CryoSat Mission and Data Products after 10 Years of operations

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CryoSat 10th Year Anniversary Science Conference
5-8 October 2020
www.cryosat10years.org

CryoSat Mission in a nutshell

- Mission Challenges
  Better understand how the mass-balance of the land-ice & sea-ice is changing... but not only.
  - New Mask Released in August 2019

- Baseline operation
  - CryoSat 10
  - SIRAL instrument and geographical Mode Mask
  - Ku-band altimeter operating in 3 modes, function of a geographical mask [EPE/ESA/Thales Alenia Space, 2019/2020]

Current ESA CryoSat Products

- Data processed both over ocean and ice surfaces
  - Baseline ± reprocessing
  - New altitude
  - New file structure
  - Redundant data
  - Baseline ± reprocessing

- Ice Products
  - to achieve the mission objectives
  - Generated with Baseline-D since May 2019
  - New NRT chain with 2-3 hrs latency operational since beginning August 2019
  - Reprocessing of Ice Baseline-D data completed

- Ocean Products
  - since April 2014 / Generated with Baseline-C since November 2017 / Contain ocean parameters optimized for scientific & operational applications
  - Reprocessing of Ocean Baseline-C data completed

To access CryoSat data, contact: eohelp@esa.int

ESA Quality-Control and Validations

- CryoSat data QCV both over ocean and ice surfaces
  - Routine QC and Instrument performance (IDEAS+)
  - Status Nominal
  - Monitoring of internal Cal (ARESYS)
  - CAL stable since the beginning of operations
  - External Calibrations at Transponders (StartSat): Basins corrected in Baseline C
  - CryoSat Performance Monitoring of ice data (MSL): most of known issues resolved with Baseline C
  - CryoSat Soline-oriented data Analysis over sea-ice areas (AlongTrack, AWZ, LEGOS, LIS) • Started

To access to CryoSat QCV Reports, visit: https://earth.esa.int/web/sppa/mission-performance/esa-missions/cryosat/

CryoSat ICE Baseline-D Improvements

- Land-Ice SARIn elevations show a slight improvement [roll angle issue fixed].
- The new surface type mask & slope model around Antarctica also show better results.
- Sea-Ice SARIn freeboard is now computed.
- SAR freeboard less noisy and no more overestimated.
- Over the ocean and inland water bodies Baseline-D SAR data shows a large increase in the number of valid observations.
- Stack Peakiness parameter added: improved leads/floes classification


Conclusion and Perspectives

- ESA Current CryoSat product status
  - Ocean Baseline-C Products : Nominal / Suited for oceanographic application /Associated full reprocessing completed
  - Ice Baseline Products: Exceed initial mission requirements / Ice Baseline-D in operation since 27th May 2019 and full mission reprocessing completed

- Mid/Long-term perspectives
  - Freezing of the requirements for L1 and L2 Baseline-E implementation.
  - First Cryo-TEMP0 SWATH operations and reprocessing.
  - Develop other CEOS/QAAE compliant CryoSat Thematic Products (polar ocean, sea ice, hydrology) to be used by non alimetry experts [e.g. Climate scientist] and generate easily accessible multi-products including uncertainty and trackable quality indexes.
  - Enhance the use of CryoSat in creating interactions with multi-tematic communities & international programs to support the preparation of a potential Compericu S-9/CRISTAL Polar Topography mission for Ice & Snow

For suggestions about product evolutions, contact: jerome.bouffard@esa.int

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CryoSat Mission in a nutshell

Mission Challenges

- Better understand how the mass-balance of the land-ice & sea-ice is changing... but not only

- Upgrades of CS-2 IPF
- Improved Data quality
- Exceed Mission requirements
- Develop new applications
- Raise future challenges
- Contribution of Antarctic & Greenland ice sheets to MSL
- Trends and Variations of Arctic sea-ice thickness
- Oceanography, Hydrology, Geodesy
- Snow on sea-ice, coastal mesoscale, swath products

SIRAL instrument and geographical Mode Mask

- Ku-band altimeter operating in 3 modes, function of a geographical mask
  (SARin/SARin, LRM/LRM,SAR)

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CryoSat Product Evolutions

**2010**
- **Global L2 GDR**

**2011**
- **L1 & L2 & FBR**
- **NRT Meteo Ocean FDM**

**2012**
- **L2i**
- **CryoSat Ocean Processor**

**2013**
- **Ice Baseline -C**

**2014**
- **Ocean Baseline -C**

**2015**
- **Ice Baseline -D**

**2020-2021**
- **CryoSat Thematic Products**

**Why ?**
- Increase significantly the number of CryoSat end-users

**When ?**
- First Land Ice Cryo-TEMPO Swath operational from May 2020

**What ?**
- Simplified – Thematic – Rapidly evolving ESA products

**2019**
- **Ice Baseline -E**

**Why ?**
- Improve CryoSat products over the Sea ice and Land ice

**When ?**
- Operational in 2021
- Reprocessing planned for 2021

**What ?**
- NetCDF
- Improved Retrackers and corrections + New fields

**2017**
- **Ocean Baseline -C**

**2014**
- **Ice Baseline -D**

**2015**
- **Ice Baseline -C**

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