NASPI Planning Implementation Task Team

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October 5, 2010

Agenda

1. NASPI PITT Workplan
2. Baselining Power System Performance
3. Synchro-phasor Data Validation
4. Ian Dobson's presentation

1. Planning Workplan

- Align with the needs of SGIG projects
- Workplan
  1. Baselining of Power System Performance
  2. System Model Validation
  3. Load Characterization
  4. Data Mining and Event Detection
  5. Sycnhro-Phasor Data Validation
- Presented to NERC PC

2. Power System Performance Baselining

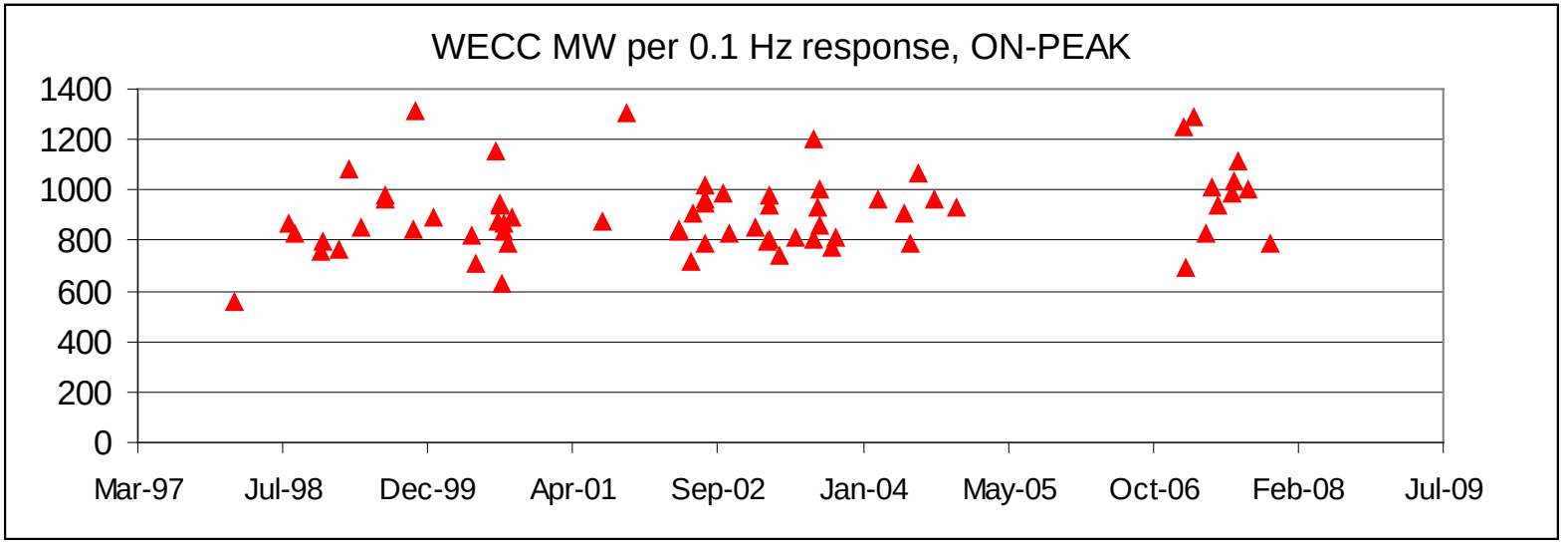
- Phase angles across an interconnection
- Frequency response
  - pre-disturbance, dip and settling frequency, time of minimum dip, size of generation event, etc
- Power Oscillations
  - frequency, damping, energy, mode shapes
- Voltage stability and power-angle sensitivities
- …

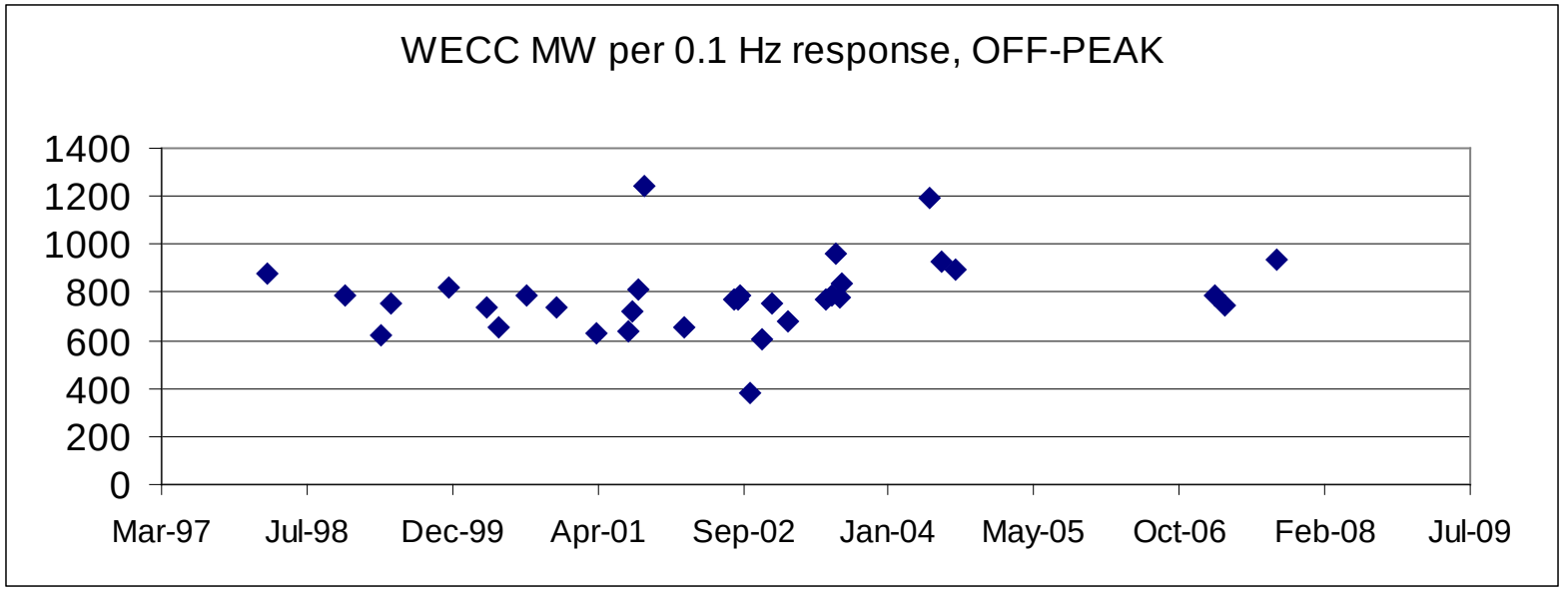
Western Interconnection Baselining

Phase Angle Baselining

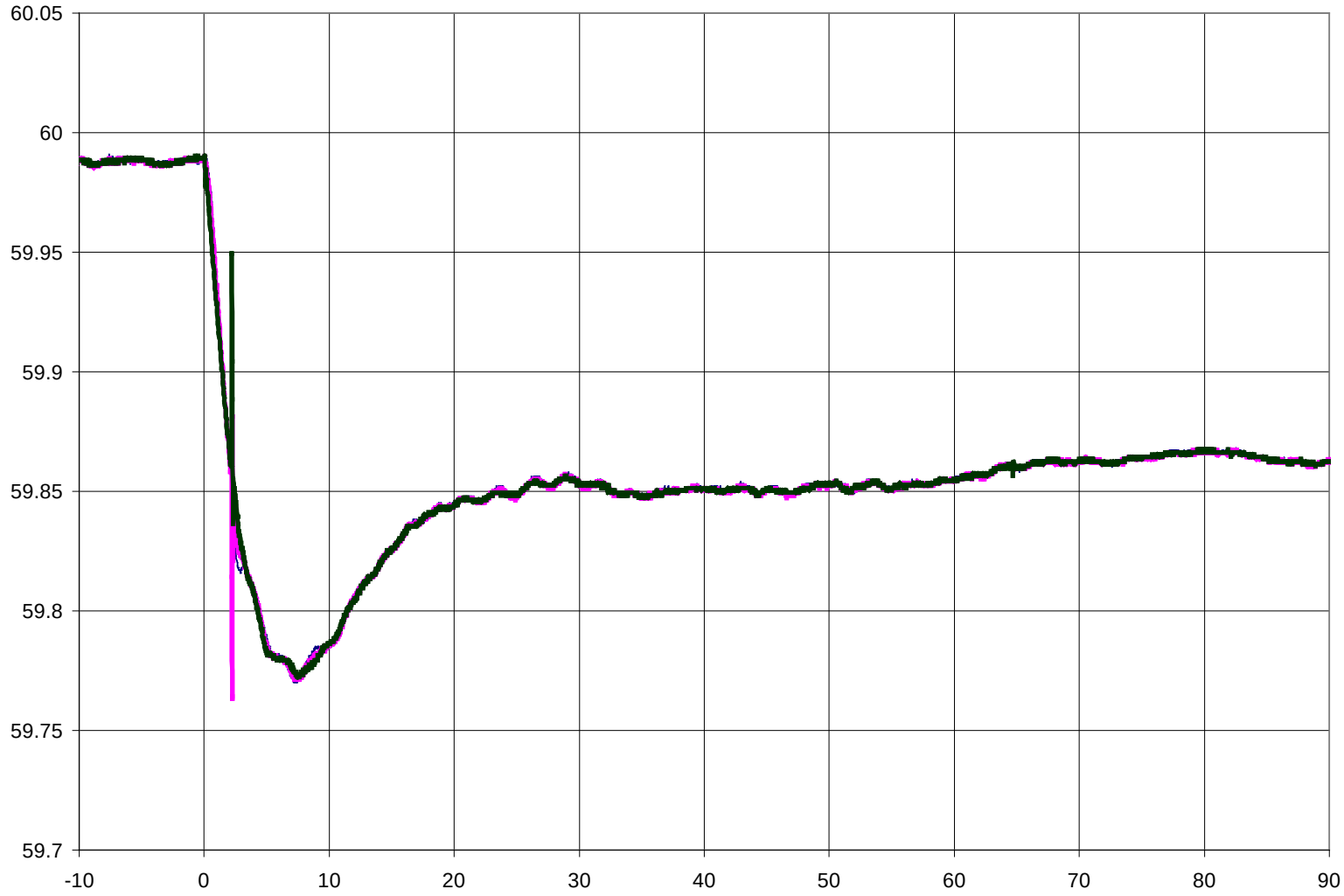
- No work is currently done for 2010
- Need to define phase angle clusters (look forward to Ian Dobson's talk)
- Need to develop a tool that generates monthly baselining reports

Frequency Response Baseline for the Western Interconnection

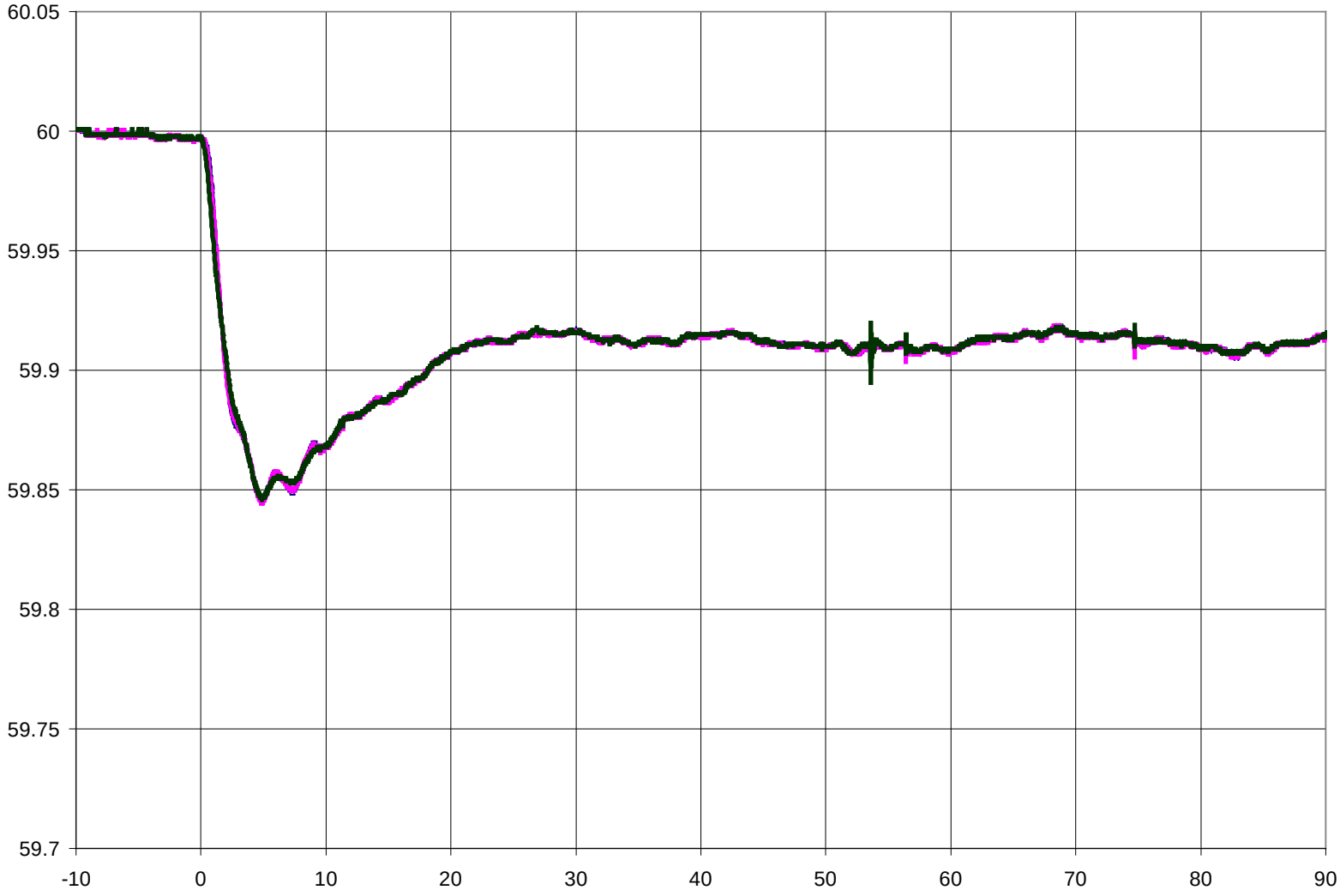




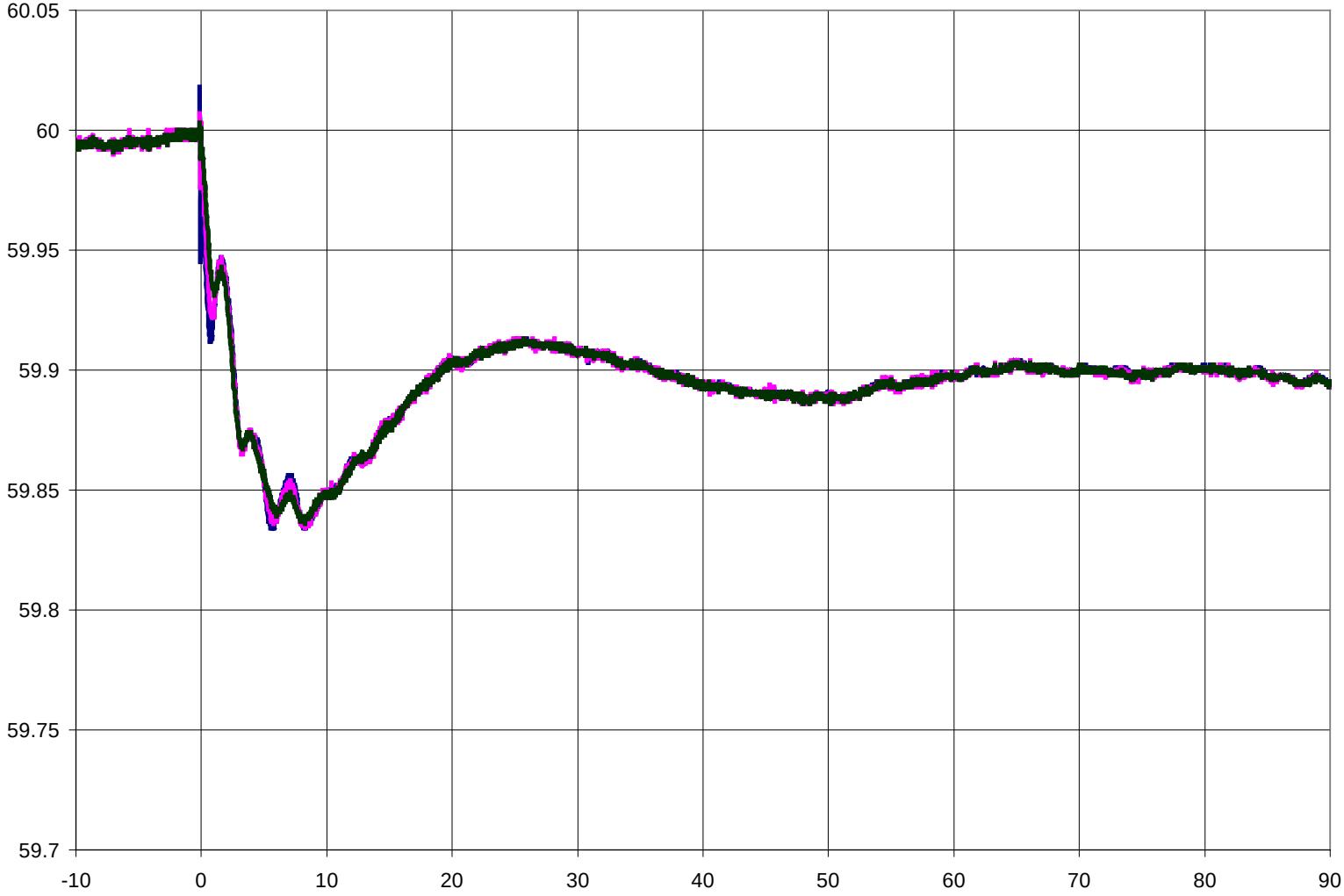
Intermountain Power Plant Outage, June 5 2010
1,900 MW



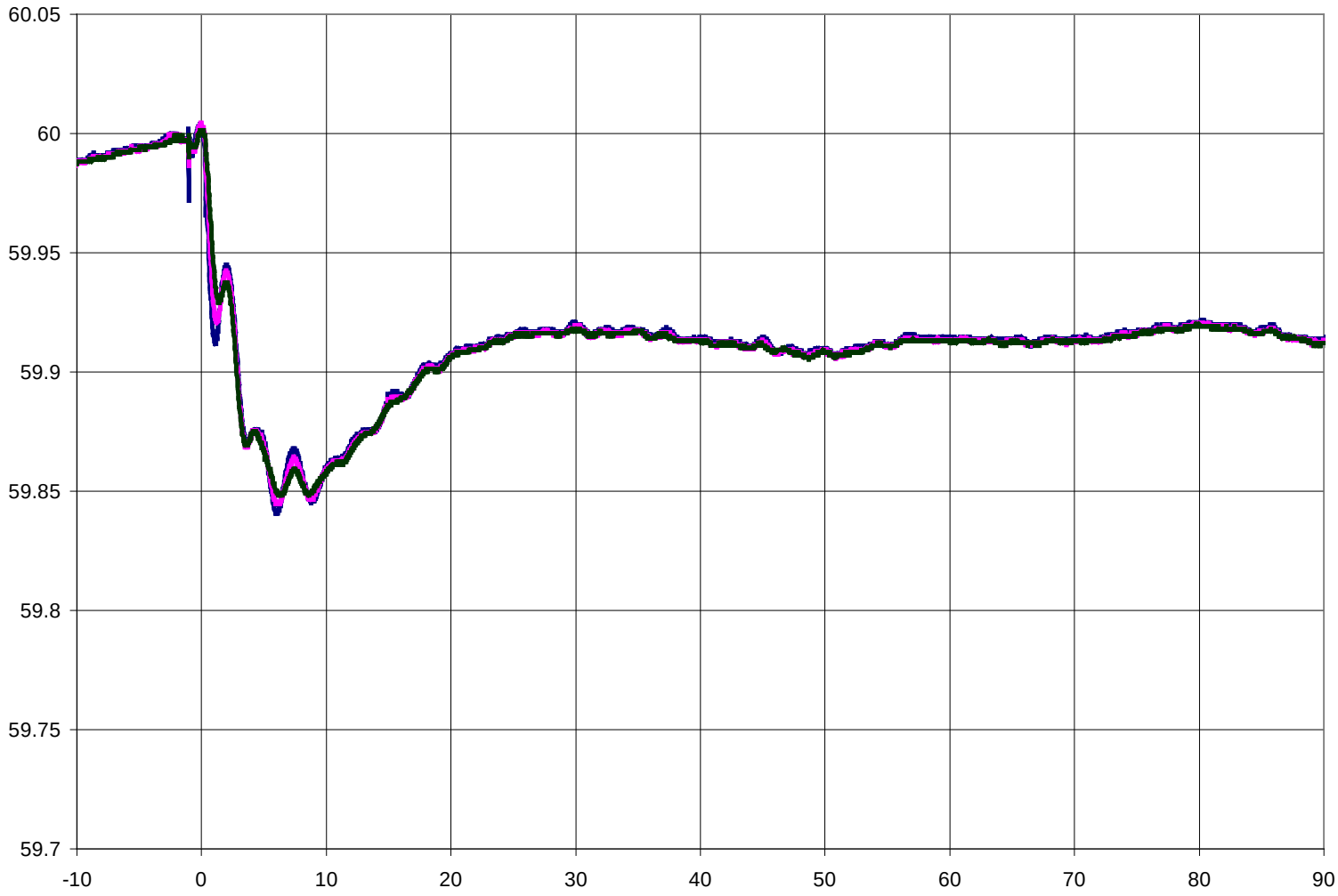
Palo Verde Unit Outage, June 18 2010
1,334 MW



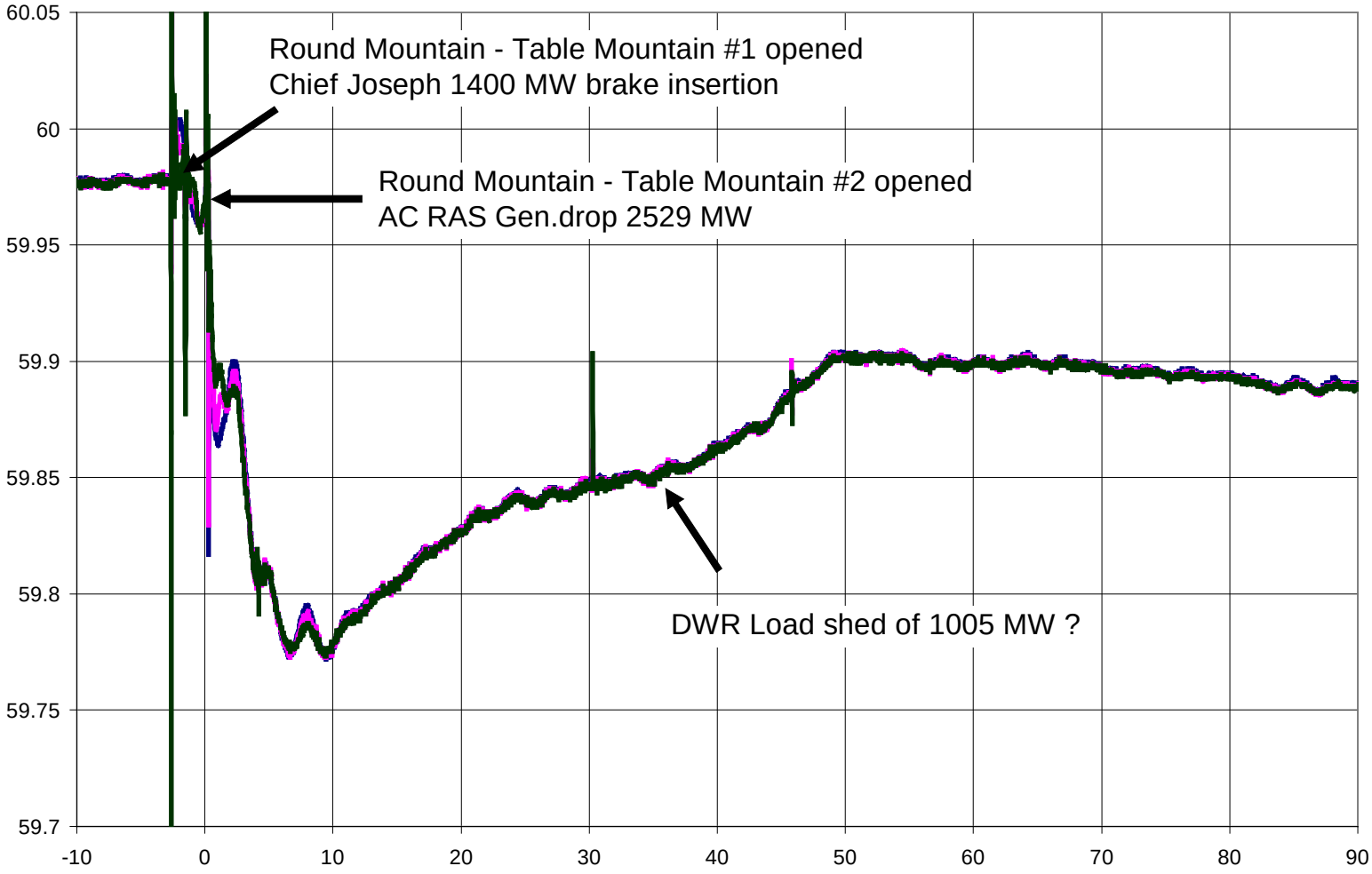
Relestoke Plant Outage, June 23 2010
1,470 MW



Relestoke Plant Outage, June 23 2010
1,430 MW



RAS Event, September 27 2010
2,529 MW generation, 1005 load



Frequency Response Summary

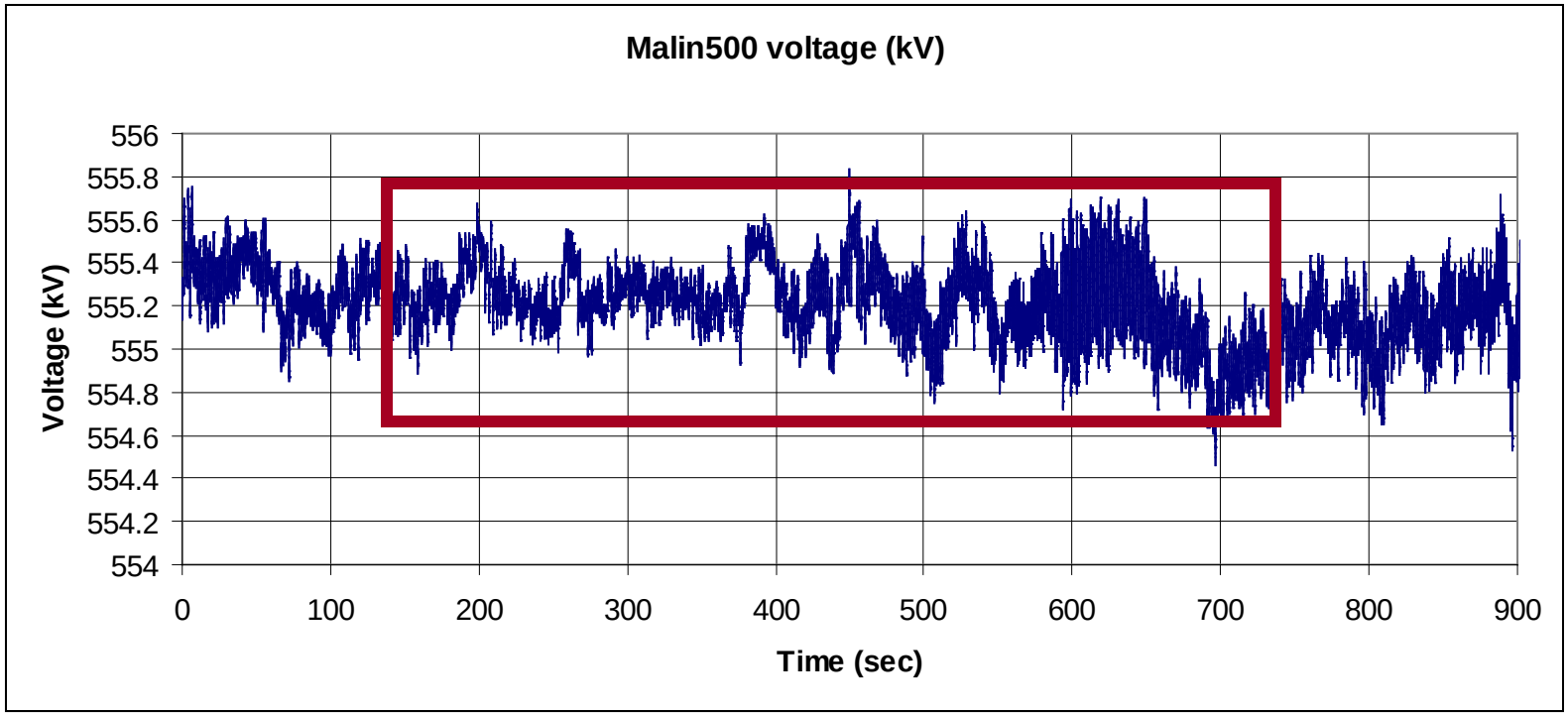
Date	Time	Event Information	Disturbance Size (MW)	Load Loss (MW)	**MW/0.1 Hz @ Min. Frequency**	**MW/0.1 Hz @ 30 seconds**	Initial Frequency (Hz)	Minimum Frequency (Hz)	Frequency at 30 seconds (Hz)	WECC Total Generation (MW)
2010-06-05	10:18	Intermountain 2-unit simultaneous outage	1900		**872**	**1357**	59.99	59.772	59.85	103,011
2010-06-18	8:07	Palo Verde U1 outage	1334		**883**	**1647**	59.997	59.846	59.916	100,989
2010-06-23	12:45	Revelstoke plant outage	1470		**942**	**1652**	59.997	59.841	59.908	119,771
2010-06-23	14:13	Revelstoke plant outage	1430		**941**	**1723**	60.002	59.85	59.919	122,046
9/27/2010	14:52	AC RAS gen.drop	2529	1005	**1240**	**1931**	59.978	59.774	59.847	
		NORM-ON PEAK*			**800 to 1,050**	**1,400 to 2,000**				
		NORM OFF-PEAK*			**650 to 920**	**1,200 to 1,500**				
		DESIGN	**2,800**		**560**	**1120**	**60**	**59.5**	**59.75**	

* Consider using total generation rather than time of day as an indicator

Oscillations Baselining

- Mode Meter estimates damping of inter-area power oscillations from ambient noise data

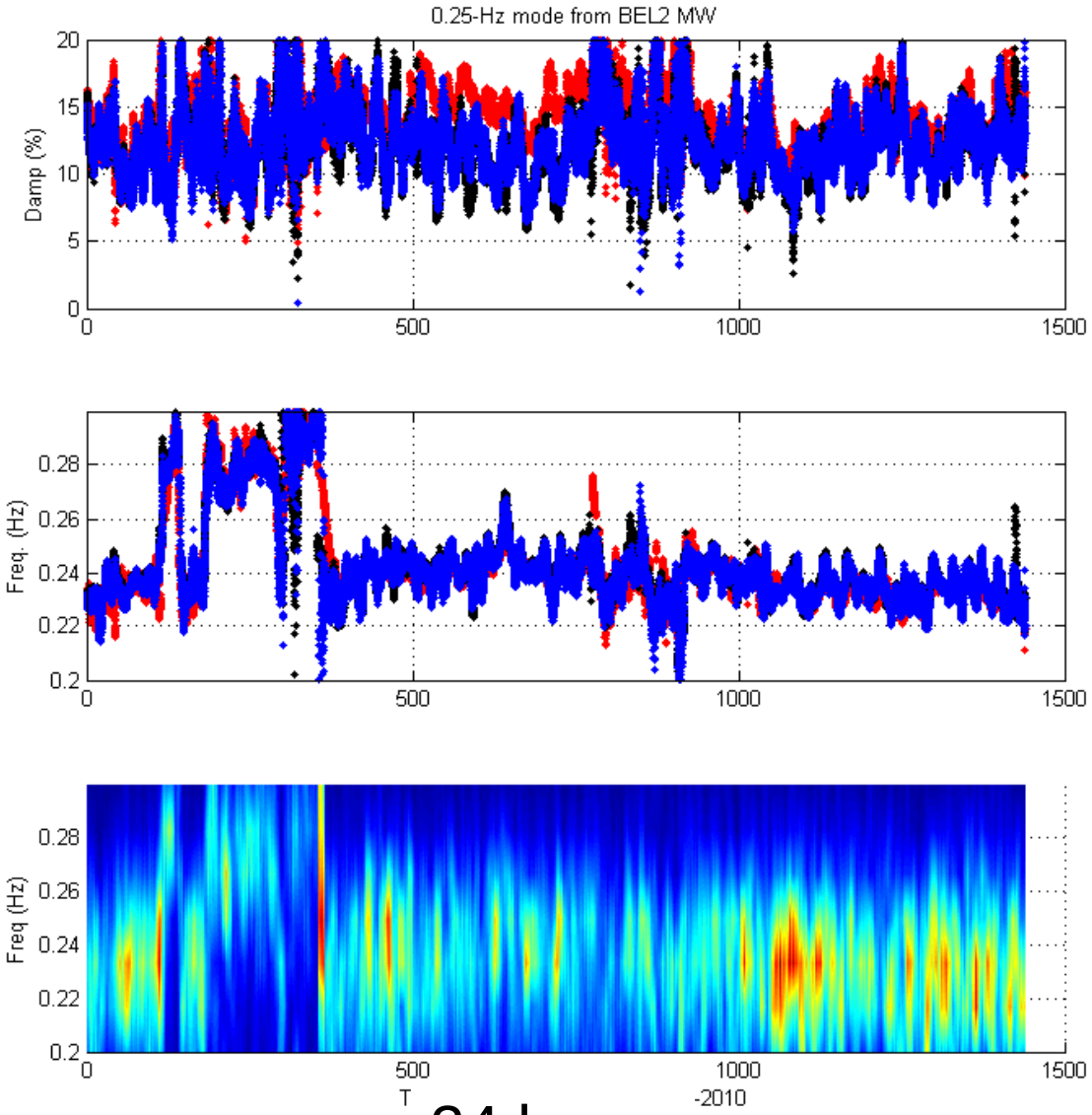
2kV



Oscillations Baselining

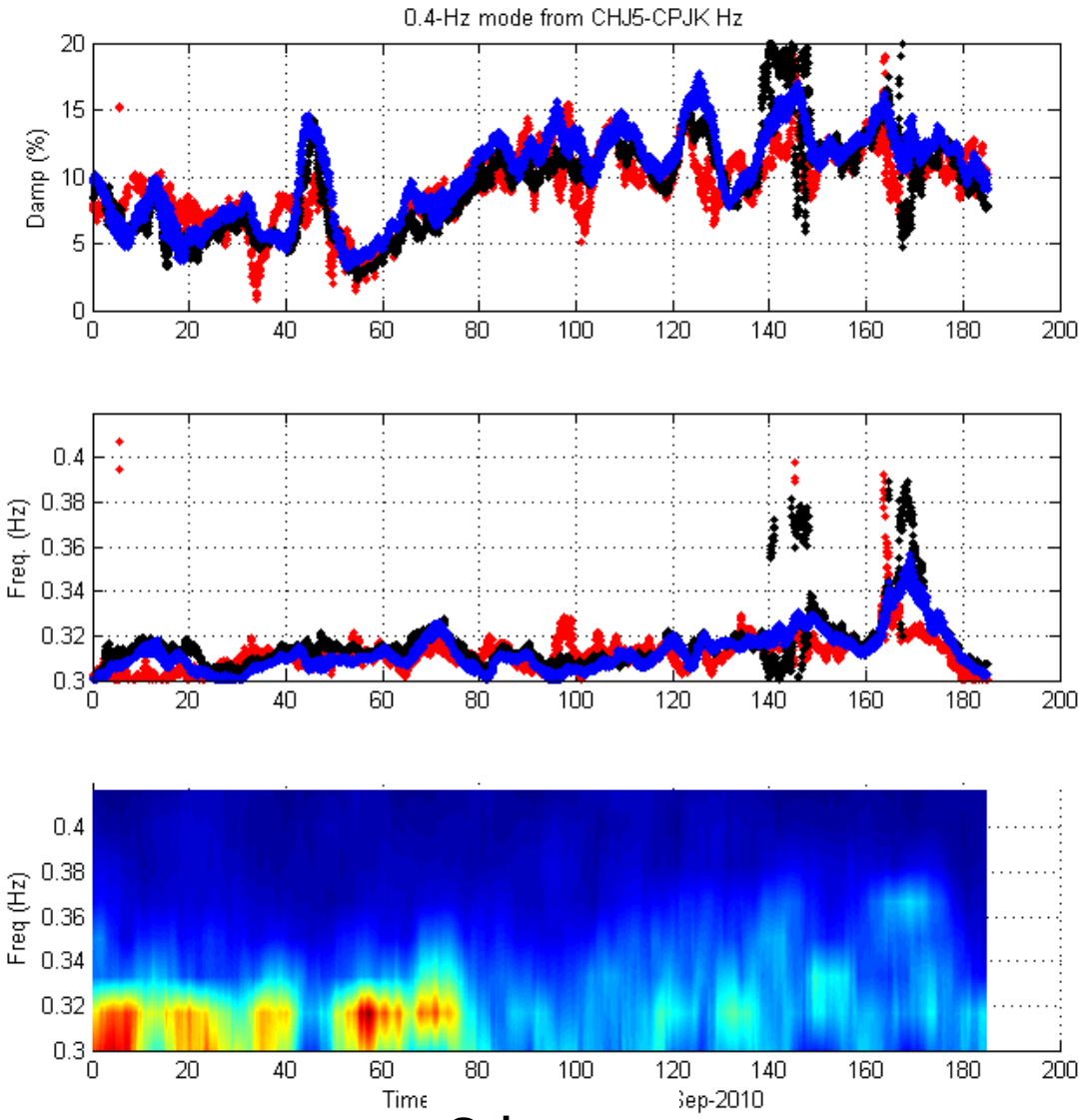
- Dan Trudnowski did the original oscillation baselining for 2008 season
  - Reported at NASPI meeting in Vancouver
- A baselining tool is installed in BPA lab in May 2010
  - Many unusual operating conditions during 2010

WECC Open Loop Operation – July 29, 2010



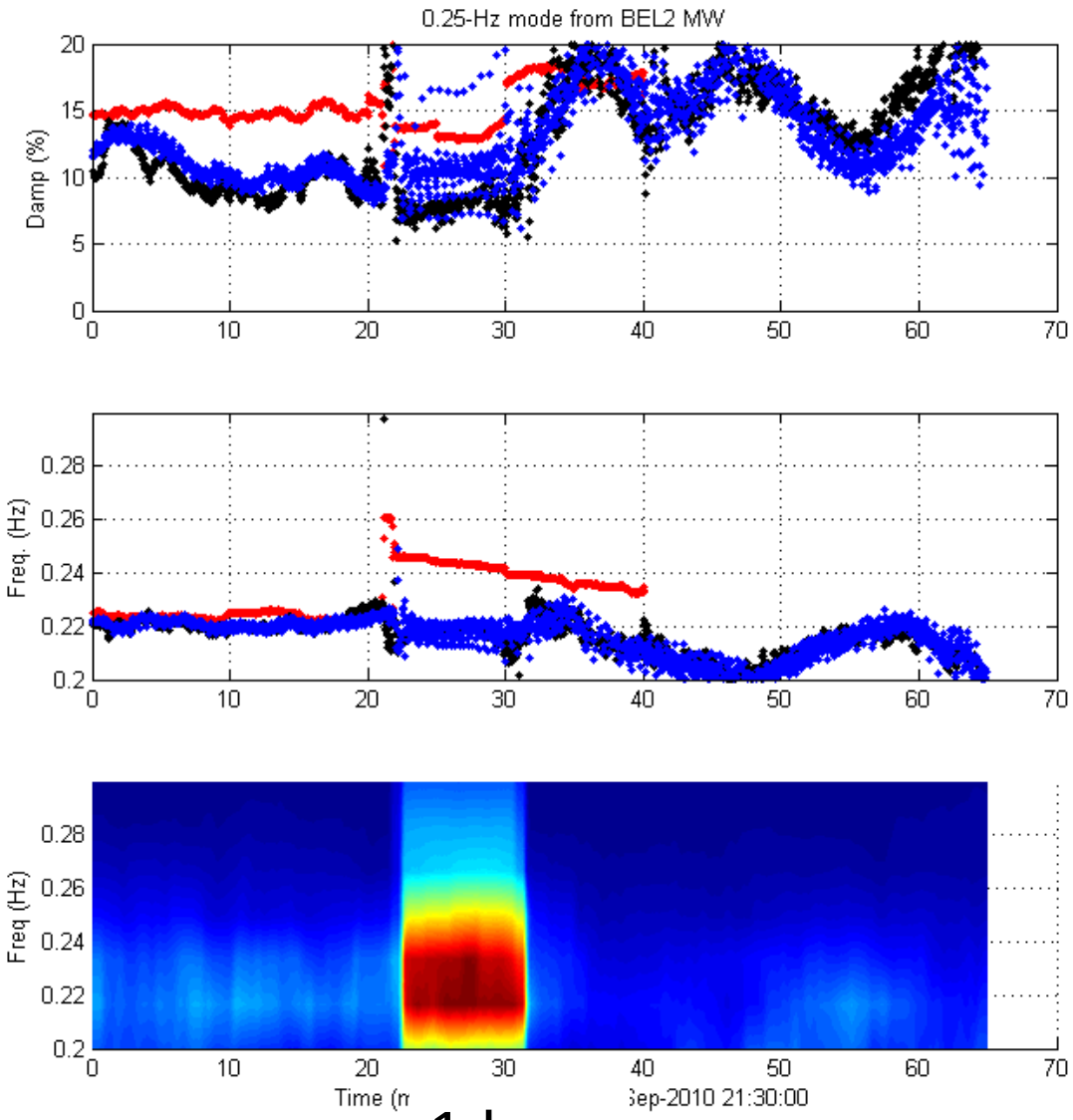
24 hours

Alberta separated – September 2, 2010



3 hours

Round Mt – Table Mt DLL – September 27, 2010



1 hour

Oscillations Baselining – 2010

- Observations
  - Greater variability in oscillation damping and frequency on daily scale compared to 2008
    - Trying to understand the reasons
  - Significantly less consistency in damping estimates (5% to 20% swings over 20 min period)
    - Need to understand the performance issues
- Need to develop a tool that generates monthly baselining reports
- Take a closer at the unusual operating conditions

3. Synchro-Phasor Data Validation

- PMU data can be corrupted, and the data quality flags may not be able to tell you that
- How to make sure that the synchro-phasor data can be trusted for real-time applications – operator alarms or automated controls ?
- The data can look “unusual” because (a) the data is corrupted or (b) the system goes through a disturbance. How can we tell the difference ?

Ian Dobson