1. BACKGROUND

• ESA’s CryoSat-2 mission is the first one to carry a radar altimeter that can operate in SAR mode.
• Although the primary aim is land and marine ice monitoring, the SAR mode capability of the CryoSat-2 SIRAL altimeter also offers potential benefits for ocean applications;

The “Cryosat Plus for Oceans” (CP4O) project is dedicated to the exploitation of CryoSat-2 data over the ocean.

It is supported by the ESA Support to Science Element (STSE) Programme, and brings together an expert European consortium.

2. OBJECTIVES & SUB-THEMES

The general objectives of the CP4O project are:
• To build a sound scientific basis for new scientific and operational applications of CryoSat-2 data over the open ocean, polar ocean, coastal seas and for sea-floor mapping.
• To generate and evaluate new methods and products that will enable the full exploitation of the capabilities of the CryoSat-2 SIRAL altimeter, and extend their application beyond the initial mission objectives.
• To ensure that the scientific return of the CryoSat-2 mission is maximised.

The specific themes that will be addressed by the project are:
1) Open Ocean Altimetry;
2) High Resolution Coastal Zone Altimetry;
3) High Resolution Polar Ocean Altimetry;
4) High Resolution Sea-Floor Altimetry.

3. GENERAL APPROACH

WP100 aims to consolidate the preliminary scientific requirements for the four sub-themes under investigation.

To achieve this goal the following tasks are to be completed:
• A user consultation with key institutions to derive an updated analysis of the high-level needs per sub-theme;
• The characterization of limitations and drawbacks of existing products to achieve the desired needs when applied to CryoSat-2 data;
• The definition of a list of scientific and operational requirements per sub-theme, detailing the technical and scientific constraints for the methods and models to be developed, if any.

4. USER CONSULTATION METHODOLOGY

The user consultation task within CP4O will follow the approach pursued within the COASTALT and PISTACH projects, and will benefit from the results obtained from these projects.

The methodology includes the following steps:
1. Defining a questionnaire (see Fig. 2), covering the four sub-themes under analysis (open ocean, coastal zone, polar ocean and sea-floor);
2. Defining a list of users covering the four sub-themes, and working for different institutions (public and private, research and operational);
3. Distributing the questionnaire to the users by email or through direct interviews;
4. Gathering and analysing the consultation results.

Some preliminary information on user requirements is already available from the COASTALT and PISTACH projects, focused on coastal altimetry. An in-depth analysis of the results of the surveys, and the definition of a list of recommendations for the new coastal-altimetry products [1], [2], [3].

In order to take advantage of these synergies, and to avoid duplication of actions, results, and efforts from the users, the current strategy is:
• to re-exploit the information available from the COASTALT and PISTACH surveys, and possibly integrate the existing questionnaire/list of users, to cover the Open Ocean and the Coastal Zone sub-themes;
• to gather new information for the Polar Ocean and the sea floor sub-themes, through new questions and new relevant users.

5. RECOMMENDATIONS FROM COASTALT AND PISTACH PROJECTS

Some of the recommendations from the COASTALT and PISTACH projects can be re-used for the new product. However, some others will have to be modified or integrated to account for the new characteristics of SAR-mode data, and for new sub-themes.

The coastal altimetry product should:
• …be mostly used with a model for validation or for assimilation;
  ➔ What is the main application for the other three sub-themes?
• …provide Sea Surface Height (SSH) and Sea Level Anomaly (SLA) as the fundamental physical parameters, but also include Mean Sea Level (MSL), Mean Dynamic Topography (MDT), Significant Wave Height (SWH) and wind speed;
  ➔ What are the most useful parameters for the other sub-themes?
• …be provided at the maximum spatial resolution (maximum posting rate), but with a reasonable SNR;
  ➔ These requirements can be largely improved by the availability of SAR-mode!
• …be developed as a delayed product, but with a processing chain compatible with Real-Time (RT) data and Near-Real Time (NRT) data;
  ➔ Are the requirements the same for for polar-ocean and sea-floor applications?
• …be provided along-track, but also as 2D gridded fields;
  ➔ What type of product would be most required in the context of SAR-mode data, and for the other sub-themes?
• …provide quality flags together with all the separate corrections;
  ➔ Which correction is still reliable, and which should be changed or modified for SAR-mode, and for the other sub-themes?
• …Guarantee continuity with altimetric products provided over open ocean;
  ➔ Securing a seamless transition between open ocean and coastal zone products in SAR-mode is a particularly important issue;
Etc… (for the full list of recommendations please see [1], [2] and [3]).

6. SUMMARY AND FUTURE WORK

• The user consultation task needs to be completed by integrating the existing information database primarily with information for polar ocean and sea-floor sub-themes.
  o New relevant users will be identified and an integrated questionnaire will be distributed;
  • The limitations and drawbacks analysis of existing altimetric products, as well as the definition of the scientific and operational requirements for open ocean and coastal zone sub-themes, will exploit the existing results from the COASTALT and PISTACH projects;
  • A new analysis and requirements definition is needed for polar-ocean and sea-floor sub-themes.

Comments, suggestions, or a request to take part to the user consultation survey for CP4O can be provided by email to the following address:

cp4o@starlab.es

Your feedback and help is encouraged and appreciated!