CMUG thoughts on a Golden Year for CCI

Background

At the CMUG integration meeting in March 2011 it was suggested by CMUG that there should be a so-called golden year during which reprocessed data for all of the CCI datasets would be generated. On the basis of the following time-span of the CCI projects for phase 1 (see Fig 1), the year **2008** was proposed as a possible candidate year. The action from the integration meeting was: *CCI Projects in agreement with ESA to decide on a golden year 2008 and iterate its implementation with the projects.*

Although, there is no optimal choice of golden year, 2008 would require small additional efforts of re-processing (namely one extra year for Fire and one for GHG). It also benefits from some more recent satellite data streams such as Envisat, Metop-A, Aqua, CloudSat, but does lack GOSAT important for GHG.

The issue was raised again at the recent second collocation meeting in Frascati. CMUG were asked to consider from a climate modelling point of view what factors would be important in the choice of a golden year and to consider the advantages and disadvantages of 2008. A number of points for consideration are summarised below.

Pros / Cons for choice of year(s)

2008 is a good choice for the following reasons:

- "Typical" or "Quiet" year as there is a low Nino index, an average number of fires and it is also the CCI aerosol project single year of processing.
- Availability of European EO missions (Envisat, Metop-A, MSG) with no data quality issues during the entire year for any of these missions.
- Availability of ECV pre-cursor data sets as their availability is easier for 2008 than more recent years. This is in particular the case for sea level as the GLORYS ocean reanalysis is assimilating the AVISO dataset (2002-2008). The ISCCP cloud precursor dataset is only available up to 2008 and this is likely to be the case for other precursor datasets also.
- Included within CMIP5 exercise. From the modeling side the advantage of allowing a comparison with CMIP5 model outputs (AMIP simulations are recommended to cover the period from 1979 to at least 2008) is a significant factor.

However there are also disadvantages in selecting 2008 from a modelling point of view. Namely, with "Typical" or 'Non-active" years it is more difficult to study the response of the CCI datasets to extreme events, which are an important metric to see how different ECVs react to the same event. Active years like 2010 (strong La Nina with exceptionally warm year with Fires in Russia), or 2006 (e.g. El Nino), would be of interest for modelling studies as they enable scientists to capture the transition from one state (ideally normal) to another (i.e. anomalous). For example, the direct effects of El Nino on the ocean surface can be monitored with the marine ECVs (e.g. changes in SSH) and the indirect effects for the terrestrial and atmospheric ECVs (e.g. soil moisture, fires, aerosols, GHG) are worth investigating. The response of the models to the phenomena would be compared for relevant ECVs.

Note that it can also be argued that the same year is not necessary for all ECVs as not all CCI ECVs are closely linked or operate or respond to climate perturbations on similar time scales (e.g. glaciers have a much longer time scale). Table 1 gives the primary (large crosses) and secondary (small crosses) linkages between ECVs and in general the matrix is well populated suggesting a single year would be desirable. Aerosol has linkages with most ECVs and would be critical to be in any golden year.

In this context, CMUG recommends 2008 as the first choice for a golden year but in addition recommends an active year such as 2006 should also be considered if possible. This is a first step and the concept can then be extended to other years to gain more insight into the integrated climate response of the portfolio of ECVs.

	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Comments**
SST													Starts in 1991
Sea level													
Ocean colour													Starts in 1995
Clouds													
GHG													Ends 2011
Aerosol													
Ozone													
Fire													
Landcover													
Glaciers													

Figure 1: Planned time series of ECVs from 1999

	SST	Sea level	Clouds	Sea ice	Ocean colour	Aerosol	GHG	Landcover	Fire	Ozone	Glaciers
SST		X	x	X	X	x					
Sea level	X			X							
Clouds	X			X	x	X			x		
Sea ice	X	X	x		x						x
Ocean colour	X		x	X		X					
Aerosol	X		X		X		x	x	X	x	
GHG						x			x	X	
Landcover						x			X		X
Fire			x			X	x	X		x	
Ozone						x	X		x		
Glaciers				X				X			

Table 1. An analysis of cross linkages between ECVs indicating where comparisons need to be made to ensure consistency. The larger crosses indicate where the CDRs linkages are strong and small crosses where they are weaker.