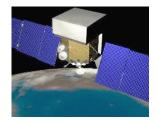


Data Acquisition System Simulation Requirements

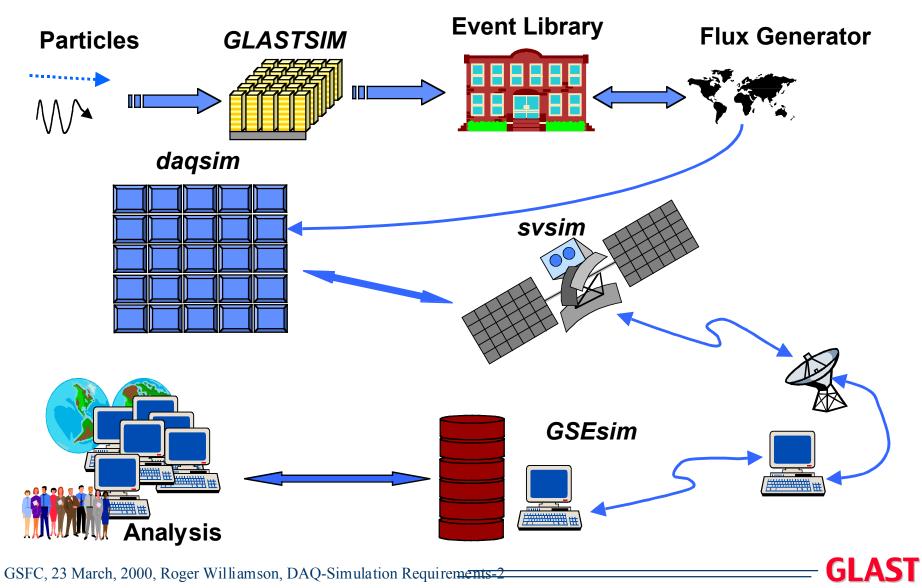
Roger Williamson GSFC March 22, 2000

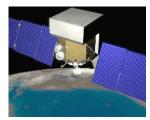


GLAST



DAQ Simulation Model

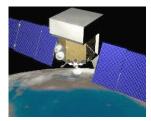




DAQ Simulation Model Elements

GLA

- Particle Library --- Representative particles
- GLASTSIM
 - -16 tower instrument
 - -In future add detector noise, performance models
- Event Library
 - -Hit addresses
 - -Pulse heights
 - -Particle data: input/output
- Flux generator --- Cosmic ray model, celestial gamma ray, gamma ray burst, Poisson statistics, orbit time variation
- daqsim --- Simulates DAQ
- svsim (Space Vehicle)
- gsesim (Ground data systems)
- Analysis

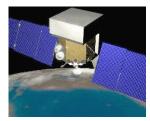


DAQ Simulation Flux Generator

- Event library input
- Real world models for
 - Cosmic rays
 - Celestial gamma rays
 - Gamma Ray Bursts
- Poisson statistics generator for time dependence
- Orbit model
 - Long term and orbit average dependence
 - Used to generate average power requirements where power is event rate dependent

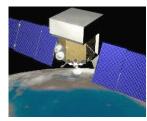
GI A

- Test particle selector for special studies
 - Heavy ion effects
 - Inter-tower gaps



DAQ Simulation Event Library

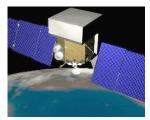
- Events cover the range of *Flux Generator* requirements
- Simulation output
 - Particles: primary/secondary, type, energy, dE/dx, true track
 - Hit addresses, Fast-OR, TOT
 - Energy deposition and location for CAL log hits
 - CAL ADC, 4 channel and discriminator outputs
 - ACD energy deposition, and location
 - ACD discriminator outputs and PHA ADC values



DAQ Simulation Requirements Doc

- Subsystem --- what subsystem is simulated
- Inputs --- what are the inputs to the simulation model
- Outputs --- what are the simulation data outputs to the next simulation element
- Metrics --- end result for this portion of the model (e.g. power consumption, memory usage, data flow rates)
- Description of the model including purpose
- Range --- the range of elements for input, output, modeled
- Resolution --- of the data elements (e.g. 12 bit PHA)
- Options --- describe the options for architecture, component selection,...



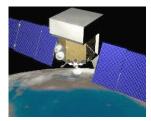


Why?

GI A

- DAQ readout simulations to size the bandwidth and model the function
- Establish the noise input to the DAQ (ACD veto noise, ...)
- Define, develop, test Level 1 Trigger
- Define, develop, test Level 2/3 Trigger
- Determine CPU cycles required per event
- Determine electrical power required
- Determine bandwidth requirements
- Input to TKR, CAL X, Y orientation proposal
- Provide realistic data challenge to analysis programs





Issues

GLAST

- Two strip hits in TKR simulations
- Non-L1T events should be included in library
 - ACD Veto activity
 - Increased TKR hits and CAL noise
- Addressing scheme should match DAQ readout format
- Tracker and Calorimeter X,Y orientation

