CONFORM (CryOsat Netcdf FORMat)

Context and General Presentation

Annex to Poster ID 667:
Migration of Cryosat-2 Product Formats to netCDF: the CryOsat Netcdf FORMat (CONFORM)

Summary

- **Why shall we go to *netcdf* ?**
- **Rational from other Missions**
- **High Level Requirements**
- **Implementation Process**
- **Useful Links**

Why shall we go to Netcdf ? (1/2)

- **Much more "user Friendly" than Earth Explorer**
  - Formats self-describing with data stored in a fashion that allows efficient subsetting
  - Interfaces to *netCDF* based on C library available in numerous languages (Matlab, IDL, Python, Octave…)
  - A wide range of application software using netCDF files for quick visualization (ferret, nc_view..) as well as an easy conversion to text from a *unix* terminal (ncdump …)

Widely used among the whole EO scientific community

Why shall we go to Netcdf ? (2/2)

- **Homogeneity with other altimetry missions**
  - *Netcdf* is the standard for multi-mission L3 and L4 altimetric products (including CryoSat)
  - *Netcdf* is the standard for new and reprocessed L1 and L2 altimetric products
- **Should be much easier to add new fields without changing the product structure**

Rationale from other missions (1/4)

- **L1b : Jason CS / Sentinel6**
  - A simulated TDS for L1b has been generated and the relevant documentation is made available to the consortium

- **L2 : S3 and ENVISAT phase F**
  - S-3 SRAL/MWR product specifications document
  - Envisat product specification document
  - International convention: http://cfconventions.org/

Rationale from other missions (2/4)

- **For L1b : Example of Jason CS vs CS EE fields**

JASON CS

Variable #B3	L1A

```
uint com_altitude_ku(Ku_rec) ;
       com_altitude_ku:long_name = "CoM altitude (Ku-band)" ;
       com_altitude_ku:units = "m" ;
       com_altitude_ku:add_offset = 1300000. ;
       com_altitude_ku:scale_factor = 0.0001 ;
       com_altitude_ku:comment = " Altitude of the satellite Centre of
Mass. " ;
```

CS FMT

Field	Descriptor	Unit	Bytes	Format
69	Altitude of COG above reference ellipsoid (interpolated value)	mm	4	sl

Existing inhomogeneity in terms of name, units ...

Rationale from other missions (3/4)

- For L1b : Example of Jason CS vs CS EE fields

JASON CS

Variable #D1	L1A

```
uint altimeter_range_calibrated_ku(Ku_rec) ;
      altimeter_range_calibrated_ku:long_name = "Calibrated 1-way range:
CoM to middle range window (at sample Ns/2 from 0) (Ku-band)" ;
      altimeter_range_calibrated_ku:units = "m" ;
      altimeter_range_calibrated_ku:add_offset = 1300000. ;
      altimeter_range_calibrated_ku:scale_factor = 0.0001 ;
      altimeter_range_calibrated_ku:comment = "This is the 1-way distance
from the satellite's Center of Mass to the middle of the range window
(sample Ns/2 from 0). It includes the following range calibrations: (a)
range_corr_internal_delay, (b) range_corr_com. Note: the actual altimeter
clock (variable 'altimeter_clock') has been used to compute the altimeter
range " ;
```

CS FMT

70	Window Delay (2way) corrected for instrument delays	10-12 s	8	sll

Existing inhomogeneity in terms of name, units ...

Rationale from other missions (4/4)

Important remark:

- The main driver for the change to netCDF is to give added value in terms of user-friendliness and easy data manipulation.

- If the harmonisation forced the users to deeply modify their analysis tools this operation will be limited.

ESA high Level requirements (1/2)

- **Products with the new format:**
  - Ice L1b: FDM, LRM, SAR, and SARin
  - Ice FBR SAR, and SARin
  - Ice L2 and L2i: FDM, LRM, SAR, SARin, and GDR
  - Ocean L1 & L2 IOP / GOP (pole-to-pole products) and future NOP (Near Real time Ocean product).

ESA high Level requirements (2/2)

- Follow as much as possible the **existing standard/conventions** to ensure harmonization with other ESA missions.
  - **L2/L2i** : S-3, Envisat phase F and CF convention
  - **L1**: J-CS and the L2 standards for common fields
- Take into account the **particularity of an ice mission** and therefore define **new conventions and parameters** for some specific fields and product level
- Should carefully address specific aspects (e.g. the timing of 1hz vs 20 hz)

Implementation process (1/4)

- **2 strategies for 2 processors**
  - The CONFORM strategy for COP and ice products have to be considered under **2 separated baselines:**
    - The COP CONFORM is implemented in parallel with COP upgrades (new baseline) allowing modifications in product structure / units /contents…
    - The Ice CONFOM has to be first implemented and tested on a frozen baseline C.
    - The Ice CONFORM will be go in operation and will be distributed to all users with Baseline D

Implementation process (2/4)

- **CONFORM - Ice Products**
  - Modifications in terms of **unit/content/structure shall be first minimum wrt Baseline C** EE products.
  - Baseline C NetCDF ice products will be released only to selected users for receiving feedbacks.
  - The distributed CryoSat ice L1/L2/GDR product will remain **in EE format until Baseline D**.
  - Any upgrades in terms of unit/content/structure shall be potentially included in baseline D.

Implementation process (3/4)

CONFORM - Ocean Products

- The products shall be aligned to the CF convention and other ESA ocean-oriented mission (**especially S-3 and S-6**)
  - S3 Product specification documents have been made available to the consortium
  - The latest netCDF definition for the S6 L1B and L2 GPP (Ground Prototype Processors) have been made available to the consortium.
  - The S6 L2 GPP is in a very initial stage yet, but format definition has been drafted in ESA.

Implementation process (4/4)

- The EE to CONFORM will be part of the COP evolution (**Q1 2017**) and the **Baseline D** Ice Processor (4Q 2017).
- The implementation shall be reviewed by **ESA and the CryoSat Quality Working Group.**
- CONFORM Implementation will be followed by a **reprocessing campaign**

Useful Links

- netCDF:
  - Website:

    http://www.unidata.ucar.edu/
  - Overview:

    http://www.unidata.ucar.edu/software/netcdf/docs/
- CF conventions:
  - Website:

    http://cfconventions.org/