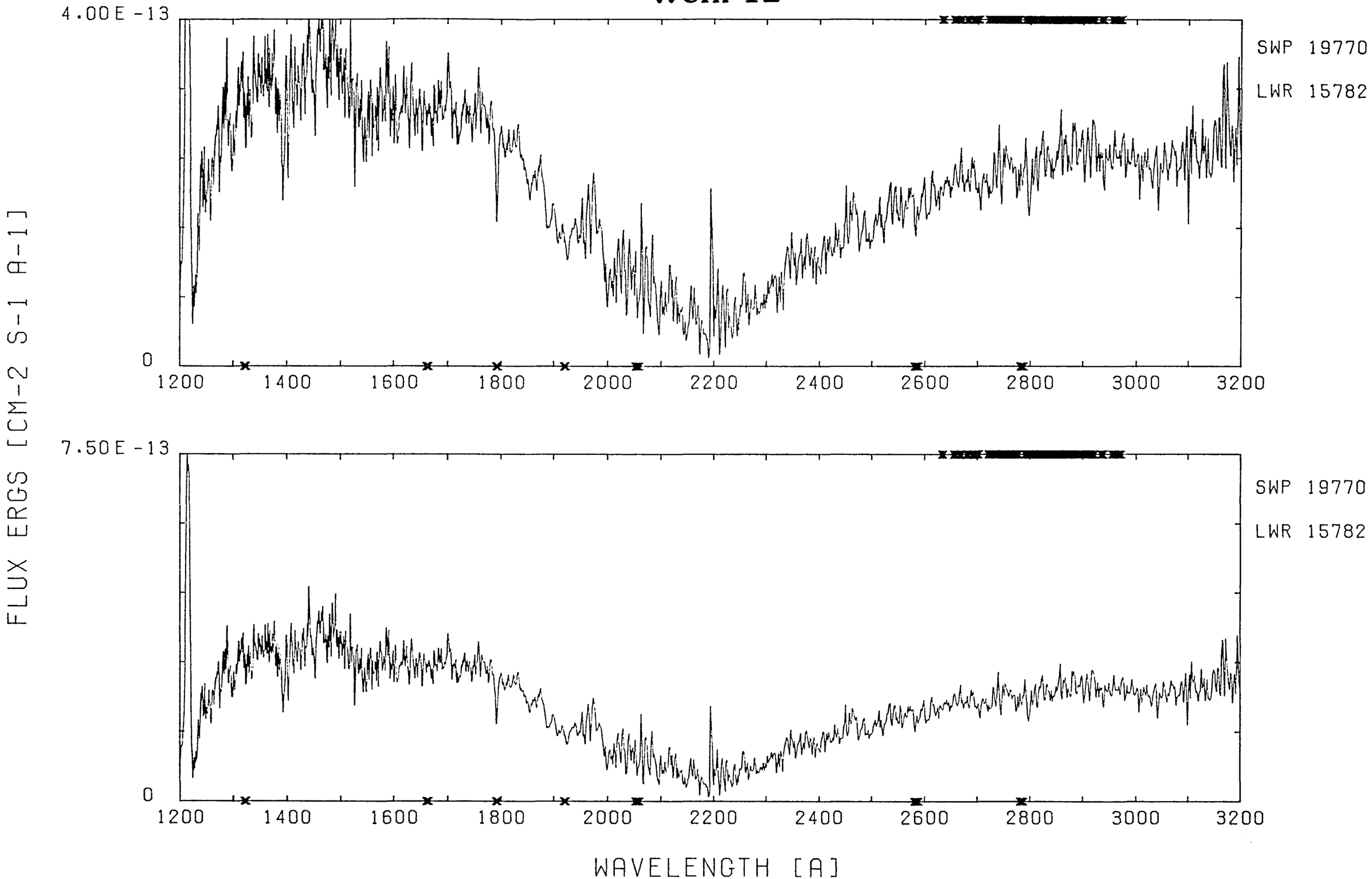
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

Wein-12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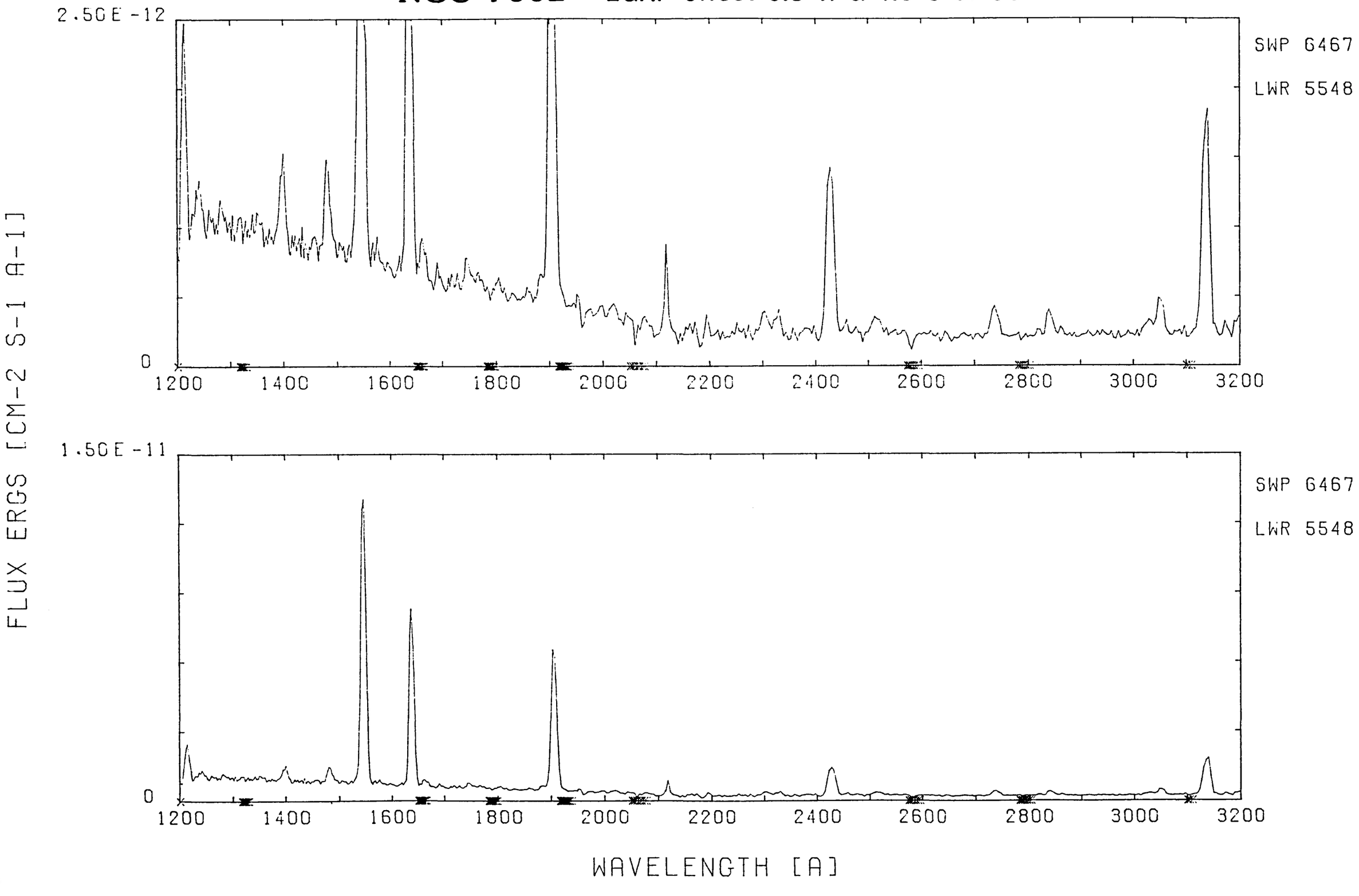
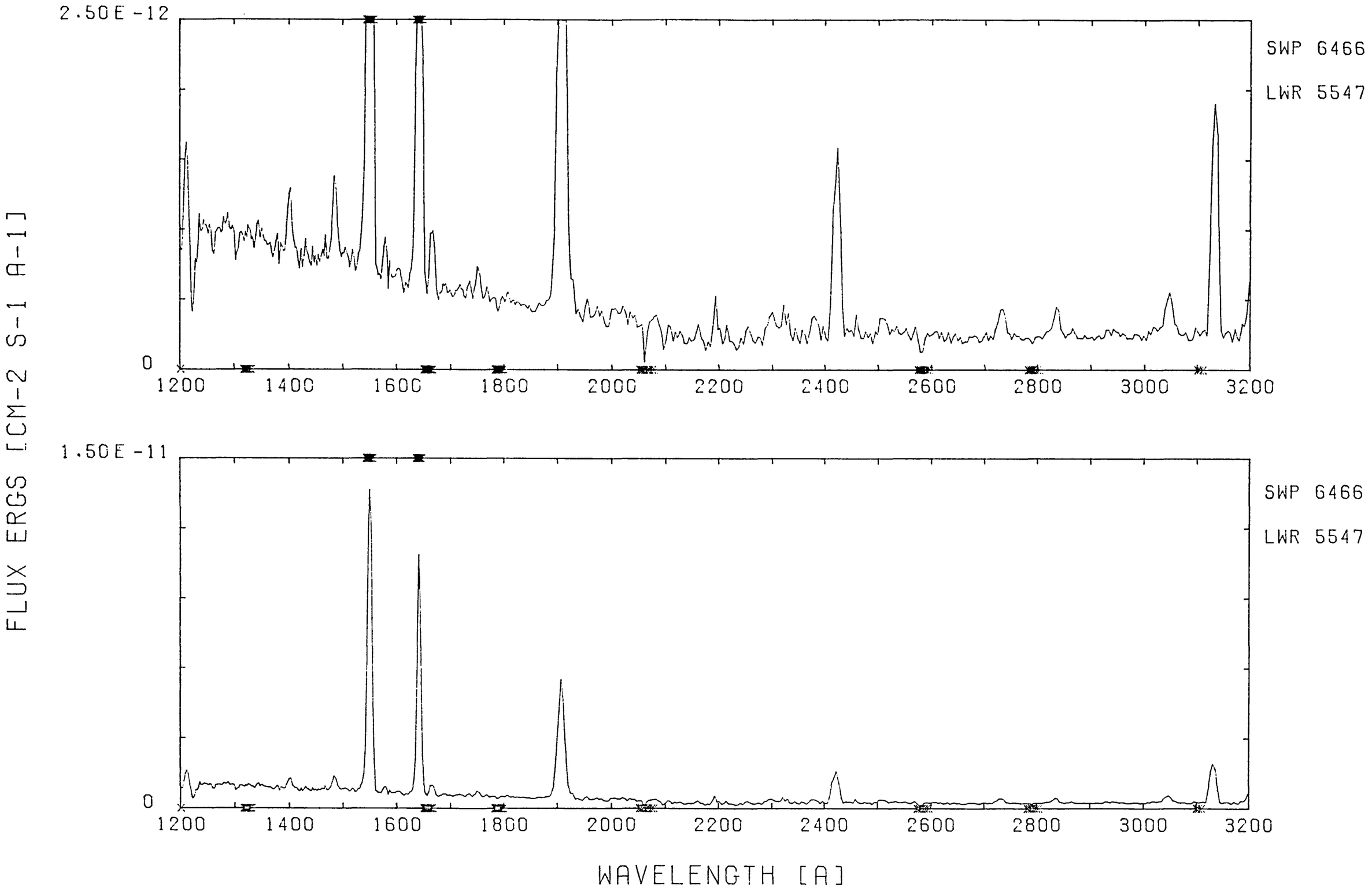
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 19770
LWR 15782
FLUX ERGS [CM-2 S-1 A-1]
7.50E-13
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
SWP 19770
LWR 15782
WAVELENGTH [A]

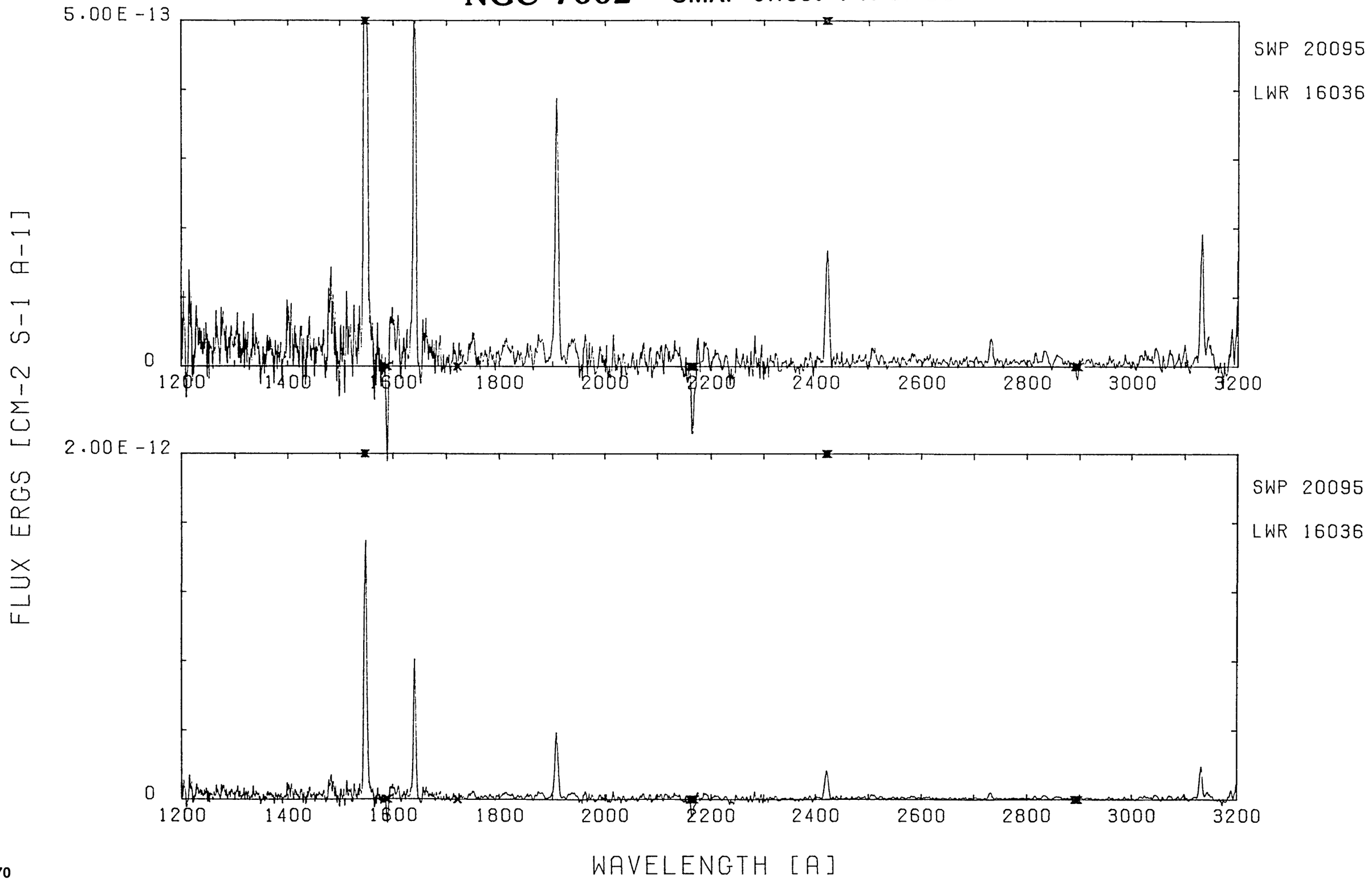
NGC 7662 - LGAP offset 6.8″W & 1.5″S of CS



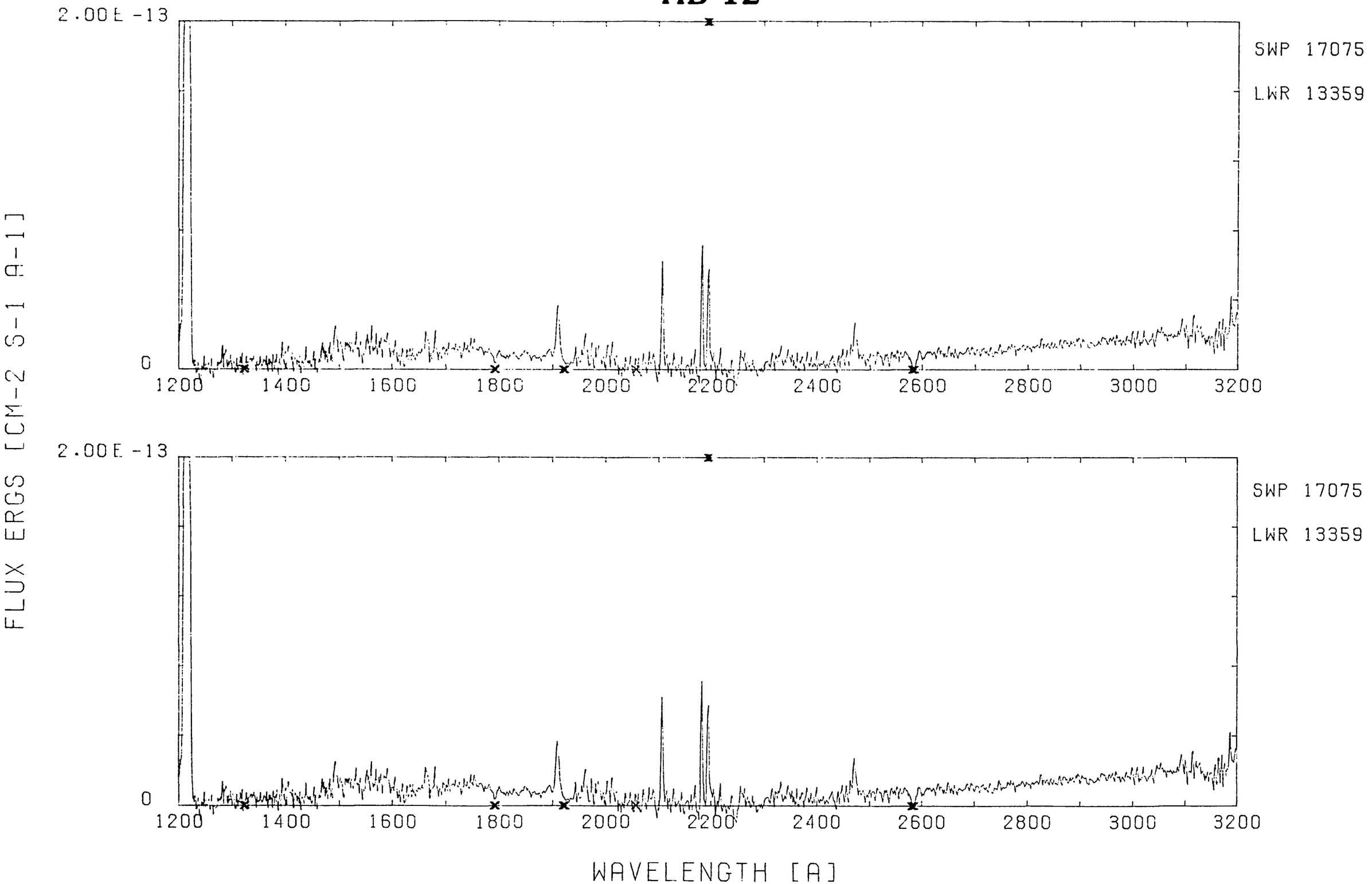
NGC 7662 - LGAP offset 6.9″E & 1″N of CS



NGC 7662 - SMAP offset 4″N of CS



HB-12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1400
1600
1800
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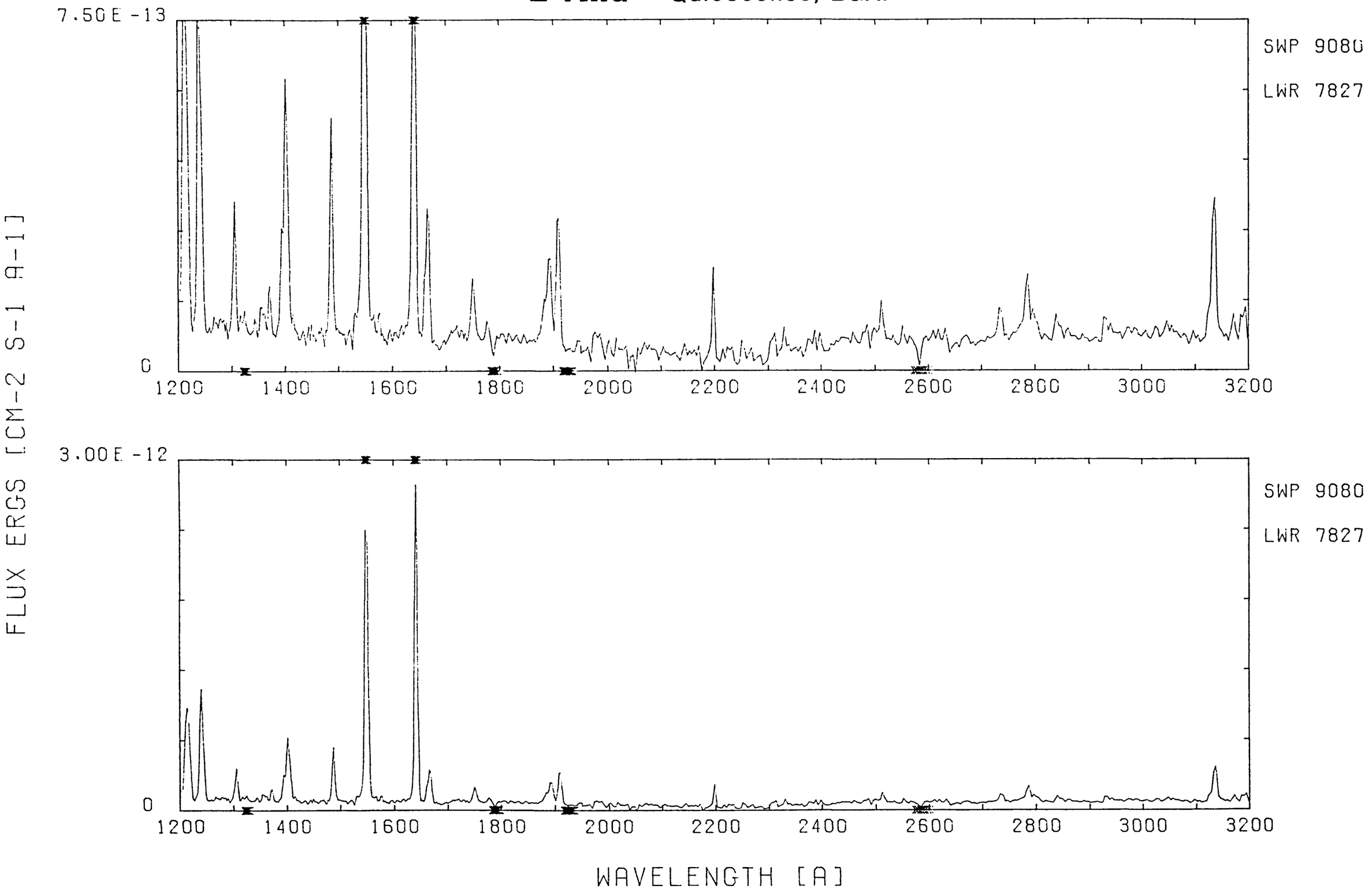
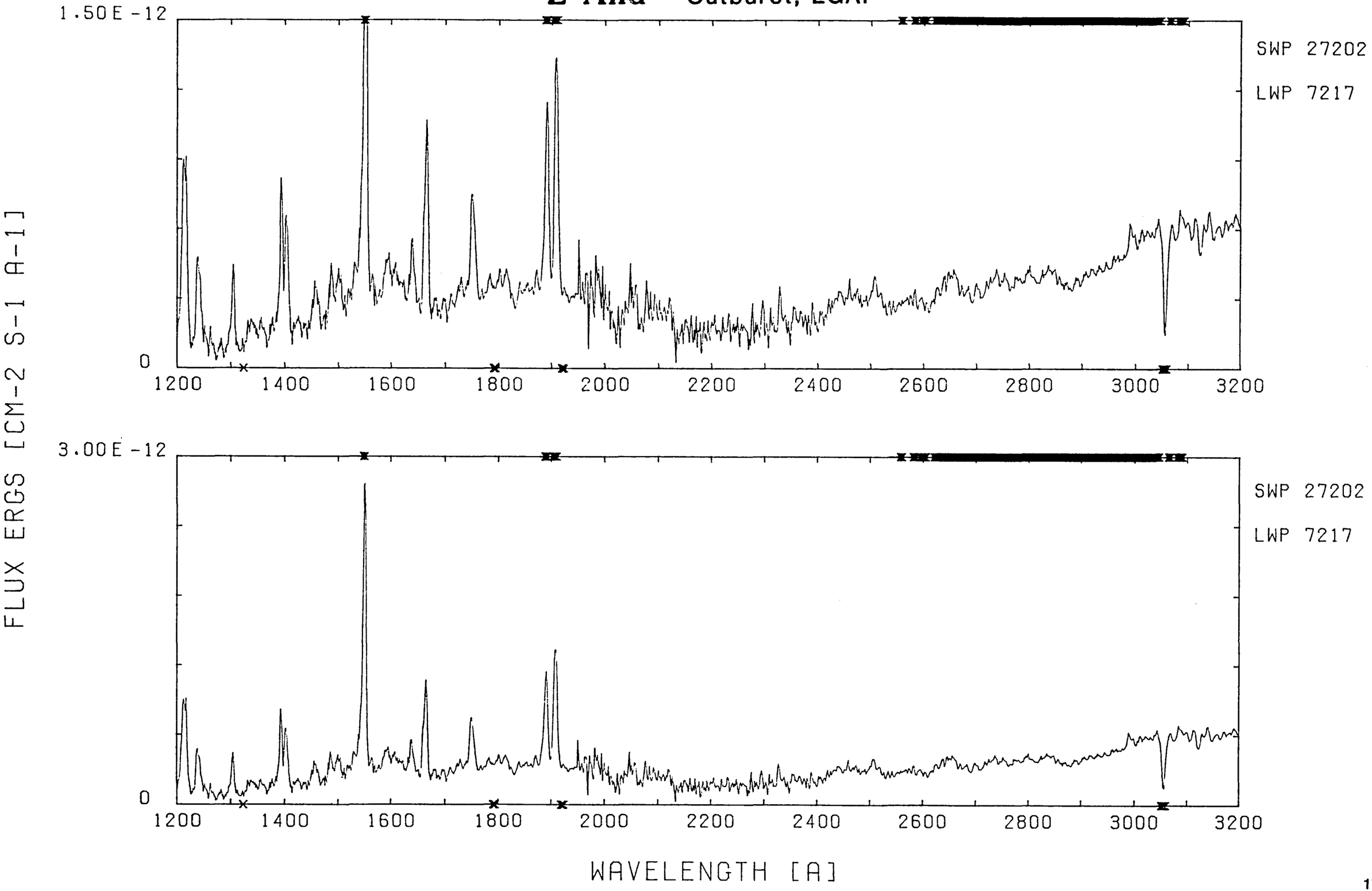
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
WAVELENGTH [A]

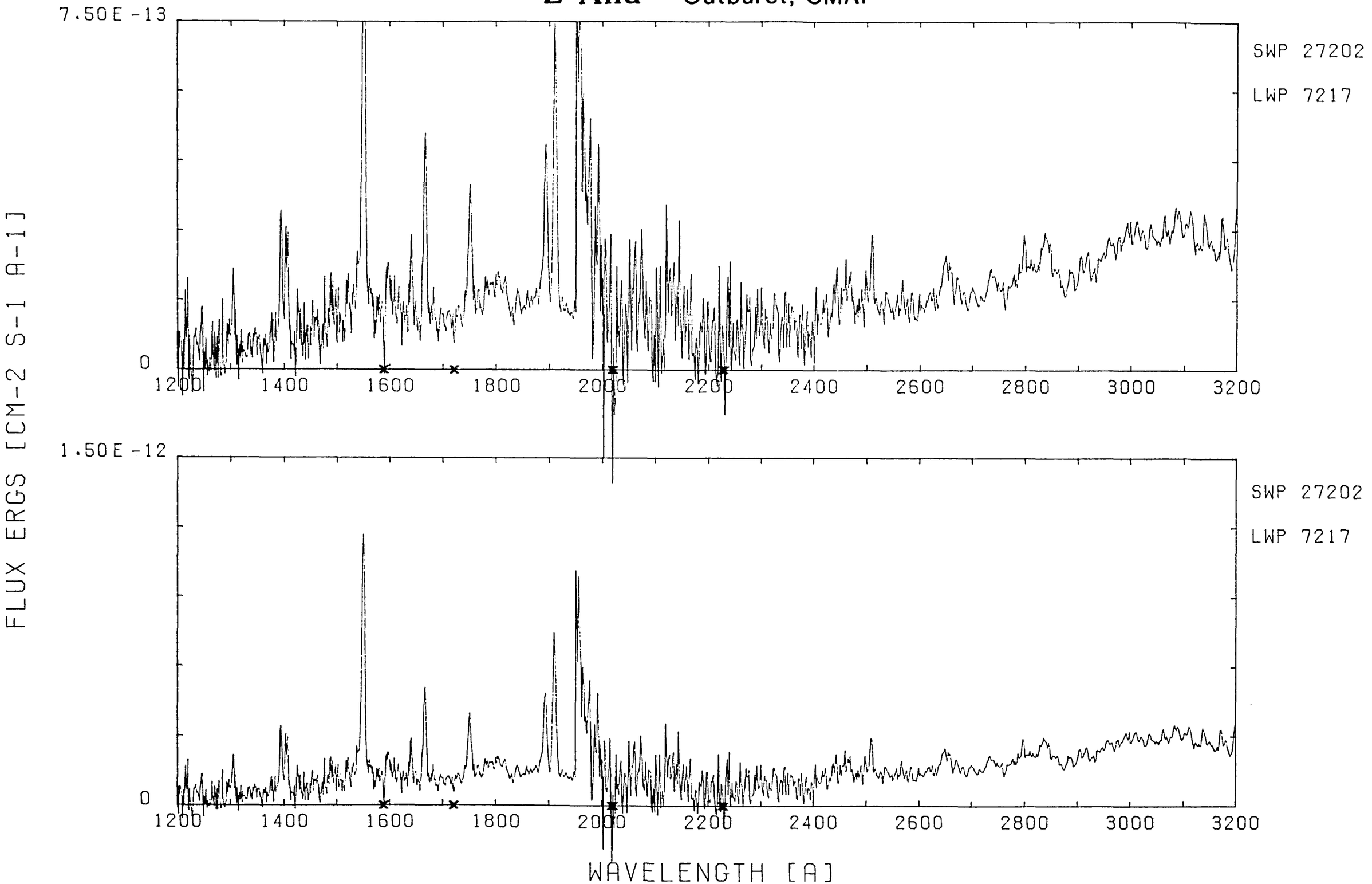
Z And - Quiescence, LGAP



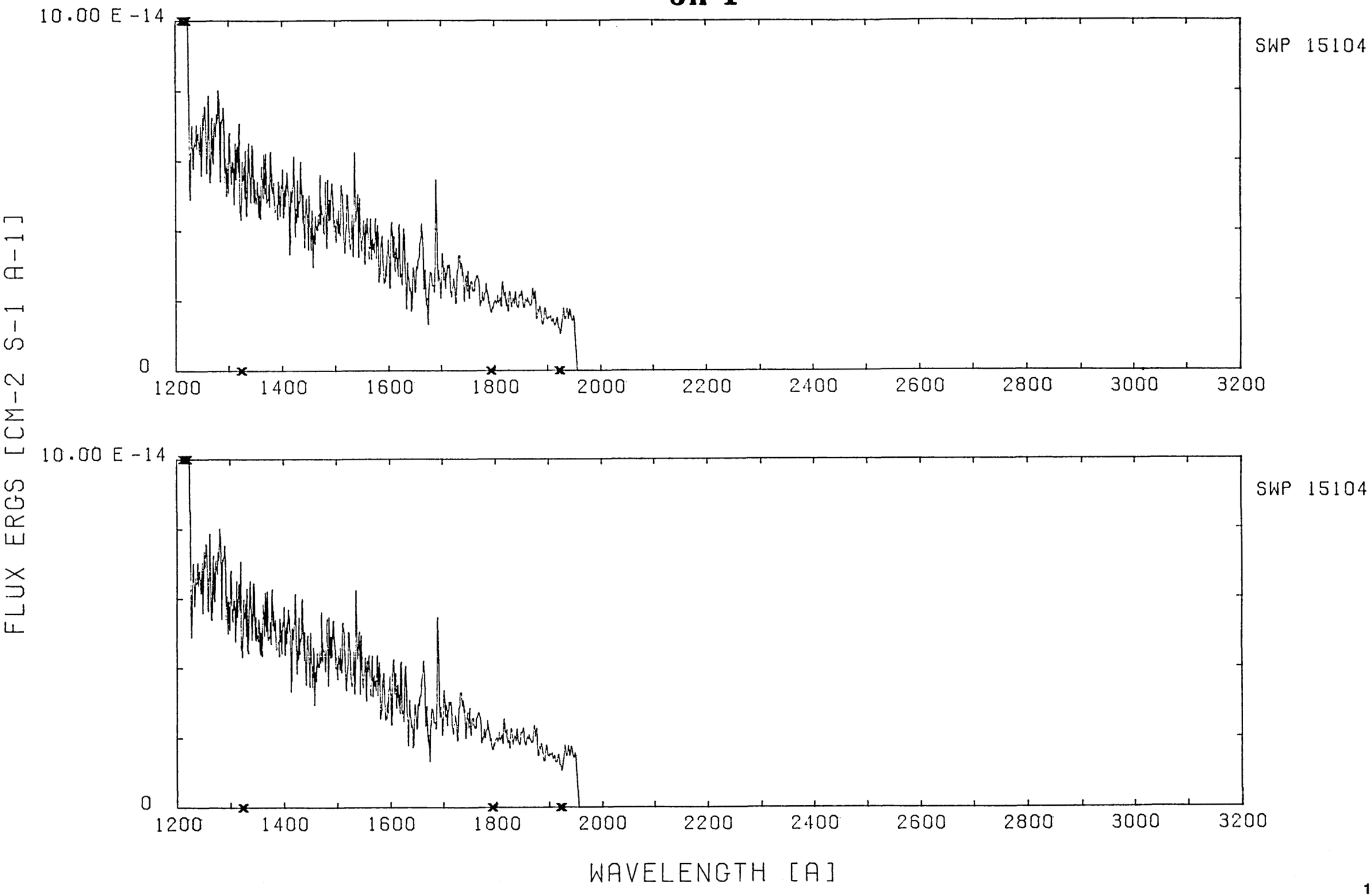
Z And - Outburst, LGAP



Z And - Outburst, SMAP



Jn-1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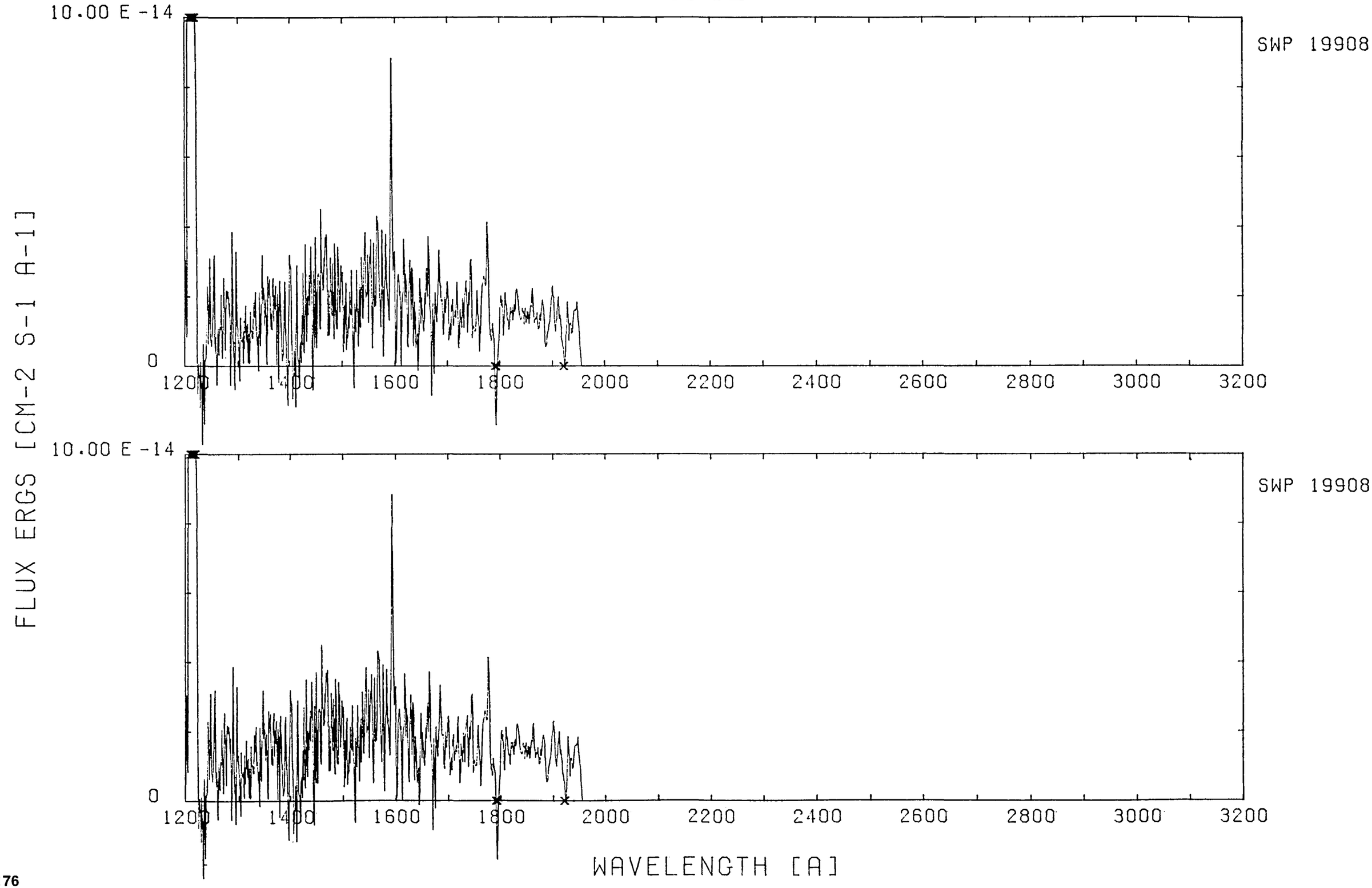
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
FLUX ERGS CM-2 S-1 A-1]
10.00 E -14
0
SWP 15104
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
WAVELENGTH [A]

A-82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1200
1400
1600
1800
2000
2200
2400
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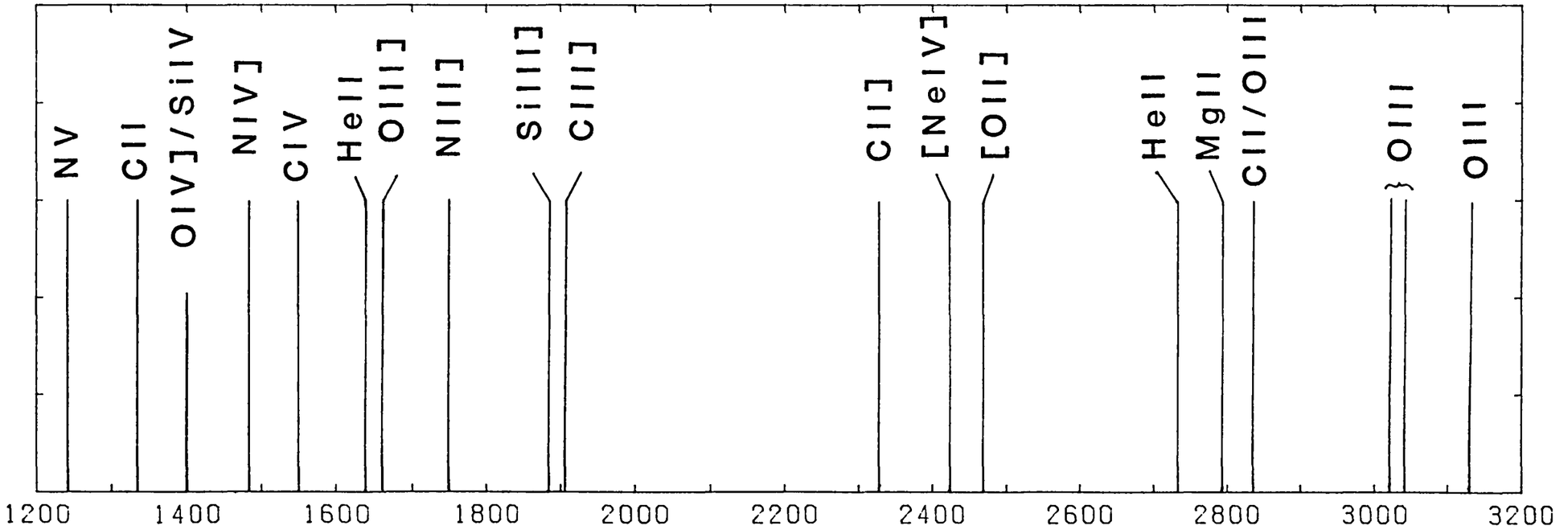
FLUX ERGS [CM-2 S-1 A-1]
WAVELENGTH [A]

Emission Line Wavelength Identifications



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16. Abstract

The IUE archives contain a wealth of information on high quality ultraviolet spectra of approximately 180 planetary nebulae, central stars, and related objects. We selected representative low-dispersion IUE spectra in the range 1200-3200 Å for 177 objects arranged by right ascension for this atlas. For most entries, the combined SWP (1200-1900) and LWR (or LWP, 1900-3200 Å) regions are shown on 30-cm by 10-cm Calcomp plots on a uniform scale to facilitate intercomparison of the spectra. Each calibrated spectrum is also shown on an expanded vertical scale to bring out some of the weaker features.

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