Modular QA/QC Outline Document

Introduction

The QA/QC system is a complete system to provide traceability from the original analogue measurement through to a final product (radiance, reflectance, vegetation index or higher level). The operations in any level processor can be broken down into fundamental modules, each of which has an associated QA protocol and outside each module a corresponding QC step.

Structure

There can be potentially thousands of fundamental modules in the QA/QC structure. Each one of these modules can be linked in a chain to provide traceability from an initial measurement to a final product,

- Each module is standalone and contains
    - Description
    - Reference to a standard (in some cases)
    - Protocol, essentially the QA
    - Uncertainty budget for the Protocol applied.
- Outside each module is the operational QC to evaluate that the data produced meets the QA uncertainty.
- Modules can be aggregated in “Management” modules to make the structural control easier, as for example a radiometric calibration will consist of many elementary modules.
- The modules can be run in simulation mode to “Predict”
- The modules highlight where the biggest areas of uncertainty are and the effectiveness of the protocol QA (as the QC will identify uncertainties which exceed the QA estimates).
- The output data can be stored (metadata and files) to allow users to look at either an aggregated quality index or drill down to detailed data.
- Once completed for a satellite system many modules can be re-used.
- Modules can be replaced or new modules added without affecting the rest of the system operation.
- Certification of such a system is at the generic level, different agencies can implement physical equivalents to the generic modules (meeting the generic guidelines) in any manner they wish, allowing diversity of solution.

Difficulties

There are issues, in that this has never been done before in EO. Hence there is a need to create hundreds or even thousands of modules and this will take some time. It is difficult to retro-fit these activities to established processing chains, but not impossible.

Potentially there may be many intermediate data quality products produced related to the processing of a single image, hence storage and processing requirements will increase substantially, unless some means of re-creating intermediate quality products is possible.

Many assumptions are present in current level processors, these need to be explicitly stated and uncertainties to many processes that are currently not quantified must be determined.

Advantages

Once complete the outputs from two very different systems can be compared directly via the quality indices produced.

In theory level processors can switch in and out different modules to reduce processing time in some cases and vary the uncertainty level of a final product for different applications, it could provide a lot more flexibility in how data is collected and used in applications. The aim is to determine and state the uncertainty, not define how we reduce the uncertainty to a minimum.

The uncertainty acceptable for a particular application is up to the end user. This uncertainty will be stated in every product allowing the end-user to make educated decisions in data choice or requirements specification.

The system once established allows the development of robust QA/QC systems for any sensor in a rapid manner.

Application to Cal / Val at Dome-C

It would take a good deal of time before the initial systems are established SSTL/DMCii are currently prototyping some algorithms in the cal/val area, exactly looking at the calibration process, including the use of DOME-C. These results will be released early in 2009.

The content of these methods will be made available as a template for discussion at the next WGCV meeting in 2009.