

RECORDS OF RADIO AURORA AT SYOWA STATION, ANTARCTICA IN 1996

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1. Introduction

This report presents a summary of data obtained in the period of 1996 with the auroral radar at Syowa Station, Antarctica.

Two kinds of data are available: a) chart records of the time variation of echo intensity and b) digital records of echo intensity and Doppler velocity.

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2. Location

Syowa Station			
Geographic		Geomagnetic	
Latitude (Deg.)	Longitude (Deg.)	Latitude (Deg.)	Longitude (Deg.)
69.00 S	39.58 E	-70.13	82.04

3. Observers

Isamu YUMISASHI (Communications Research Laboratory)

4. Equipment

The main parameters of the auroral radar at Syowa Station are shown in Table 1 (Igarashi *et al.*, 1996). In 1995 a new scanning-beam VHF auroral radar (50 MHz) was installed at Syowa Station. Five transmitting antennas, each having an azimuthal beam width of about 30 degrees, cover a wide area of about 160 degrees in azimuth.

The outputs from four 5 kW solid-state power amplifiers are combined so that finally 20 kW peak power is available. Five Yagi antennas are switched, depending on the covered region of transmitting beam pattern. The receiving beam direction is scanned in 5 degree step by using two sets of array antennas with beam width of about five degree. The beam direction and observation region can be varied from one observed object to another. A plasma convection pattern is available every several minutes. Another auroral radar is operated at the frequency 112 MHz and antenna beam direction is fixed to the geomagnetic south. The specification of this radar is shown in the reference paper (Igarashi *et al.*, 1982).

Table 1. Specifications of the 50 MHz VHF auroral radar at Syowa Station

Site	Syowa Station (69°00' S, 39°35' E)
Type	Coherent pulse radar
Frequency	50.0 MHz
Peak power	20 kW
Pulse width	100 μ s (typical)
Pulse repetition frequency	50 Hz
Transmitting pulse pattern	Double pulse
Transmitting antenna	5 sets of 8 element Yagi antenna
Receiving antenna	Two sets of sixteen Yagi array antenna
Receiving beam width	5 degrees
Receiver bandwidth	10 kHz (typical)
Beam cover region	± 80 degrees in azimuth (directed toward geomagnetic south)
Signal processing	Intel 386 (16 MHz) class PC with DPS board
Data recording	Digital recording with 3.5 inch MO, and chart recording of echo intensity

5. Explanation of Diagrams

An example of typical scanned echo power plots is also presented to show an observation region of the scanning-beam VHF auroral radar. RTI (Range Time Intensity) plots along the beam directed to 45 degree and 135 degree are shown as a summary of observation. Echo intensity is recorded with 12 bit A/D converter. Gray scale shows the backscattered echo power in dB.

Reference

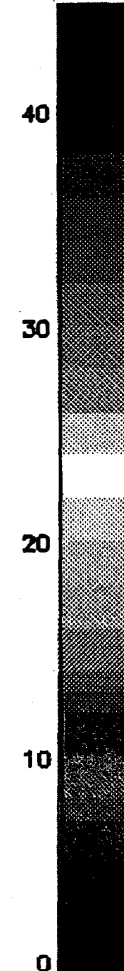
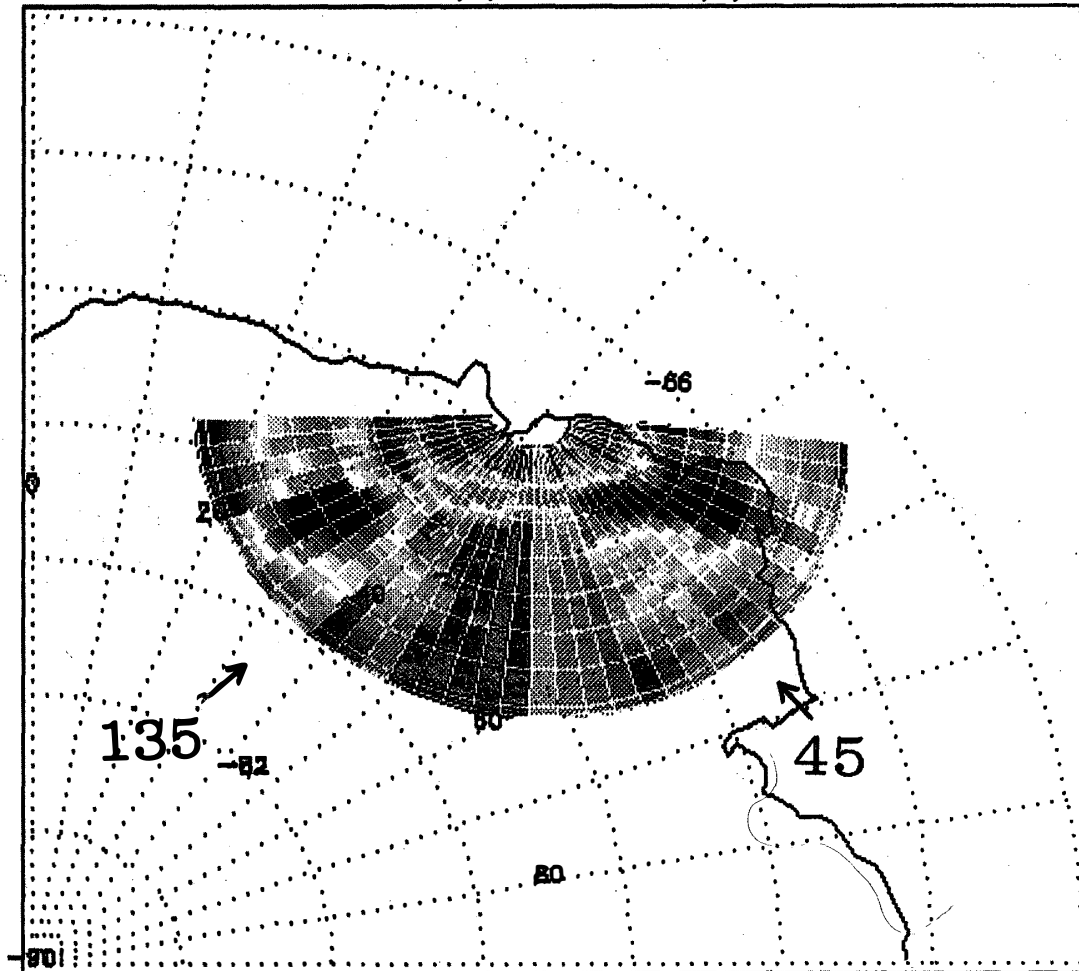
Igarashi, K., Ogawa, T., Ose, M., Fujii R. and T. Hirasawa (1982): A new VHF Doppler radar experiment at Syowa Station, Antarctica. Mem. Natl Inst. Polar Res., Spec. Issue, 22, 258-267.

Igarashi, K., Ohtaka, K., Kunitake, M., Tanaka, T. and Ogawa T. (1995): Development of scanning-beam VHF auroral radar system (Extended Abstract), Proc. NIPR Symp. Upper Atmos. Phys., 8, 65-69.

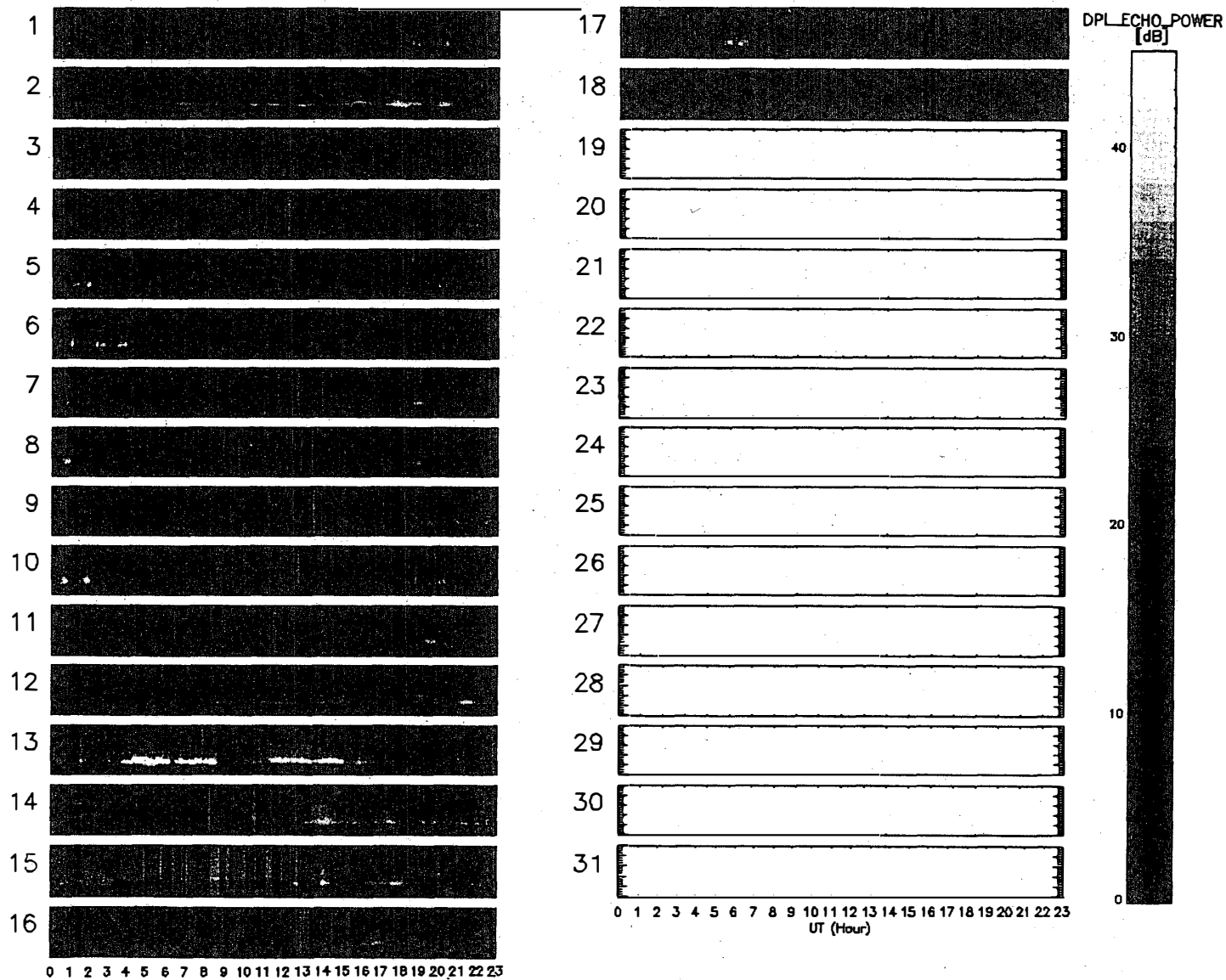
Bibliography relevant to RECORDS OF RADIO AURORA AT SYOWA STATION, ANTARCTICA

Observing Period	Observers	Literature		
		JARE Data Reports		
		Volume	Pages	Year
Mar.1966 - Jan.1968	Ose, M. Hasegawa, S. Takeuchi, T. Nishimuta, I. Isobe, T.	5 (Ionosphere 2)	64	1969
Apr.1970 - Feb.1971	Shiro, I. Sakamoto, T.	15 (Ionosphere 6)	34	1972
Feb.1972 - Dec.1972	Isozaki, S. Miyazaki, S.	23 (Ionosphere 10)	22	1974
Feb.1973 - Jan.1974	Nishimuta, I. Yabuuma, H.	26 (Ionosphere 12)	23	1975
Mar.1974 - Dec.1974	Shiro, I. Yamazaki, I.	33 (Ionosphere 14)	89	1976
1975	Shiro, I. Sugiuchi, H. Komiya, N.	37 (Ionosphere 16)	105	1977
1976	Shiro, I. Yamakoshi, A. Sasaki, T.	42 (Ionosphere 18)	105	1978
Apr.1978 - Dec.1978	Igarashi, K. Tsuzurahara, S.	53 (Ionosphere 21)	23	1980
Jan.1979 - Dec.1979	Igarashi, K. Ojima, S. Komiya, N.	58 (Ionosphere 23)	28	1980
1980	Igarashi, K. Nozaki, K.	68 (Ionosphere 24)	28	1982
1981	Ose, M. Kurihara, N.	81 (Ionosphere 28)	28	1983
1982	Igarashi, K. Kuratani, Y.	88 (Ionosphere 30)	28	1984
1983	Igarashi, K. Tanaka, T. Yamazaki, I.	100 (Ionosphere 32)	64	1985
1984	Igarashi, K. Tanaka, T. Yamamoto, S.	113 (Ionosphere 34)	33	1986
1985	Igarashi, K. Maeno, H. Ogawa, T.	123 (Ionosphere 36)	56	1987
1986	Igarashi, K. Maeno, H. Suzuki, A.	134 (Ionosphere 38)	59	1988
1987	Maeno, H. Inamori, K.	146 (Ionosphere 40)	33	1989
1988	Maeno, H. Ohtsuka, A.	154 (Ionosphere 41)	34	1990
1989	Maeno, H. Yamamoto, S.	167 (Ionosphere 43)	42	1991
1990	Ohtaka, K. Igarashi, K.	175 (Ionosphere 46)	34	1992
1991	Nozaki, K. Igarashi, K.	188 (Ionosphere 48)	25	1993
1992	Kamata, M. Igarashi, K.	195 (Ionosphere 51)	151	1994
1993, 1994	Yamaguchi, T. Iwasaki, K. Igarashi, K.	220 (Ionosphere 57)	18	1997
1995, 1996	Inamori, K. Ohtaka, K. Igarashi, K.	227 (Ionosphere 59)	27	1997

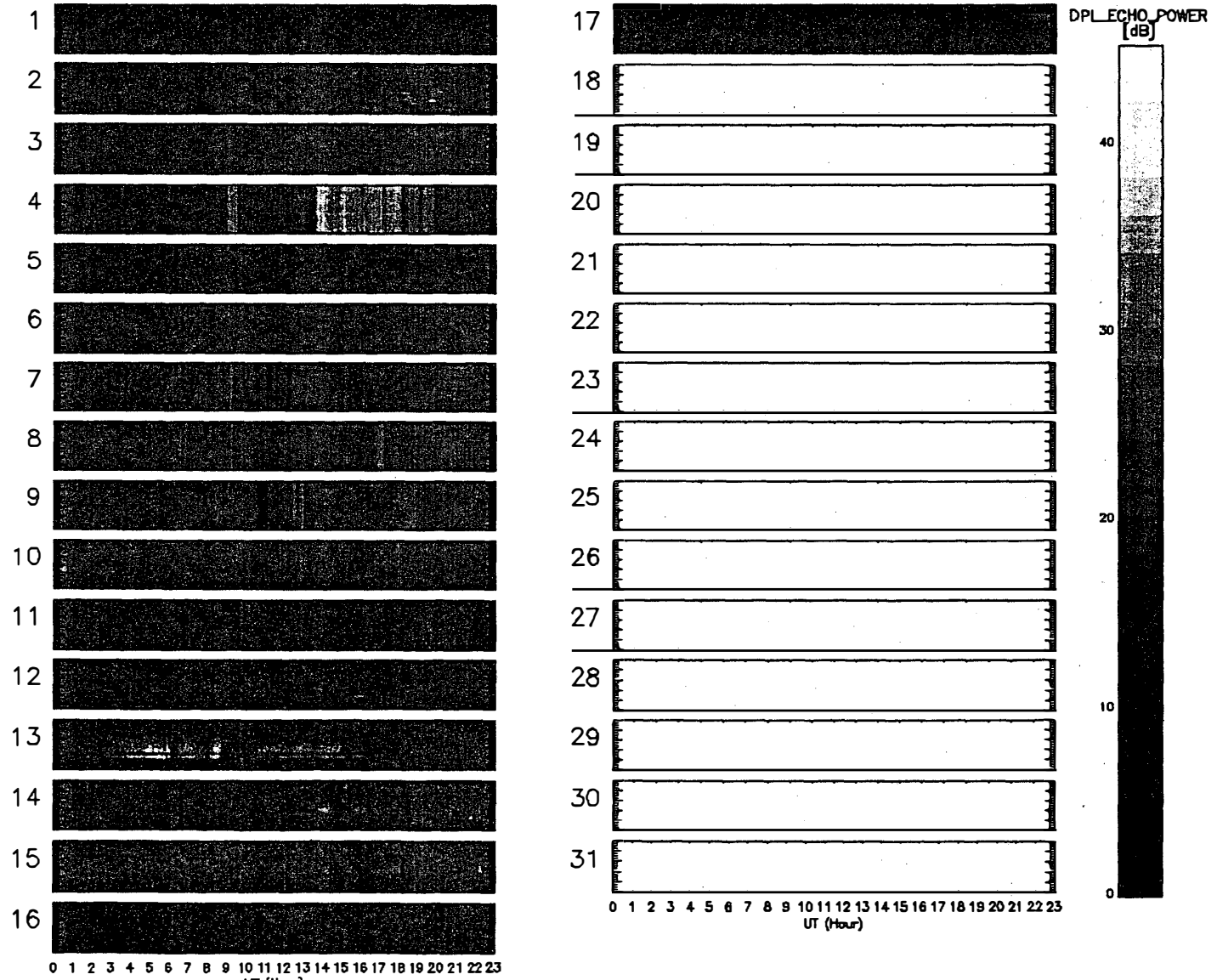
VHF AURORA RADAR
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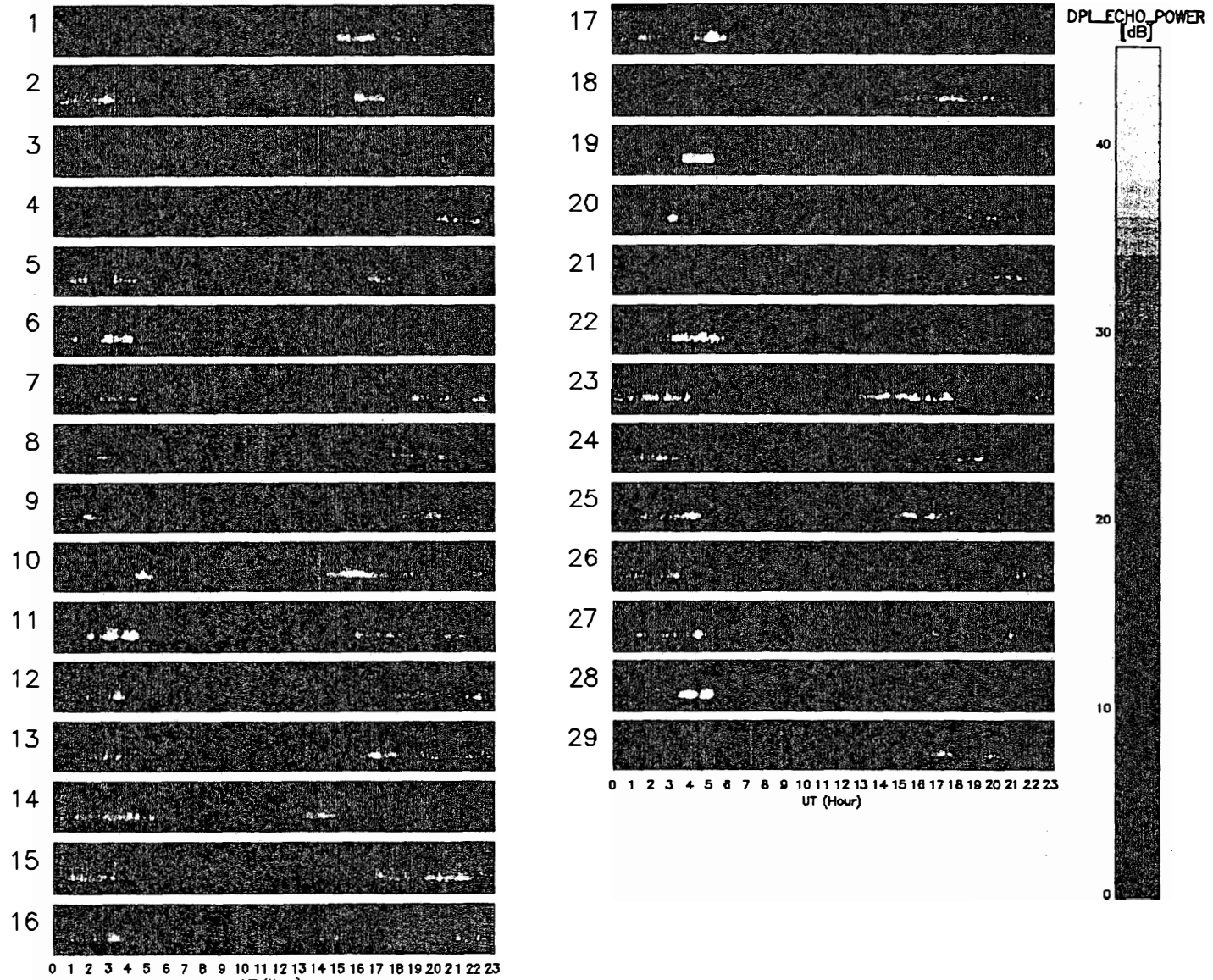
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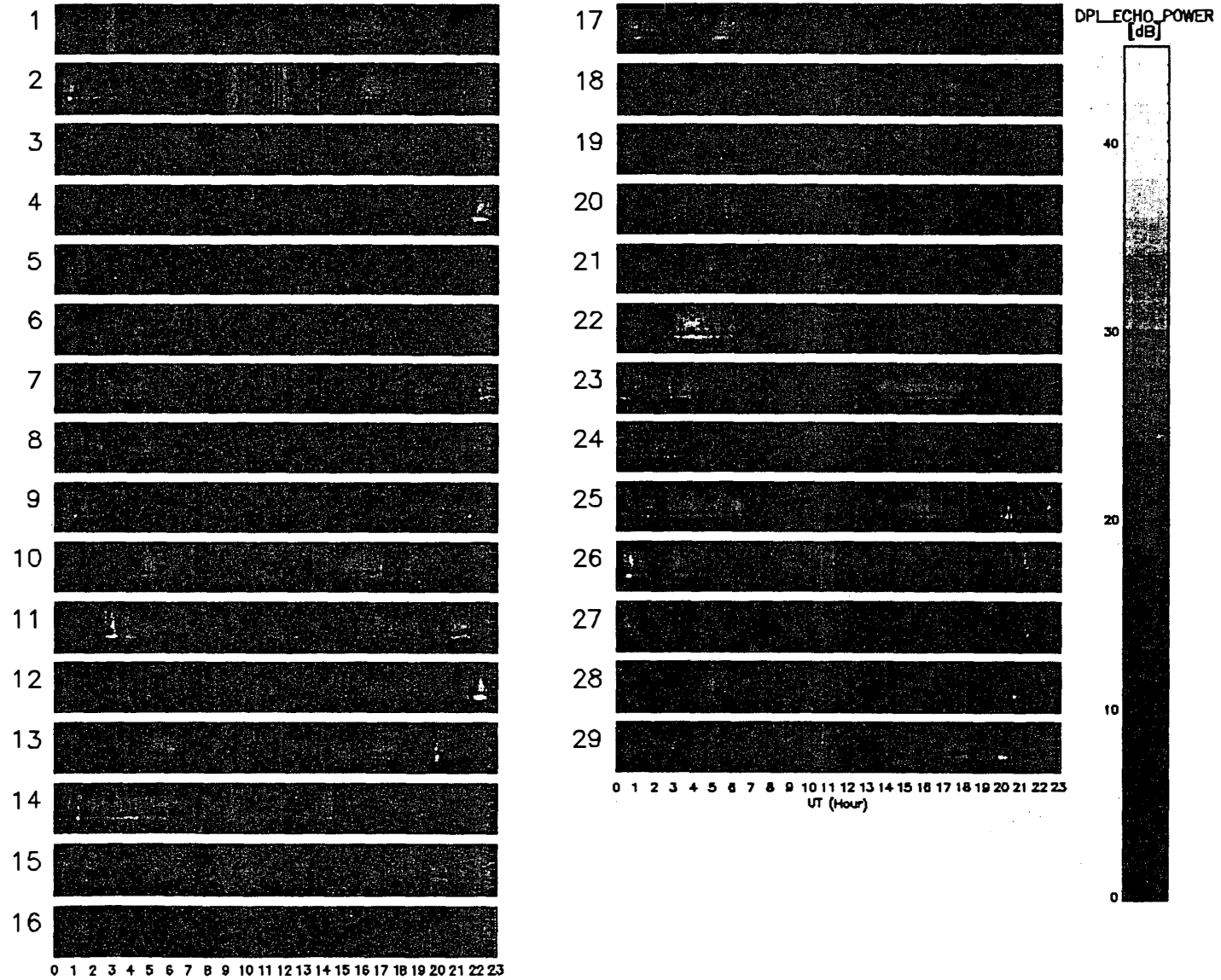
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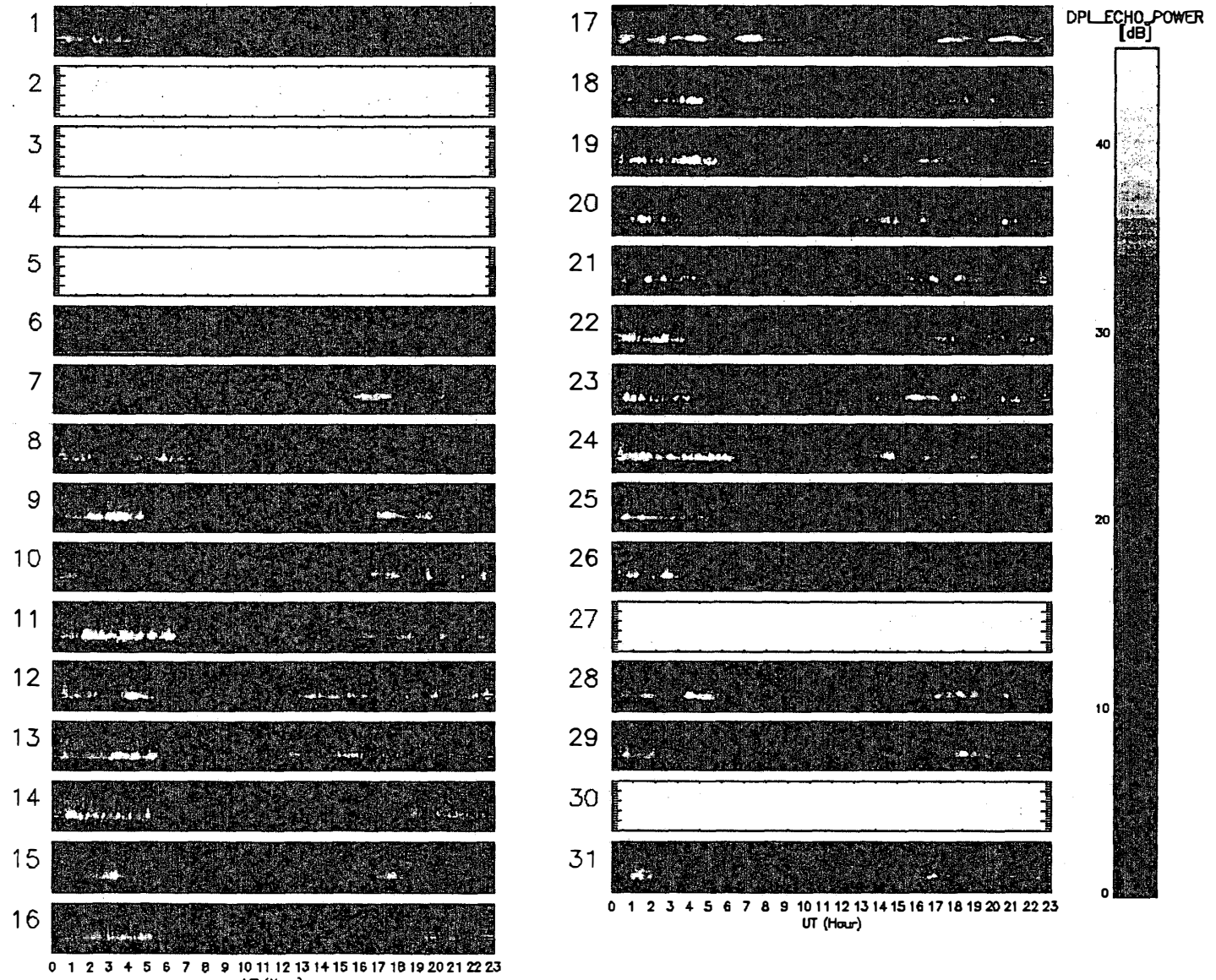
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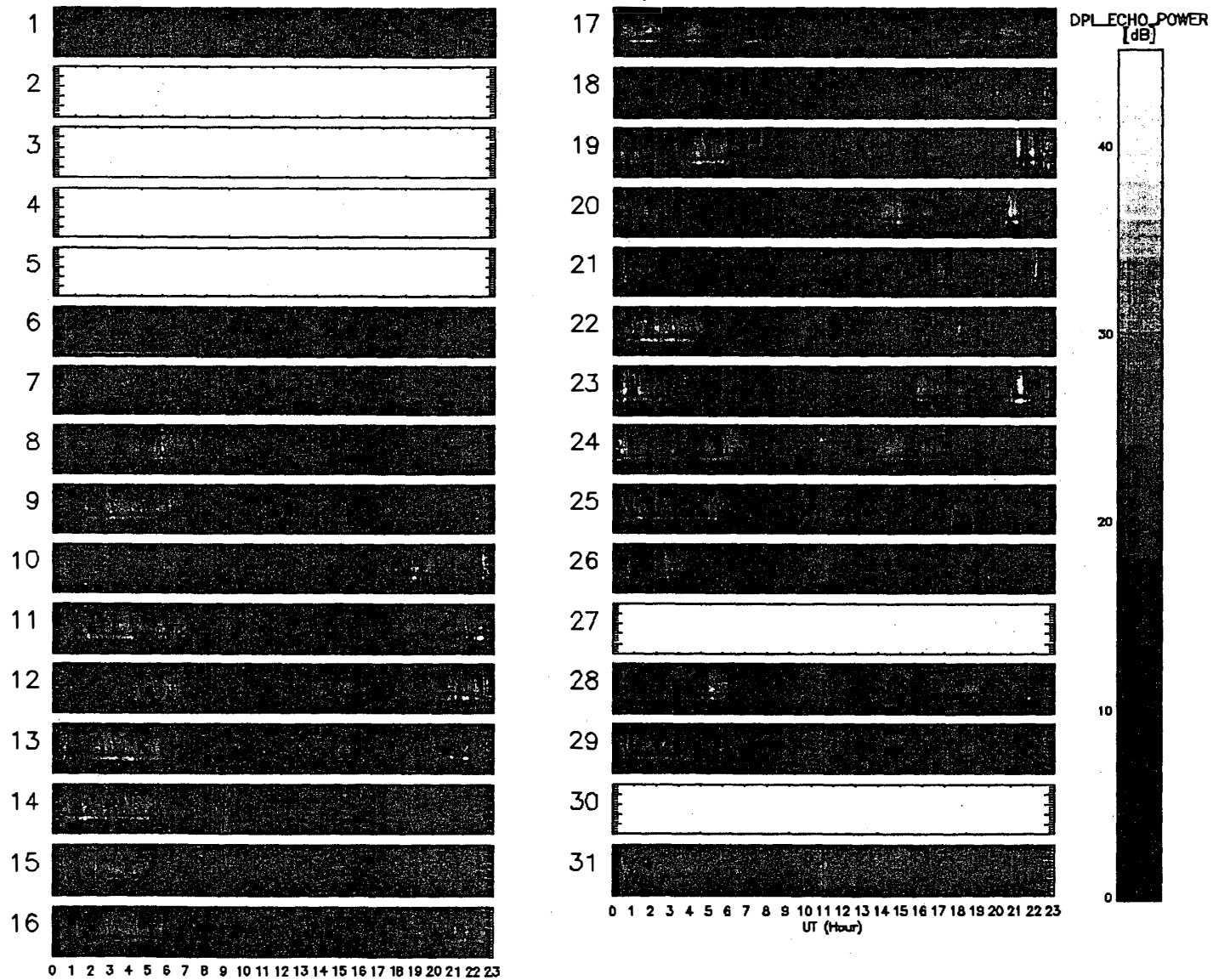
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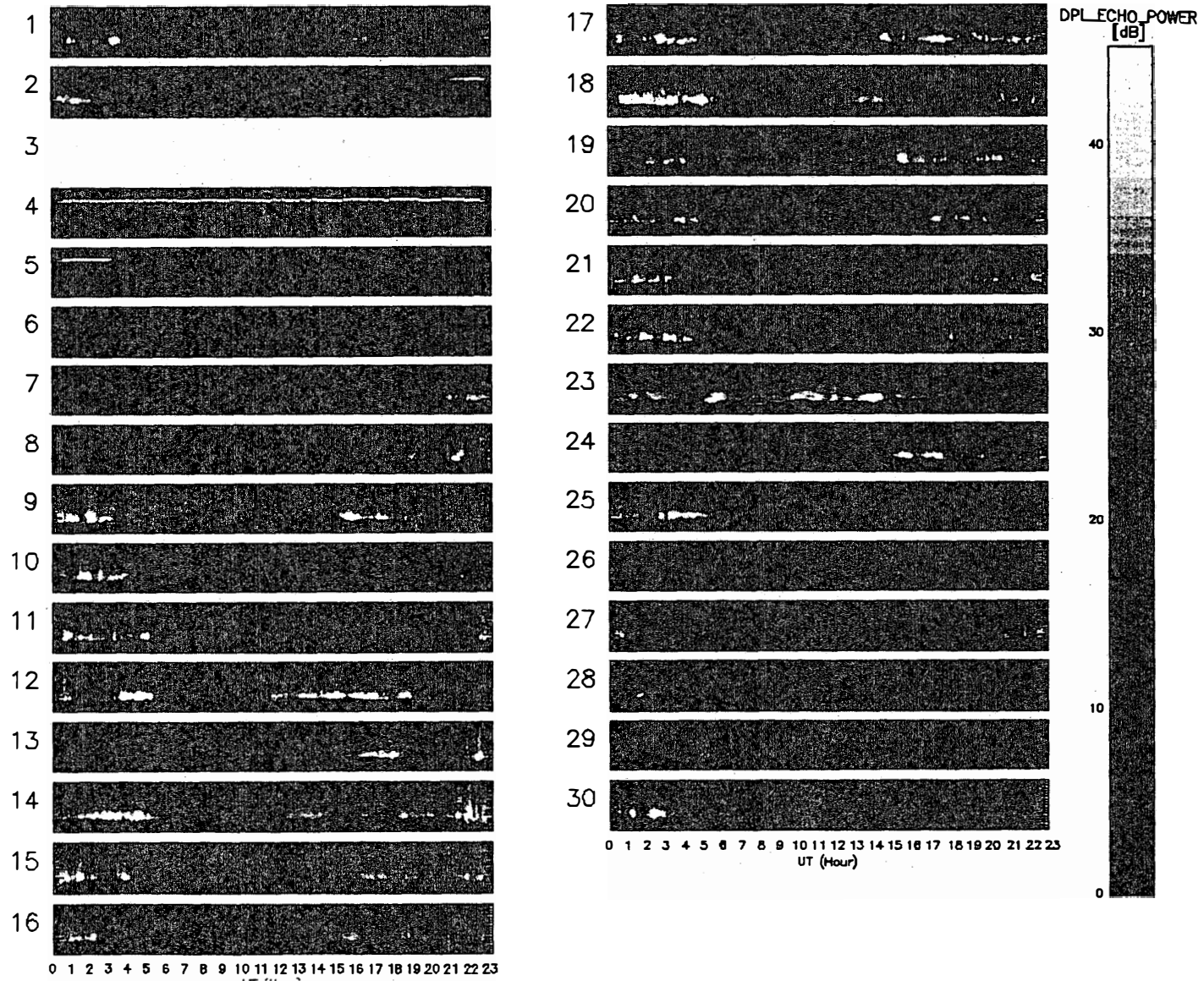
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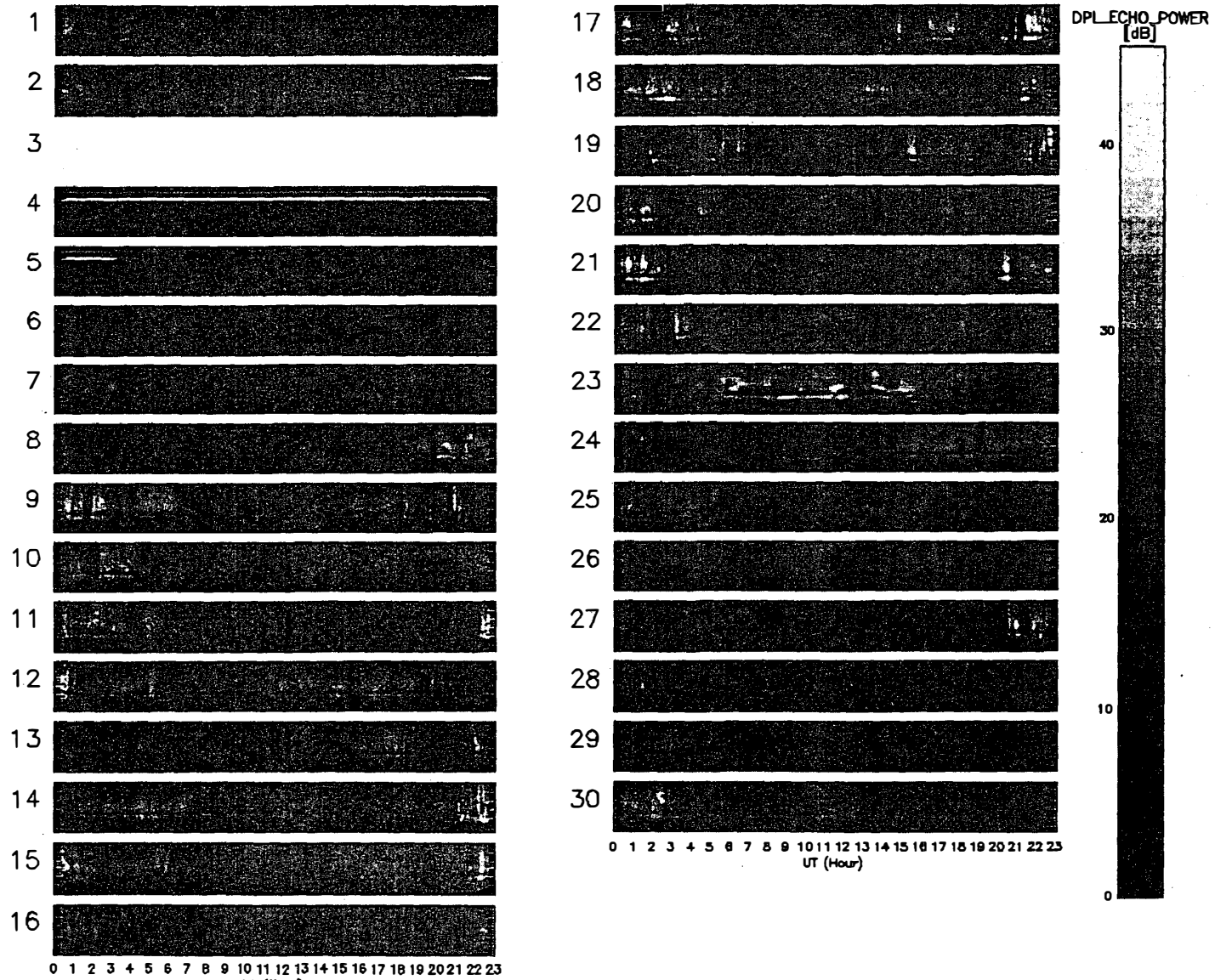
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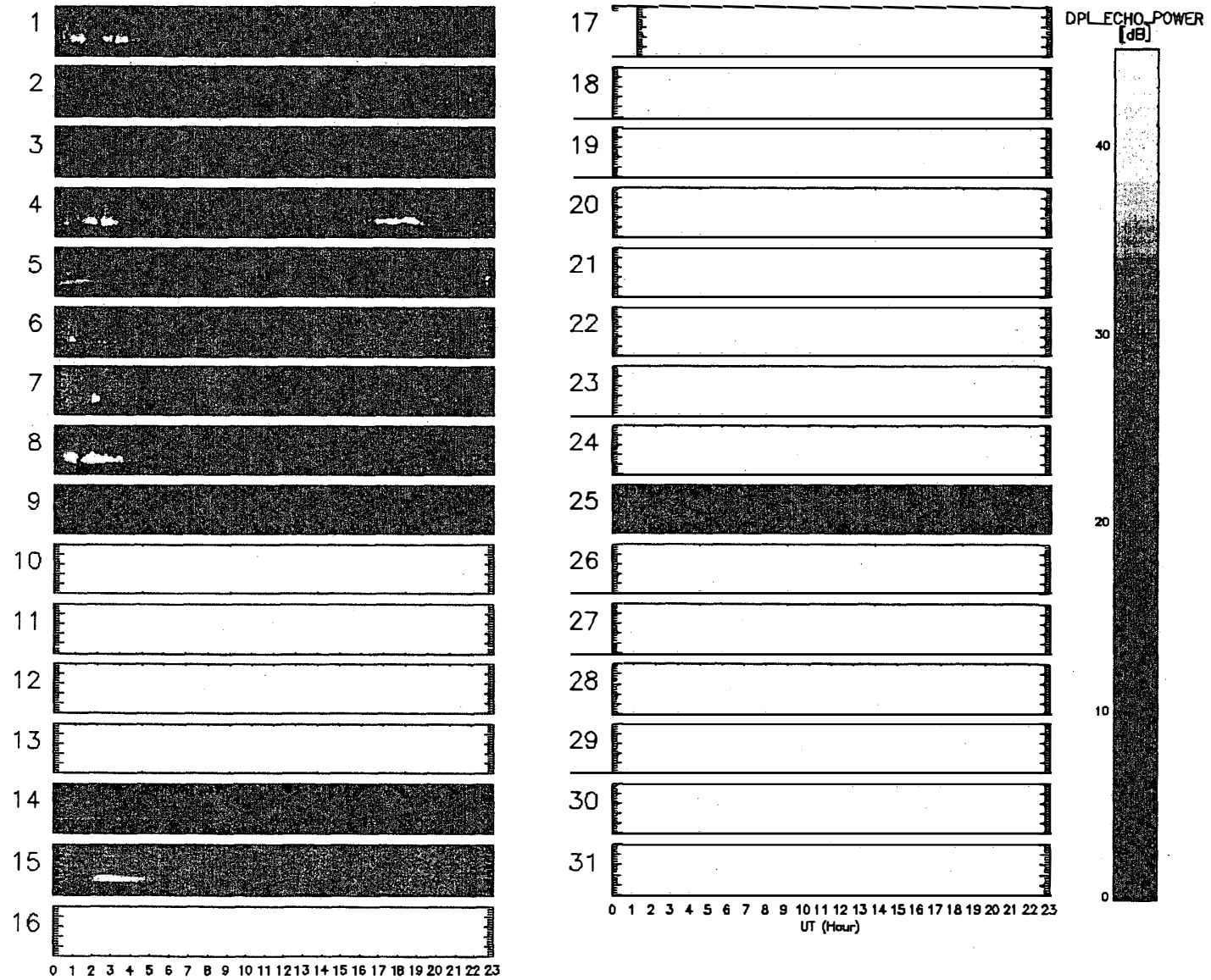
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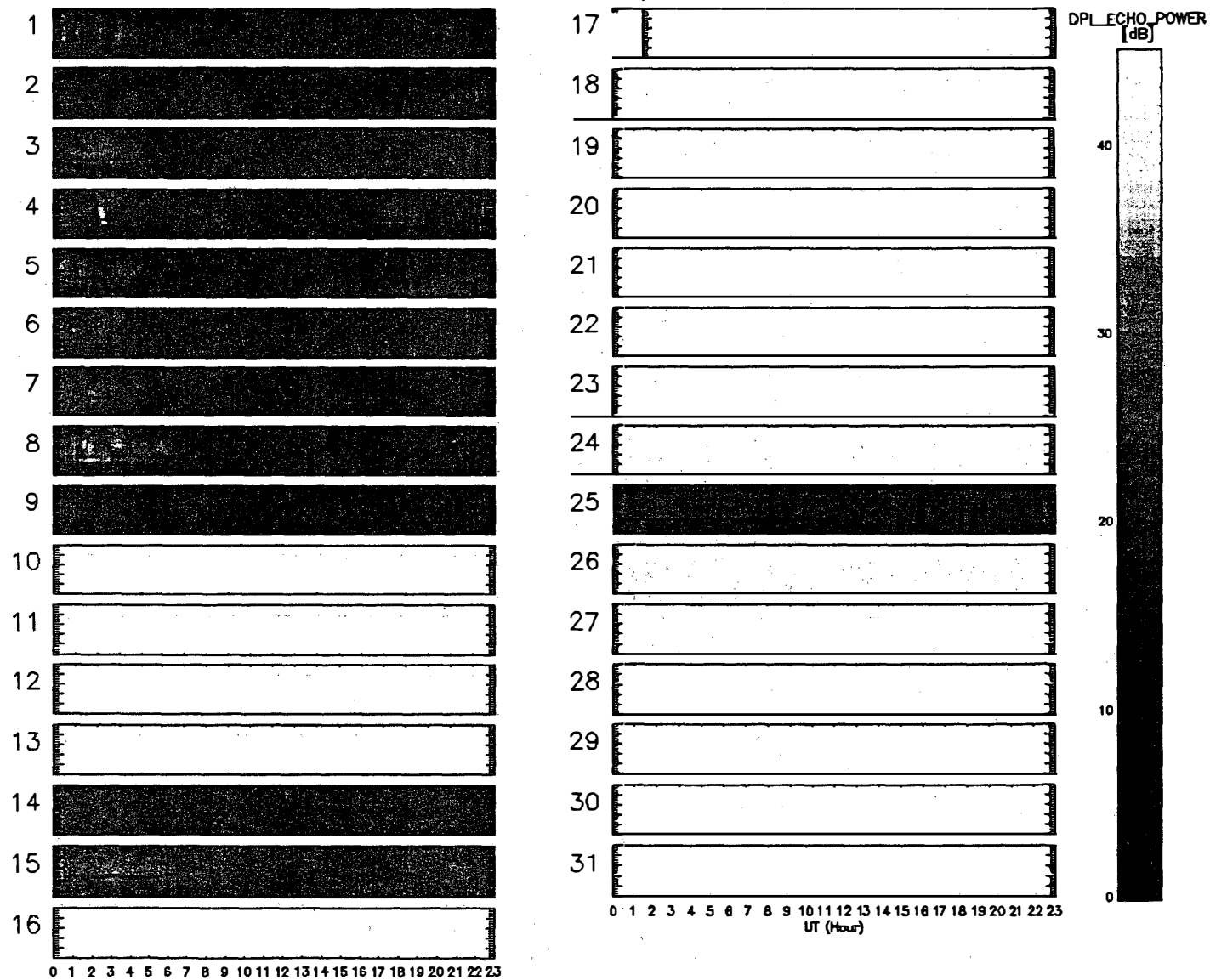
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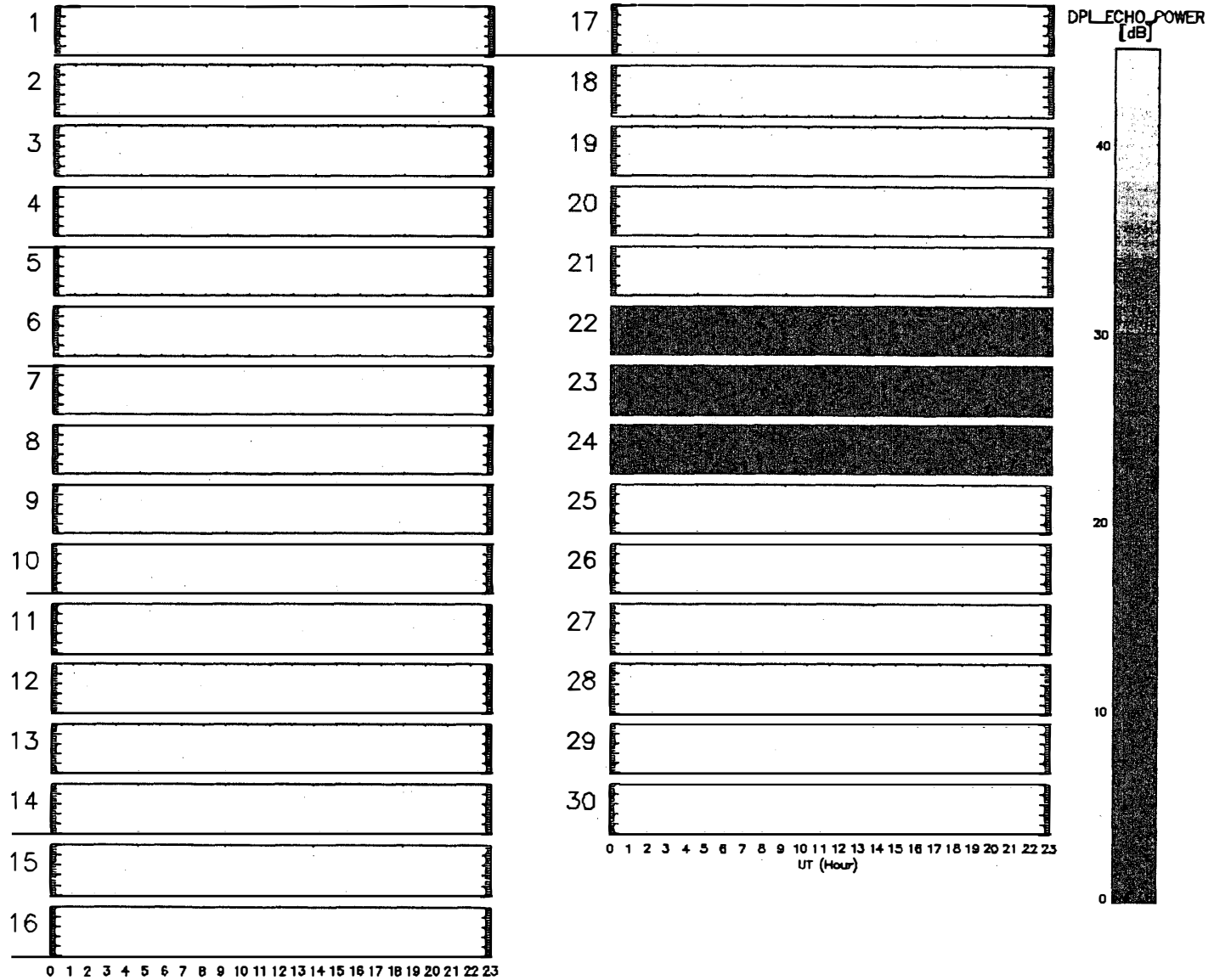
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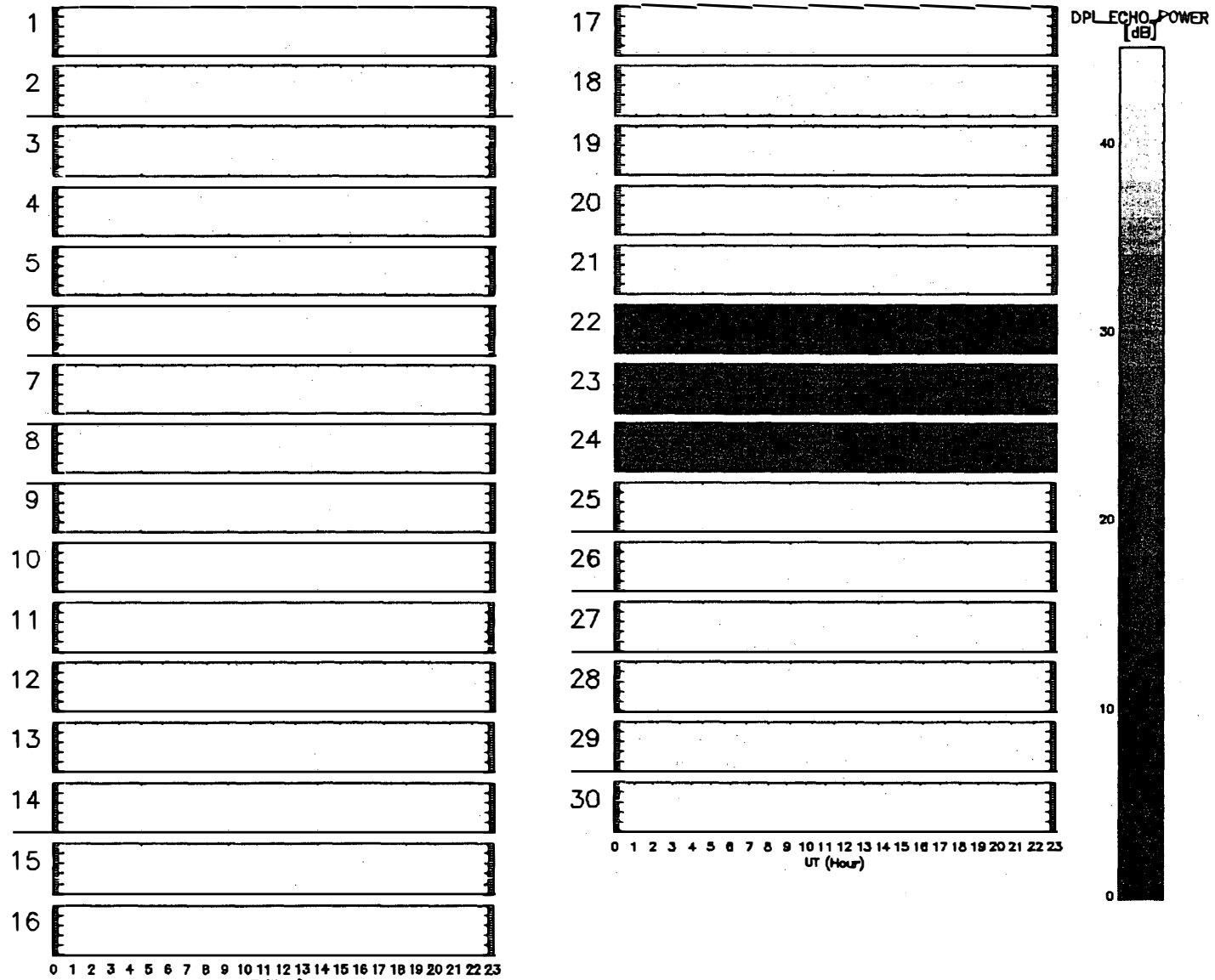
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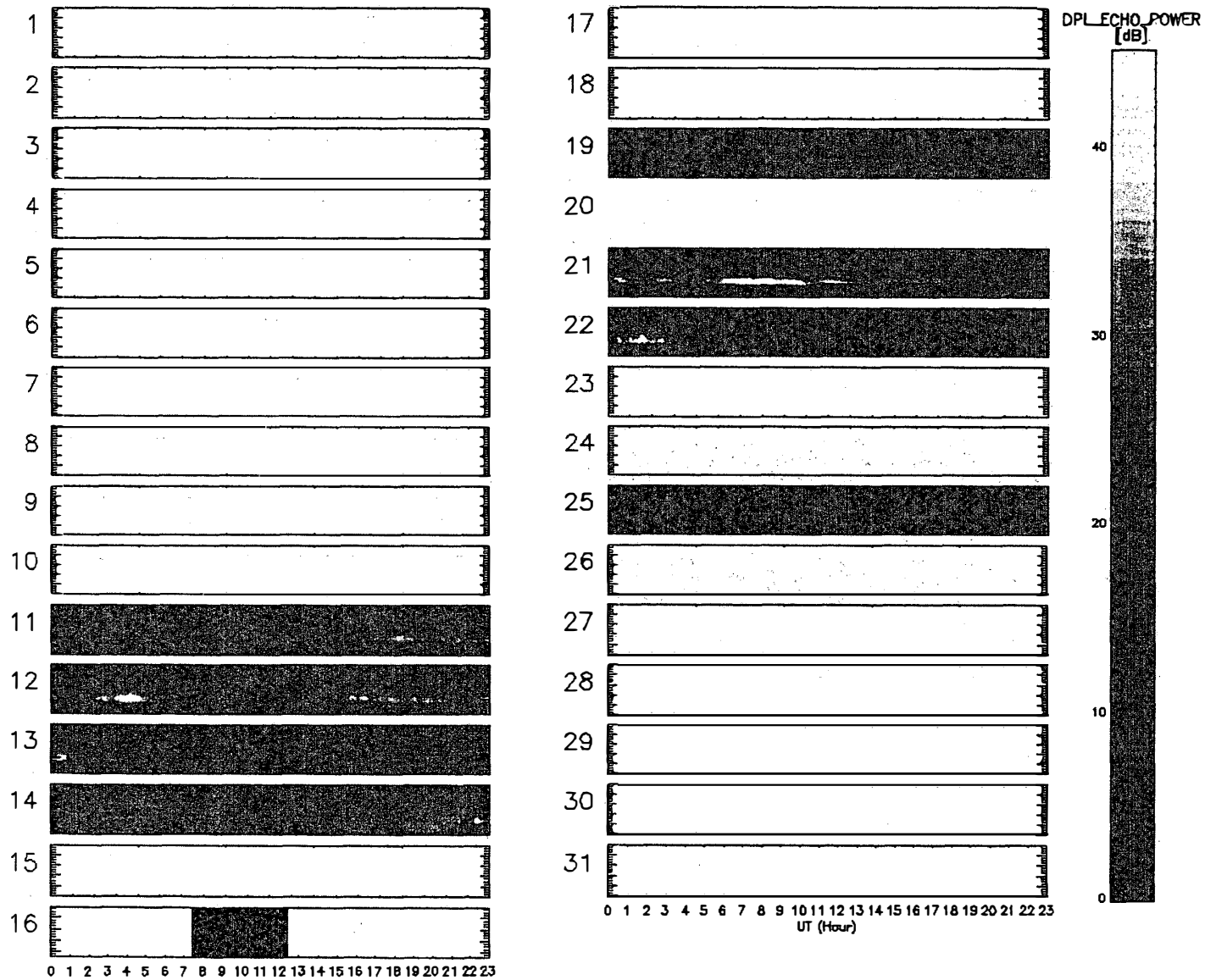
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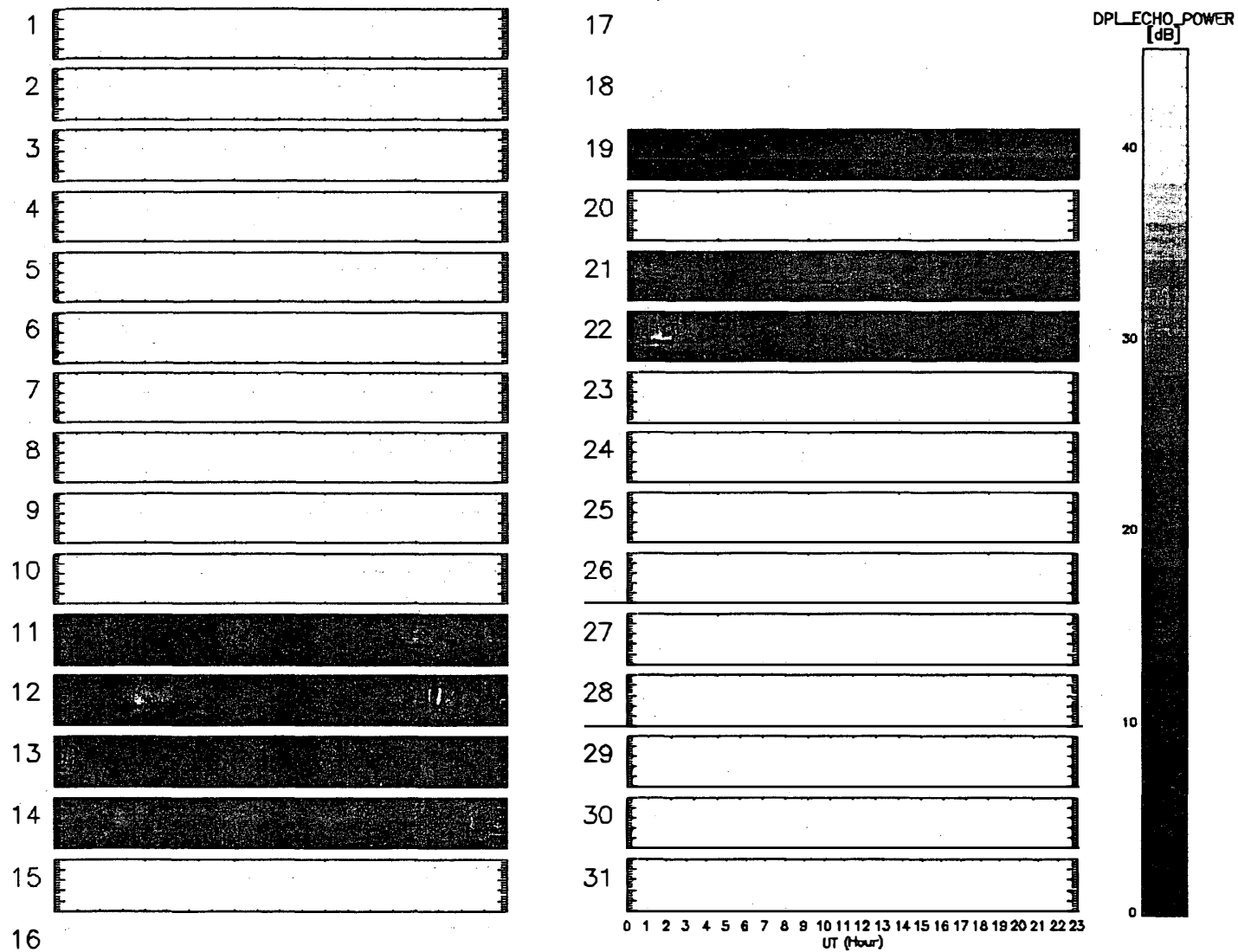
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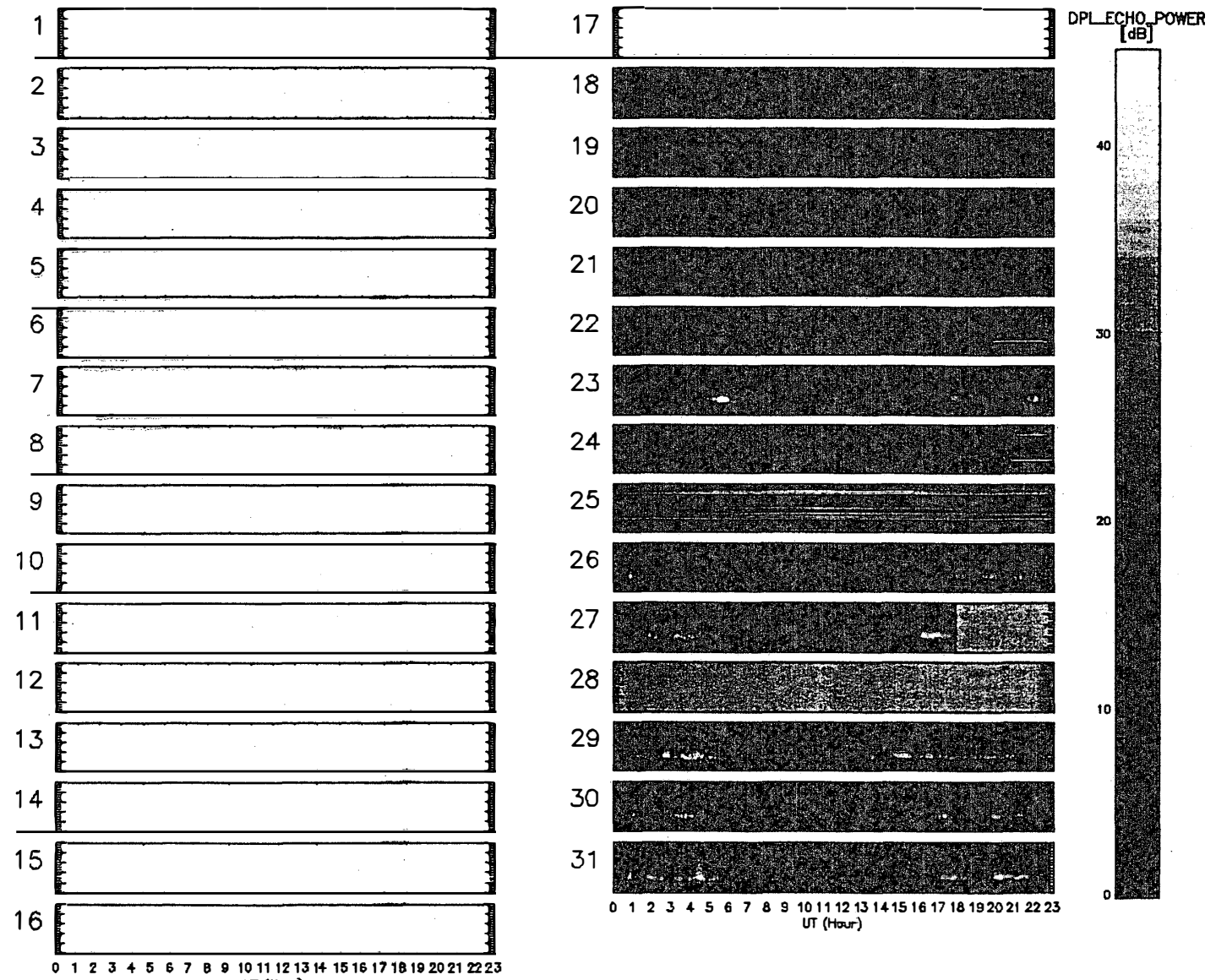
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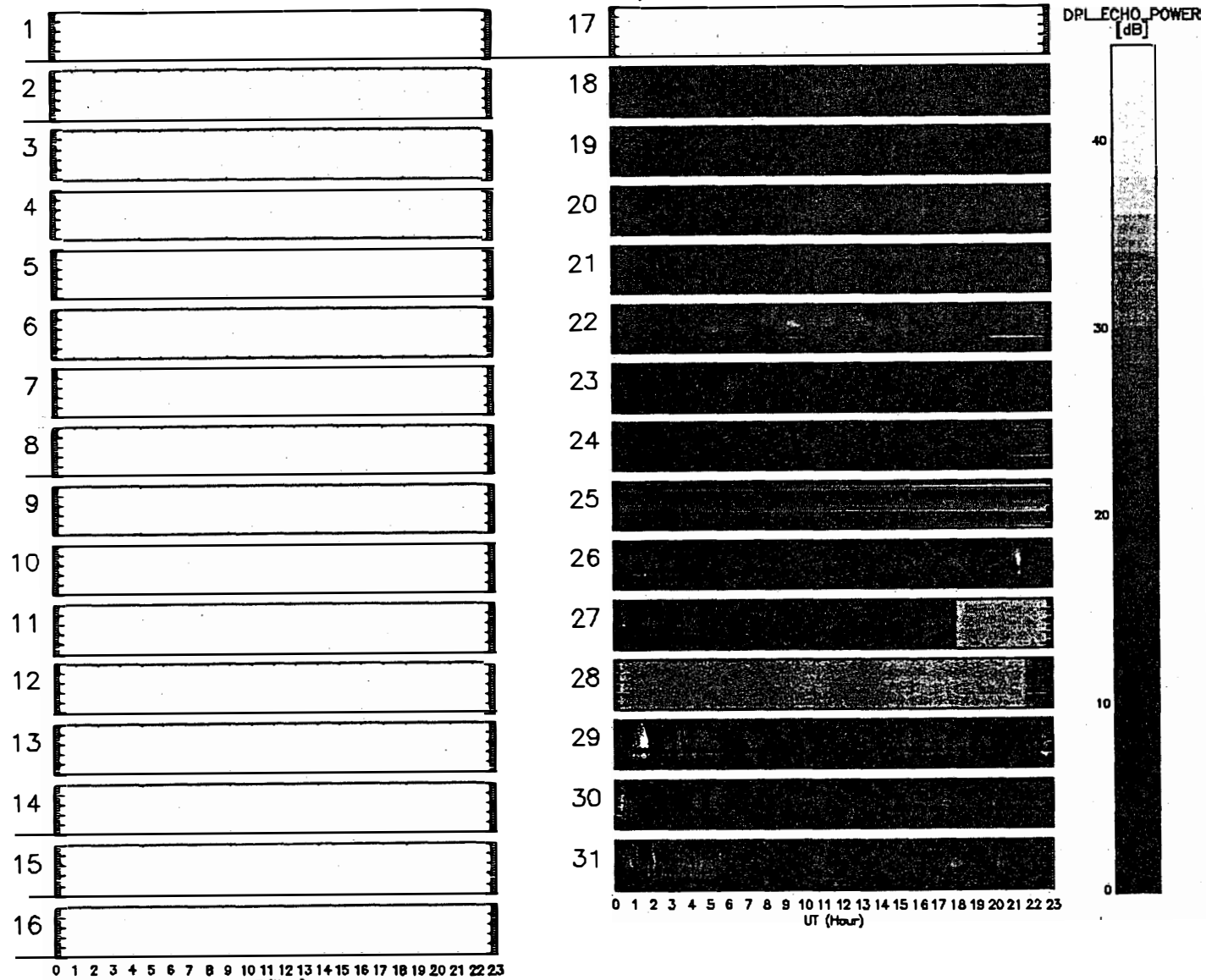
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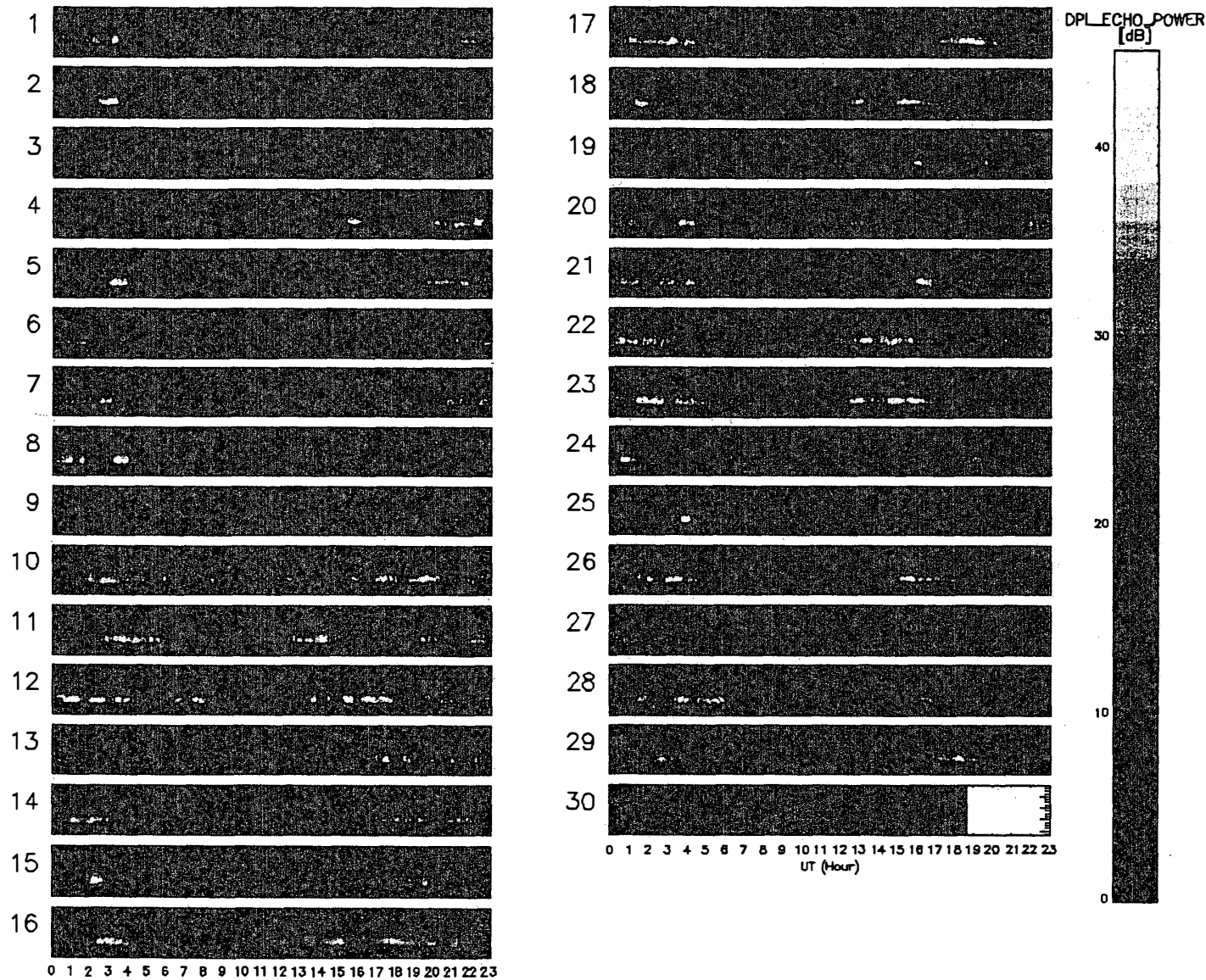
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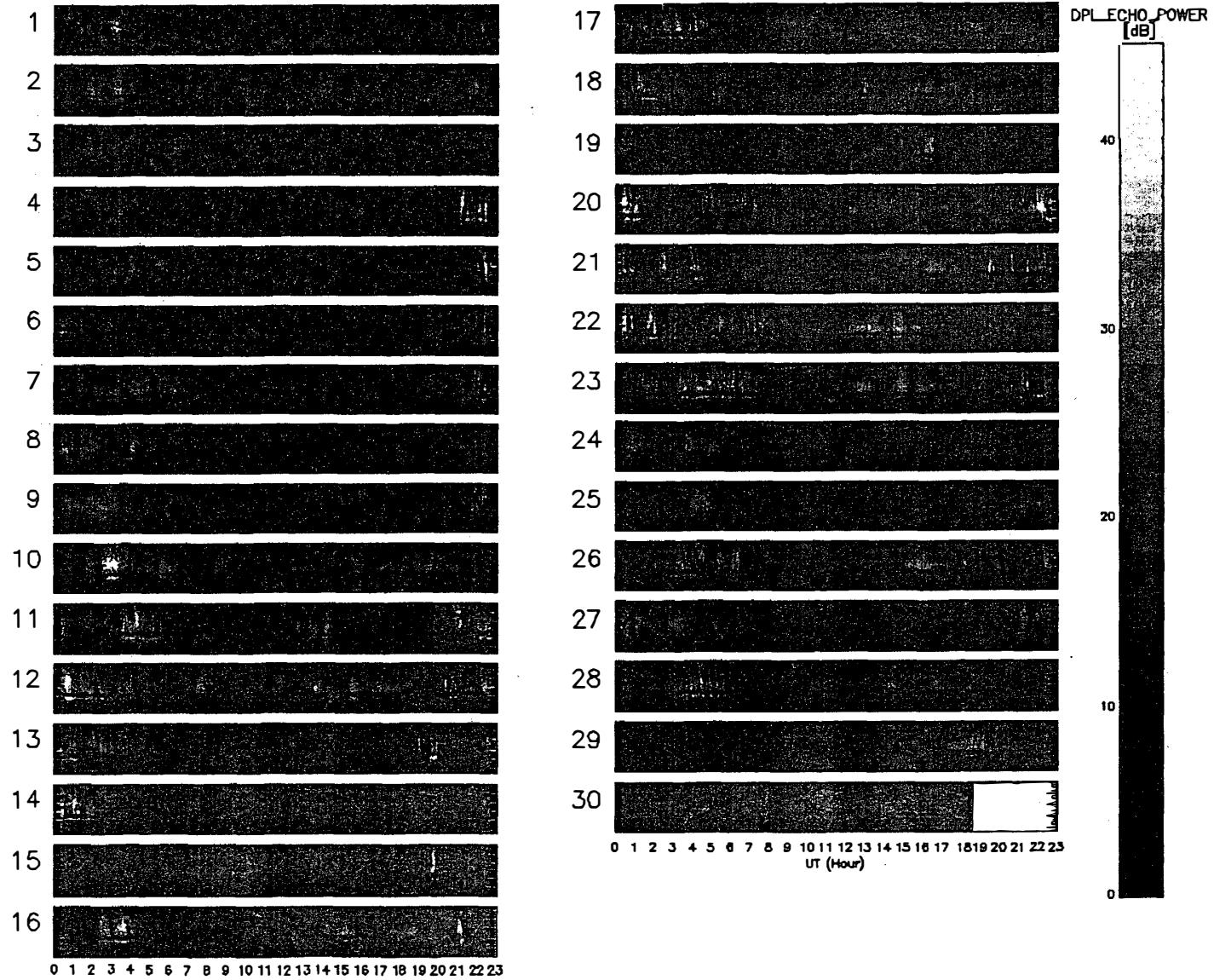
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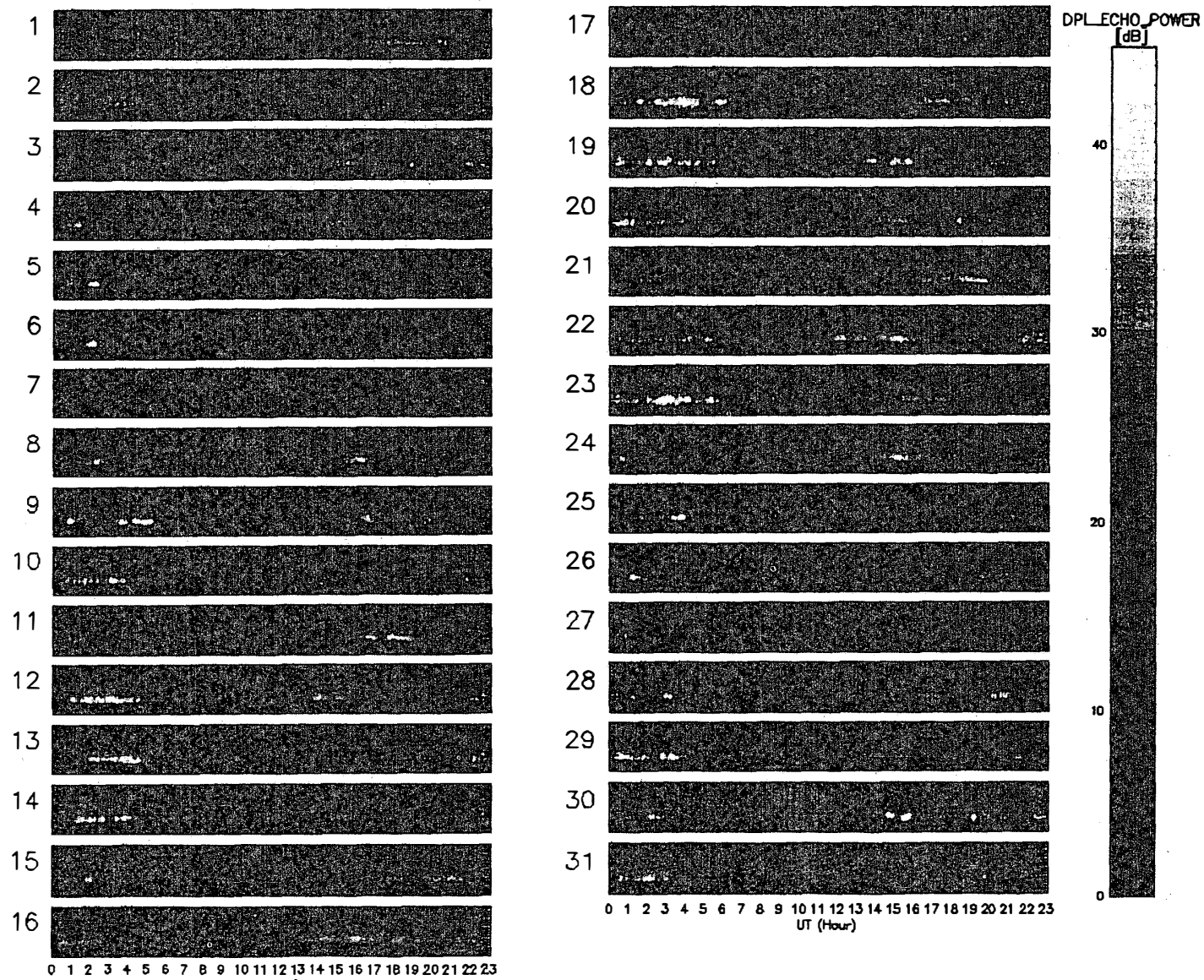
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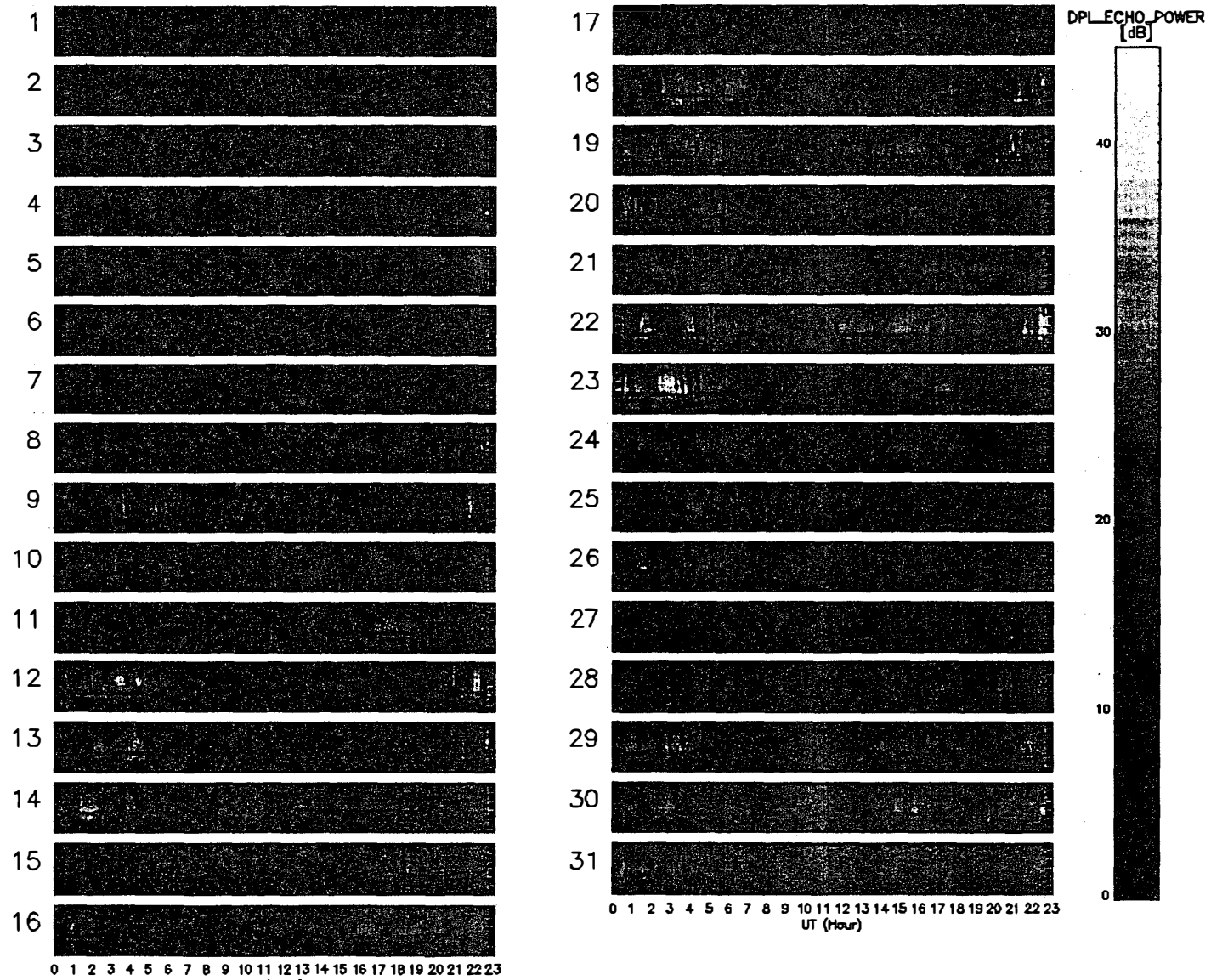
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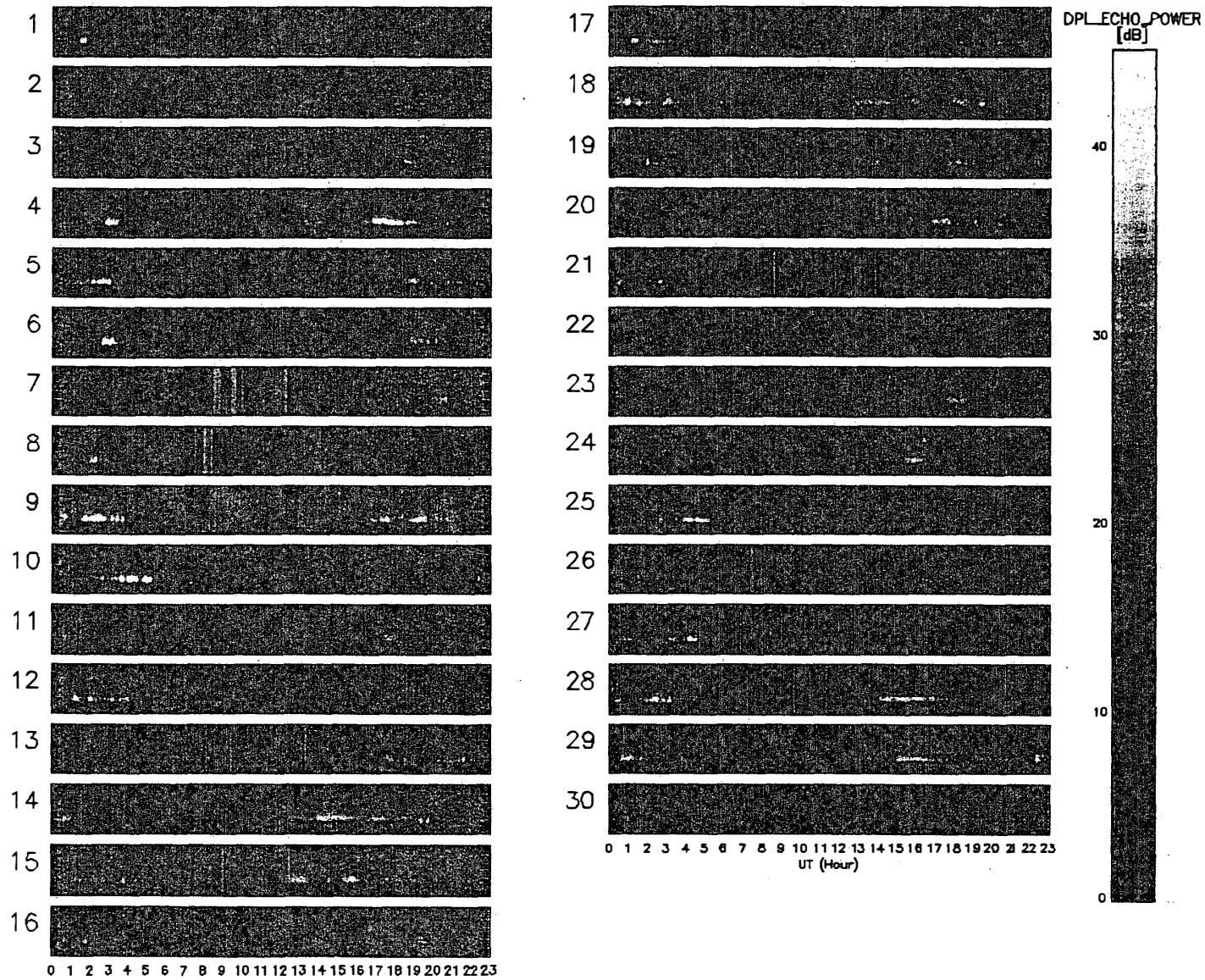
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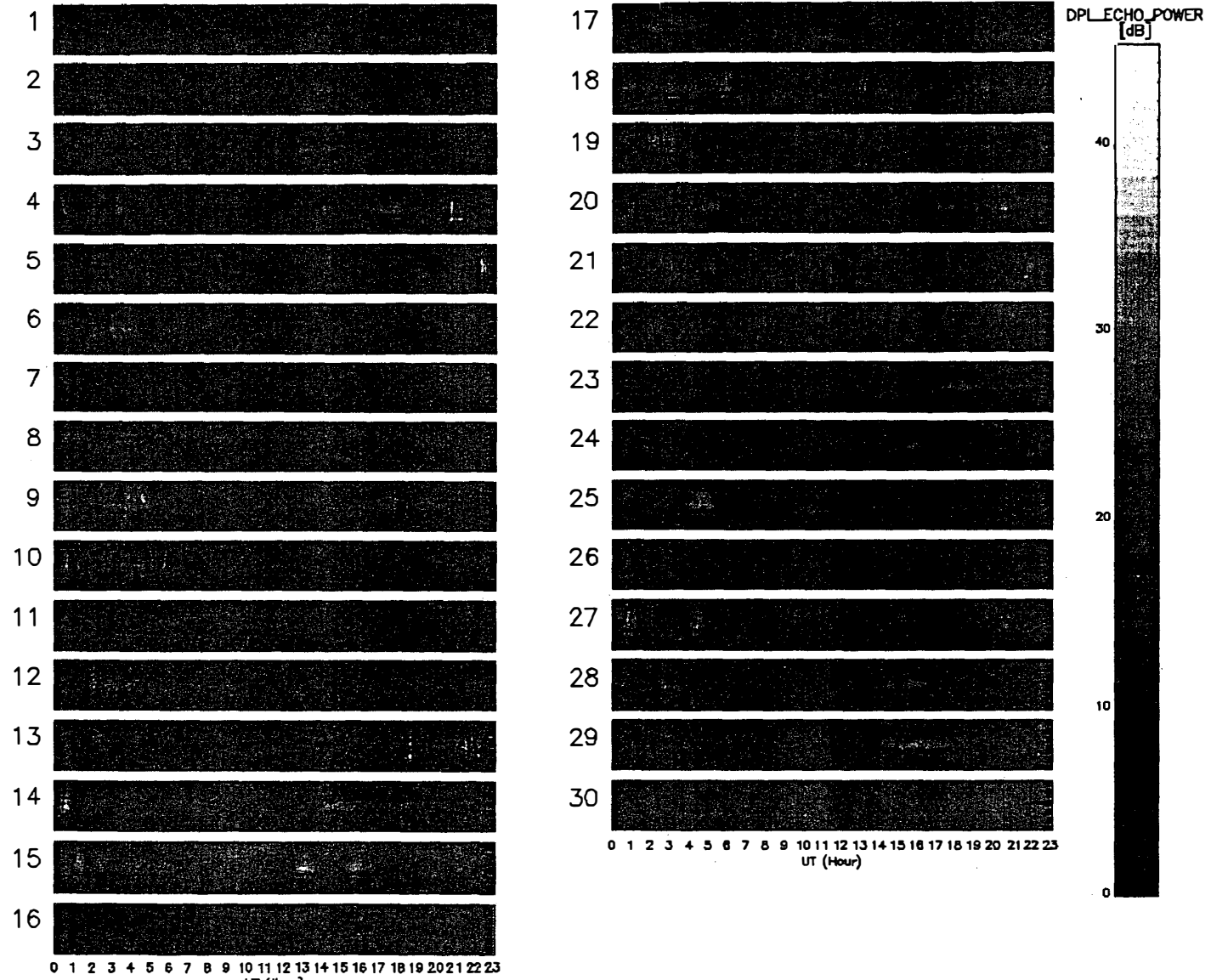
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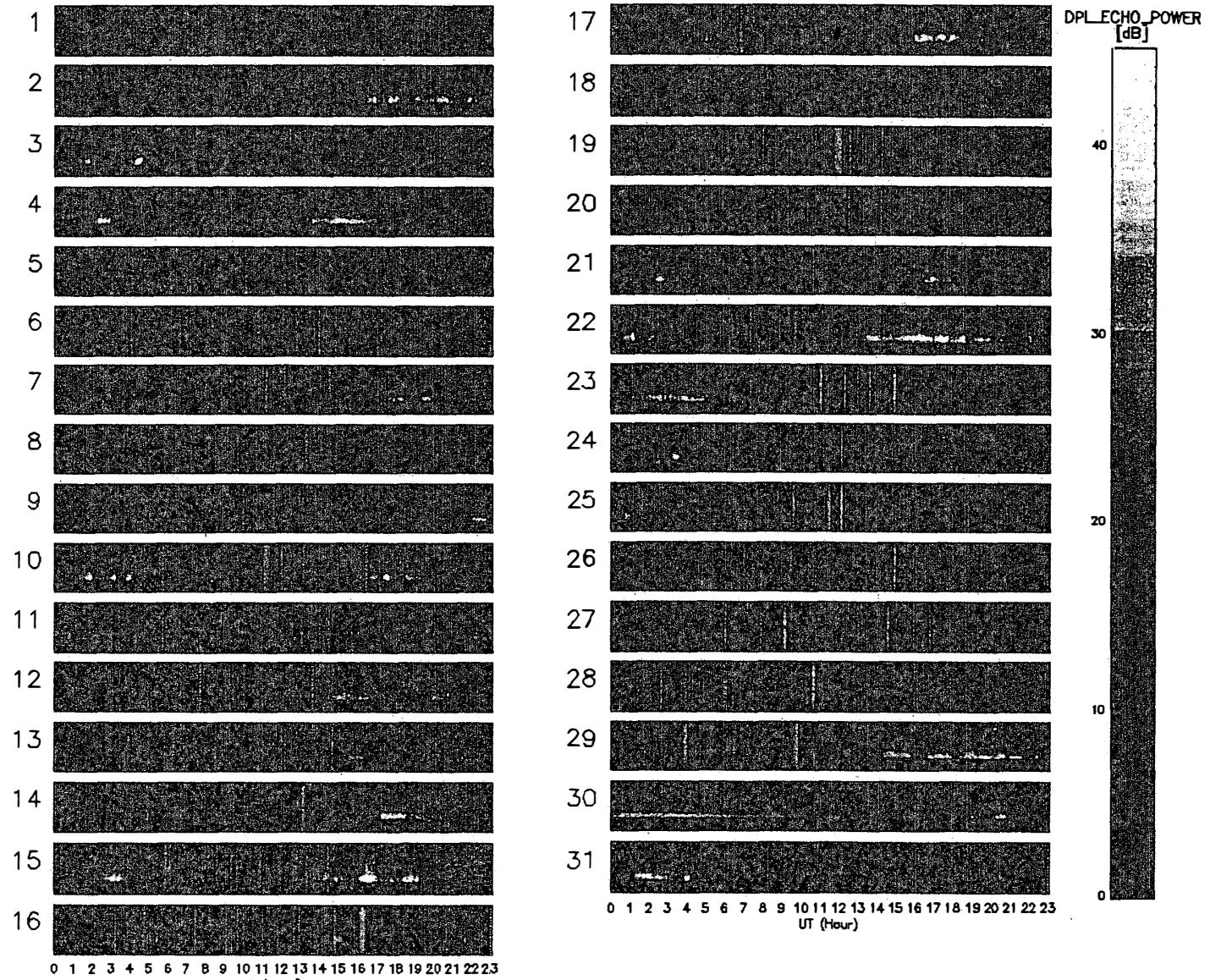
VHF AURORA RADAR DPL_ECHO_POWER 1996/11 Beam 45



VHF AURORA RADAR DPLECHO_POWER 1996/11 Beam 135



VHF AURORA RADAR DPLECHO_POWER 1996/12 Beam 45



VHF AURORA RADAR DPLECHO_POWER 1996/12 Beam 135

