A weather sampler: a new handbook, *Technical Soaring* is on-line and an on-line glider pilot self-briefing system

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(www.ssa.org)

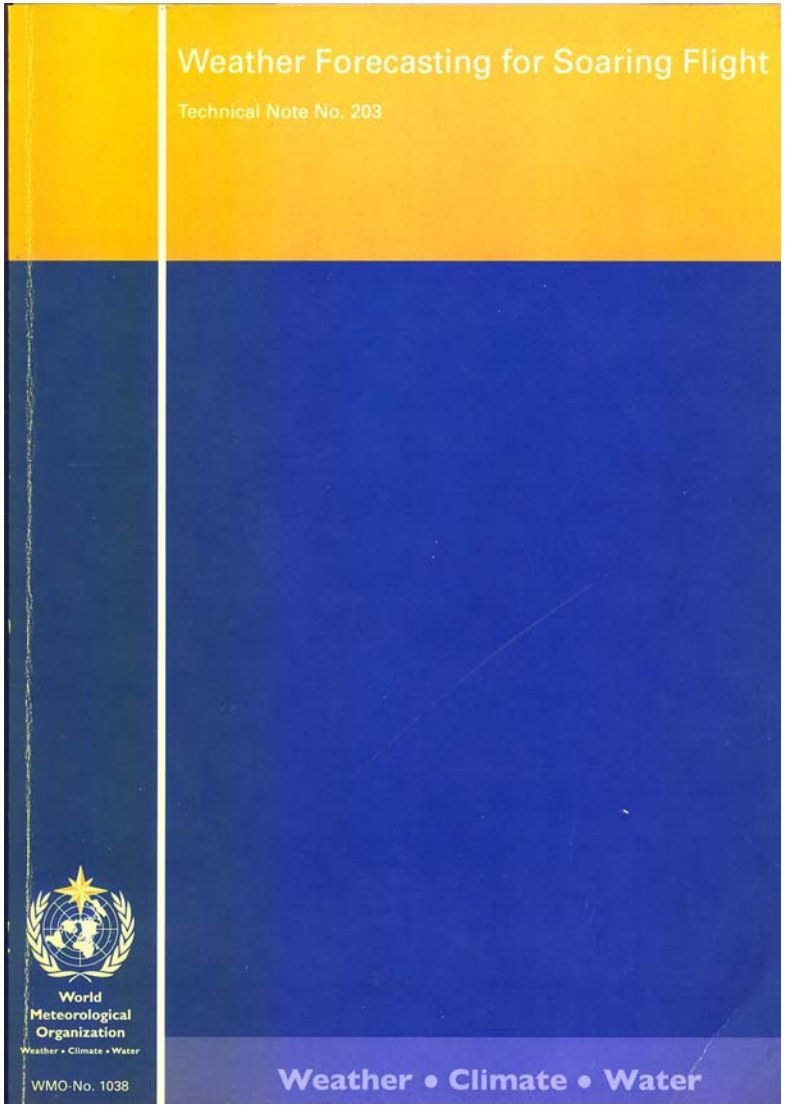
Introduction

Significant changes have occurred in weather forecasting for soaring flight since the World Meteorological Organization(WMO)/OSTIV *Handbook of meteorological forecasting for soaring flight* was published in 1993. The totally new WMO/OSTIV handbook *Weather forecasting for soaring flight*, published in the spring of 2009, documents this progress. I will highlight the handbook's content and describe how to obtain a copy.

In 1971, the SSA initiated *Technical Soaring*. This international journal contains pioneering scientific and technical studies. The journal is now on-line which increases its world-wide access. I will illustrate sample content and give you subscription information.

Finally, an experimental glider pilot self-briefing system for the East Coast USA and Colorado has been developed. A pilot is able to 'fly' a planned task through a numerical weather prediction forecast to determine the task's feasibility. After the actual flight, the forecast can be checked using the resulting flight-recorder file. I will explain and demonstrate this revolutionary system.

A weather sampler: a new handbook



- Written by experts from Argentina, Austria, Germany, Switzerland and the United States

- Reviewed by experts from Australia, Sweden, Turkey, United Kingdom and United States

- Contains internationally-agreed on guidelines for forecasting support for meteorological offices routinely receiving inquiries from pilots as well as those in the field supporting contests

A weather sampler: a new handbook

Contents

Chapter 1: A phenomenological description of atmospheric processes is presented so the meteorological background for gliding activities can be understood.
Idealized two-dimensional mountain wave system

Chapter 2: A technical description of gliding and soaring flight is presented so the impact of weather on feasibility, timing, range of operations and safety in soaring may be appreciated. *Straight-flight and climb performance*

Chapter 3: Numerical analysis and forecasting techniques that address both the large-scale and smaller-scale features relevant to soaring are described.

Chapter 4: Sophisticated pilot self-briefing systems are described: pilots may use high-resolution soaring forecasts for establishing flight plans for individual tasks. Personal briefings for task-setters and pilots at soaring competitions also are described. *Meteorological support for competitors and task-setters*

Chapter 5: Recorded flight data are presented that reveal the flight altitudes used, the climb rates achieved and the position of the up draughts. The data are shown to support both the development and the quality of numerical models for the prediction of soaring conditions.

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Idealized 2-D mountain wave system

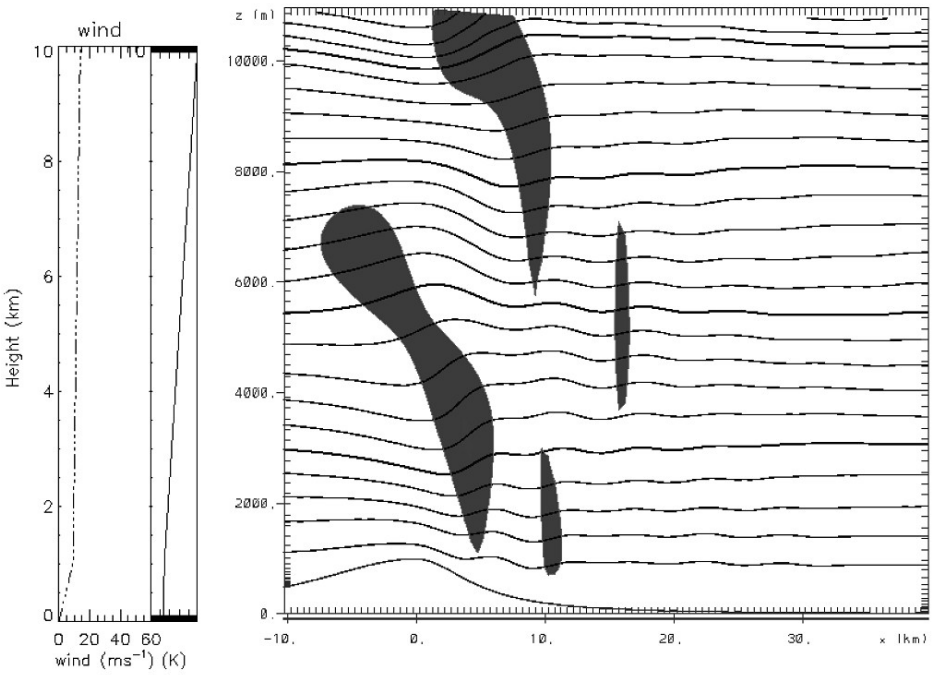

Figure 1.16. Isentropes (contours) and positive vertical velocity (gray shading) showing mostly vertically propagating waves from a numerical model simulation initialized with weak vertical shear of the wind above mountaintop level (right panel). Wind and potential temperature profiles (left panel).

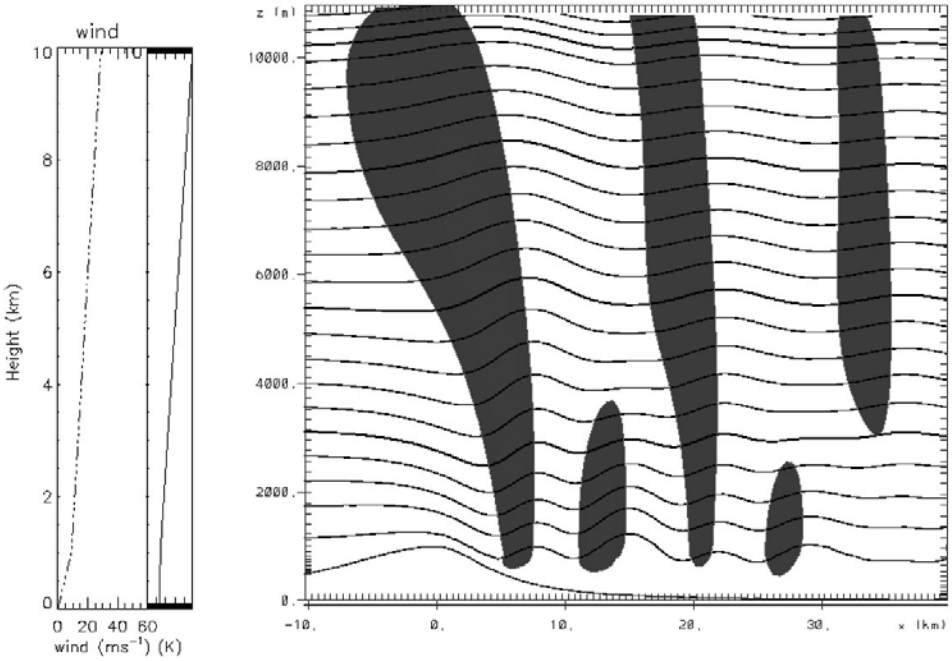

Figure 1.17. Isentropes (contours) and positive vertical velocity (gray shading) showing mixed-mode waves from a numerical model simulation initialized with moderate vertical shear of the wind above mountaintop level.

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Climbing-flight performance

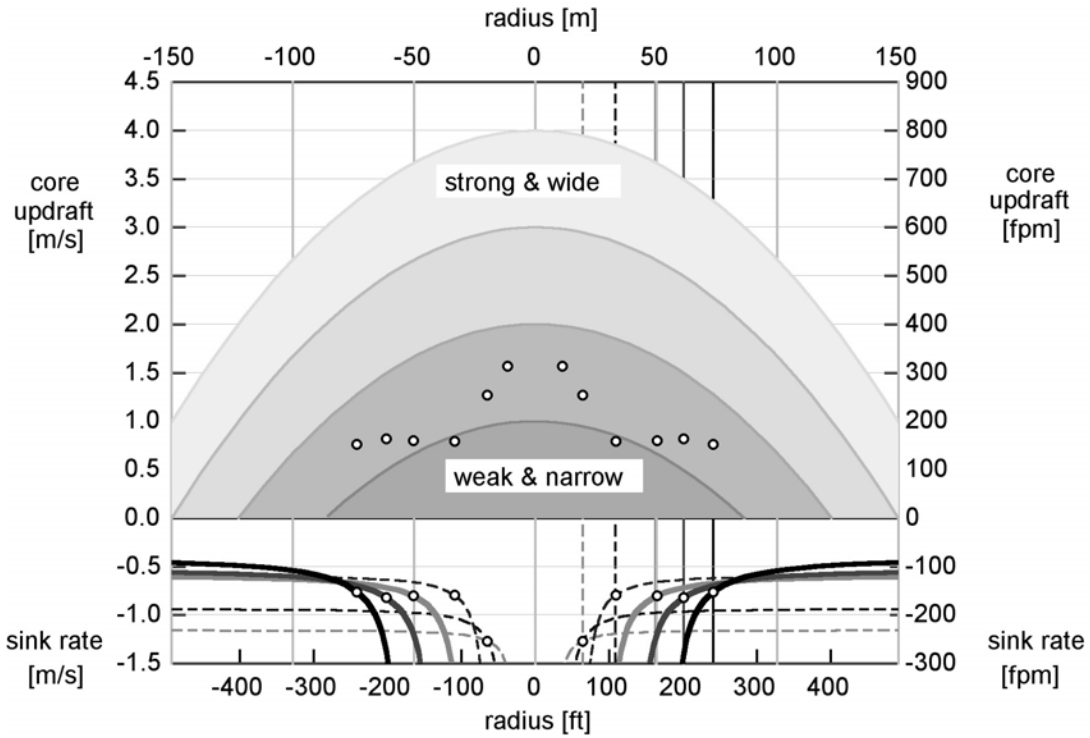

Figure 2.4. Parabolic lift profiles (top) and sink rates of gliders and sailplanes (bottom) in steady turns. Open circles refer to the optimum turn radius, the corresponding sink rate and the minimum required core updraught of a standard parabolic thermal.

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Meteorological support for competitions

A possible timetable of preparations:

- t–180 min: Analyze the latest surface and upper-air charts and the current weather situation
- t–160 min: Check the models
- t–140 min: Forecast of the surface wind for the expected runway to use; first guess of the tasks with task-setter(s)
- t–120 min: Comparison of models with actual conditions
- t–100 min: Coordinate the meteorological conditions with the provisional tasks set by the task-setter, preparing alternatives, if necessary
- t–75 min: Monitoring the conditions for the prepared task(s) and feedback loop with the task-setter
- t–60 min: Preparation of the weather briefing
- t–0 min: Weather briefing for pilots
- t–take off : Monitoring: unexpected changes, hazards – communication with the organizer

Table 4.2. Contents of a competition briefing

Goal
General synoptic weather situation and development, comparison to the day before and outlook
airmass
Thermals and relevant phenomena for the competition area
height, duration and strength of thermals during the day, convective clouds with base and tops, stratiform clouds, inversions, advections, freezing level
special remarks f.i. low level outflow of cold air ect.
Wind
Special phenomena, depending on the situation
Warnings:
hazards in flight and on the ground
Additional information

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How to get a copy

Visit www.wmo.int/e-catalog/detail_en.php?PUB_ID=535&SORT=N&q= :

Hit 'cart': Please address your order to: **American Meteorological Society, Attn: WMO Pub. Center, 45 Beacon Street, Boston, MA 02108 USA, Fax: 617-742-8718, Tel: 617-227-2425**
25 CHF = 24.07 USD (on 26 Jan 10). To ship and handle add USD 5 per book for USA and USD 10 for Canada. Hit Download the PDF order form.
Or, buy at www.ostiv.fai.org (bookshop)

A weather sampler: *Technical Soaring* is on-line

In 1971, the SSA initiated *Technical Soaring* and in 2006 OSTIV assumed responsibility. This international journal contains pioneering scientific and technical studies. As of Vol. 33, No. 4 (October-December 2009), the journal is on-line at journals.sfu.ca/ts/.

Only OSTIV members have complete access to *TS* on-line; other visitors can access titles and abstracts. A pay-per-view feature is being developed.

The main advantage of the on-line version is unlimited use of color; print copies are in shades of grey.

Print copies will continue for the foreseeable future.

Here I will provide information on submissions, sample content, indexing and subscriptions.

A weather sampler: *Technical Soaring* is on-line

Submissions

Please submit manuscripts to *TS*. All necessary information is at

www.ostiv.fai.org (editor)

If you submit a paper to the OSTIV Congress to be held at the WGC in Hungary this coming July, your paper will be automatically considered by *TS*. The call-for-papers and Congress information are in the current issue of *TS* on-line.

A weather sampler: *Technical Soaring* is on-line

Sample content

A friendly step-by-step *TS* on-line quick-start guide is available on the OSTIV web site. Here are the initial steps and the final outcome once you reach a paper:

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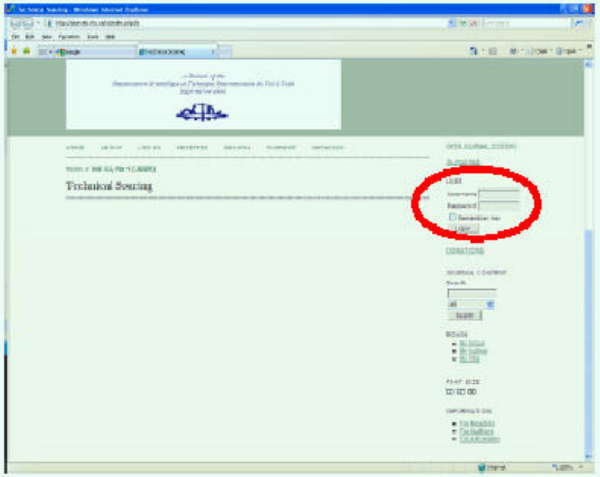
Technical Soaring *online* – a quick-start guide

Please have a print of the e-mail with the reference "[TS] Journal Registration" available. You received this e-mail earlier before.

Step 1:
Please copy the following link to your web address field (URL)
http://journals.sfu.ca/ts/index.php/ts
and press the <carriage return> key on your keyboard.

Step 2:
The following screen will open.
Type in the user name and password as written in the above mentioned e-mail (unless you already changed your password, then use yours).
Then click on the "Log In" button.



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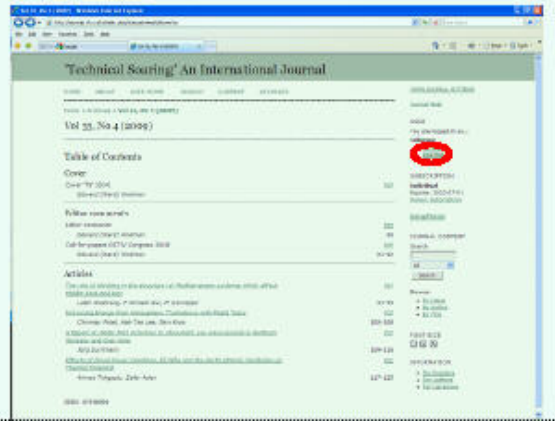
The following screen will open. The article is now available to you. To return to "CONTENT" just click the "back" button of your browser.

Step 8:
To choose another one, start again at "Step 5:", or, if you want to leave the site click on "LOG OUT".



A weather sampler: *Technical Soaring* is on-line

Indexing

The *TS* Volumes 1 through 33 (1971-2009) have been indexed - Author, Subject and Issue - by John Leibacher and is at soaringweb.org. *TS* Volumes 10 through 33 are available in hard-copy from the OSTIV Secretariat. I have copies of Volumes 1 through 9 and would be glad to copy any requested articles.

One goal is to get all back-issues of *TS* on-line. This will take more time than available to me. Consequently, I invite interested individuals to work with me to achieve this goal.

A weather sampler: *Technical Soaring* is on-line

Subscriptions

Only OSTIV members receive *TS*, in print and on-line.

Member categories: Student (35USD/yr), Individual membership (63USD/yr), Scientific/Technical (libraries, gliding clubs, etc, 112USD/yr) and Active Membership (National Aero Clubs, eg. SSA, 350USD/yr).

All necessary information is at www.ostiv.fai.org (join us!)

A weather sampler: self-briefing system

Background

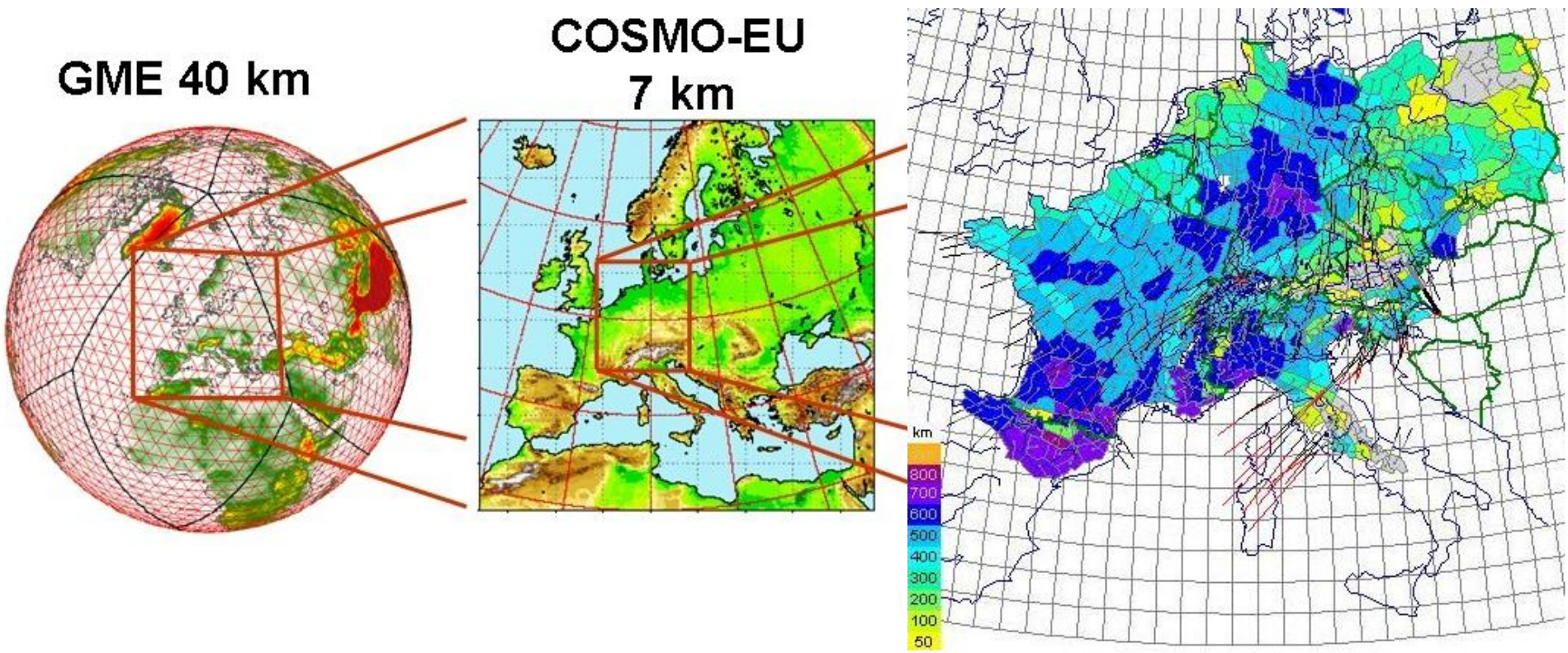
My colleagues Drs. Olivier Liechti (Analyzen und Konzepte of Winterthur CH) and Ralf Thehos (German Weather Service) have developed a glider pilot self-briefing system for Europe at www.flugwetter.de. Using the system, a pilot is able to 'fly' a planned task through a numerical weather prediction to determine the task's feasibility. After the flight, the forecast can be checked using the resulting flight-recorder file.

During the 2009 soaring season, as an experiment, we operated the system for the East Coast USA and Colorado. We validated the East Coast system using data from glider contests and, with a few qualifications, found it successful.

I will explain and demonstrate this revolutionary system.

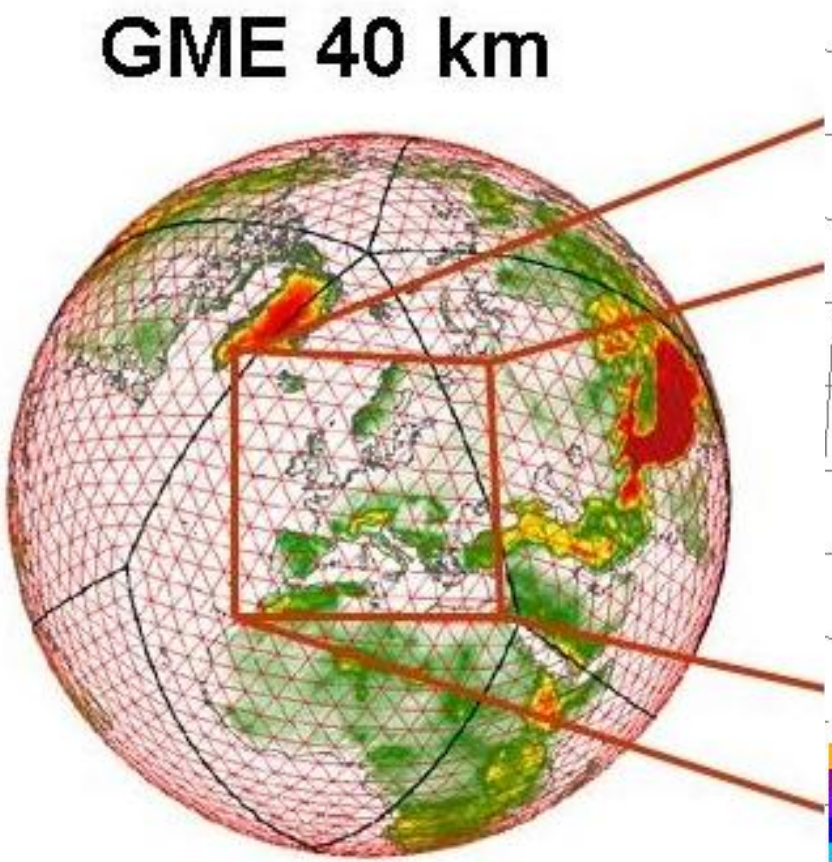
A weather sampler: self-briefing system

The system in Europe

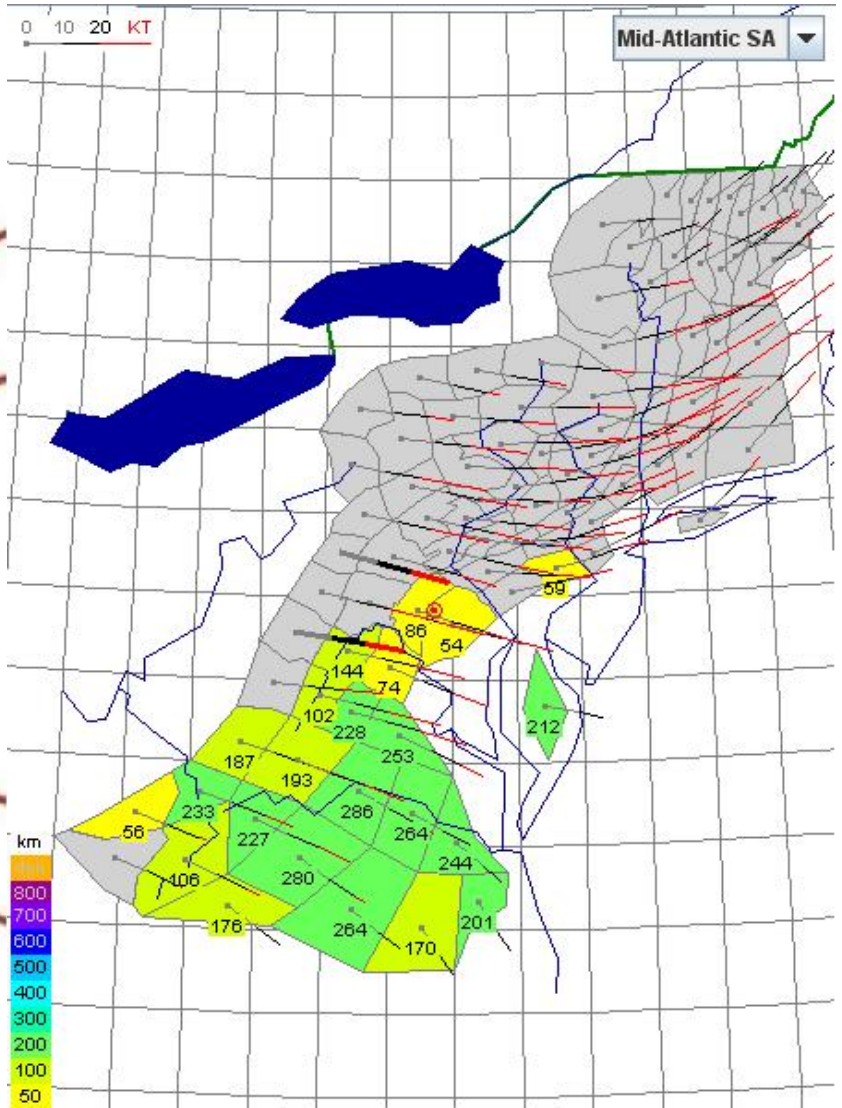


A weather sampler: self-briefing system

The system for the East Coast USA

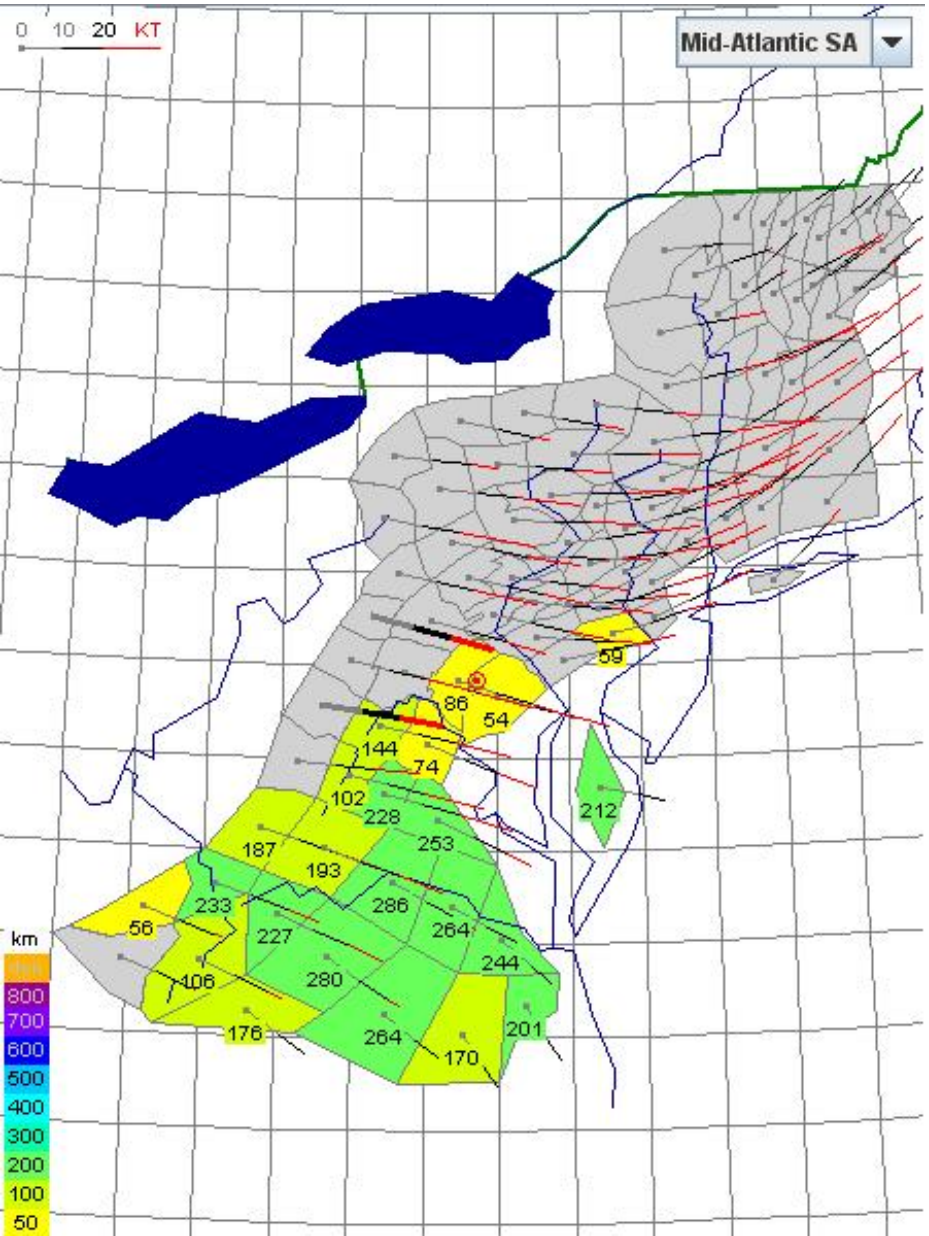


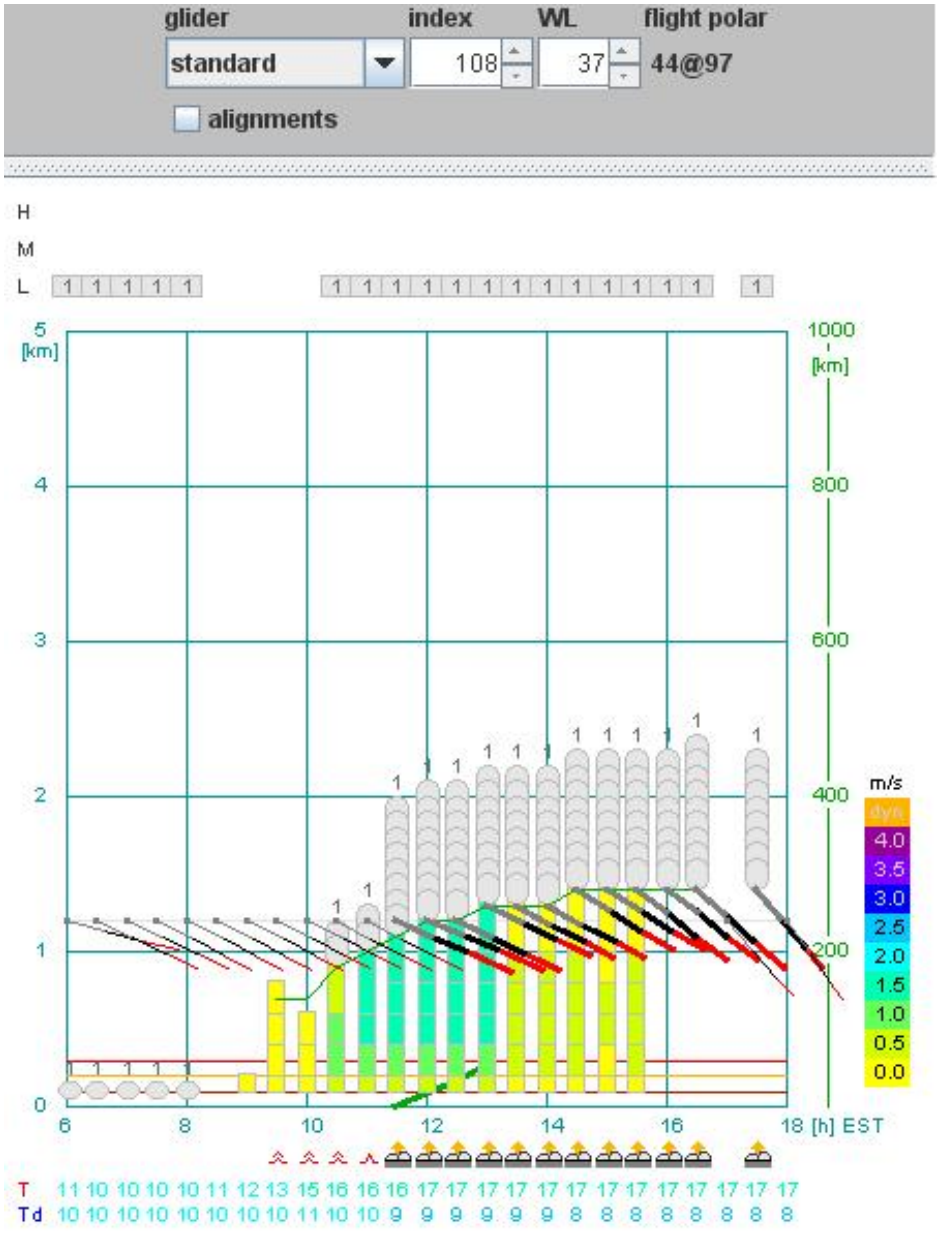
TOPTHERM



A weather sampler: self-briefing system

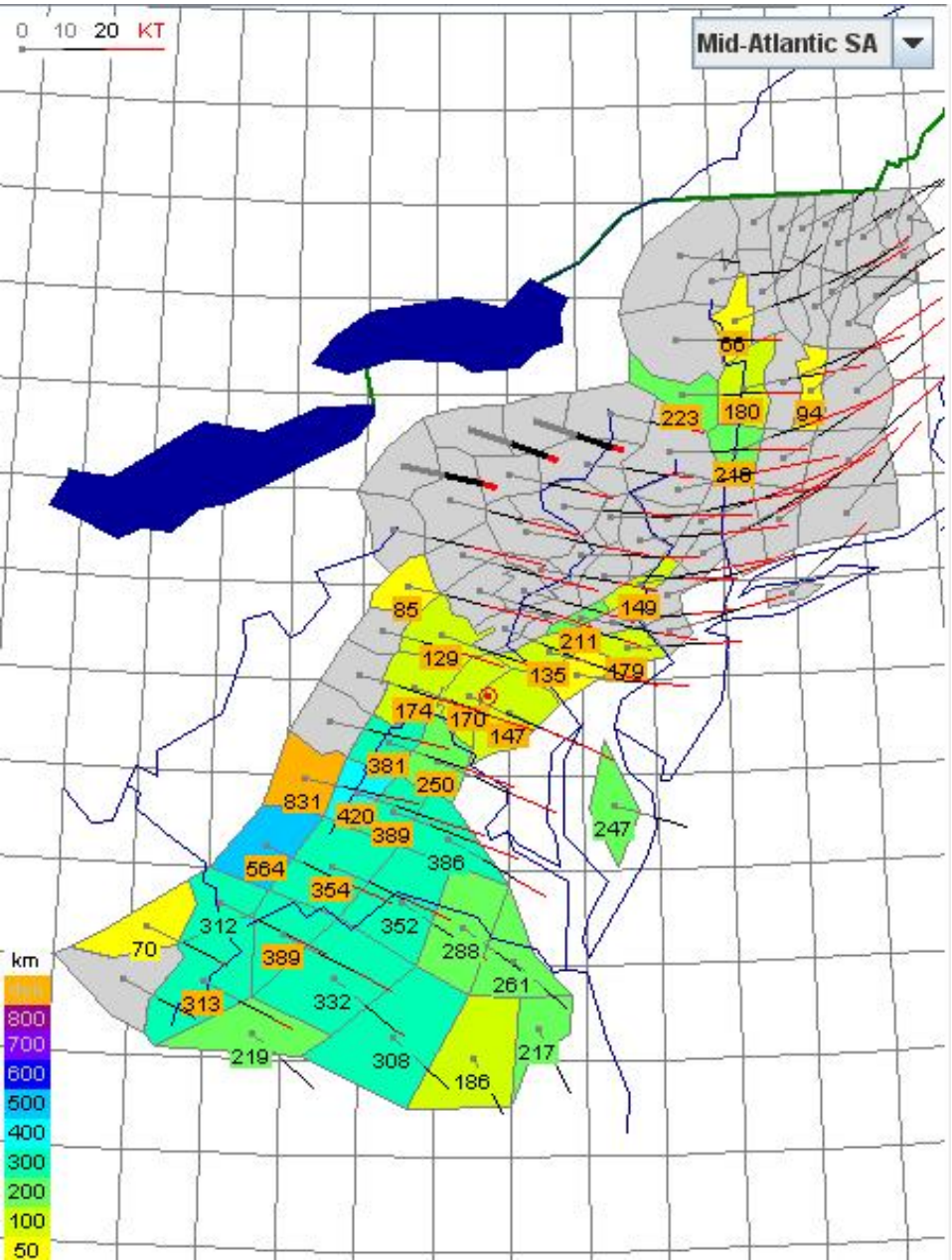
The TOPTHERM forecast for 13 October 2009 for random convective lift

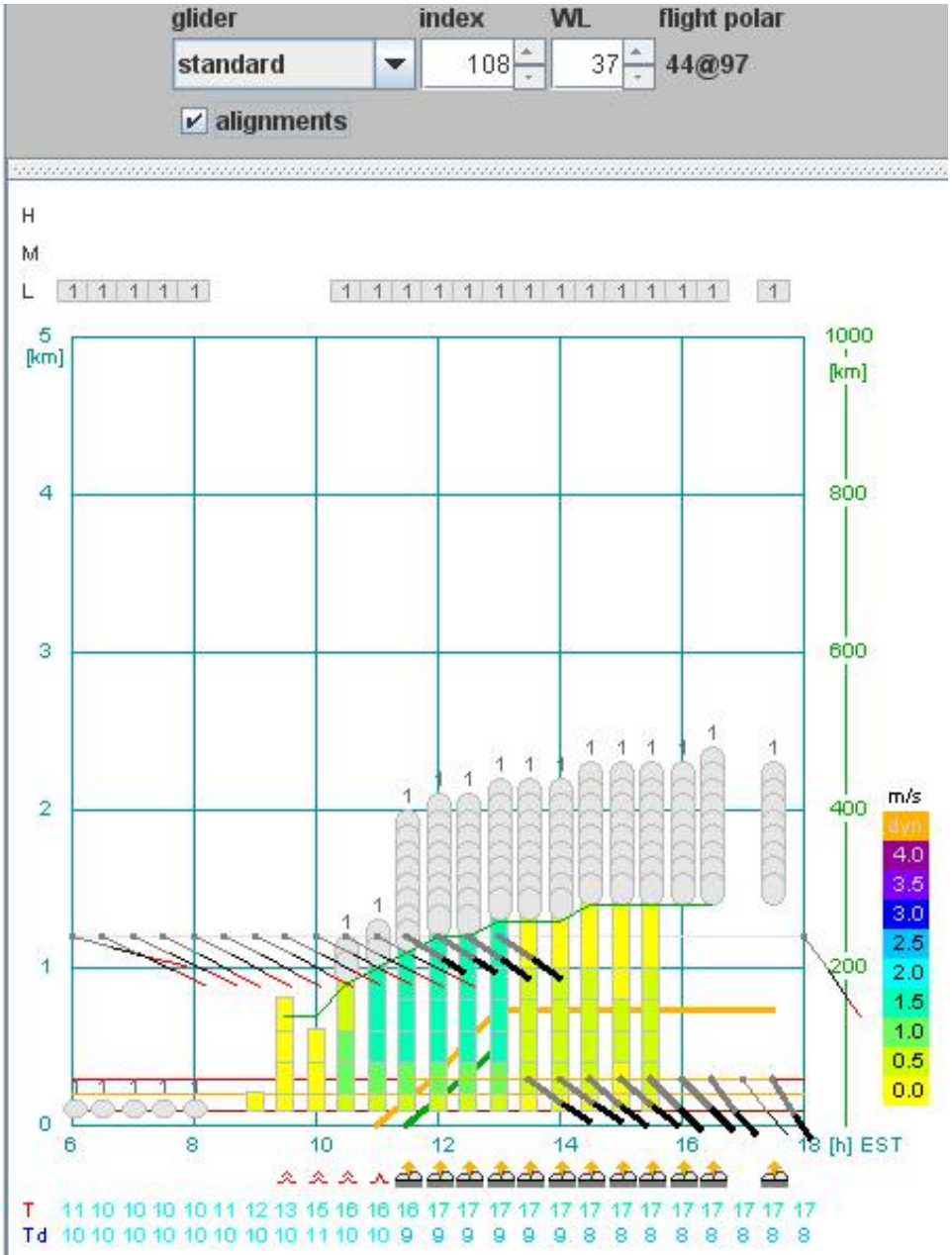




A weather sampler: self-briefing system

The TOPTHERM forecast for 13 October 2009 for aligned lift





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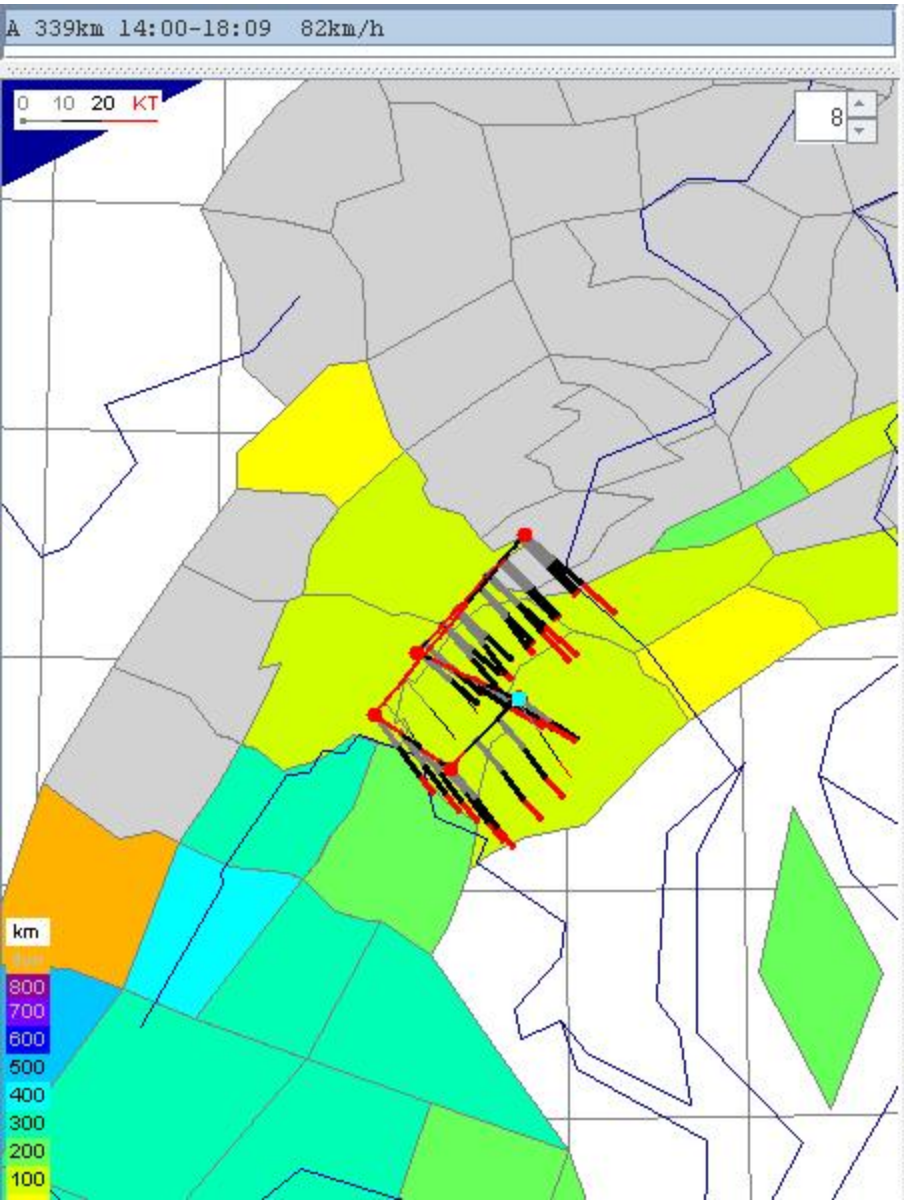
Flight plan for 13 October 2009 for aligned convective and ridge lift

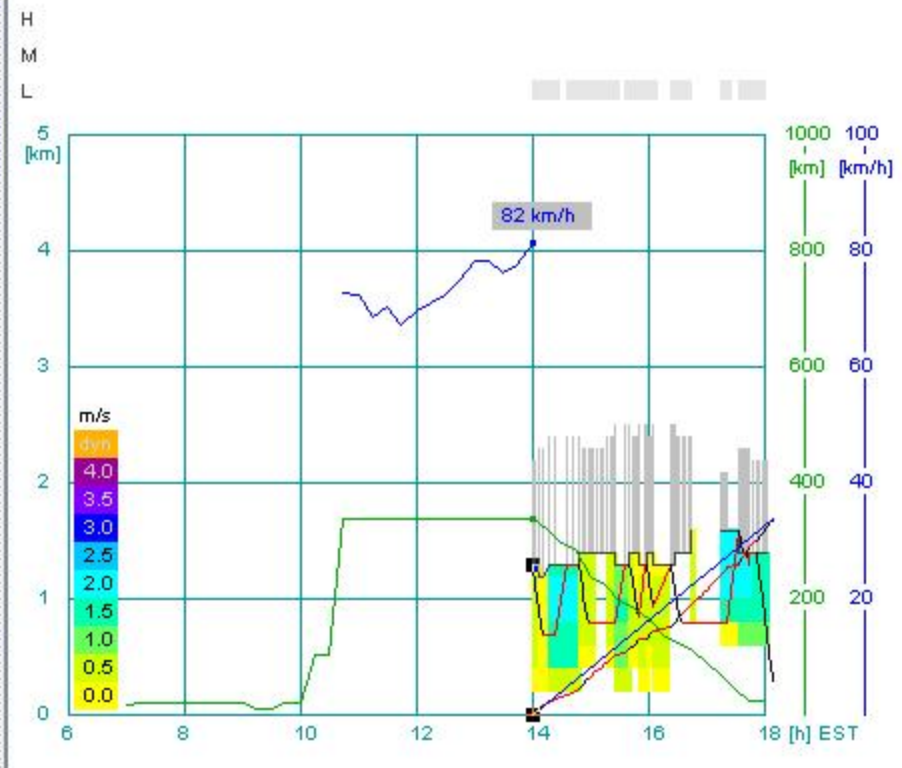


AAT | glider | index | WL | flight polar

inverted | standard | 108 | 37 | 44@97

optimum | alignments | wave

point	name	longitude	latitude
start	W 77.274/N39.841	-77.274	39.841
point #1	W 77.849/N40.042	-77.849	40.042
point #2	W 77.232/N40.559	-77.232	40.559
point #3	W 78.097/N39.771	-78.097	39.771
point #4	W 77.664/N39.538	-77.664	39.538
finish	W 77.274/N39.841	-77.274	39.841



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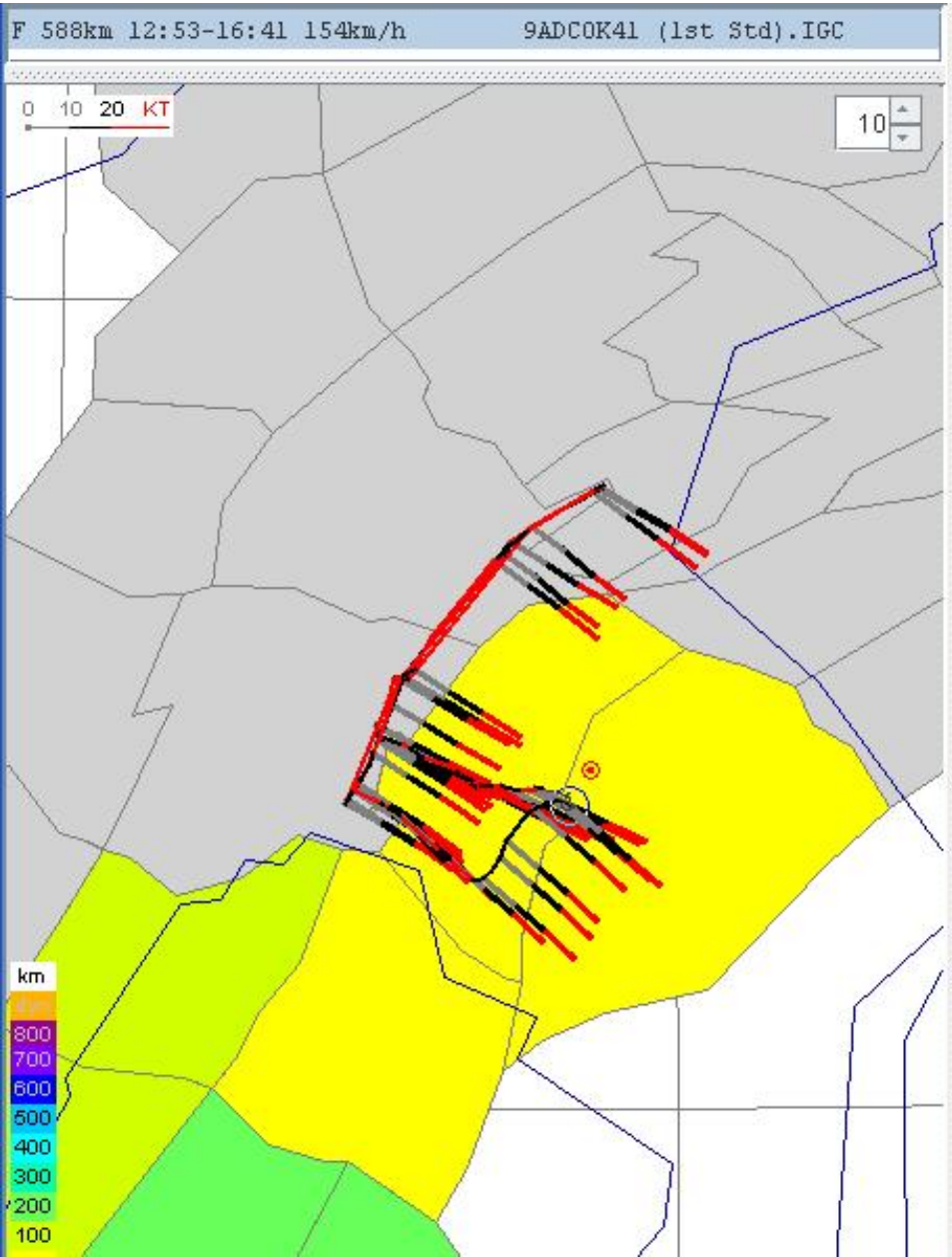
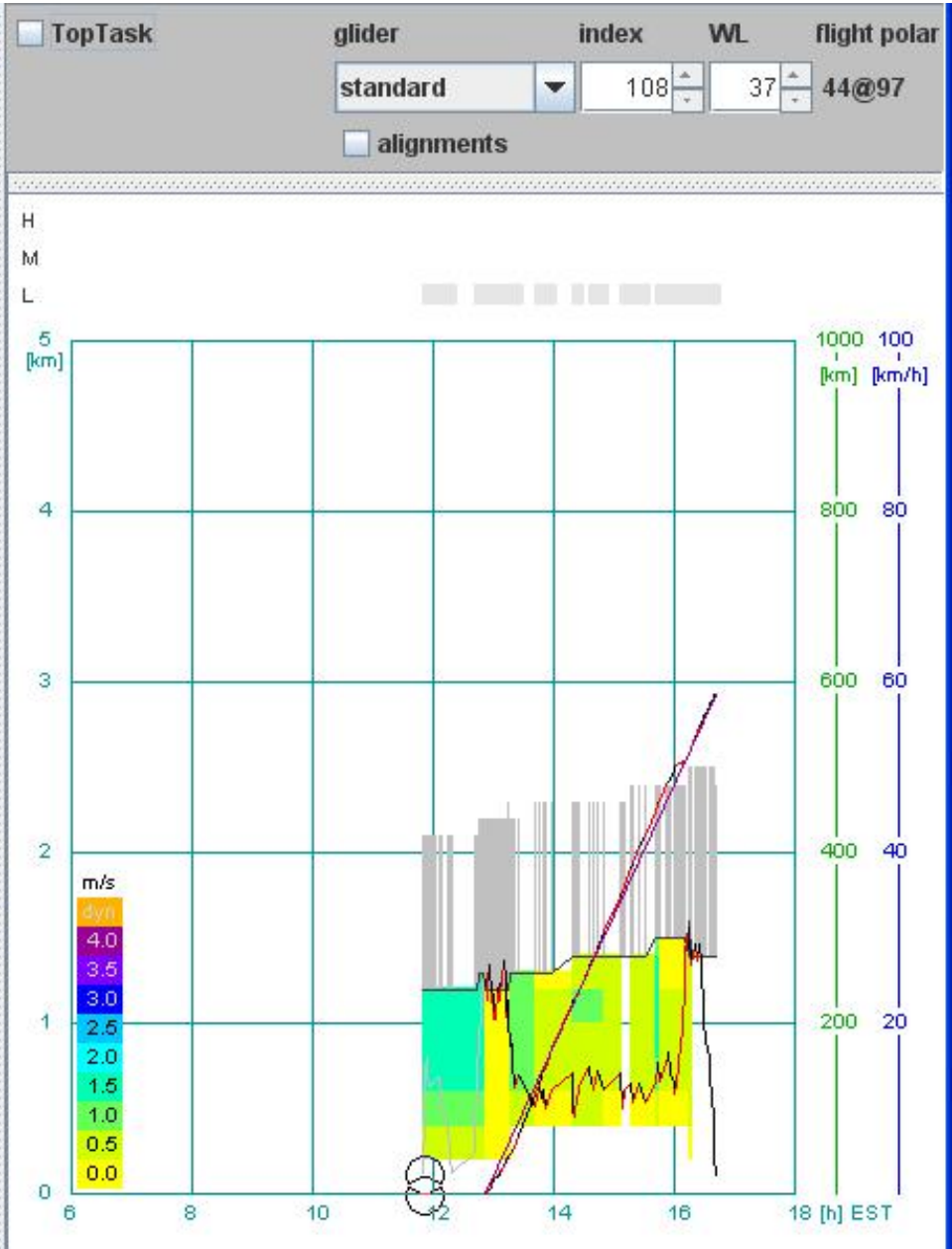
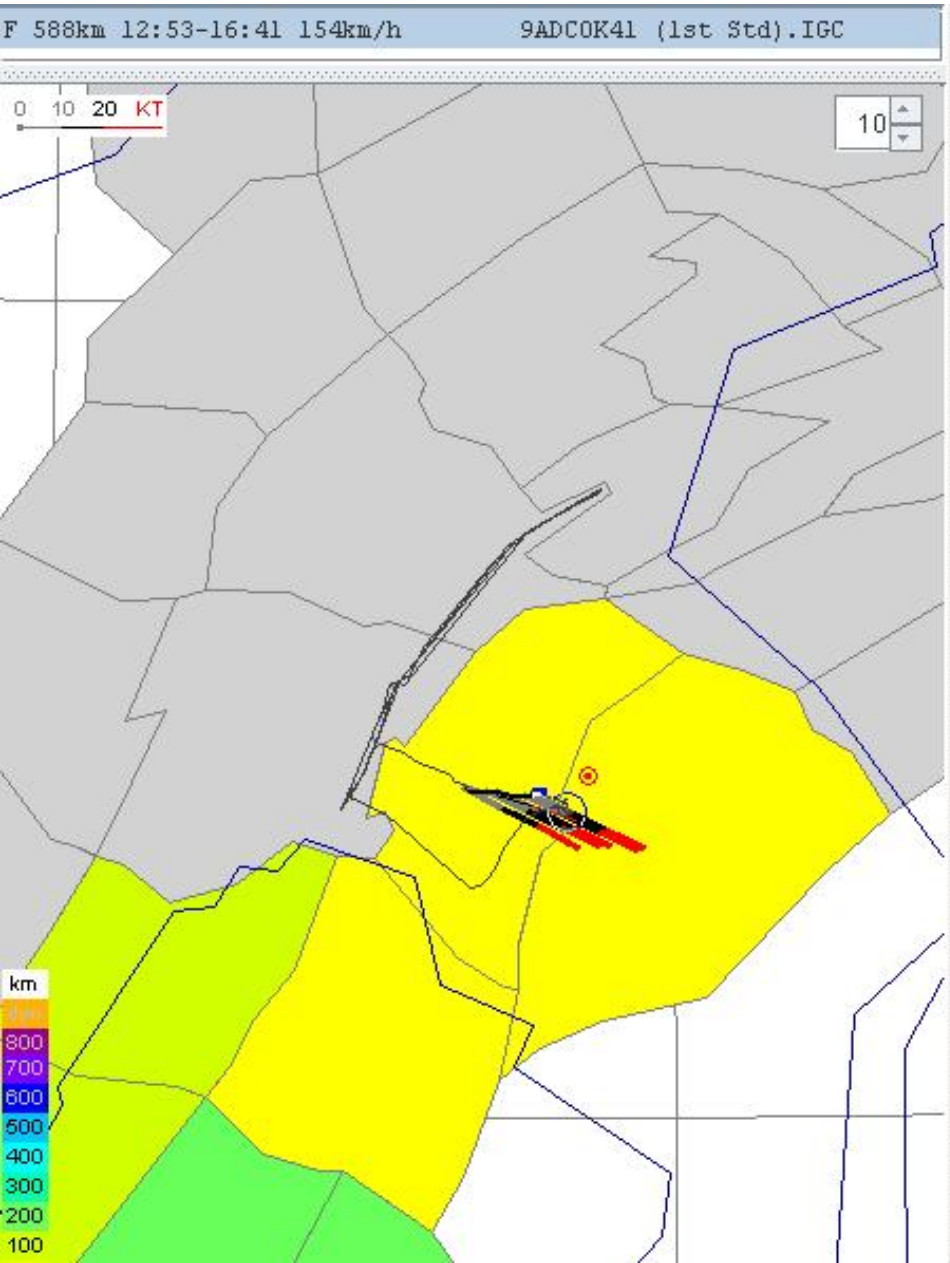
Analysis of the 13 October 2009 flight

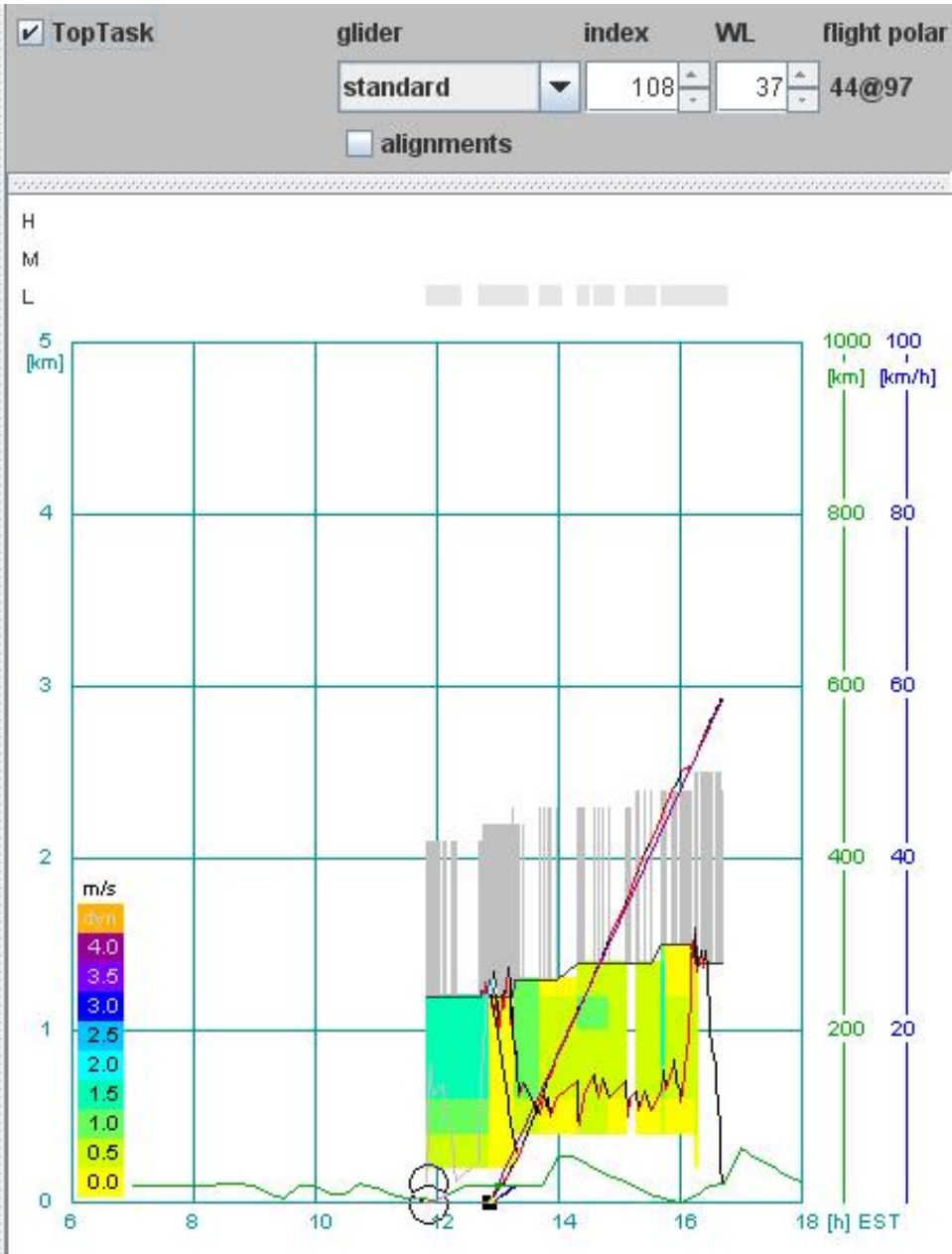




A weather sampler: self-briefing system

Validate the TOPTHERM forecast for random convective lift





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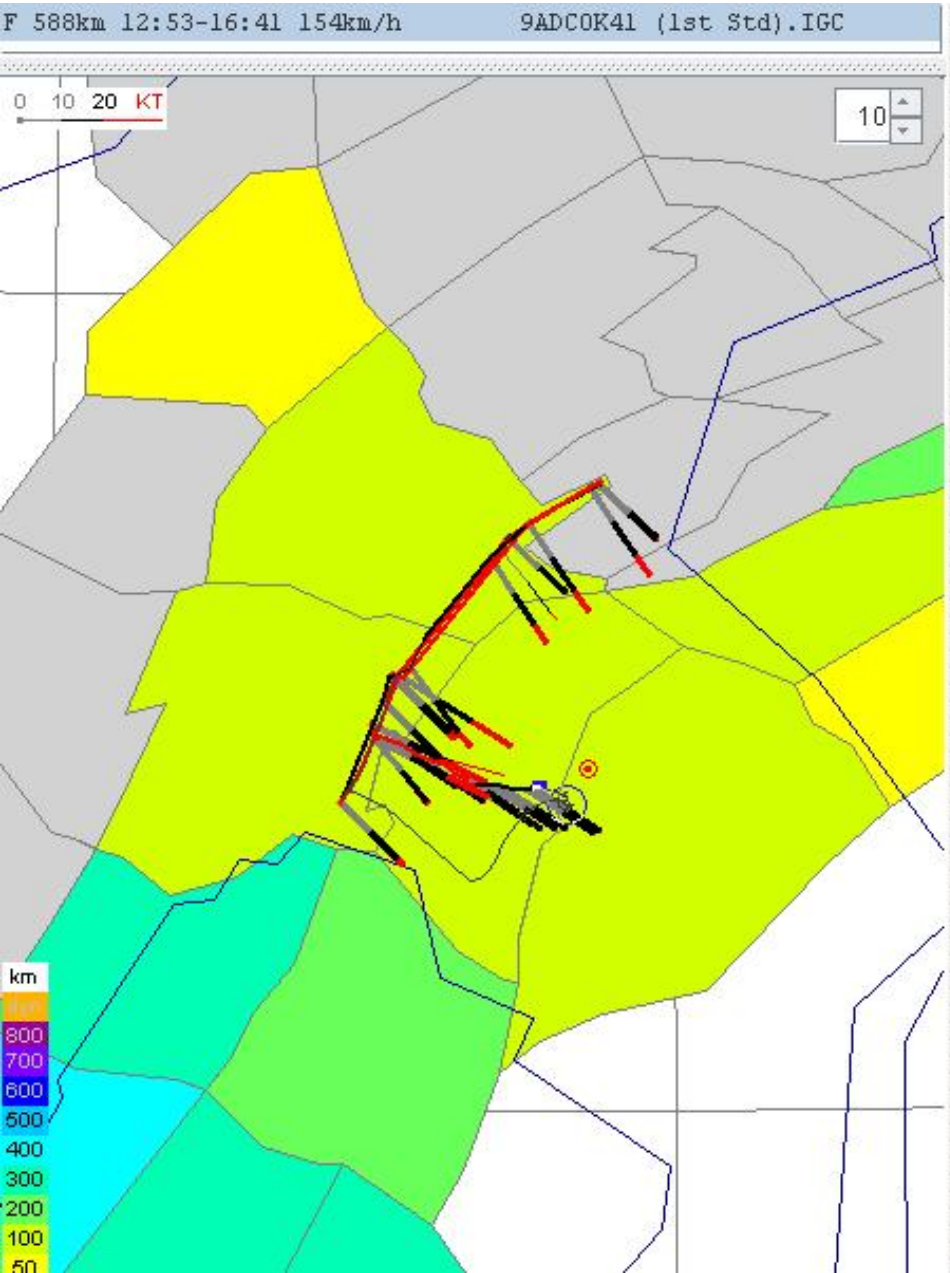
Validate the TOPTHERM forecast for aligned lift



A weather sampler: self-briefing system

Forecasts validated using data from 2009 East Coast USA contests

The GME-TOPTHERM-Java TopTask system was evaluated for the northeast USA using meteorological and flight recorder data collected from glider contests held in the spring, summer and fall of 2009 in the following states: New York (Sports Class), Pennsylvania (R2, R4N) and Virginia (R2S). The system made useful predictions of the convective boundary layer (CBL) depth, the flight speed and the Potential Flight Distance (PFD) with the following qualifications:

- The predicted CBLs developed more slowly and lasted longer than the actual CBLs.
- More accurate surface T and Td predictions would improve the CBL predictions.
- For flights in random convection, CBL depths were under-predicted by 75m, flight speeds were under-predicted by 7kph and PFDs were twice the actual flight distances.
- The Java TopTask successfully predicted flights that utilized a mixture of aligned convective and ridge lift, the longer the task the better the prediction.
- The actual threshold for weak aligned lift seems to be somewhat lower than the threshold assumed in Java TopTask.

A weather sampler: self-briefing system

Future

These findings are encouraging for setting up the system anywhere on the globe. Due to the coarse global model, limitations exist for convective lift in extremely complex terrain (e.g. Alps, Himalayas, ...), whereas wind generated aligned lift (ridge, wave) may be predicted anywhere. Minor improvements in temperature and dewpoint values can be expected by adjusting the surface sensible heat and latent heat fluxes. This will improve the growth of the CBL and the predicted base of cumulus clouds. Additionally, the assimilation of surface measurements of temperature and dew-point should further improve the prediction of cumulus (onset, base and depth) as is known from current German Weather Service operational runs.

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The experiment continues in 2010

The system is ready to be evaluated by USA glider pilots flying in the mid-Atlantic and northeast States and Colorado (where a formal evaluation has not been conducted due to a lack of contests). To encourage pilot participation, the system on www.flugwetter.de will available free-of-charge for the 2010 soaring season. Procedures on how to access and use the system will be forthcoming.

If the experimental system is accepted and wanted by the pilots for the 2011 season, the system will be made operational. But, a fee will be required to access the system. The fee structure, necessary to cover the operational costs, has yet to be determined.

A weather sampler:

- a new handbook
- *Technical Soaring* is on-line
- on-line glider pilot self-briefing system

This presentation will be on my website following the Convention:

www.sci.ccny.cuny.edu/~hindman

hindman@sci.ccny.cuny.edu