



## H2020 - Research and Innovation Action



### **APPLICATE**

Advanced Prediction in Polar regions and beyond: Modelling, observing system design and Linkages associated with a Changing Arctic climaTE

Grant Agreement No: 727862

**Deliverable No. 7.4**

**Training Plan**

## Submission of Deliverable

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## EXECUTIVE SUMMARY

This training plan describes the components of and the plans for education activities included in WP7 of APPLICATE. To optimize the efforts the training plan has been prepared at the beginning of the project, outlining not only the activities itself, but plans for their implementation as well as the expected risks and interdependencies. The major training activities planned include (1) a webinar series on the APPLICATE project and on impact of Arctic changes on the weather and climate of the Northern hemisphere, (2) a summer school planned for 2018 on polar prediction with instruction in both modeling and observational methods, (3) an online course entitled „Advancing predictive capacity of Northern Hemisphere weather and climate.“ This document provides details on both the planned activities themselves and the approach by which they will be accomplished.

The webinar series will be run in fall 2017 and will serve as an introduction for the APPLICATE project to the early career polar science community.

The summer school will be based on a previously-run school organized by the Year of Polar Prediction. It will take place at Abisko Station, Sweden in April of 2018. The school will be organized by a project manager based at UiT, with help from APPLICATE members, other partners and APECS volunteers.

Finally, the online course will be run in the winter to spring of 2019 to train early career researchers and prepare them for careers in Northern Hemisphere prediction science.

## 1. INTRODUCTION

### 1.1. Background and motivation

Training not only aims to improve the professional skills and competences of those working and being trained to work within APPLICATE, but it also provides a legacy for future generations of scientists and early career experts working in the fields of climate and weather prediction and modelling. APPLICATE therefore includes a strong training component with a set of tailor-made training activities that will be held throughout the duration of the project. An assessment of the activities will be conducted at the end of the project to determine their usefulness for the target groups and provide advice to future projects. All training materials, recorded webinars, lectures and presentations from the summer school will be provided as an open resource on the website of APPLICATE and the website of the Association of Polar Early Career Scientists (APECS). Coordination of training activities and synergy with other on-going projects (e.g. YOPP, Blue Action, INTAROS) will increase the desired impact, ensure cost-effectiveness and potentially help to get external funding.

The training component is part of WP7 of APPLICATE. To optimize the efforts a training plan prepared at the beginning of the project outlines not only the activities itself, but plans for their implementation as well as the expected risks and interdependencies.

### 1.2. Organisation of the plan

The training plan will first list the training activities planned for APPLICATE and discuss the procedure how they are planned. The content of these activities is subject to change during the planning phase. Afterwards the plan will discuss some of the risks and interdependencies and the implementation of the plan.

## 2. TRAINING PLAN

The APPLICATE training component includes both online and in-person activities throughout the project duration. Below we list a description of the planned activities and the responsible person within APPLICATE. While most activities are planned for a certain year during the project, task 7.3.2. will accompany the entire duration of the project.

### 2.1. Short-term activities (9 months to 1 year)

| Activity      | Leader  | Procedure   | Expected outcome                      |
|---------------|---|---|---------------------------------------|
| Training Plan | Gerlis Fugmann (UiT / APECS)<br>gerlis.fugmann@apecs.is | The training plan is developed at the beginning of the project in discussion with the project partners in WP7 as well as consultation with the APECS and outside participants of the Year of Polar Prediction (YOPP) and the Blue Action project. The plan defines all the training activities, their time of execution and the overlap with other projects. The plan will be revised and updated during the lifetime of the project to reflect the ongoing planning progresses of the listed activities. | Training plan submitted in April 2017 |

### 2.2. Mid-term activities (2 years)

| Activity       | Leader  | Procedure  | Expected outcome  |
|----------------|---|--|---|
| Webinar Series | Gerlis Fugmann (UiT / APECS)<br>gerlis.fugmann@apecs.is | A short webinar series of three webinars directed towards early career researchers (but open to the general public) is planned for October and November 2017. These webinars will introduce the APPLICATE project and increase awareness about the impact of Arctic changes on the weather and climate of the Northern hemisphere. While the first webinar will provide an overview of the APPLICATE project as a whole, the following two webinars will go more into details introducing some of the science conducted in the APPLICATE WPs.  | Webinars and webinar recordings submitted at the end of November 2017. The recordings will be made available as an open resource on the APPLICATE and APECS websites. |
| Summer School  | Gerlis Fugmann (UiT / APECS)<br>gerlis.fugmann@apecs.is | APPLICATE will include a unique, high-level, summer school program for 30 PhD students and postdoctoral researchers, covering some of the theories and methods used within the research project. The 10-day training course will be organized in late April 2018 at Abisko Station in Sweden by UiT in cooperation with other projects and external partners (YOPP and Blue Action, APECS). The APPLICATE summer school will build on experience from the YOPP summer school in 2016 at Abisko Station. A draft schedule for the school can be found in chapter 4.2. All participants will create FrostBytes (short 30-seconds videos) on their research projects (in connection to Task 7.1.4). | Summer School, FrostByte videos   |

### 2.3. Long-term activities (4 years)

| Activity             | Leader  | Procedure   | Expected outcome   |
|----------------------|---|---|--|
| Online Course (MOOC) | Gerlis Fugmann (UiT / APECS)<br>gerlis.fugmann@apecs.is | UiT will organize a 3-months online course on “Advancing predictive capacity of Northern Hemisphere weather and climate” in the form of a MOOC from January until March 2019 for early career scientists (but open to anyone interested) with weekly interactive online sessions. The course will be coordinated by | Online course and recordings. Resources including recommended reading and sample exercises |

| Activity   | Leader  | Procedure  | Expected outcome |
|--|---|--|------------------|
|  |   | <p>the APPLICATE training manager at UiT with help from a team of volunteer APECS members and members of the APPLICATE project team. Lesson subjects will be identified by the APPLICATE team to cover a reasonable background to weather and climate prediction in the northern hemisphere (4 weeks) and several key areas at the cutting edge of research in weather and climate predictability (6 weeks). Each week’s course activity will consist of a webinar lecture by a prominent scientist in a related area of research, reference information for a number of recommended reading items for students seeking a deeper understanding of the subject, and where feasible a short exercise using model results to illustrate content areas described in the lectures. Links to further reading, any exercises, and additional relevant information will be posted to the class webpage and made openly available with the recordings of the lectures after the course concludes on the APPLICATE and APECS websites.</p> |                  |
| <p>Follow up assessment of the outcomes of the learning experience</p> | <p>Gerlis Fugmann (UiT / APECS)<br/>gerlis.fugmann@apecs.is</p> | <p>A report will be produced assessing the training activities of the APPLICATE project and lay out lessons learned and recommendations to future projects. To achieve this and gain an objective evaluation of activities, every training activity in APPLICATE will be immediately followed up with three survey, one for the organizers of the activities, one for the mentors / lecturers of the activities and one for the participants. The surveys will be set up as a google form, as this will allow easy distribution of the survey and display of the results. The data received from this survey will be collected and provide the basis for the assessment report at the end of the project. The questions in the survey will include both ratings of the activities, their planning, implementation and usefulness themselves, but also long-answer questions with option to give</p>  | <p>report</p>    |

| Activity | Leader | Procedure   | Expected outcome |
|----------|--------|---|------------------|
|          |        | <p>detailed feedback both on the reasons for the ratings and for recommendations on how to improve the activities in the future. The assessment report will contribute to improving training activities and teaching tools and strategies in future project as well as those of APECS. The assessment report will be published on the APPLICATE and APECS websites.</p> |                  |

### 2.4. On-going activities throughout the project

| Activity  | Leader  | Procedure   | Expected outcome   |
|---|---|---|--|
| <p>Connection and training opportunities for early career researchers</p> | <p>Gerlis Fugmann (UiT / APECS)<br/>gerlis.fugmann@apecs.is</p> | <p>Networking tools for increasing connection and training opportunities for early career researchers will include:</p> <p>a) an email list: it will be set up via the APECS mailing list system in August 2017 and all participants of the APPLICATE training activities and other interested members of the APPLICATE project are encouraged to register for it to use it as a platform for connecting with other early career researchers in the field of climate and weather prediction</p> <p>b) training webpage hosted on the APPLICATE and APECS websites: the page will be set in August 2017 by the project manager at UiT and the Arctic Portal, and will be used throughout the project to compile materials derived from the APPLICATE training activities and other interesting training resources relevant for early career researchers in the field of climate and weather prediction. This page will be openly accessible and will be updated throughout the project.</p> <p>c) dedicated mentor sessions: throughout the project, APPLICATE in cooperation with APECS will be organizing mentoring discussions and networking opportunities for early career participants of the project at APPLICATE General Assemblies as</p> | <p>Mailing list, webpage, report about mentor sessions</p> |

| Activity | Leader | Procedure   | Expected outcome |
|----------|--------|---|------------------|
|          |        | <p>well as providing the opportunity to include a minimum of two featured talks from early career researchers into the program. In addition, APECS will organize sessions at APECS workshops with for APPLICATE relevant soft skill and thematic training topics that will connect early career and senior researchers. These sessions will be organized by the project manager at UiT as well as volunteers from APECS at meetings, workshops and conferences relevant to the APPLICATE project.</p> <p>A report will be written about each of these sessions contributing to the overall training assessment of APPLICATE (task 7.3.6.)</p> |                  |

### 3. RISKS AND INTERDEPENDENCIES

The risks associated with development of training materials are significantly lower than those associated with major research activities.

#### 3.1. Risks

| Risk   | Probability | Response   | Responsibility                               |
|--|-------------|--|--|
| Unsuccessful hiring search for project manager position                  | Low         | Extend or re-open the period for applications and seek additional advertising routes for the position and targeted recruiting. APECS volunteers will do their best to keep the school planning moving forward before someone is hired for the position | Gerlis Fugmann (UiT / APECS)                 |
| Low registrations for the summer school and online course                | Low         | Extend or re-open the period for applications and extend the reach for advertising the activities  | Gerlis Fugmann (UiT / APECS)                 |
| Website technical issues   | Low         | Coordinate with the website host (Arctic Portal) to solve issues   | Gerlis Fugmann (UiT / APECS) / Arctic Portal |
| Technical issues with webinar platform during webinars and online course | Low         | Organize training sessions with speakers before the event and provide a guide how participants can check their audio settings when   | Gerlis Fugmann (UiT / APECS)                 |

| Risk   | Probability     | Response  | Responsibility               |
|--|-----------------|---|------------------------------|
|  |                 | logging into the system used (GoToWebinar)  |                              |
| Delay in submitting deliverables or achieving milestones           | Medium          | The training team will work closely with the Management team of APPLICATE to ensure deadlines are being met and delays minimized.   | Gerlis Fugmann (UiT / APECS) |
| Shortage of funding for summer school                              | Low to moderate | Seeking additional fundraising and / or adjust the number of participants and their travel funding amounts  | Gerlis Fugmann (UiT / APECS) |
| Speaker cancellations in summer school, webinars and online course | Low             | Find additional speakers or replacements among the APPLICATE project partners or adjust the program or schedule of the activity   | Gerlis Fugmann (UiT / APECS) |
| Logistical and weather problems during summer school               | Low             | Work with station manager to minimize risk. Adjust the program and planned activities as necessary (Steering Committee will plan a few backup activities for cases like this) | Gerlis Fugmann (UiT / APECS) |

### 3.2. Interdependencies

The summer school will be organized with input from the Year of Polar Prediction (YOPP) community. Specifically, members of the YOPP steering group organized a similar summer school at the same venue in 2016. Their experience and lessons learned will be particularly valuable in efficiently organizing the 2018 school. In addition, the summer school will partner with the EU Horizon 2020 funded Blue Actions Project.

The online course will depend on input from other participants in the broader APPLICATE team. This input is not dependent on their research results, but rather on their expertise to help develop the course to cover the best possible set of subject areas for preparing students for this research area.

## 4. IMPLEMENTATION OF THE PLAN

### 4.1. Overall management of the training activities

The training activities listed in APPLICATE will be managed and implemented at UiT by:

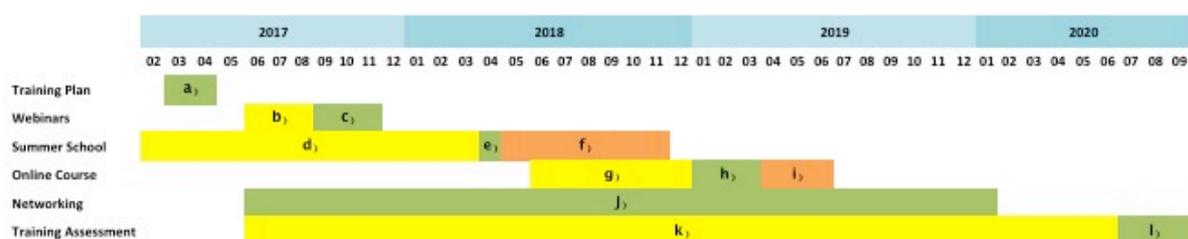
- Dr. Gerlis Fugmann (WP 7 Training Leader and Executive Director of the APECS) who will be responsible for overall coordination and monitoring of the training plan and activities as well as supervision of the project manager at UiT and volunteers of APECS.
- A project manager at UiT who will be hired with project funds to assist with the implementation of the training activities in APPLICATE and will be supervised by Dr. Gerlis Fugmann. The project manager position was published in April 2017 with application deadline on 5 May 2017. The hiring process is expected to end in summer 2017.
- Volunteers (all early career researchers) from APECS who will participate in several aspects of the planning and implementation of specifically the webinar series, the

summer school and online course assisting the project manager and Dr. Gerlis Fugmann. The volunteers will be coordinated by the project manager at UiT and supervised by Dr. Gerlis Fugmann.

The project manager at UiT and Dr. Gerlis Fugmann will ensure regular reporting of training activity results as well as preparation and delivery of training deliverables to the other WP 7 partners and the APPLICATE Project Office and Project Leader. Changes to the training plan will be included and coordinated with the APPLICATE Project Office and WP7 partners as the detailed planning of each activity progresses. The plan will therefore be updated during the lifetime of the project as needed.

## 4.2. Detailed Implementation of Activities from the Training Plan

The timeline below shows the different phases of the implementation of each training activity:



- a) Training Plan preparation
- b) Webinar preparation phase
- c) Webinar phase (one per month)
- d) Summer School Planning phase
- e) Summer School
- f) Post-Summer School phase (financial wrap-up, report writing)
- g) Online Course planning phase
- h) Online Course (10 sessions)
- i) Post-Online Course phase (wrap up with participants and speakers)
- j) On-going networking activities
- k) Preparation of and data collection for training assessment
- l) Writing phase of training assessment

### 1) Webinars (Task 7.3.3.)

The planning for the webinars will start in June 2017 and the speakers will be sought among the project partners of APPLICATE. Speakers will be invited based on their expertise in the topics of the webinars. International as well as gender diversity will also be carefully considered in the selection of the speakers. The webinars will be advertised starting late August 2017 through the APPLICATE and APECS channels. The webinars are planned for:

- Second half of September
- mid-October
- mid-November

Attending the webinars will be free. To ensure the APPLICATE branding of materials, the presentations will use the APPLICATE power point template. Each webinar will be recorded and made available online afterwards, with the last webinar recording being expected to be added on the APPLICATE and APECS websites before the end of November 2017.

### 2) Summer School (Task (7.3.4.)

The planning for the summer school started in February 2017 with initial calls of the organizing team members. The summer school will be organized jointly between APPLICATE, YOPP and APECS with involvement of the Blue Action project and other relevant partners.

In April 2017, the hiring process for the project manager at UiT was ongoing with the hiring process expected to be finalized in summer 2017. The project manager will assume responsibility for most of the logistics of organizing the school. Before the school, these include site arrangements and reservations, coordinating supplemental fundraising, advertising for the school, soliciting applications, and managing communication with both students and mentors.

The full steering committee will be assembled in May 2017 to advise on refinements to the syllabus (see the current draft below) and recruiting speakers for the school. The steering committee will include members with diverse scientific background and attention will be given to gender balance. The program will be mostly finalized and speakers secured in early September 2017. Speakers will be invited based on their expertise in the topics of the school. International as well as gender diversity will be also carefully considered in the selection of the speakers. The steering committee will also develop the content for the evening sessions on soft skill and career development.

|               |    | Session                              |                              |  |                           |                                    |
|---------------|----|--------------------------------------|------------------------------|--|---------------------------|------------------------------------|
|               |    | AM - 1                               | AM - 2                       | PM - 1                                   | PM - 2                    | Evening                            |
| Day of school | 1  | Welcome                              | Intro to polar weather       | Practical: set up met observations tower |                           | Icebreaker & networking activities |
|               | 2  | Observations                         | Intro to polar climate       | Predictability                           | Practical: Predictability | Student research presentations     |
|               | 3  | Initial value ensembles              | Practical: Large ensemble    | Discussion                               | Projection uncertainty    | Career pathways                    |
|               | 4  | See ice in the polar climate system  | Sea ice 101                  | Practical: floe size model               | Discussion                | Presentation skills                |
|               | 5  | Sea ice modeling                     | Polar ocean forecasting      | Practical: ocean model                   | Discussion                | Abstract bootcamp                  |
|               | 6  | Excursion Day                        |                              |  |                           |                                    |
|               | 7  | Practical: working with observations |                              | Diurnal & seasonal cycles                | Practical                 | Education & Outreach skills        |
|               | 8  | Clouds                               | Polar lows                   | Practical: Arctic Hurricanes exercise    | Discussion                | Project management                 |
|               | 9  | Mid-latitude/polar linkages          | Polar representation in GCMs |  |                           | Celebration                        |
|               | 10 | Wrap up                              |                              |  |                           |                                    |

Advertisement for the school and application phase for participants will start in June 2017 with application deadline in mid-September 2017. Applicants will be reviewed and selected by the steering committee based on their application material using a set of selection criteria (including educational and scientific background) developed by the Steering Committee.

International as well as gender diversity will be also carefully considered in the selection of the participants. Successful applicants will be contacted by early October 2017. Travel support will be provided to participants as available.

A webpage for the summer school will be set up in May 2017 on the APECS website and linked to from the APPLICATE website. The page will be updated throughout the planning phase of the school and will include all information needed for participants and speakers including (but not limited to) program, speaker and participant biographies, registration form, logistics information for participants and speakers, training material needed for participants for preparation of attendance, FrostByte videos from the participants (task 7.1.4) and other content as needed.

From November 2017 to March 2018, the main activities will be final logistics arrangements and travel arrangements coordination with participants and speaker, coordination of the production of FrostBytes videos from the participants, updates to the summer school website and further refinements of the program as needed.

The summer school itself will be in late April 2018. After the summer school, several months of follow up both on travel reimbursements and reporting are expected. In addition, a follow-up survey will be done with the participants and speakers, the data of which will be used both for the summer school report and the final training assessment of APPLICATE. The final summer school report will be published in November 2018.

### **3) Online Course (Task 7.3.5.)**

In January - March of 2019, APPLICATE and APECS will run a course titled “Advancing predictive capacity of Northern Hemisphere weather and climate”.

Planning the online course will start well in advance of the course itself. In summer 2018, a committee consisting of the project manager at UiT, volunteers from APECS, and members of the APPLICATE project team with subject matter expertise will draft the syllabus for the class, keeping in mind that students will be coming from diverse backgrounds and varying degrees of preparation for the course.

The first four lectures will address an overview of the topic, with introductions to weather and climate prediction, Northern Hemisphere climate phenomena, and the methods used for prediction models. This will serve as an opportunity for students who may lack background in this area to join the class and at least have some baseline from which to work for the duration of the course. The subsequent lectures will focus on individual areas where there is presently a chance to advance predictive capacity in the northern regions. These topics will be selected by the committee to reflect the state of the field at the time.

For each week of the course, there will be 1-3 recommended readings, consisting of textbook chapters, academic papers, assessment reports, or other relevant documents. A guest lecturer will deliver a lecture via webinar on the topic for the week. Some weeks, there may be an additional exercise for students to gain a deeper understanding of the material. These exercises could range from practical skills like how to open and use certain models or datasets to more theory-focused assignments like comparing two models’ sea ice predictions and discussing why they differ.

The goal of this course is to provide students with the context and understanding necessary to contribute to research on weather and climate prediction. The course will be freely available to students while it is being run live, and the archived course material will stay available online after the conclusion of the course.

#### 4) **Networking Tools (Task 7.3.2.)**

Networking tools for increasing connection and training opportunities for early career researchers are seen as important and therefore the APPLICATE project will provide the following tools:

**a) Email list:** This list will be set up via the APECS mailing list system in August 2017 and all participants of the APPLICATE training activities and other interested members of the APPLICATE project are encouraged to register for it to use it as a platform for connecting with other early career researchers in the field of climate and weather prediction. The project manager at UiT will maintain the list throughout the project lifetime.

**b) Training webpage hosted on the APPLICATE and APECS websites:** The page will be set up in August 2017 by the project manager at UiT and the Arctic Portal, and will be used throughout the project to compile materials derived from the APPLICATE training activities and other interesting training resources relevant for early career researchers in the field of climate and weather prediction. This page will be openly accessible and will be updated throughout the project. The project manager at UiT and the APECS International Directorate Office will be maintaining and updating the page throughout the duration of the APPLICATE project.

**c) Dedicated mentor sessions:** Throughout the project, APPLICATE in cooperation with APECS will be organizing mentoring discussions and networking opportunities for early career participants of the project at APPLICATE General Assemblies as well as providing the opportunity to include a minimum of two featured talks from early career researchers into the program. In addition, APECS will be organizing sessions at APECS workshops with APPLICATE-relevant soft skill and thematic training topics that will connect early career and senior researchers. These sessions will be organized by the project manager at UiT as well as volunteers from APECS at meetings, workshops and conferences. Reports from the sessions and possible training material or power point slides from speakers will be made available on the APECS and APPLICATE websites.

#### 5) **Training Assessment (Task 7.3.6.)**

A report will be produced assessing the training activities of the APPLICATE project and lay out lessons learned and recommendations to future projects. To achieve this and gain an objective evaluation of activities, every training activity in APPLICATE will be immediately followed up with three surveys, one for the organizers of the activities, one for the mentors / lecturers of the activities and one for the participants. The surveys will be designed in June – August 2017 by the project manager at UiT. Google forms will be used as the platform for the survey as it will allow easy distribution of the surveys and display of the results.

After each training activity, the project manager at UiT will send out the survey to the relevant target group. The survey data will be collected and archived by the project manager. It will provide the basis for the assessment report at the end of the project.

The questions in the survey will include both ratings of the activities, their planning, implementation and usefulness themselves, but also long-answer questions with option to give detailed feedback both on the reasons for the ratings and for recommendations on how to improve the activities in the future.

The assessment report will be written in the last year of the APPLICATE project by the project manager at UiT in cooperation with the Dr. Gerlis Fugmann at the APECS International Directorate Office. The report and its results will contribute to improving training activities and teaching tools and strategies in future projects as well as those of APECS. The assessment report will be published on the APPLICATE and APECS websites by September 2020.

## 5. REFERENCES

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## 6. ACRONYMS

|       |  |
|-------|--|
| APECS | Association of Polar Early Career Scientists |
| PPP   | Polar Prediction Project                     |
| UiT   | UiT The Arctic University of Norway          |
| YOPP  | Year of Polar Predictions                    |