



Deliverable D-22

Monthly Progress Report

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| Prepared by (met.no) | : | Yvonne Gusdal | |
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AMENDMENT HISTORY

| Version | Date | Change Description | Author |
|----------------|-------------|---------------------------|---------------|
| 1.0 | 17/08/12 | Report July 2012 to ESA | Yvonne Gusdal |
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DISTRIBUTION

| Name | Role | Company |
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| Craig Donlon | Scientific Officer | ESA |
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EXECUTIVE SUMMARY

for July:

The Roms model have been re-run for the period 1 March to 1 May 2010. Have begun analysing the fields, where we have started with the strongest Polar Low event, assessing the SST and EKE signals during and after passage.

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INTRODUCTION

Purpose and Scope

This is the Progress Report for the STARS project and forms deliverable D-22 of the project documents. The purpose of the report is to provide a monthly update of the project activities and progress over each elapsed reporting period and a project plan of the activities for the following month.

This STARS progress report covers the elapsed period from 1 to 31 May 2012. The plan summarises task of STARS Phase II (described in the Project Management Plan (D-21)), management activities, status of deliverables, milestones and travel, risk analysis, problem areas and activities to be performed in the coming months.

The next progress report is planned for 5th of September 2012.

Document Structure

The information within this document is structured as follows:

- Section 1: This introduction
- Section 2: Provides an overview of the project
- Section 3: Progress, problems and forthcoming activities for all major work packages
- Section 4: A summary of the management activities addressing contractual and financial aspects, status of deliverables, milestones and travel expenditure, actions and risks

Referenced Documents

| ID | Title | Reference | Version | Date |
|-----------|---|-------------------|----------------|-------------|
| SOW | Sea Surface Temperature and Altimeter Synergy | EOP-SM/1900/CD-cd | 1.0 Rev 2 | 23/02/2009 |
| D-21 | STARS Project Management Plan Phase II | | 2.2 | |
| D-1 | STARS web portal | | | |
| D-23 | STARS Action Database | | | |
| D-2 | STARS Literature review | | 1.0 | 14/04/2009 |
| D-3 | STARS Scientific analysis Plan | | 6 | |
| D-4 | STARS-DAT v10 | | | |
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PROJECT OVERVIEW

The main objective of the STARS project is to investigate possible ocean surface warming by strong winds from polar lows using an extensive satellite data set. In the STARS project a data set will be built and used to investigate each polar low event over a ten year period.

In the original plan for phase II of STARS, a coupled atmosphere-ocean model will be designed. The purpose of the coupled system is to simulate polar low events and to investigate how the ocean and atmosphere interacts. However, due to an installation of a new super computer facility in Norway in 2011, it is considerable uncertain that the required resources are available to the STARS project in 2011/2012. The shift in computer infrastructure also ties up expert resources on the proposed atmosphere model. It will therefore be difficult to allocate the expert competence assumed available in the proposed implementation plan. The original plan for phase II of STARS is therefore altered to not implement and use the coupled STARS-MODEL.

In the second phase, we will conduct an ocean hindcast simulation with a resolution of ~800 m. The objective is to investigate with observations and numerical modelling the adjustment processes that lead to ocean re-stratification after PL events. A process that influence the net heat loss to the atmosphere.

The oceanic response to hurricanes has long been recognised (Price, 1983; Sanford et al., 1987; Brink, 1989). Strong turbulent mixing entrainment of cold waters from deep layers leads to a cooling of the sea-surface. This rapid surface cooling reduces the surface fluxes and inhibits further hurricane intensification. When hurricanes moves over deep cores of warm waters, such as the Loop Current in the Gulf of Mexico, or warm core rings this surface cooling is strongly reduced. The warm water will then act to insulate the entrainment of cold waters form even deeper layers (Hong et al., 2000; Shay et al., 2000). In such cases, strong hurricane intensification has been observed. In 2005, Katrina intensified into a category 5 hurricane as it entered the warm Gulf of Mexico (Kafatos et al., 2006).

The ocean surface warming reported by Saetra et al. (2008) has only been observed by microwave satellite data. During cold air outbreaks the ubiquitous cumulus convection prevents the sea-surface to be observed by infrared sensors (IR) such as AATSR, AVHRR and MODIS. However, verification of such ocean response to polar lows is urgent. Here, we propose to use altimeter combined with SST products from both microwave and infrared sensors to investigate possible surface warming in connection with polar lows. As the altimeter measures the surface anomaly (SLA) this can be related to the ocean heat content.

The main scientific questions to be addressed are:

- Can satellite IR observations in combination with altimeter be used to detect possible sea-surface warming caused by strong winds under polar low events?
- Can we identify a Polar Low Indicator based on satellite data that could be a useful tool for polar low forecasting?

- What are the dominant time and space scale of the ocean advection processes that govern the adjustments after PL event ?

In the second phase of STARS, an International Workshop on Polar Lows will be arranged in Oslo in 2012. The workshop aims at bringing together scientists and weather forecasters to present the results of the recent activity on polar low research, to share new knowledge and to encourage discussions on improved forecasting and understanding of polar lows

PROGRESS ON MAJOR TASKS PHASE II

Task 1: Management (Ongoing through the whole project)

Results of Reporting Period:

- Non Activities

Plans for Comming Reporting Period:

- Non Activities

Task 7: Maintain and improve STARS web portal

Results of Reporting Period

- Non activities

Plans for Comming Reporting Period

- Non Activities

Task 8: Extend STARS-DAT data set

Results of Reporting Period:

- Non activities

Plans for Comming Reporting Period

- In task 8.1 on extending STARS-DAT:
 - Finalize STARS-DAT, deliver the Usermanual to ESA and publish the extended image based data set on the webpage.

Task 9: Impact assessment of Polar Lows

Results of Reporting Period

- In task 9 on Ocean adjustment:
 - We have rerun the period 1 March to 1 May 2010 since this period includes three PL events within the model domain. Model fields for this focus period have been saved every three hours. We have begun analysis of these fields, starting with the strongest of the three events, assessing the SST and EKE signals during and after passage. The analysis suggests only a very weak SST drop along

the PL path and no significant enhancement of EKE. This result is somewhat surprising given that observations (OSTIA SST and along-track SLA) suggested considerable SST drop and EKE enhancement associated with PL events. A possible explanation is that the observations reflected primarily the impact of the larger-scale and longer-period cold air outbreaks preceding the PL events.

- We have also redone the analysis on coarser-scale (4 km horiz. resolution) hindcast simulations and found a similarly weak response there. There is an indication of weak EKE enhancement commencing 2-3 days after the PL events, and we intend to pursue this signal.

Plans for Comming Reporting Period

- In task 9 on Ocean adjustment:
 - Continue the analysis of the PLs in March 2010. The analysis of the surface fields will be refined, and we will also begin to look at the sub-surface response, specifically the evolution of the static stability in the top ~100 meters.
 - We will also conduct high-res. simulations of the spring of 2008, specifically covering a strong PL event observed on 4 March during the Thorpex campaign.

Task 10: Polar Low Scientific Community Development

Results of Reporting Period

- Non Activities

Plans for Comming Reporting Period

- Prepare a workshop report once all extended abstracts has been collected.

Progress team meetings

| Name | Date | Purpose |
|------|----------|--|
| PTM1 | 05/07/11 | Progress team meeting 1 - SAR |
| IKO | 21/09/11 | Internal Kick-off meeting for STARS phase II |
| PTM2 | 03/02/12 | Progress team meeting 2 - PLI |
| PTM3 | 16/02/12 | Progress team meeting 3 – SAR + ASCAT |

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MANAGEMENT

Invoices

| Milestone | Schedule date | | | |
|---|----------------|---------|----------------|------------------|
| | | Payment | Invoice to ESA | Payment Received |
| ADVANCE PAYMENT: upon signature of the Contract by both Parties | September 2009 | 24.000 | yes | yes |
| PROGRESS PAYMENT: Upon successful completion of phase 1 and acceptance of all related deliverables by the Agency | June 2011 | 96.000 | yes | yes |
| ADVANCE PAYMENT: Upon written authorization to proceed with phase 2 | June 2011 | 16.000 | yes | ?? |
| PROGRESS PAYMENT: Upon the acceptance by the agency of P2D-1 STARS-web P2D-2 STARS-DAT-V3 P2D-3 STARS-DAT-DB-V3 P2D-4 STARS-DAT-UM-V3 P2D-5 REP-4 | March 2012 | 20.000 | yes | no |
| FINAL SETTLEMENT: Upon satisfactory completion of all obligations, including the ones relating to Appendix 5 on statement of inventions and inventory, and acceptance by ESA of all deliverables | 11/01/12 | 144.000 | yes | no |
| Totals | | 300.000 | | |

Action Database

| Action Ref | Action | Actioner | Target Date | Status | Date Closed |
|------------------------------|--|----------|-------------|--------|-------------|
| Mid Term Review MTR-7 | Review the potential for RFI contamination of AMSRE data in Thorpex event | ØS | | | |
| MTR-9 | CD to organize an ESA web story on Polar Lows with STARS team in preparation for 2011/2012 PL season | CD | | | |
| MTR-13 | Update phase-II plan to include steering of PL by mesoscale ocean structure | ØS | | | |
| Progress meeting | | | | | |

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|--------------------------------------|---|-----|--------|---------|--|
| ESA (PM) | | | | | |
| PM-2 | Include information/pictures of the first forecasted polar low this season on the web page | GN | | - | |
| Progress meeting Tromsø (PM8) | | | | | |
| PM8-1 | Write down what is needed of SAR-data for polar low forecasting, should be part of the reporting that Birgitte is writing, so that this can influence Sentinel-1 operations | BF | May | | |
| PM8-2 | Is it possible to make a link through the MetLex on Yr which gives a link to STARS? So when a polar low occurs, we have a link to the public. | GN | | | |
| PM8-7 | Check AMSRE TCWV fields from RSS to be included in STARS-DAT | SE | | | |
| PM8-18 | Can we find out how many people have accessed the STARS-DAT? | SE | | ongoing | |
| PM8-19 | Need to have a discussion within STARS to actually provide PL track data in the right way for further use. Currently hourly interpolated ASCII file of time and positions. Aim to put a short publication/note. | All | | | |
| PM8-22 | ØS and team - to contact university professors and ensure that students are aware that STARS-DAT can be used for a project. And figure out what period of the data set should be given to the users!! | ØS | | | |
| PM8-24 | Need to provide guidance in STARS-DAT-UM on basic use of NWP fields (e.g. calculations of equiv. Pot. Temp) | YG | August | Ongoing | |
| PM8-25 | Steinar/Gunnar: put comments in User Manual | YG | August | ongoing | |

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| | that the polar low list is our interpretation of the situations, and acknowledge that we might have missed some cases. We also only track the strongest PL in multiple PL cases | | | | |
| PM8-28 | Remember to mention in the finale report the use of EOLI software if we are missing anything, or positive feedbacks | BF | December | | |
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Status of Deliverables

The following contractual deliverables of Phase II have been submitted to ESA.

| Doc Ref | Doc Title | Delivery Date | Status |
|---------|-----------|---------------|--------|
| P2D-1 | STARS-web | 10/01/11 | |
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Each document will be submitted to ESA for approval. Upon confirmation from ESA that the deliverables are satisfactory, the status shall be updated to accepted.

Status of Milestones

Milestone meetings are planned at vital points throughout the project lifetime. The status of these meetings to date is as follows.

| Name | Date | Venue | Purpose | Status |
|-------------|----------|-------|---------------------------|-----------|
| MTR Phase I | 07/06/11 | ESA | Mid Term Review | Completed |
| KO Phase II | 07/06/11 | ESA | Kick-off meeting Phase II | Completed |

| | | | | |
|----|----------|--------|------------------|---------------|
| PM | 23/11/11 | Met.no | Progress meeting | Completed |
| PM | 22/03/12 | Tromsø | Progress meeting | Completed |
| PM | 01/10/12 | Met.no | Progress meeting | Not Completed |
| FM | 05/12/12 | ESA | Final Meeting | Not Completed |

Status of Travel Expenditure

Risk Analysis

The table below shows the most probable risks and issues identified to date.

| ID | Type | Risk title and Description | Probability | Impact | Duration | Mitigation Strategy |
|----|------|----------------------------|-------------|--------|----------|---------------------|
| | | | | | | |