**Testing harness   
Version 0.2  
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This system is designed to provide a comparison between the output for models of telescope performance vs calibration data from real telescopes

**Dependencies:**

Refers to:   
DreamBeam\_Source\_Data\_Description\_0\_1.docx   
ACC\_Source\_data\_description\_0\_0.docx  
ACC\_to\_CSV\_converter\_0\_0.docx  
ACC\_CSV\_Converter.py  
Comparison\_Module\_0\_1.docx

**Abstract**

The output from the model and from the real observation are extracted from their respective source formats and converted into a common format if needed. Once in this common format, the two datasets are compared by means of a modular comparison system to produce an output which provides one or more figures of merit regarding the fit of the model to the real data.

**Design diagram**

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**dreamBeam**

**Real Telescope**

**1.1 dreamBeam File**

**Telescope Output File**

**Common Format Files**

**1.2 dreamBeam Converter**

**Telescope Converter**

**Noise mitigation module**

**Comparison Module**

**Comparison Result**

**The inputs may be made to common data type in an upcoming version, eliminating the need for the converter**

**The nature of this feature is dependent on the noise characteristics of the input data to be used.**

Figure : Design of the testing harness system

**Operation**

1. Data is provided by the predefined DreamBeam system and converted to a common format
   1. DreamBeam data is currently stored in proprietary format(s) described in (DreamBeam\_Source\_Data\_Description\_0\_1.docx)
   2. This is converted by a process defined in (to be developed – may be modified output from Dreambeam) into the common format for comparison between instrument and model data (probably CSV)
      1. *Further manipulations may be carried out as an optional feature.*
2. Data from a telescope is converted from its current format to a suitable common format
   1. Data is provided by telescopes in proprietary format(s) described in ACC\_Source\_data\_description\_0\_0.docx (ACC files do not dovetail well with DreamBeam outputs – need to consult with TCD to discuss most suitable inputs)
   2. This is converted by a process similar to that described in ACC\_to\_CSV\_converter\_0\_0.docx such as ACC\_CSV\_Converter.py into the common format for comparison between instrument and model data (currently CSV format)
   3. It is necessary to put a moving average or some other smoothing here to reduce the impact of scintillation and other sources of noise, as these will attribute errors to the model which are caused by factors other than the model.
3. Data in the common format is compared between model and test, and an evaluation of the accuracy, error and other comparisons between the two datasets is carried out.
   1. Data in the common dataset (currently CSV format)
   2. A module similar to that described in Comparison\_Module\_0\_1.docx such as prototype\_comparison\_module\_1d\_0\_0.r compares the data from real and model sources by calculating the difference, correlation and RMSE (this can be extended) to define a figure of merit
   3. Future element: calculate this figure of merit for each value of the independent variables in the parameter space such as
      1. Model
      2. Station
      3. frequency (or Frequency Band)
      4. Time (of Day and of Year)
      5. Target
   4. Future element: map the variance of the response of the system by Alt-Azimuth instead of tracking against a single target over time
   5. Output is produced in a suitable format. Initial elements include
      1. PNG File plotting model vs real
      2. PNG File plotting difference
      3. Text output of RMSE
      4. Text output of correlation
   6. Future element: a series of plots of how the figure of merit varies against independent variables in the parameter space above.