

Jicamarca Unattended Long-term Investigations of the Ionosphere and Atmosphere (JULIA)

1. Configuración de conexiones generales JULIA EW+Imaging&BS (Julio 2016)

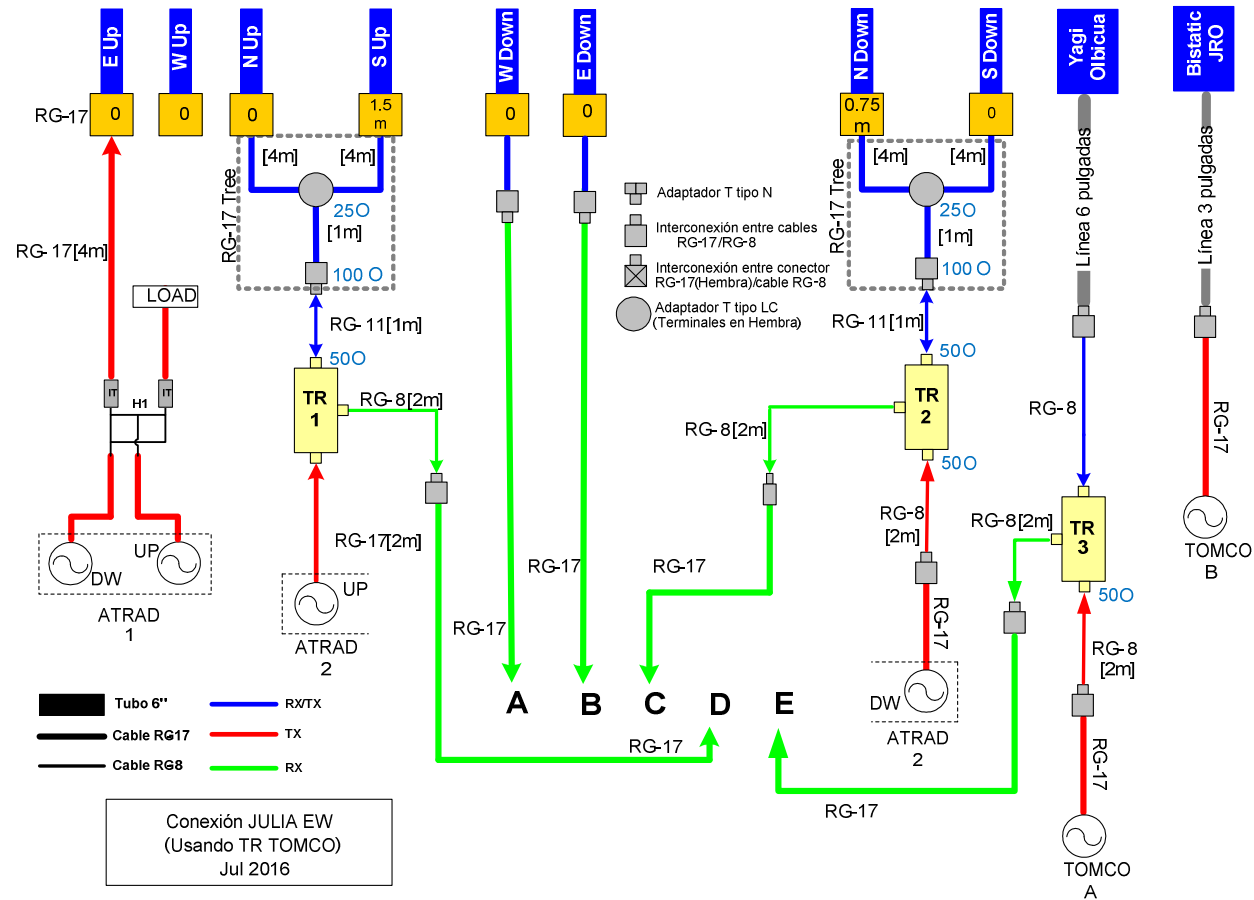
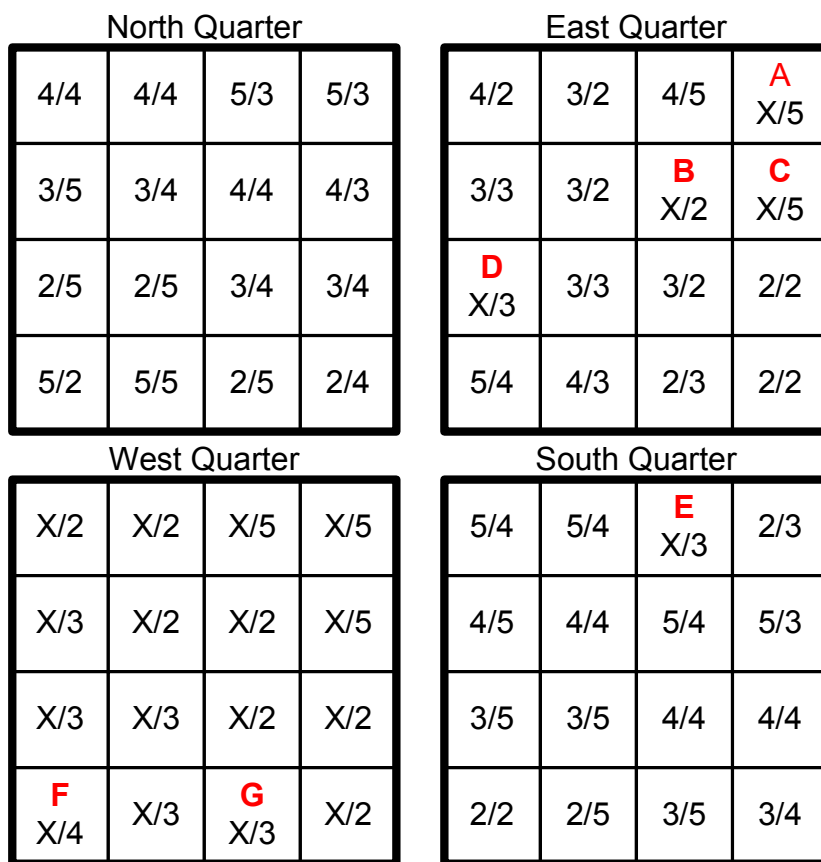


Figura 1

Jicamarca Unattended Long-term Investigations of the Ionosphere and Atmosphere (JULIA)

2. Enfasamiento de Módulos en Antena Principal

JULIA EW & Imaging
I. Manay / K.Kuyeng / M.Milla /R. Yanque
July 2016


H

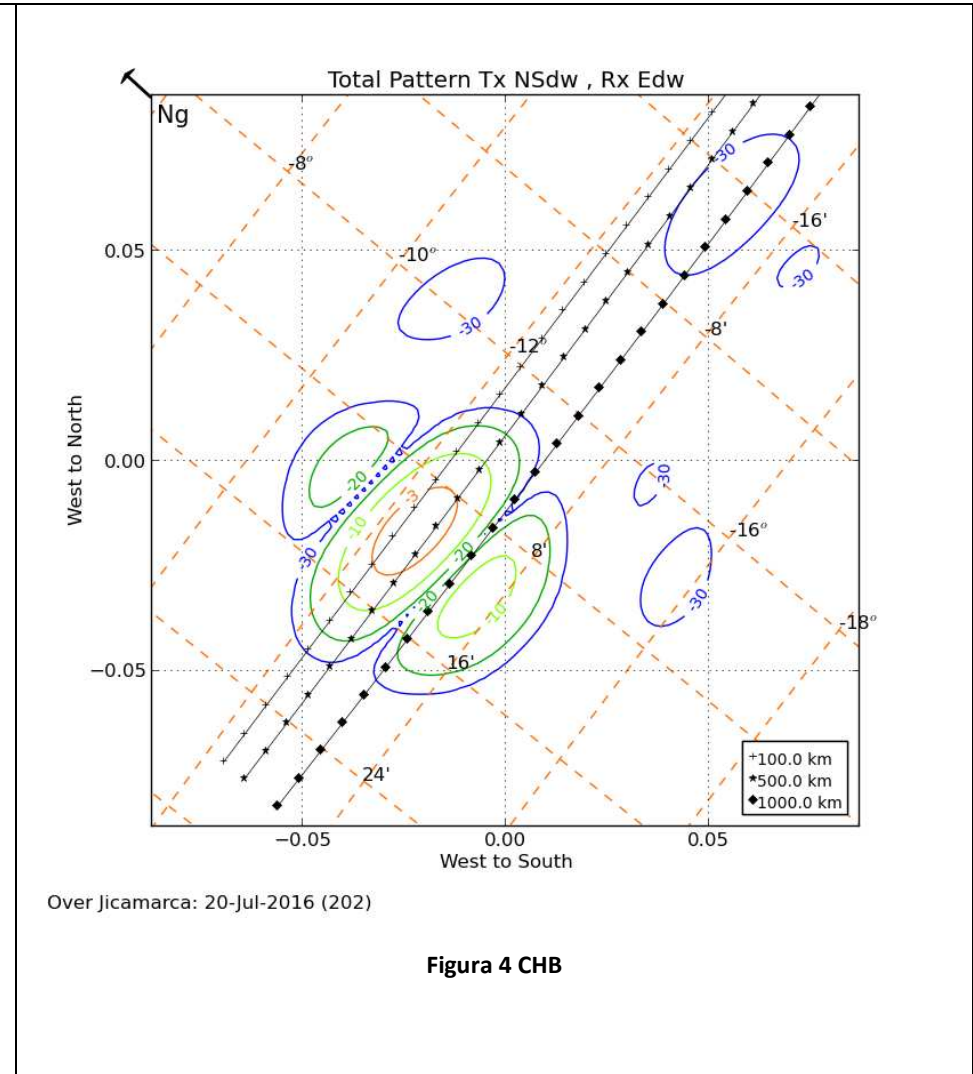
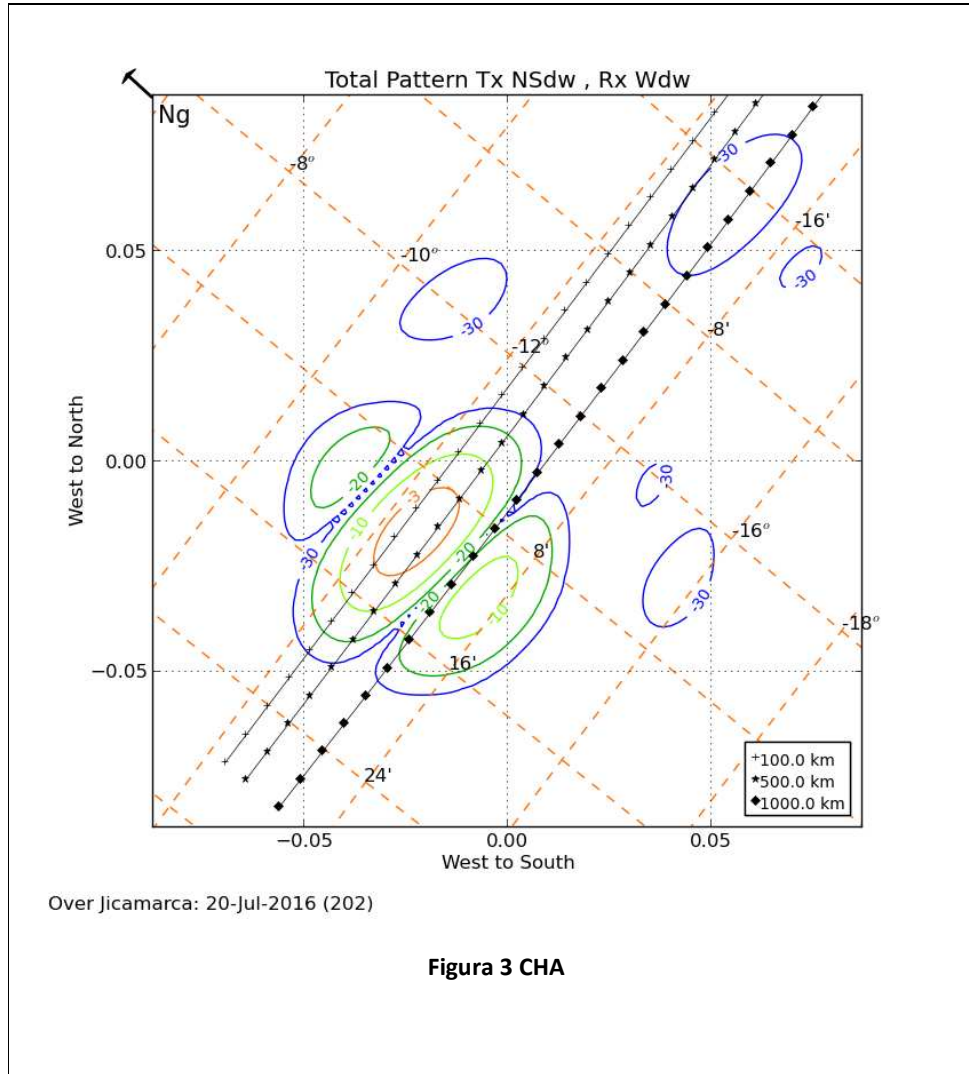
Hysell
module

Antenna module with a red letter uses
a field amplifier. Yellow color uses a TR

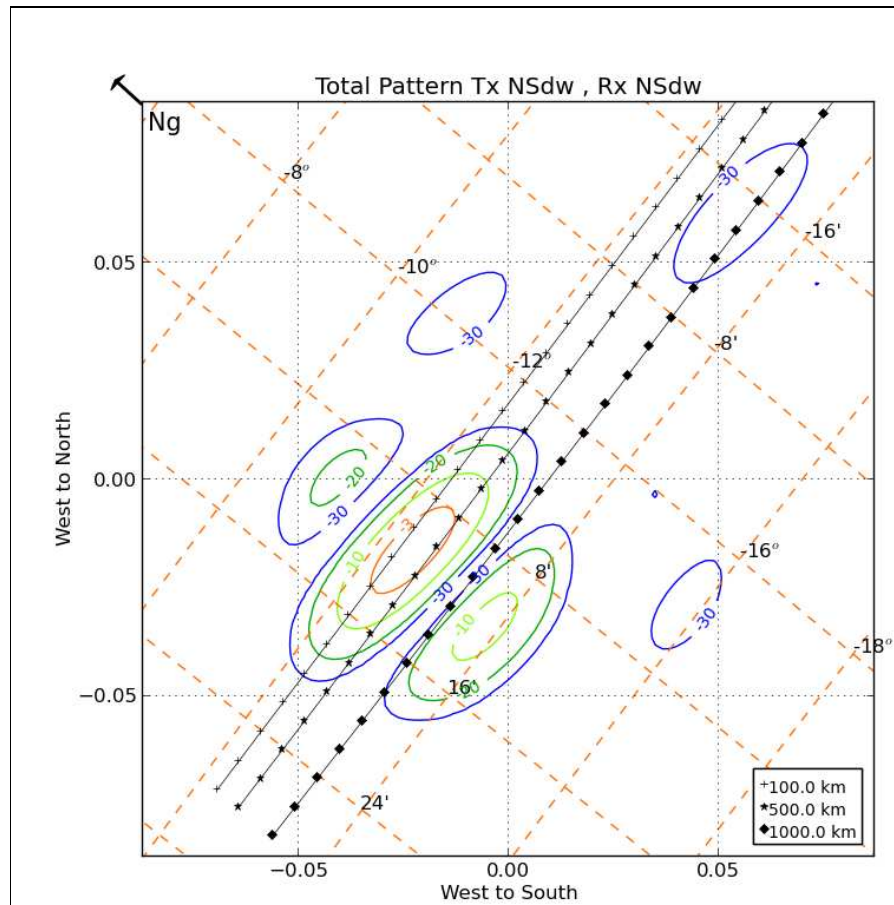
Figura 2

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3. Patrones de antena

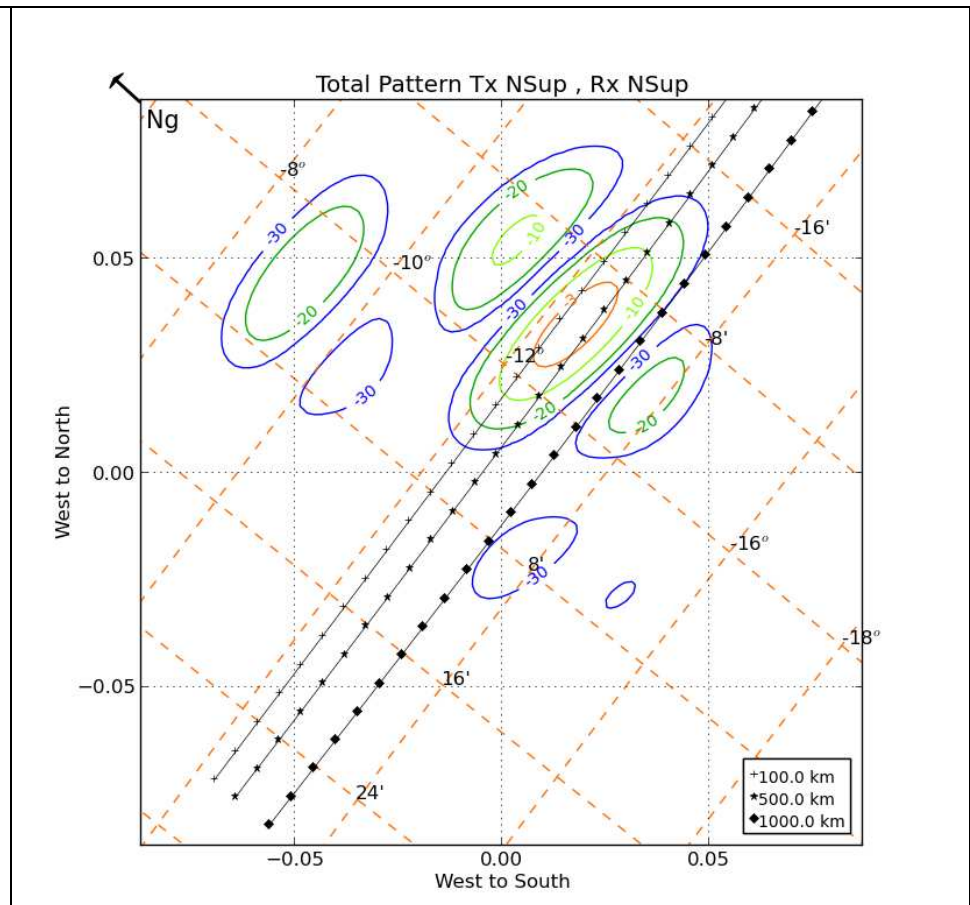


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Over Jicamarca: 20-Jul-2016 (202)

Figura 5 CHC



Over Jicamarca: 20-Jul-2016 (202)

Figura 6 CHD

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4. Sincronización de Sistemas

4.1. Pulso de sincronismo

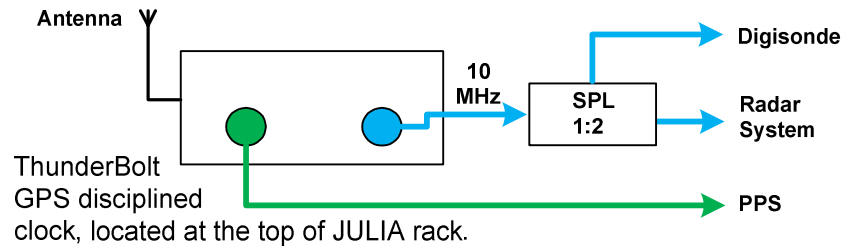


Figura 7

4.2. Multiplicador de reloj

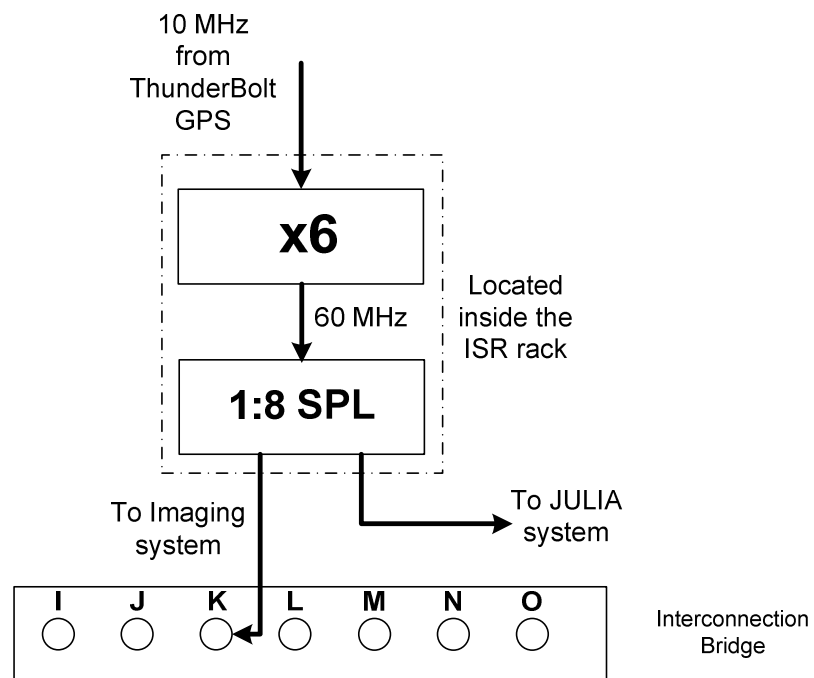


Figura 8

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5. Conexión de equipos

Los equipos para este experimento se localizan en los racks mostrados en la Figura 9 y Figura 10

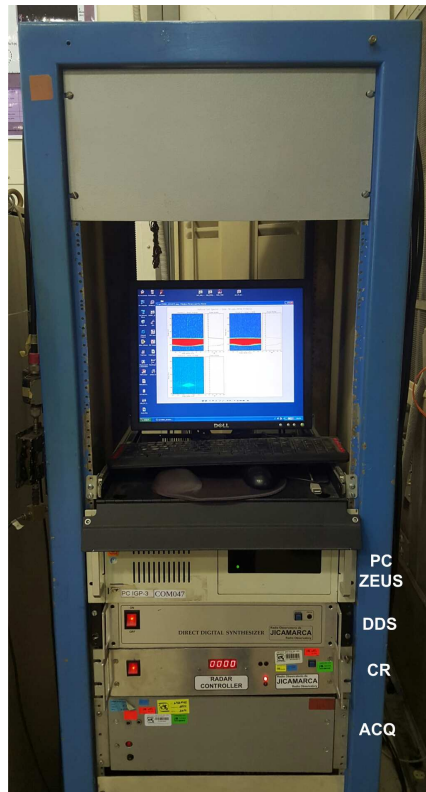


Figura 9

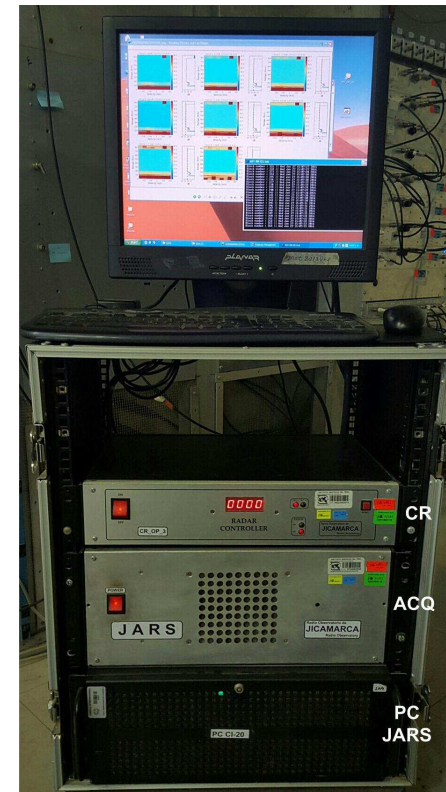


Figura 10

Jicamarca Unattended Long-term Investigations of the Ionosphere and Atmosphere (JULIA)

5.1. Panel posterior del Sistema de Adquisición NATALIA

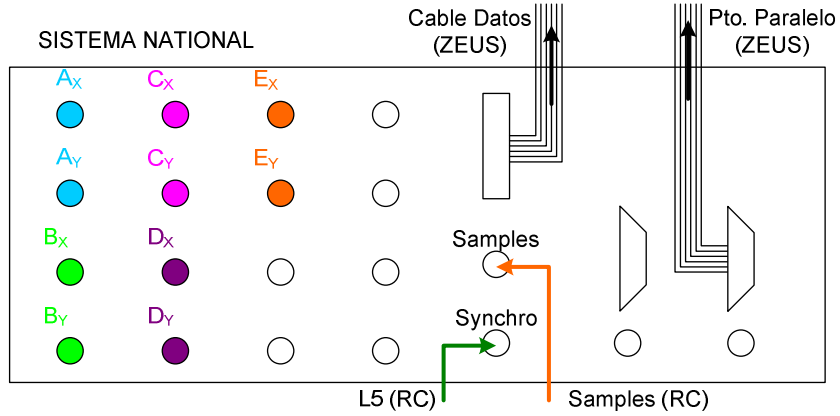


Figura 11 Panel posterior del sistema de adquisición Natalia para JULIA EW +BISTATIC (PC-ZEUS)

5.2. Panel posterior del Controlador de Radar de JULIAEW

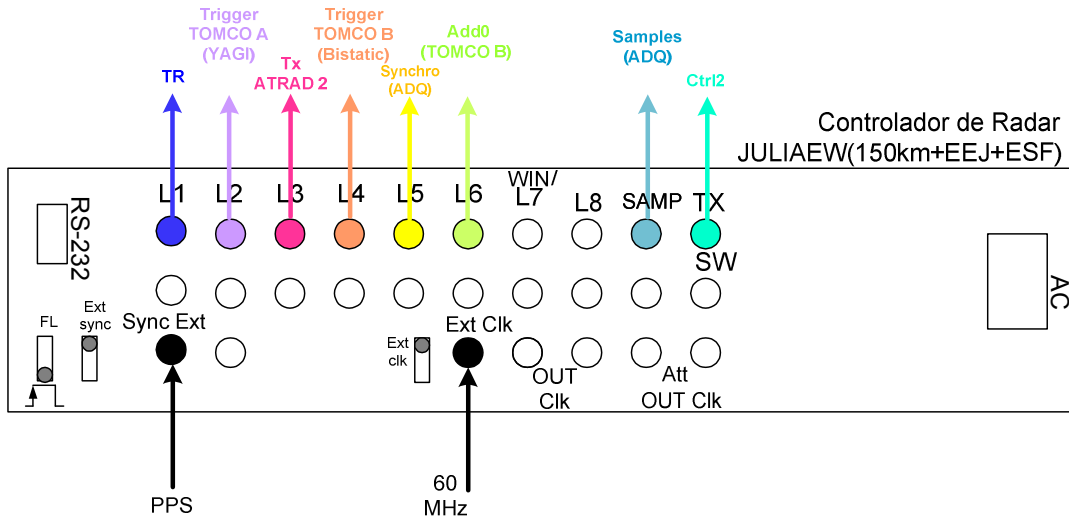


Figura 12 Panel posterior del Controlador de Radar para JULIA EW +BISTATIC

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5.3. Interconexión entre Operaciones y la sala de Transmisión

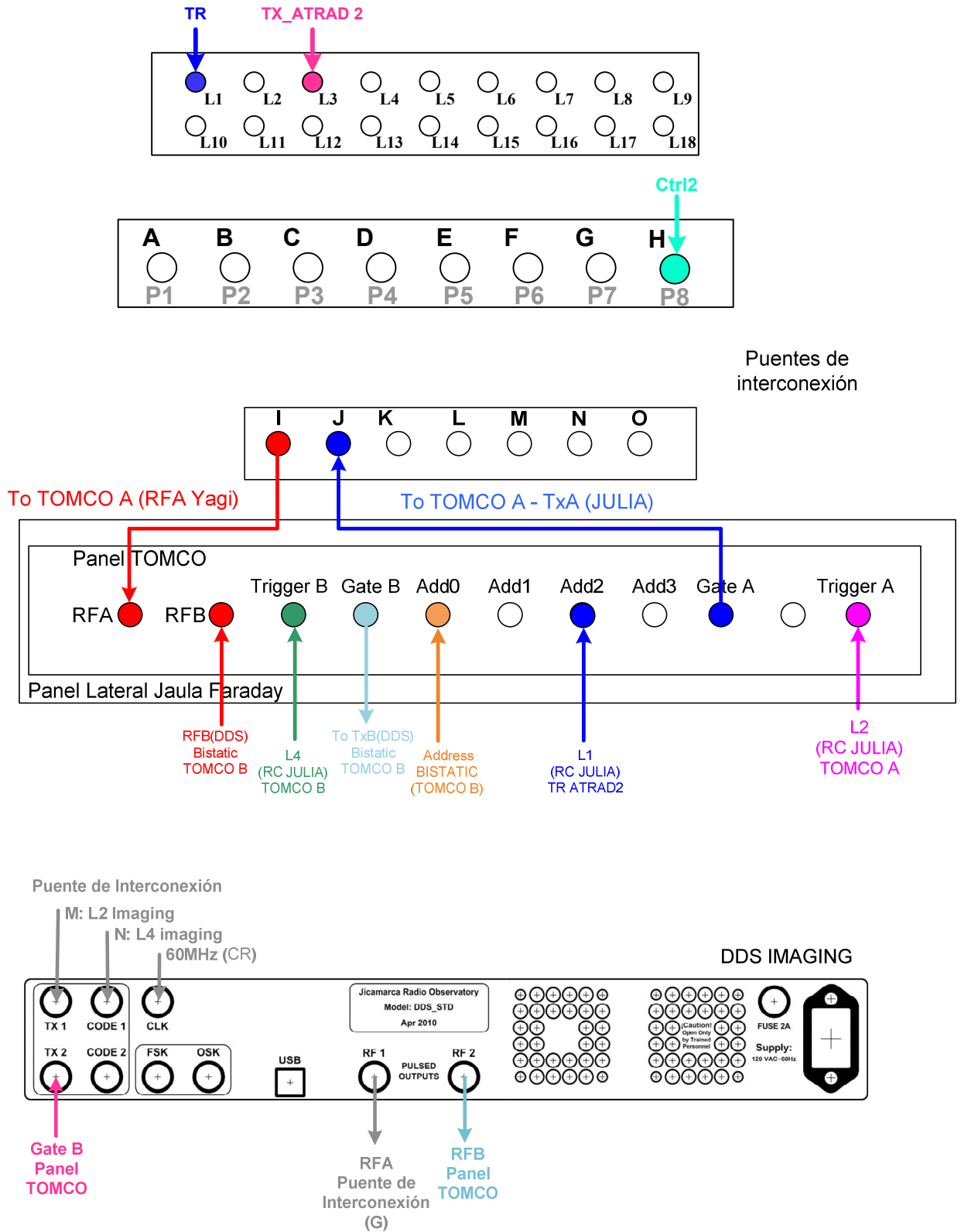


Figura 13 Panel TOMCO y puentes de conexión con Jaula de Faraday para JULIA EW +BISTATIC, conexiones al DDS IMAGING

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5.4. Panel posterior del Sistema de Adquisición JARS y el CR de IMAGING

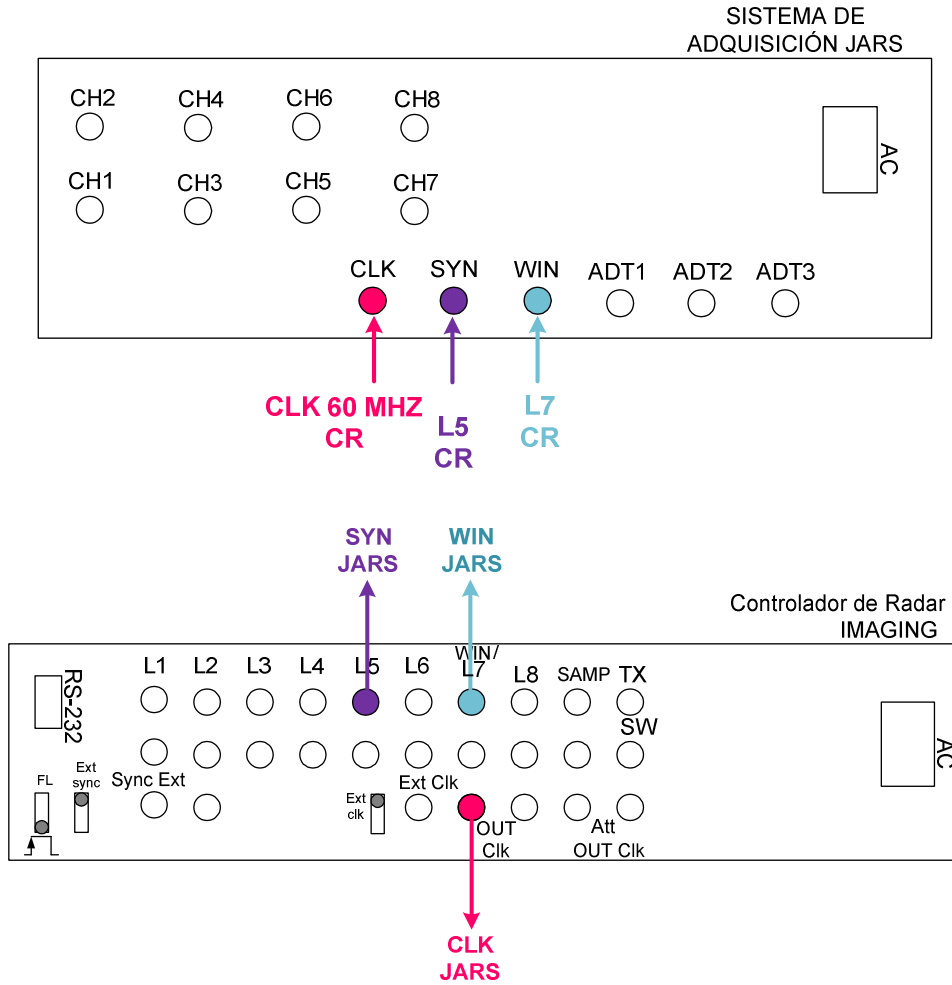


Figura 14 Conexiones entre el sistema de adquisición JARS y el CR IMAGING.

5.5. Panel posterior del DDS de IMAGING

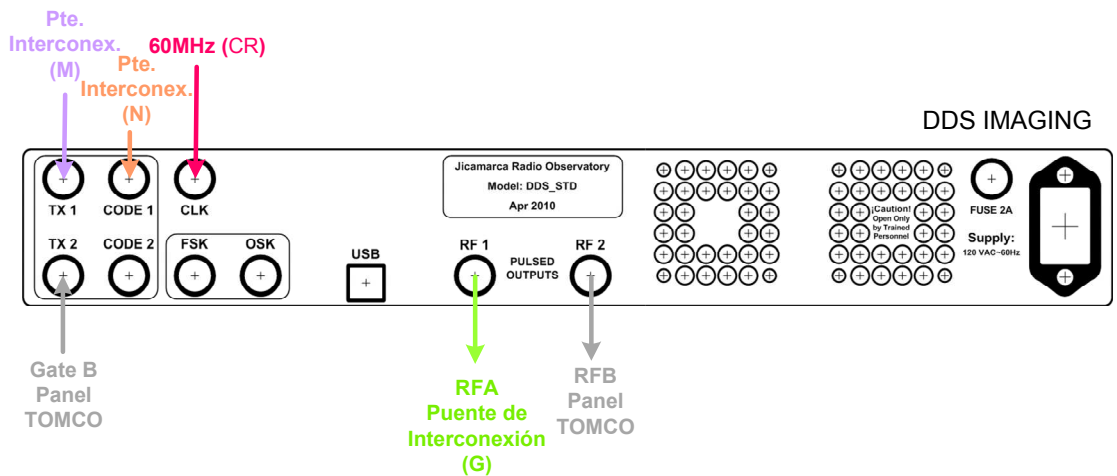


Figura 15

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5.6. Interconexión entre Operaciones y la sala de Transmisión

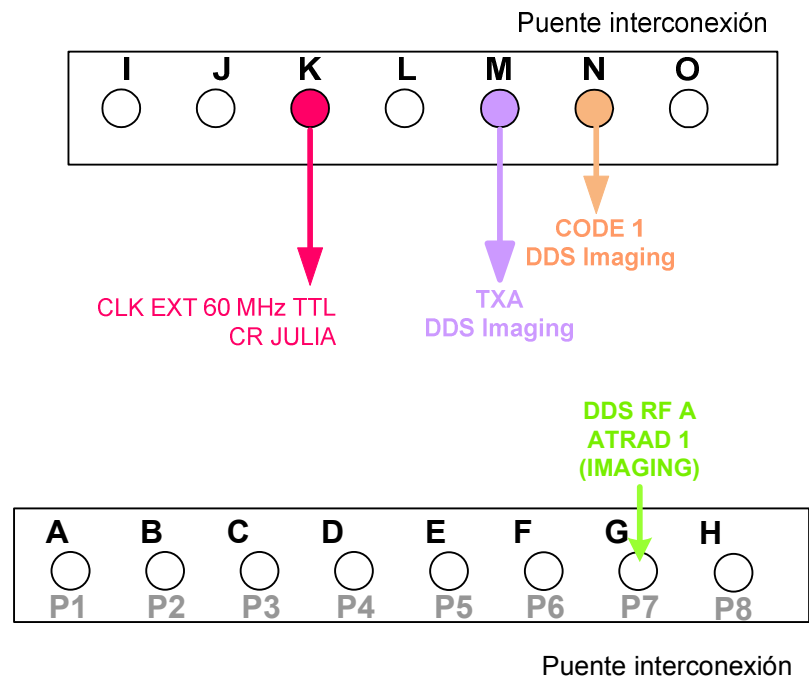


Figura 16 Conexiones entre el DDS y el puente de interconexiones.

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5.7. Interconexión de líneas de control en J. FARADAY para JULIA EW + IMAGING&BISTATIC

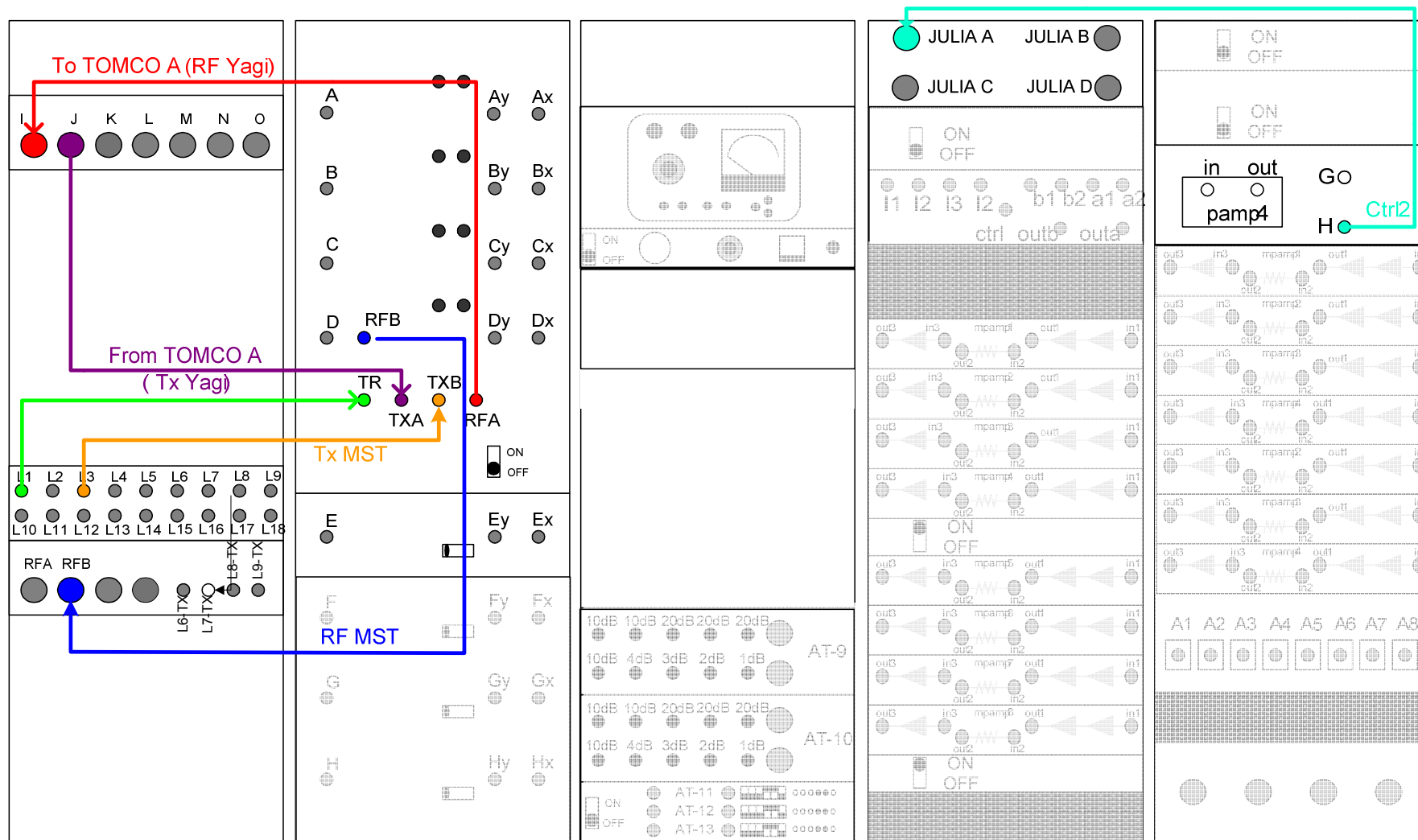


Figura 17

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5.8. Interconexión de líneas de recepción en J. FARADAY para JULIA EW

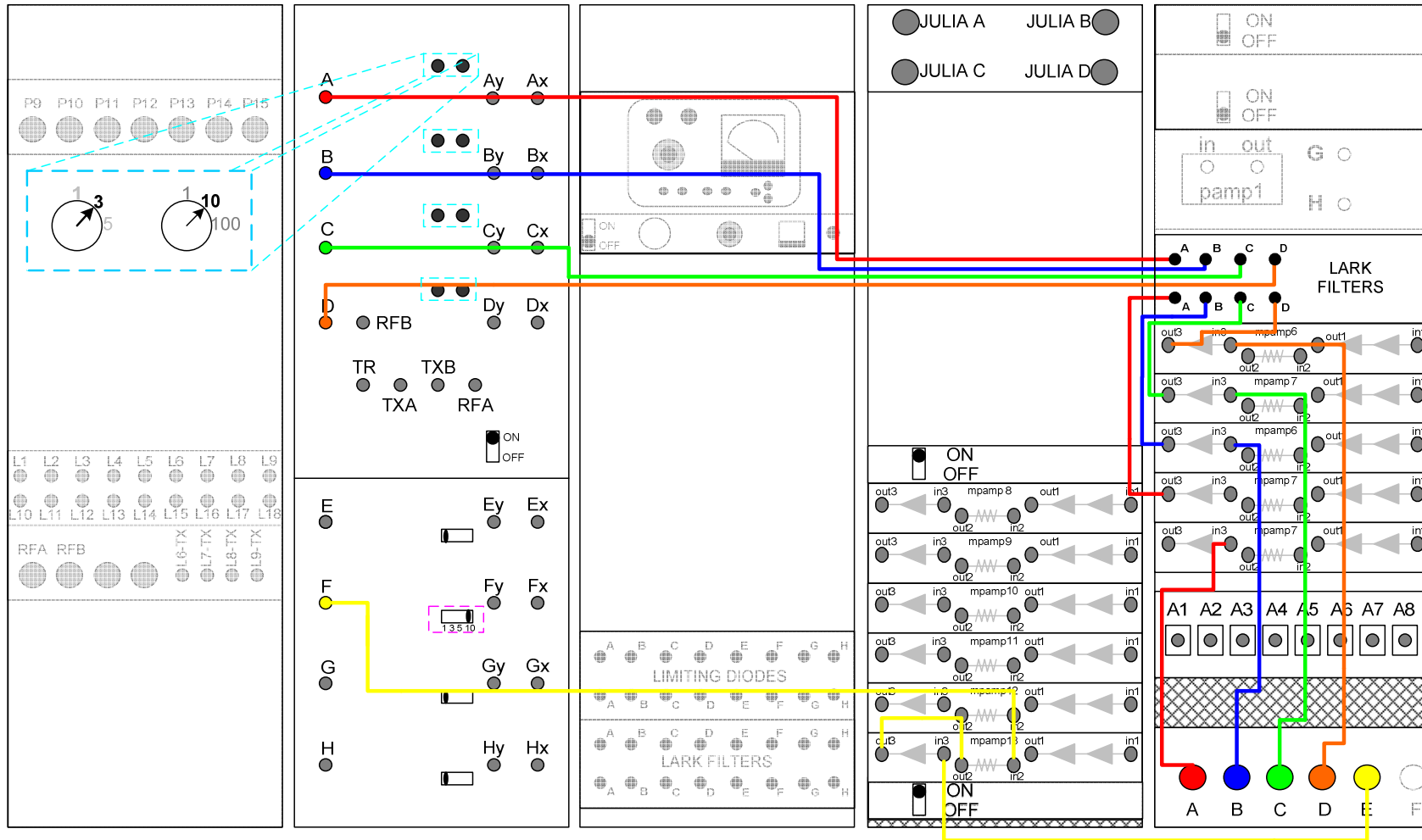


Figura 18

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5.9. Interconexión entre el CR IMAGING y el panel de la J. Faraday.

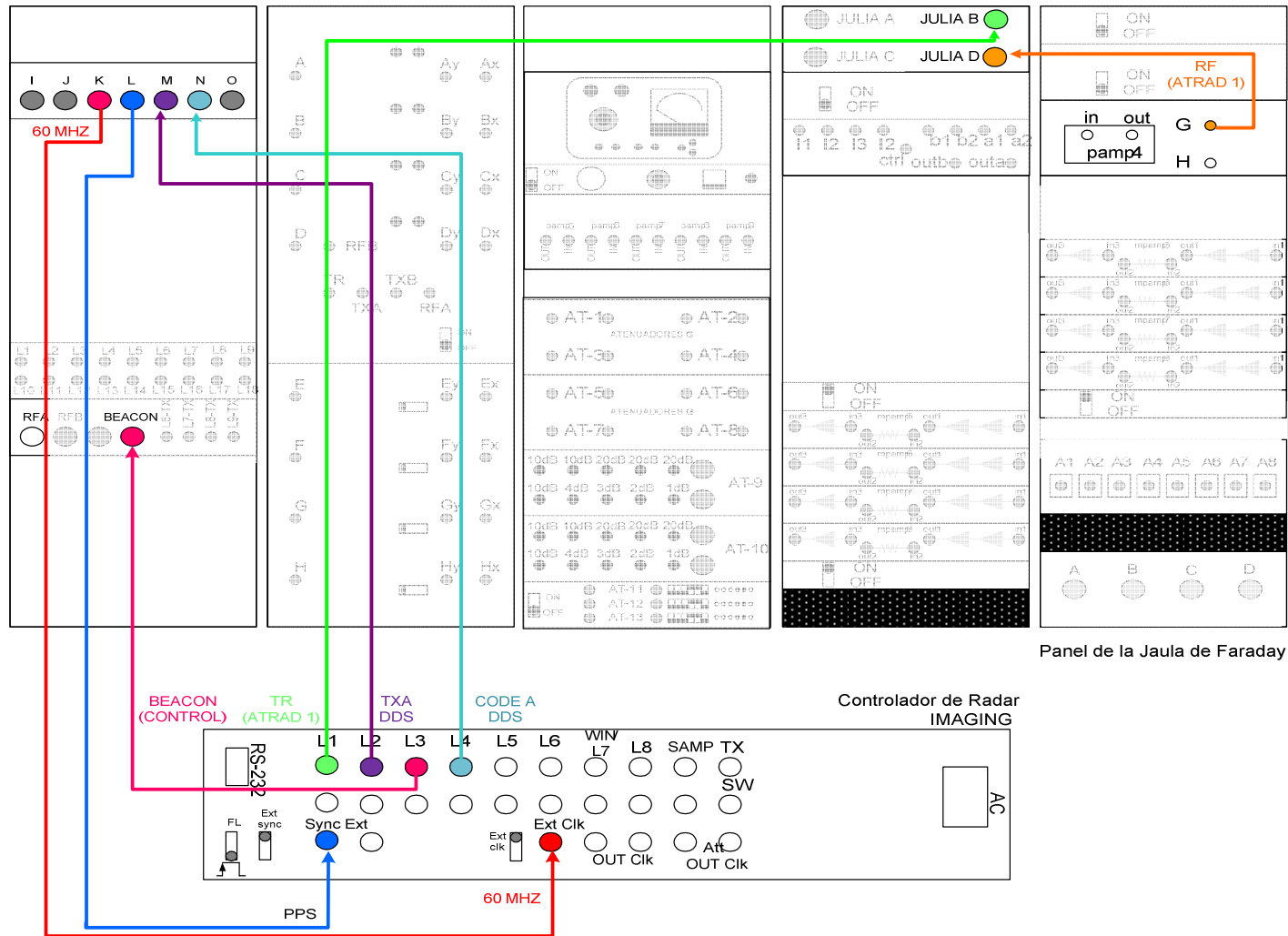


Figura 19

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5.10. Interconexión entre el sistema de adquisición JARS y el panel de la J. Faraday.

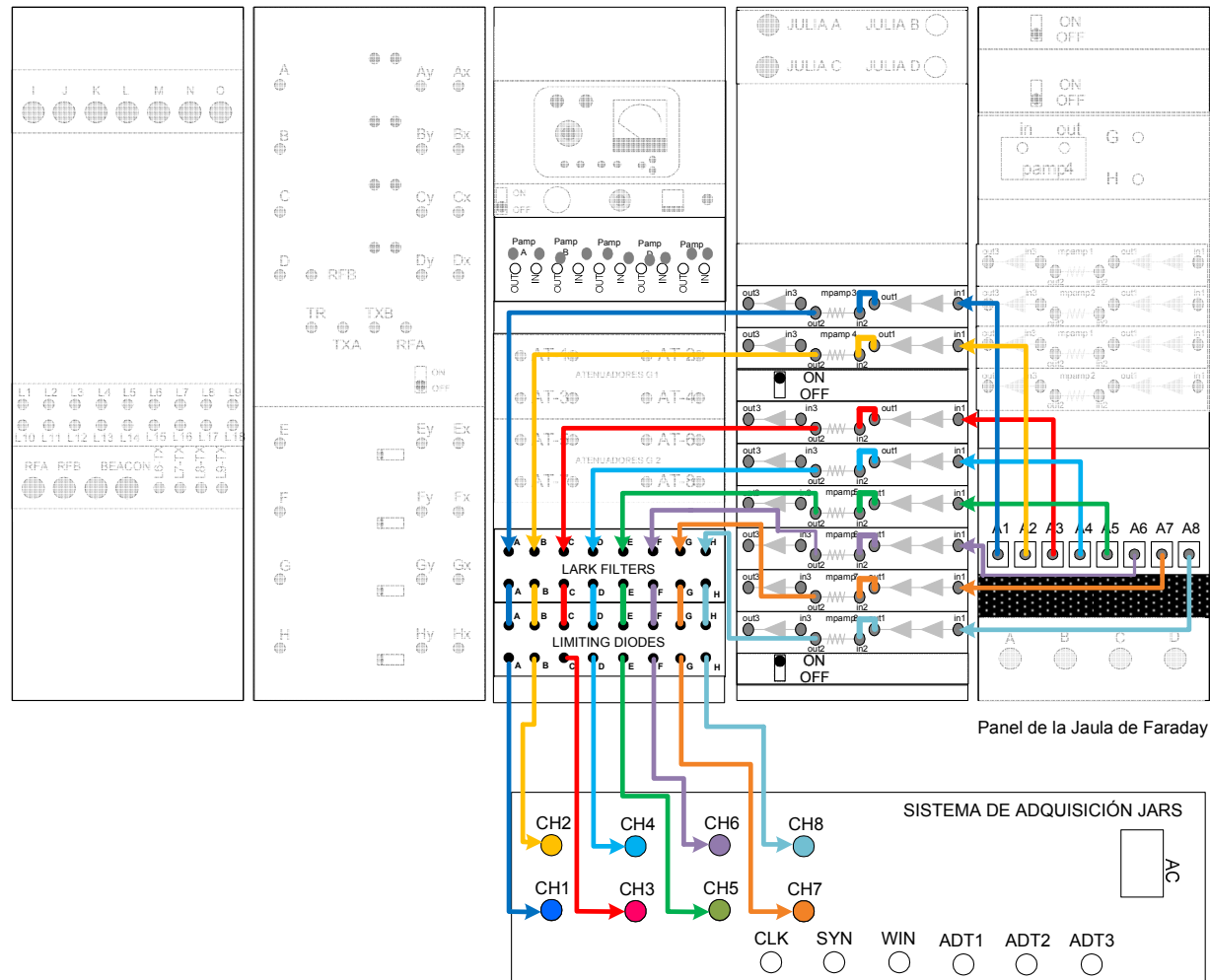


Figura 20

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6. Resumen del experimento

HORARIO	07:00-18:00				18:00-07:00	
Exps	JULIA EW (150km + EEJ)		Bistatic	Monitor Bistatic	JULIA EW- ESF	IMAGING
Sist Adq (PC)	National (ZEUS)		Echotek (ESI- ICA)	JARS	National (ZEUS)	JARS
IPP(km)	375		375	375	937.5	937.5
NTX	1		2	2	16	16
TX	1.5	3	7.8	7.8	3.75	84
Code	NO		Barker 13 (FLIP)	Barker 13 (FLIP)	NO	Binary 28 (FLIP)
Beacon	NO		NO	NO	NO	Width=1.5km Height=850km
Ventana de muestreo	Ho=79.95km DH=1.5km NSA=77		Ho=0km DH=0.6km NSA=251	Ho=0km DH=0.6km NSA=251	Ho=0km DH=3.75km NSA=248	Ho=0km DH=1.5km NSA=620
Tipo de dato	Proc. Data		Proc. Data	Proc. Data	Proc. Data	Proc. Data
# Canales	3		2	1	2	8
Coh Int	1		1	1	1	1
FFT Points	1024		----	64	16	8
Inc Int	22		---	192	15	120
Spec. Comb.	(0,0),(1,1),(2,2)		---	(0,0)	All Comb.	All Comb.
DECO	NO		YES	YES	NO	YES
Acq Prof	1024		---	512	16	960
Prof x Block	1024		---	512	240	960
Block x File	80		---	50	100	20
Rate(MB/h)	57.8MB/h		---	7.05MB/h	154.4MB/h	341MB/h
Transmisor	TOMCO A	ATRAD 3 y 4 (UP+DOWN)	TOMCO B	ONLY RX	ATRAD 4 DOWN	ATRAD 1 y 2 (UP+DOWN)
Potencia(Kw)	16	16	16	-	8	16
Control Ctrl2	SW=1 (activa ATRAD 3 UP)				SW=0	
Antena Tx	YAGI Oblicuas	Nd+Sd Nu+Su	Bistatic ROJ	---	Nd+Sd	Eu
Antena Rx	E: YAGI Oblicuas	C:Nd+Sd D:Nu+Su	Bistatic Paracas	Ch A (IMAGING)	A: Wd B: Ed	8 módulos (ver figura)

Tabla 1

Jicamarca Unattended Long-term Investigations of the Ionosphere and Atmosphere (JULIA)

Parámetros de JULIA EW (EEJ + 150km)

The figure displays three screenshots of the JULIA EW software interface, each showing a different tab of the 'Controller Parameters' window.

Parámetros del controlador de radar: This screenshot shows the 'Radar Controller Parameters' tab. It includes settings for Inter Pulse Period (IPP) with Inter Pulse Period (375 km, 2500 units) and Pulse RF (400 Hz). It also shows the Number of Pulse to transmit & Pulse Selection (Number of Periods (NTX) = 1, Select Pulses). There are sections for Line 2 (TX A), Line 3 (TX B), Line 4 (Code Entries), Line 5 (FLIP 1), and Line 6 (FLIP 2), each with Pulse Width and Duty Cycle settings. A section for Line 7 (Sample Windows Characteristics) includes Edit Sampling Windows and TXA Reference. At the bottom, there are Controller Settings, Special Settings, and Control Switches (TX, SW, CLOCK).

Parámetros de Procesamiento: This screenshot shows the 'Process Parameters' tab. It includes a checked 'Generate RASP (Radar System Parameters)' option with Rate (57.7909 MB/h) and Time per Block (56.32 seg). It shows Data Arrangement (Number of Samples in a Profile = 77, Blocks per File = 80), Number of Transmissions (NTX) = 1, Number of Acquired Profiles = 1024, Acqtime(seg) = 2.56, and Number of Profiles per Block = 1024. It also shows the Acquired Data Store Directory (D:\Data\Julia_EW-Bs&Imaging\Julia_EW\), Channel Selection (Number of Cards = 2, Number of Channels = 3), and Signal Pre-Processing (Type of Experiment = SPECTRA, Type of Data = FLOAT (4bytes), Coherent Integrations = 1, Integ. Slide = 1, Vrange = 600 m/s).

Parámetros de sistema: This screenshot shows the 'System Parameters' tab. It includes Schedule (Begin Time = 07:00, End Time = 18:00, Begin on Start checked), Hardware Parameters (PCI Bus Width = 32, ADC Resolution = 8, Synchros per Block = 1, Screen Refresh = 1 sec), and Send STATUS to FTP Server (checked) with Save STATUS and DATABLOCK (checked). It also shows Server (jro.igp.gob.pe), Remote (/users/database/on-line/), User (operaciones), File (status.bt), Password (*****), Interval (60), and RTI & Blocks (Generate RTI File, Send Block & RTI File, RTI Inc. Int. = 1).

Figura 21

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Parámetros de JULIA EW (ESF)

The figure displays three screenshots of the JULIA EW (ESF) software interface, showing different configuration panels:

- Parámetros del controlador de radar:** This panel shows radar controller settings. Key parameters include:
 - Inter Pulse Period (IPP): 937.5 km, 6250 units, Pulse RF (Hz): 160
 - Number of Pulse to transmit & Pulse Selection: 16
 - Line 2 (TX A): Pulse Width 0 km, 0 units, Duty Cycle 0 %
 - Line 3 (TX B): Pulse Width 3.75 km, 25 units, Delays: Delays
 - Line 4 (Code Entries): none, FLIP, CODE, Sampling, Synchro, Portions Spec
 - Line 5 (FLIP 1): none, FLIP, CODE, Sampling, Synchro, Portions Spec
 - Line 6 (FLIP 2): none, FLIP, Sampling, 256Divisor, Synchro, Portions Spec
 - Line 7 (Sample Windows Characteristics): H0km(units), NSA, DHkm(units), Last Height(units)
- Parámetros de Procesamiento:** This panel shows processing parameters. Key parameters include:
 - Generate RASP (Radar System Parameters): checked
 - Experiment Name: ESF-EW
 - Rate: 154.395 MB/h
 - Time per Block: 1.5 seg
 - Data Arrangement: Number of Samples in a Profile: 248, Blocks per File: 100
 - Number of Transitions (NTX): 16
 - Number of Acquired Profiles: 16, Acqtime(seg): 0.1
 - Number of Profiles per Block: 240
 - Acquired Data Store Directory: D:\Data\Julia_EW-Bs\imaging\Julia_EW\
 - Sub-Directory Per Day: checked, ExpName in Sub-Directory: checked
 - Alternative Data Directory: [empty]
 - Channel Selection: Number of Cards: 1, Number of Channels: 2, All Channels
 - Sequence: 1, Channel Sequence: 0,1, Ch -> Ant
 - Signal Pre-Processing: Type of Experiment: SPECTRA, Type of Data: FLOAT (4bytes)
 - Coherent Integrations: 1, Integ. Stride: 1
 - DeFlip Data: unchecked, Decode Data: TimeDomain, Post Coherent Integration: unchecked
 - Range: 240 m/s
 - Spectral Analysis: FFT Points: 16, Incoherent Integrations: 15
 - SpectralCombinations (Ch:A,B,C...): (0,0), (1,1), (0,1)
 - Save Channels DC: checked
- Parámetros de sistema:** This panel shows system parameters. Key parameters include:
 - Schedule: Begin Time: 18:00, End Time: 07:00, Begin on Start: checked
 - PCI Bus Width: 32, Save Data: checked
 - ADC Resolution: 8, Reset on each Block: unchecked
 - Synchros per Block: 1, View Raw Data: checked
 - Screen Refresh: 1 sec
 - Hardware Parameters: Digsonde Synchro Divided by: 1, Mark Width: 2 Samples
 - Acq. Hardware Configure File: dmasg_pprofiles_pch_64_pdig_6clk_jam
 - Generate Own Sampling Window: unchecked
 - Send STATUS to FTP Server: checked, Save STATUS and DATA LOCK: checked
 - Server: jro.jgo.gov.pe, Remote: /users/database/on_line/
 - User: operaciones, File: status.bd
 - Password: [masked], Interval: 60
 - RTI & Blocks: Generate RTI File: unchecked, Send Block & RTI File: unchecked, RTI Inc. Int.: 1
 - Process Ranges: Profiles Range: H0km, NSA, DH
 - Process Samples: [empty]
 - Profiles to Join: 1, Profiles to Split in: 1

Figura 22

Jicamarca Unattended Long-term Investigations of the Ionosphere and Atmosphere (JULIA)

Parámetros de IMAGING

The figure displays three screenshots of the 'Controller Parameters' software interface, organized into three columns:

- Left Column: Parámetros del controlador de radar**
 - Radar Controller Parameters:** Inter Pulse Period (IPP) set to 937.5 km, 6250 units, Pulse RF (Hz) 160. Number of Pulse to transmit & Pulse Selection: Number of Periods (NTX) 16. Line 2 (TX A) Pulse Width 84 km, 560 units, Duty Cycle 8.96%. Line 3 (TX B) Pulse Width 1.5 km, 10 units, Delays checked. Line 4 (Code Entries) none selected. Line 5 (FLIP 1) none selected. Line 6 (FLIP 2) Sampling selected, Edit Sampling Windows: Window 1: 10.35 km, 1, 0.15 km. Line 7 (Sample Windows Characteristics) Edit Sampling Windows: W1: 0km(0), 625, 1.5km(10), 936km(5240).
 - Controller Settings:** Samplig Reference: Middle Of Sub-baud. Special Settings: Sync Delay (µs) 0, Time Before (µs) 12, Time After (µs) 1. Control Switches (Ctrl1, Ctrl2): CLOCK, Clock in 1 Mhz, div 0, 1 Mhz.
- Middle Column: Parámetros de Procesamiento**
 - Process Parameters:** Generate RASP (Radar System Parameters) checked. Rate 2.82297 GB/h. Experiment Name julia. Time per Block 1.5 seg.
 - Data Arrangement:** Number of Samples in a Profile 625, Blocks per File 20. Number of Transmissions (NTX) 16, Profiles for 1/4 Ffo. Number of Acquired Profiles 480, Acqtime(seg) 3, 48. Number of Profiles per Block 480, Read 1/4F, force 1/4F.
 - Acquired Data Store Directory:** F:\data\JULIA_EW-be\imaging\imaging. Sub-Directory Per Day and ExpName in Sub-Directory checked.
 - Channel Selection:** Number of Cards 2, Number of Channels 8, All Channels. Sequence 0,1, Channel Sequence 0,1,2,3,4,5,6,7, Ch -> Ant.
 - Signal Pre-Processing:** Type of Experiment SPECTRA, Type of Data FLOAT (4bytes), Coherent Integrations 1, Integ. Stride 1. DeFlip Data unchecked, Decode Data checked, Freq Domain selected, Post Coherent Integration unchecked, Vrange 240 m/s.
 - Spectral Analysis:** FFT Points 8, Incoherent Integrations 30, SpectralCombinations (Ch:A,B,C...) 0 0, Add, Replace, Delete, All SPC_Comb, Save Channels DC checked.
- Right Column: Parámetros de sistema**
 - System Parameters:** Schedule: Begin Time 18:00, End Time 07:00, Begin on Start checked.
 - Echotek Parameters:** Save Data checked, Reset on each Block unchecked, View Raw Data checked. SysClk (MHz) 0, EchClk (MHz) 0, Fd (MHz) 0. FTW 0, FREQ 0, Fr (MHz) 0.
 - Hardware Parameters:** Digisonde Synchro Divided by 0, Mark Width No Mark. Acq. Hardware Configure File dmasp_pprofiles_pch_64_pdig_6clk_jam.
 - RTI & Blocks:** Generate RTI File unchecked, Send Block & RTI File unchecked, RTI Inc.Int. 1.
 - Process Ranges:** Profiles Range H0(Km) NSA DH. Parallel Processes: Parallel Processes.
 - Profiles to Join:** 1. Profiles to Split in: 1.

Figura 23

Jicamarca Unattended Long-term Investigations of the Ionosphere and Atmosphere (JULIA)

7. Procedimiento de toma de datos

- I. Configuración de equipos
 - a. Encender equipo multiplicador de frecuencias: Este equipo genera 60 MHz a partir de los 10 MHz de la Digisonda.
 - b. El DDS no necesita programación, debido a que está configurado por defecto con la frecuencia que opera el radar principal.
- II. Experimentos
 - a. Experimento: JULIA_EW (PC Zeus)

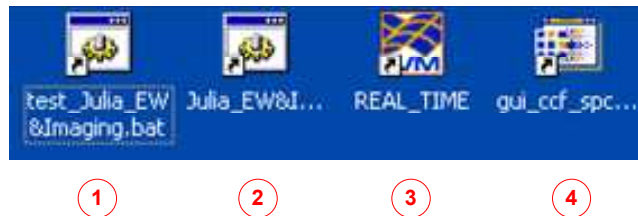


Figura 24

1. Para realizar el test del experimento JULIA_EW+Imaging&Bs, hacer doble click en el icono.
2. Para iniciar la adquisición del experimento JULIA_EW+Imaging&Bs, hacer doble click en el icono.
3. Para iniciar el procesamiento en Real Time del experimento JULIA_EW+Imaging&Bs, hacer doble click en el icono.
4. Para enviar los datos del experimento al servidor, hacer doble click en el icono y luego en "start".

Jicamarca Unattended Long-term Investigations of the Ionosphere and Atmosphere (JULIA)

La Figura 25, 23 y 24 muestran los pulsos para el experimento JULIA_EW:

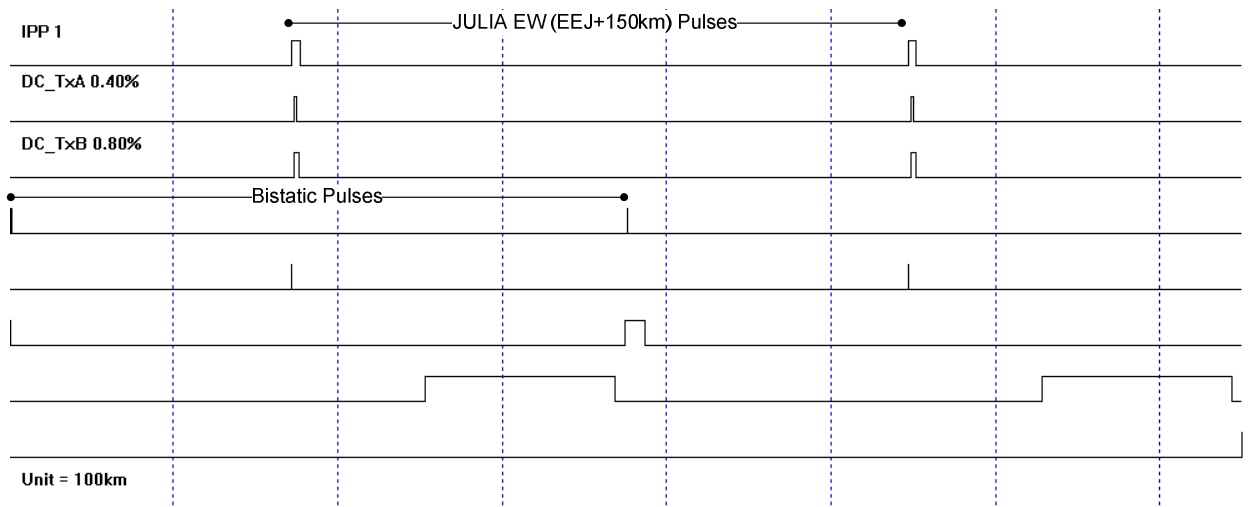


Figura 25 Pulsos de JULIA EW (EEJ+150km) y Bistatic, HORARIO → 07:00 – 18:00

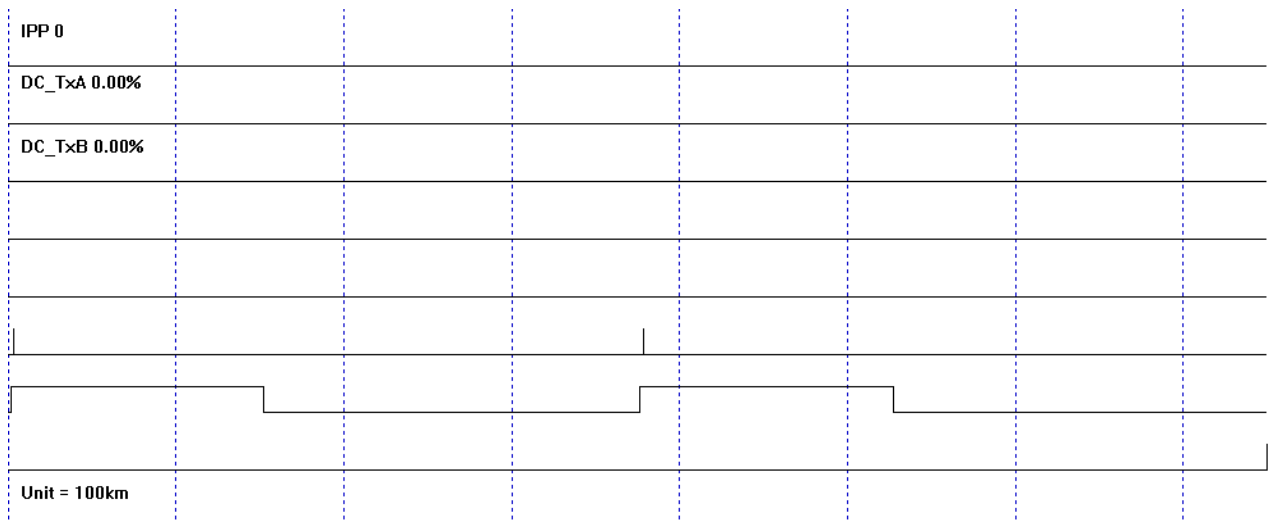


Figura 26 Pulsos de Monitor Bistatic, HORARIO → 07:00 – 18:00

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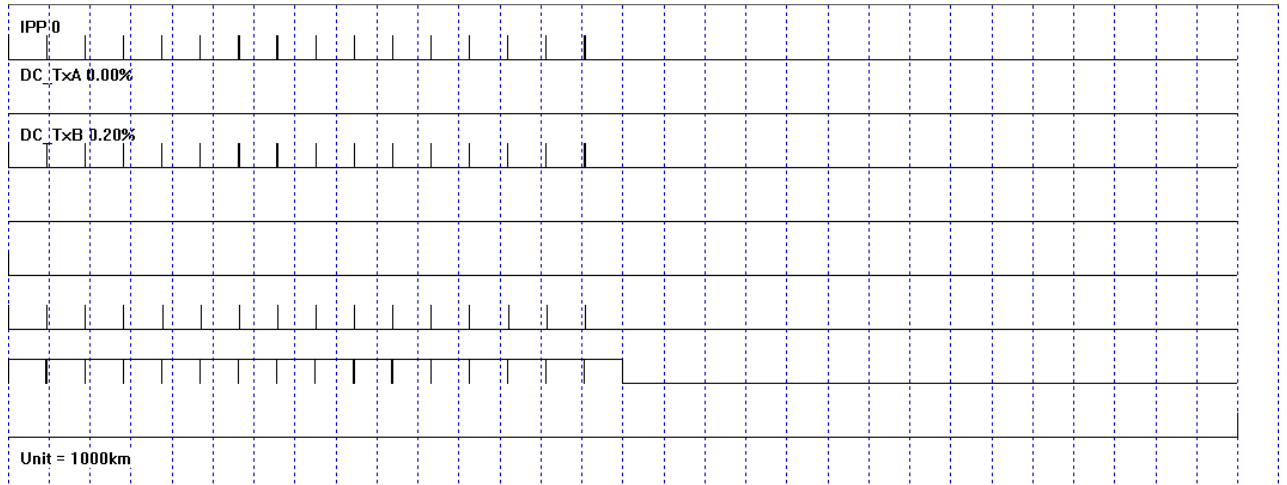


Figura 27 Pulsos de JULIA EW (ESF), HORARIO →18:00 – 07:00

b. Experimento: IMAGING (PC JARS)



Figura 28

1. Para encontrar los datos del experimento IMAGING, hacer doble click en el icono.

2. Para encontrar los datos del experimento BISTATIC, hacer doble click en el icono.

3. Hacer doble click en el Batch para correr el programa de adquisición Test.

4. Hacer doble click en el Batch para correr el programa de adquisición de Imaging.

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La **Figura 29** muestra los pulsos para el experimento IMAGING:

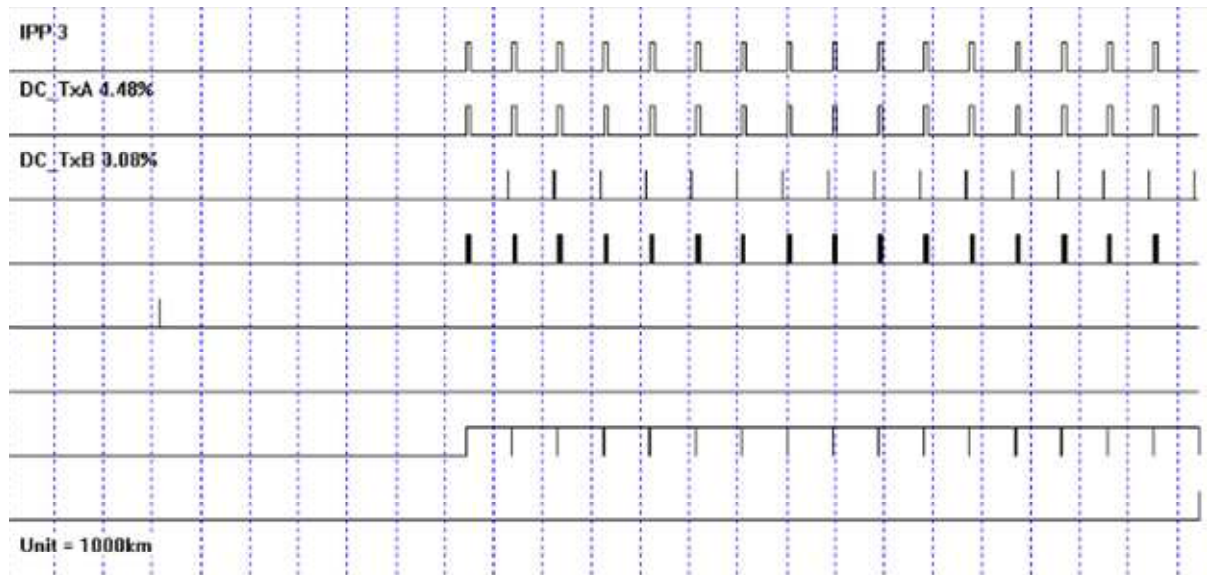


Figura 29 Pulsos de Imaging, HORARIO →18:00 – 07:00

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8. Datos procesados

i. Experimento Julia_EW

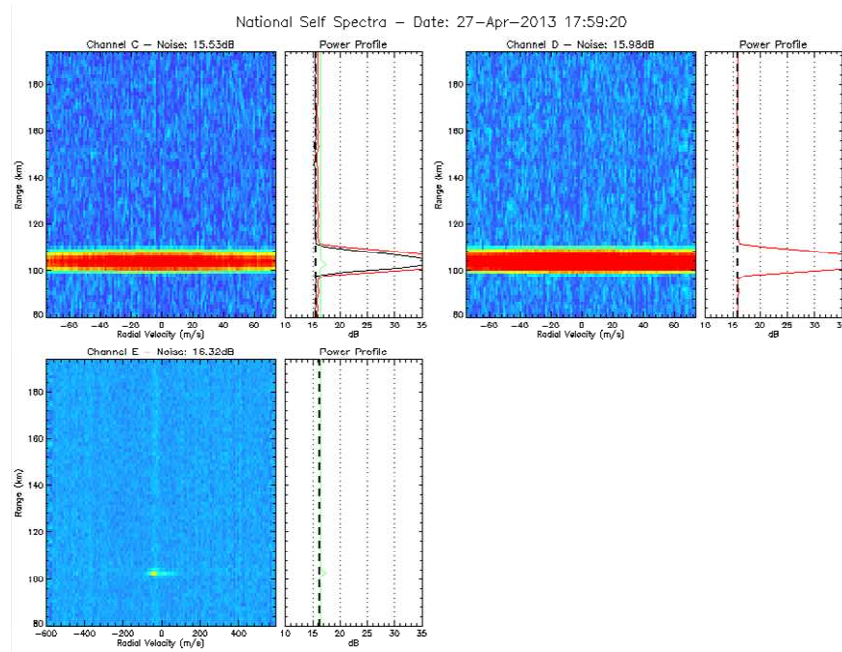


Figura 30 Gráfico de Spectros de JULIA EW (EEJ+150km), HORARIO → 07:00 – 18:00

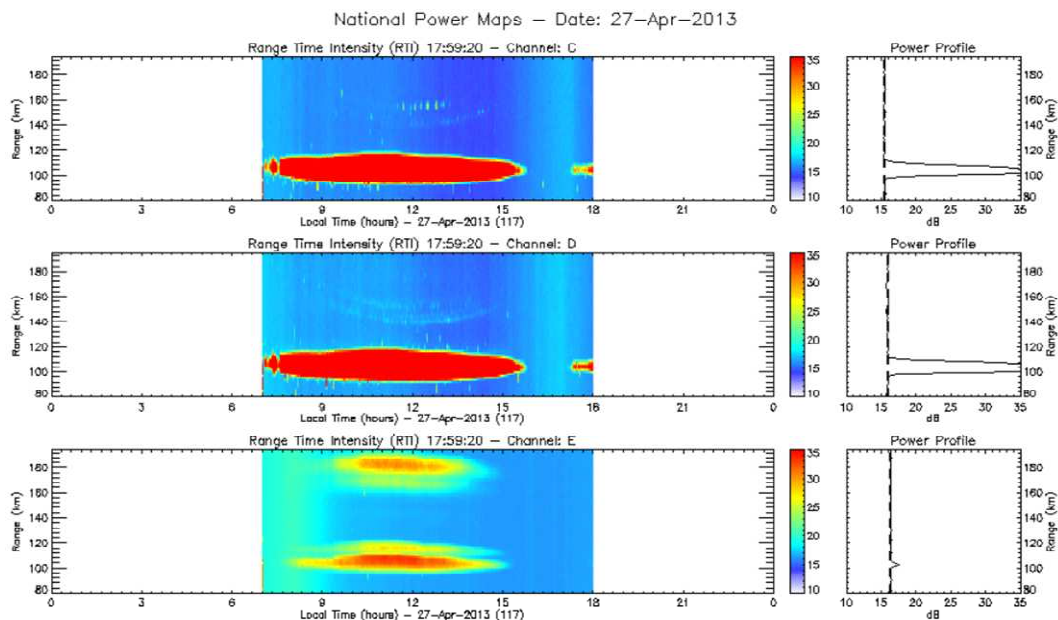


Figura 31 Gráfico de RTI de JULIA EW (EEJ+150km), HORARIO → 07:00 – 18:00

Jicamarca Unattended Long-term Investigations of the Ionosphere and Atmosphere (JULIA)

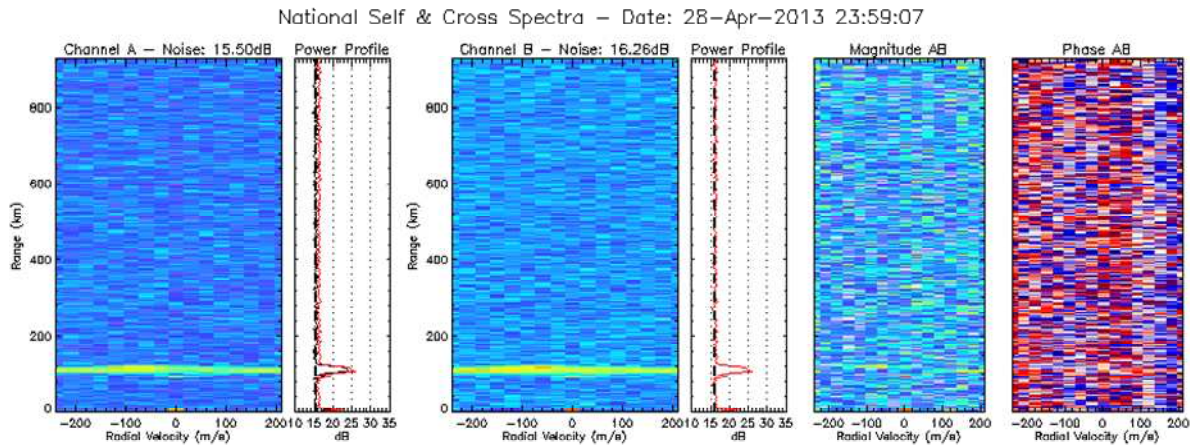


Figura 32 Gráfico de Spectros de JULIA EW (ESF), HORARIO → 18:00 – 07:00

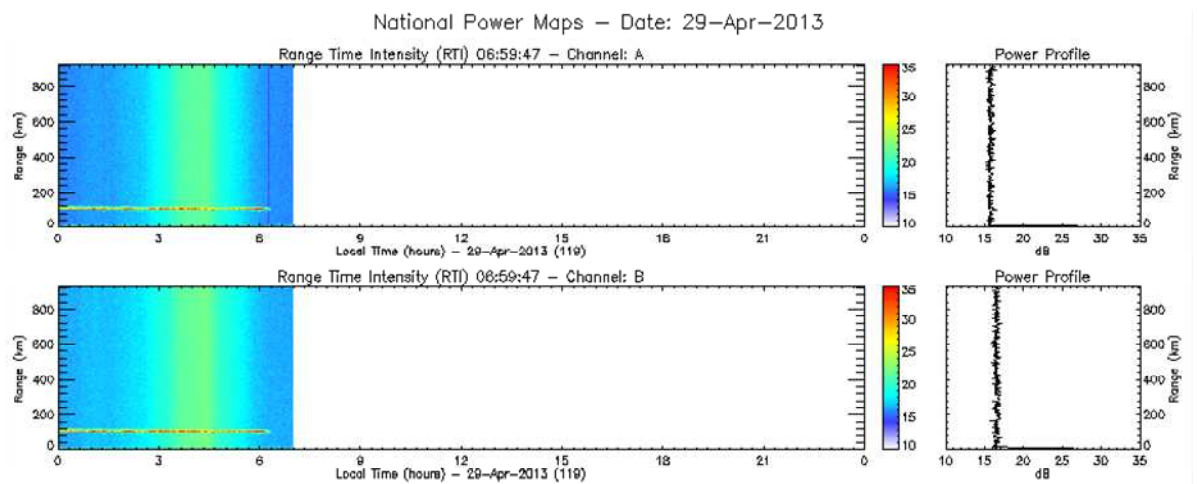


Figura 33 Gráfico de RTI de JULIA EW (ESF), HORARIO → 18:00 – 07:00

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ii. Experimento Imaging

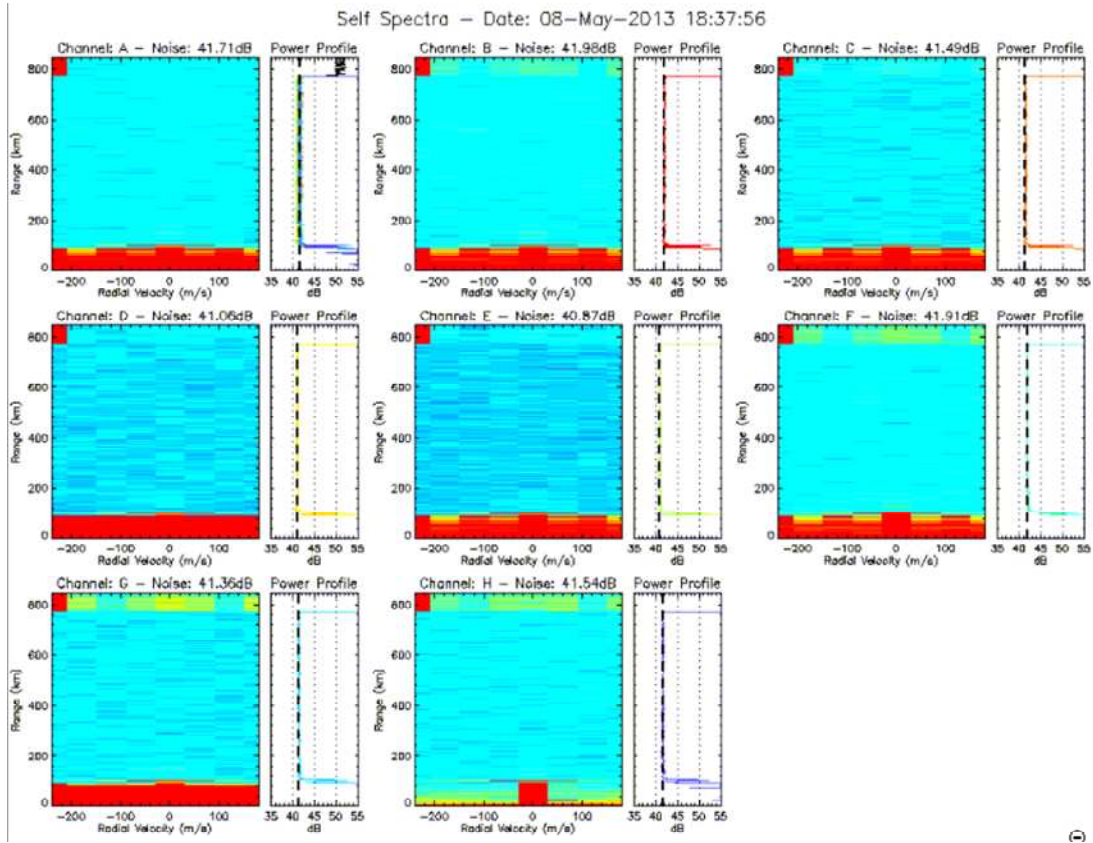


Figura 34 Gráfico de Spectros de Imaging, HORARIO → 18:00 – 07:00

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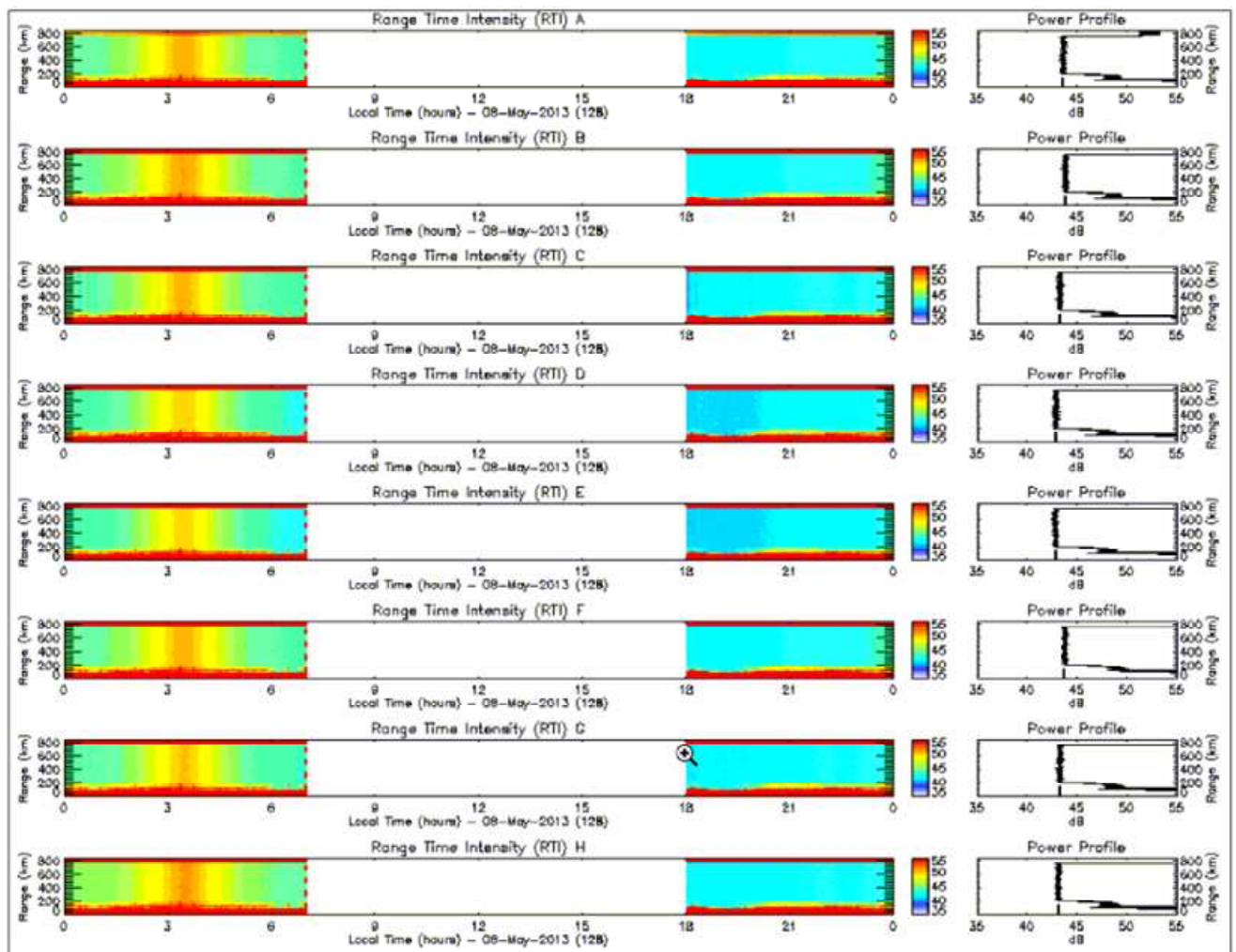


Figura 35 Gráfico de RTI de Imaging, HORARIO → 18:00 – 07:00