

The Danish RWIS education Programme

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ABSTRACT

This paper will give an overview of the Danish education programme for RWIS users. In Denmark we have a year long tradition in close cooperation between the Road Directorate and the Danish Meteorological Institute and the cooperation also includes the education programme. The main aim of the programme is to make the users understand the basic principles in road meteorology, and to make the users familiar with the RWIS system. The education programme consists of two 1-day courses; one for beginners and one for more experienced users. Each course is a mixture of theoretical lectures and practical exercises with the special designed “RWIS-education” system.

Keywords: RWIS, education, road meteorology.

1. INTRODUCTION

Teaching road meteorology is a question of balancing theoretical input with a “hands on” experience. Learning by doing should be a substantial part of the process, rather than hours of theoretical oral one-way lectures.

2. EDUCATION OF RWIS USERS

When a new user opens the RWIS system for the first time it’s important that he or she finds a system well organised and designed in way, so the information needed is found in an intuitive way. Of course the RWIS system includes a user manual. During the years, the manual has grown to become quite comprehensive and first-time users find it in some cases enormous. Experience shows, that it is necessary for the user to spend some time “clicking through” the system in order to “get to know” the system.

It is often useful, that new users have some kind of introduction to the system. When for example a municipality, entrepreneur firm or any other new users choose to purchase access to the RWIS system, a demonstration of how to navigate the system is offered. It’s important quickly to become familiar with the contents and possibilities of the system. Many municipalities choose to educate their employees further by offering them to participate in the education programme.

The education programme consists of two 1-day courses; one for beginners and one for more experienced users. The beginners’ course give the students the basic knowledge of road meteorology. Introduction to the concept of rime formation and basic understanding of the dewpoint temperature – a rather tricky dimension to deal with for beginners in road meteorology – are the main themes in the course.

The second course is aimed at users who have already seen the weather happening and used the system. We look more in-depth into the dewpoint processes, precipitation processes, road weather sensor capabilities, numerical modelling capabilities and the exercises are typically harder.

The students have a highly varying educational background. This is always a distracting factor for the teacher, but in general we have too much information in too little time. Without going into details with the syllabus, we need to go through really any aspect of meteorology. This is not possible. The theoretical – oral – part of a course day is supported by a high degree of nice and partly moving graphics to keep the listener focused. While trying to explain the mysteries of humidity and dewpoint, you need to merge the students everyday experiences with weather (and the home freezer) to connect the students’ basic knowledge to the parameters used in road weather physics. For instance, going into the processes that lead to precipitation in fronts makes students go asleep. The information should be given using more or less dramatic satellite images of moving fronts, combined with radar, and most importantly how this affects the roads. The effects of a clearing sky should just be explained and demonstrated, not followed by too many words like long/shortwave radiation, fluxes etc.



The text material (50-60 pages for two courses) is covering more information than is explained during the courses. The student is supposed to read this preferably at a later stage when he has "seen" weather happening. Relating these experiences to the text while remembering what was learned during the courses will bring a better understanding of the meteorological world.

There are many ways of presenting theoretical information to the students, and we need to do it. But this part of a course-day should be limited to the absolutely necessary. While demonstrating the features of the RWIS only the absolute basic functions should be presented.

The amount of theoretical stuff that really sinks into the students grows rapidly, when they get their "hands on" the system and get to analyse the weather in a "real life" exercise.

Afterwards the course is evaluated and commented by the participants and generally the comments are: Not enough time, too much theory, want more exercises, - and "good teachers"...

3. THE "RWIS-EDUCATION" SYSTEM

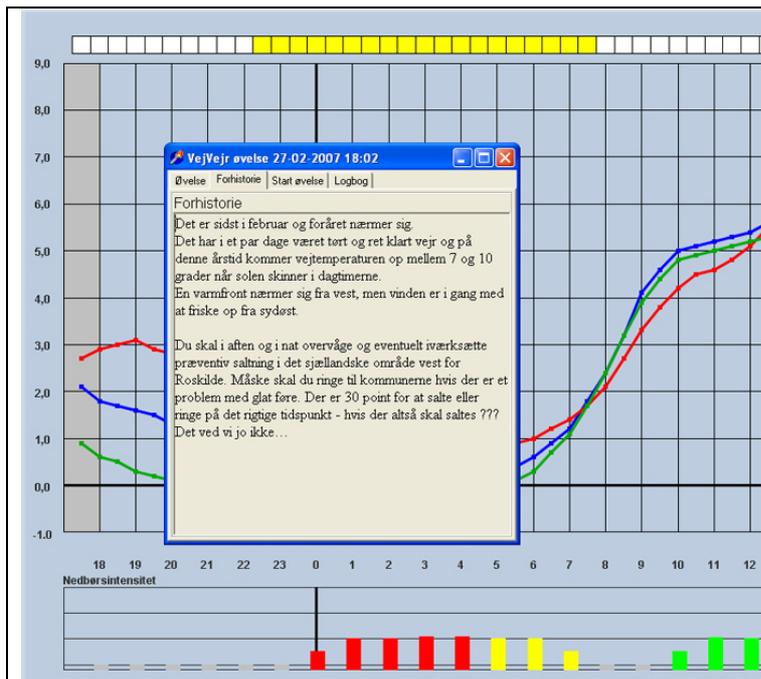
The "RWIS-education" system is a special designed issue of the official Danish RWIS-system. The education system provides the opportunity for the users/students to virtually "be on duty" and handle historic weather situations, while learning to navigate the RWIS-system, scoring points while answering theoretical questions and retrieving important and case-relevant information from the RWIS. In some cases the challenge is to make better decisions than was made when the weather really happened.

The Danish RWIS system includes a historic database. All information such as observations, forecasts, satellite- and radar images are stored in the database. The "RWIS-education" system consists mainly of a "time-machine", allowing the user to slowly step forward in time in "historic mode". This function gives an illusion of "being on duty" and handle the weather situation and to initiate salting.

An exercise typically runs a historical weather situation of 8-12 hours. The student clicks through time at steps of 30 minutes to 1 hour and at each time step he should evaluate the weather situation using the RWIS and decide if and when to take action.

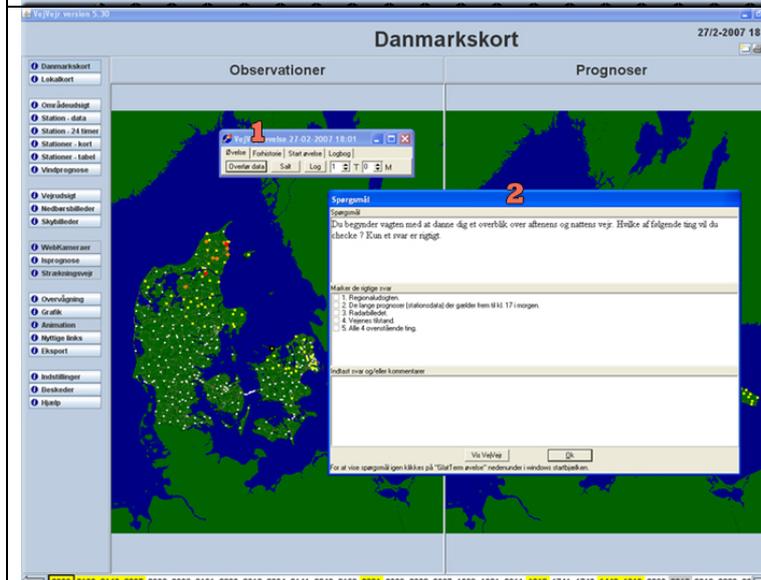
But the exercise is spiced up with a quiz-program. At nearly each time step the program pops up with a question. The questions could be related to a specific use of the RWIS, a theoretical question, a question related to the weather observed, - to the forecast, - to the road condition etc. All these questions make the student experience all facilities of the RWIS and demonstrate that he listened well during the first part of the day.

The exercises are scored, and the time the student took any preventive action (salting) is validated and scored as well. This leads to good discussions with fellow students and the teachers. All have great fun in the competition between 8-12 participants. After the course, the exercises are available for download, so that you at home – or on your shift while awaiting winter weather – can run selected historic road weather while refreshing your knowledge.



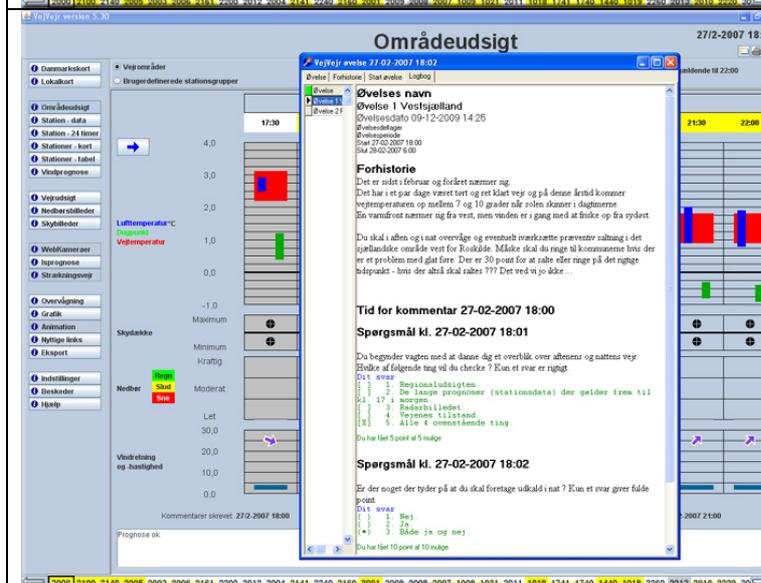
All exercises begin with a briefing about the conditions leading up to the exercise time. What kind of weather preceded the situation and when was the last salting initiated.

The task-area is assigned and the maximum score for the correct decisions is indicated.



The "time manager" (1) runs in the process line of the PC along with the RWIS system. The time manager allows you to step forward in time when you have checked all relevant information. When deciding to initiate salting you press the "salt" button and select routes to be salted. The time is registered in the exercise program.

While watching the weather developing, quiz-questions pops up (2). To answer, you need to go to the RWIS to find answers to the questions. One or more answers are correct, and when they are selected, the correct answers appear below, with a thorough explanation of how to reach the correct conclusions. Then the answer(s) are scored with a number of points.



During and after the exercise you can check your own logbook. All questions, answers and correct answers are listed, and the scoring can be viewed by teacher and student.

When the exercise is finished, the total score is computed and a debriefing including a discussion of how the situation should have been handled is presented.

4. IMPORTANCE OF EDUCATION

You can say, that a “state of the art” RWIS system not is worth much, if the end-users don’t know how to use the system and interpret and analyse the cascades of information and output. Of course you also have to take this question into account when you design the RWIS system and educate users.

In these years, when increasing amounts of information is freely available on the internet, it is of growing importance to give the users a realistic relation to uncertainties and to the quality of numerical weather modelling. For an uneducated user a fancy presentation and freely available data can be the main reason to choose not to invest money in a RWIS system.

It is of great importance, that the users of the RWIS system quickly become familiar with improvements and new functions in the RWIS system. Such information must reach the users continuously. In Denmark the RWIS system has a build-in message function that allows the forecasters as well as the system developers to send messages to the users of the system. Such messages are typically issued when new versions of the RWIS system with improvements and changes are released. In recent years we have also published newsletters on email to the end-users.

Feed back from users is each year collected. Of course some take contact to us on their own initiative, with questions and suggestions. But you can’t count on, that all users do that. That’s why it’s important each year to examine whether the users are satisfied or not. We use questionnaires and analyse the results. This way we can compare the results year by year.

On yearly basis we offer all users to participate in a one-day seminar. The seminar consists partly of evaluation of the recent winter season and partly of discussions of future improvements and developments. It’s our hope, that the seminar also will provide good opportunity for networking between colleagues.

5. SPECIAL EDUCATION OF FORECASTERS

A special education of forecasters – regarding the operational aspects of road maintenance - is also an important aspect in this discussion. In Denmark the operational RWIS system is designed with automatic output from the numerical road- and weather model. The forecaster on duty adds a comment to the automatic output, thereby validating the forecast.

On the Danish Meteorological Institute the forecasting service is organized in 3 sections; public weather services, maritime services and civil aviation services. Surveillance and input to the RWIS system is one of the tasks in the section of civil aviation services. The reason why the road weather forecasting is one of the tasks in the civil aviation section is mainly due to the identical time horizon of the forecasts. Making TAF- and TREND-forecasts for the airports is nowcasting – and so is road weather forecasting. Besides; many slippery roads situations in Denmark includes hoar frost, and then detailed forecasting of the cloud cover plays a major role. Detailed forecasting of clouds is well known as one of the most important issues in aviation weather forecasting. Making an aviation forecaster into a road weather forecaster requires a special education. The forecaster has to become familiar with the operational aspects and issues the end-user of the RWIS system has to take into account when deciding whether to – or not – initiate actions on the roads.

In Denmark each autumn before the winter season starts all the meteorologists goes through a one-day brush up course in road weather meteorology, especially concerning the duties regarding input to the RWIS system. If possible a representative from the Danish Road Directorate takes part in the course contributing with input from the end-users point of view.