

Report from OSTIV Congress XXXI

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Introduction

The OSTIV Congress is held at the site of every World Gliding Championship. This year's WGC in Uvalde Texas USA was no exception, with the XXXI OSTIV Congress taking place in parallel to the competition. The eight-day Congress was held between 8 and 15 August, 2012. During five of the eight days, researchers from all over the world presented papers about many interesting subjects relevant to soaring, ranging from aerodynamics to modeling of thermals and weather-prediction. As usual, the presenters represented many countries from at least four continents and included participants in the World Gliding Championship. Over the next two years the papers will be published in *Technical Soaring*, OSTIV's journal (journals/sfu/ca/ts). The remaining three days of the Congress were taken up by the opening ceremony, the always-popular excursion and the sumptuous closing dinner. A summary of the activities and presentations during the Congress follows.

Wednesday, 8 October 2012, Opening ceremony and awards

The opening ceremony of the Congress was held in the company of a beautiful Waco Biplane, a P-51 Mustang, and others, and was made possible by Mark Huffstutler kindly allowing us the use of his hangar. After a brief introduction, Loek Boermans, OSTIV President, presented several awards. The OSTIV Prize and Morelli Award was presented to Josef Prasser for his outstanding and world-wide acknowledged improvements of safety and security of sailplanes. A Special OSTIV Prize and Morelli Award was presented to Hugh Browning for advancing winch launching safety. The OSTIV Diploma for the best technical paper was awarded to Francois Ragot for his paper, "Total energy." The OSTIV Diploma for the best meteorological paper was awarded to Olivier Liechti for "Regionalized predictions of aligned updrafts and their tuning for planning soaring flights."

The award presentations were followed by welcoming comments by Al Tyler, President of the Soaring Society of America, Ken Sorenson, Championship Director, and Hector Gonzales, President of Southwest Texas Junior College. These proceedings were followed by a social period of food, drink, and engaging conversation. The final event of the evening was the

Thanks to Ward Hindman and Mark Maughmer for contributing to this article.

Keynote Lecture, "Developing a tailored safety program for the U.S. soaring community," presented by Richard Carlson. His presentation was followed by a thought-provoking question and discussion period.

Thursday, 9 August 2012, Technical session

In the first presentation of the morning session, Alfred Ultsch discussed a proactive approach to flight safety in soaring. The talk was named "Flytop-Competition — An effective method for enhancing safety in glider competitions." Instead of relying on regulations that react to past accidents, the approach presented uses errors and shortcomings observed by the general soaring pilots in order to initiate safety improvements. That improvement process, however, requires specific training and preparation of the involved glider pilots. The need for specific training was highlighted in a study that used two different competitions. In either competition pilots could receive up to 6% extra points by recording safety concerns on index cards. Based on this semi-anonymous feedback, the Competition Director took appropriate actions when feasible, e.g. providing longer tow ropes. Despite the positive reinforcement of extra points, the participation of the contest pilots was clearly dependent on prior instructions and training about a proactive safety approach. The presenter is promoting a similar approach with a two-day, proactive-safety training in clubs. Supported by the experiment, this training is imperative for a successful implementation of a proactive safety approach.

Next, Christoph Santel presented "A review of contemporary collision avoidance systems in general aviation," coauthored by U. Klingauf. To this day, collision avoidance is a challenge for general aviation, including soaring. Unfortunately, see-and-avoid is not entirely reliable, as indicated by 21 mid-air collisions in Germany from 1999 through 2011. New instrumentation, such as ADS-B and FLARM, are a significant aid to the pilot by providing collision alerts. The presenter discussed a "human-factor model" that takes into account relative target size, search time, and other aspects, such as weather. An "instantaneous acquisition rate" allows the formulation of a "probability to acquisition" term. Based on this theoretical model, the presenter discussed ongoing research efforts to improve the performance of collision alerting systems that are suitable for the light end of general aviation, such as sailplanes. Primary issues are cost, weight, and power needs. In addition, improvement of the

human-factor interfaces of those devices is the center of recent research to make them more effective. The goal is to develop design guidelines for the human-factor interfaces of low-cost collision avoidance systems.

The meeting then paused for the morning competition pilots' briefing. This break occurred each morning that a Congress session coincided with a competition day, helping to emphasize the link between the Congress and the competition.

After the lunch break, in a talk entitled "Saw-tooth flight performance of motor gliders with retractable jet engines," J. Lenz (with coauthors are G. Sachs and F. Holzapfel) explored performance advantages of motor gliders with retractable, small jet engines. In comparison to conventional motor gliders with retractable propellers, jet engines have the advantage of providing significantly less aerodynamic drag when extended and reduce the trim needs. Disadvantages are their relatively high cost and fuel consumption. A saw-tooth flight profile, that is, a powered climb followed by unpowered glide, can significantly extend the range of motor gliders with retractable engines. In general, a saw-tooth profile consists of six phases: powered climb, engine cool down, engine retraction, glide, engine extension, and restart. Using an optimization approach, the conventional piston-engine driven motor glider can extend its range by a factor of approximately three in comparison to a cruise at a constant altitude. A similar analysis of the jet-motor glider indicates over twice the range using a saw-tooth flight profile rather than a constant altitude cruise. Also, the analysis indicates that jet engines with higher thrust levels have higher efficiencies with the saw-tooth flight profile.

Next, J. Lenz presented a talk on behalf of Gottfried Sachs entitled "Unique performance characteristics of electric aircraft." Aircraft with electric propulsion have been around since the 1970s. Unlike air-breathing engines, electric propulsion systems have only minor performance penalties with increasing altitude. A result typical for electrically propelled flight is that the speed for maximum range increases with altitude. Other issues for sustained electric flight are power storage and power generation through solar cells. The effectiveness of solar cells improves with altitude and varies with latitude. Apparently, at around 40 degrees latitude solar power seems to be at an optimum over the course of a day. Based on the solar information and the extended flight envelope, an optimized flight profile was found that maximizes range of sustained electric flight.

F. Galvo continued the discussions on electric propulsion for gliders with his talk titled "Note on electric propulsion glider." Galvo highlighted the advantages and disadvantages of electric propulsion for motor gliders. In general, advantages are low noise emissions, relatively cheap direct operating cost, the potentially "clean" power concept, and the high reliability of electric propulsion systems. Disadvantages are the relatively high cost and weight of batteries. Subsequently, the current range of electrically propelled motor gliders is limited. In the presentation a low-cost electrical motor-glider concept was explored that uses a fixed propeller system, that is, it cannot be retracted. In

soaring mode, the drag penalty of the fixed propulsion system is limited. A wind milling propeller-electric motor combination results in little additional drag due to little internal resistance of a "free spinning" electric motor. This performance penalty could be accepted for the simplicity of the system. Additionally, the combination could be used to recharge the batteries, for example by extending the time in a thermal after reaching cloud base. The additional energy stored in the recharged batteries can be used to climb above cloud-base level and, then, continue gliding flight from a higher altitude.

At the end of the day, Mark Maughmer presented "Flight-path planning for the 2011 Green Flight Challenge," a talk by J. W. Langelaan, A. Chakzabarty, A. Dengz, and K. Miles. This talk presented the process of the winning team of the 2011 Green Flight Challenge. The winning design was able to move four passengers at over 200 mph over a predetermined course with an equivalent fuel efficiency of 400 person miles per gallon. This was accomplished with a design that used two Pipistrel G2 aircraft joined by a center pod containing the electric propulsion system. Despite the aerodynamically sub-optimal design, the Taurus G4 was the winner of an overall field of 28 competitors and the 4 aircraft that came to the actual competition in August 2011. One of the greatest challenges was the tight schedule with a project start the previous April. Overall, the concept demonstrated the feasibility of electric flight for general aviation.

Friday, 10 August 2012, Technical session

The first paper, "Aerodynamic effects of the canopy/fuselage gap on a modern sailplane," was presented by Richard Starke. It was authored by A. S. Jonker and J. J. Bosman. In this work, the transition from laminar to turbulent flow over the front section of a fuselage was determined in flight experiments using an acoustic probe. It was found that transition was forced at the forward canopy gap on the upper surfaces, and was near the theoretical location on the lower surface of the fuselage. Further investigations were performed using computational fluid dynamics (CFD), and various gap sizes and inflow/outflow rates through the gap were considered. It was concluded that performance gains are achievable with a small gap and complete sealing, or a slightly negative cockpit pressure.

The next talk was given by Johan Bosman entitled "Refinement of glider aerodynamic design." Bosman explained how computational fluid dynamics (CFD) can be used to increase the performance of the next generation 18-m class sailplane. In order to gain an additional 2 points of maximum glide ratio over current gliders, approximately 4 N of drag reduction are needed, which is quite challenging with the current state of the art. Bosman looked at improving the fuselage-wing combination and concluded that a high-wing configuration will provide roughly 3-N drag savings over a mid-wing configuration. Additional drag can be saved by properly placing inlet and outlets of the cockpit ventilation system. For example, an inlet near the leading edge of the wing root has some positive effects on the

flow over the junction by removing a high-pressure spot. Further studies looked at vertical fin-tailboom junctions with more potential drag savings. Overall, an 18-m class glider with a maximum lift-to-drag ratio of 56 seems quite feasible.

Then after lunch, Götz Bramesfeld (coauthored by Frank Kody and Sven Schmitz) presented a paper entitled "Design of a winglet for a sailplane using a multi-objective evolutionary algorithm optimization method." This presentation specifically detailed the approach to developing an evolutionary optimization design scheme. The tools developed were described, including a discussion of evolutionary algorithms. Although the winglet design example presented was driven for a single design point, the result did perform well over a range of airspeeds. The new method shows promise for future design work.

The next presentation was given by Mark Maughmer. In his talk, "Numerical investigation of the wing-winglet juncture" that was coauthored by Jim Coder, Maughmer discussed recent comparison studies of experiments and predictions of various CFD codes. Whereas XFOIL, MSES, and Profil are relatively reliable in predicting the low drag region and maximum lift, modern CFD codes, such as Overflow, led to unsatisfactory results. Those inaccuracies are related mainly to problems with the prediction of transition from laminar to turbulent flow. Despite significant advancements in modeling transition behavior, more work is needed. Nevertheless, CFD analysis provides some insight that is not possible otherwise as shown with the simulated complex flow field at the round-out from wingtip to winglet in a simulation of an 18-m Discus.

The next talk entitled "The Penn State human-powered aircraft project" was given by Mark Maughmer who provided an update on the activities of the "Akaflieg" Penn State. In 1989, Penn State University (PSU) adapted the Akaflieg concept to the aerospace curriculum as a response to engineering education shortcomings identified by the National Science Foundation. The resulting PSU Sailplane Class balances aircraft fabrication and paper design studies to develop and maintain skill sets of engineering students. Over the past two decades, several projects were pursued, including frequent designs for the AIAA Design, Build, Fly Competition. One of the more recent projects is a human powered airplane in pursuit of the Kremer Flight Challenge. The aircraft has been built and flown successfully, although weighted and without an onboard pilot. Instead it was controlled by radio. The aircraft empty weight is approximately 60 pounds with about an 80 foot wingspan.

The last talk was about the estimation of wind speeds using GPS data and some airspeed data entitled "Estimating wind velocities from limited sailplane flight data" by N. Zhang, R. Millane, E. Enevoldsen, and J. Murray (presented by Millane). The presenter discussed how, with only ground speed and airspeed available, the horizontal wind speed and direction can be estimated by flying two or more headings at different speeds through a circle-intersection method. In a similar approach, the wind speed can be estimated using only GPS data. In this case, however, the airspeed constraints have to be known, for example

stall and maximum allowable airspeed. Wind estimations using existing GPS flight data and radiosonde traces agreed reasonably well and demonstrated the viability of that approach. Once the horizontal wind components are determined, the vertical wind component can be backed out from GPS data using the aircraft flight polar.

Saturday, 11 August 2012, Technical session

The first paper of the morning session was "Aeroelastic gliders," presented by competition pilot, Ulf Ringertz. The presentation provided an overview of the strengths and weaknesses of the traditional flutter analysis. Details and difficulties of performing a ground-vibration test were discussed. Also discussed was the inability to accurately determine the damping along with its important role in determining the flutter behavior of gliders. Suggestions and contributions of on-going work for improving flutter prediction were outlined. The ultimate goal of aeroelastic research is to address these issues in the design phase of an aircraft rather than react to findings in flight test.

In the second presentation, "Examining atmospheric conditions for the potential exploration of Gas Giant Vorticities with autonomous gliders," Ray LeBeau (coauthors G. Bramesfeld, S. Warning, C. Palotai) discussed the possibility of using an autonomous glider to explore giants such as Jupiter, Saturn, Neptune, and Titan. A glider mission could offer far greater horizontal coverage and duration compared to parachuted atmospheric probes. In addition, simulations and observations of the atmosphere of Uranus and Neptune indicate the possible use of updrafts in front of their dark spots, which are high-pressure systems. First estimations indicate that a 100 kg glider could remain airborne in excess of 33 hours providing substantial horizontal coverage.

After the pilots' briefing and lunch breaks, Krzysztof Kubrynski presented two papers, "Influence of aerodynamic and design parameters on sailplane performance in rough air" and "Aerodynamic design of a flapped airfoil for a high-performance sailplane." In the first presentation, the cross-country performance of a sailplane was reviewed using "static" thermal models, and then these results were compared with the performance of a sailplane in "dynamic" thermals. In particular, the influence of the lift-curve slope of the airfoil on performance was investigated. In the second presentation, an airfoil was designed that takes advantages of the "dynamic" findings. After a number of "adjustments" to Xfoil to improve the agreement between theory and experiments, a new airfoil was designed using a genetic-optimization algorithm.

The last presentation was given by Loek Boermans who discussed current efforts of developing a suction airfoil for sailplanes in his talk called "Design of a sailplane wing airfoil for boundary layer suction." Suction airfoils have the potential of significantly reducing profile drag, which is the dominating drag contribution during interthermal cruise. Current natural laminar airfoils are reaching a limit with 95% and 75% of the chord having laminar flow on the lower and upper surface,

respectively. Loek showed his developments of using constant suction on the upper surface. The subsequent increases in performance have the potential for a standard class glider to have a maximum lift-to-drag ratio in the mid-50s. The talk addressed issues of the integration of the suction system in the wing and possible fabrication approaches.

Sunday, 12 August 2012, Excursion

This day, which was also a rest day for the contest, was dedicated to the traditional OSTIV Ausflug (Excursion). In the morning, the Congress participants explored the operation of Sierra Industries, a business jet modification facility located on the competition airfield. Many thanks to Mark Huffstutler for carefully guiding the Congress participants through his impressive facility. The next stop was at the nearby aviation museum. Then, a trip was led by Honorary OSTIV Member Bernald Smith through the Texas Hill Country. It included a cool-off stop to wade in a river and a hearty Texan BBQ meal. At the end of the day, everyone watched in awe the emergence of literally millions of bats from a local cave (www.friobatflight.com).

Monday, 13 August 2012, Technical session

The next contest and congress day, a power outage caused some early disruptions and delays. With the lights and air-conditioning back on, the Congress reconvened after the noon-time launch of the contestants.

The first speaker, Richard Starke, who was a crewmember of the South African team, presented a talk on the development of a flight-test data acquisition system at the North-West University/Potchetstroom, South Africa. In the talk, named "Development of a module data acquisition system for flight testing," it was shown the system is suitable for sailplanes and is meant to reduce the workload of a pilot during test flights for research, development, and certification purposes. The system is a small, lightweight device that can easily be integrated in the aircraft during tests. The system logs up to 8 analog signals, aircraft attitude and states, as well as two video signals with voice over. The post-flight analysis program allows reliving the flight and recorded parameters for a detailed in-depth analysis as demonstrated by the speaker with the example of stall and spin entry tests.

The second talk, "Modeling thermals," Gerhard Waibel discussed the nature and characteristics of thermal models that the sailplane designer can use for average cross-country speed predictions. Waibel reviewed existing models, such as one of the earlier models by Bruce Carmichael. The Carmichael model assumed relatively tight thermals, which tended to result in relatively light wing loadings. Latter models, for example by Horstmann and Quast, attempted to account for different weather models. The speaker believes in the greater prevalence of "hat-like" thermals than assumed until now. According to his interpretation and observations, these thermals occur much more frequently than assumed so far, and, thus, need to be considered

more with future sailplane designs that have heavier wing loadings.

The first talk after a break, "Spline mapping to maximize energy exploitation of non-uniform thermals," was given by John Bird, who is a graduate student at Penn State. As part of his research, he is exploring autonomous (or automated) soaring to improve the performance of small unmanned aerial vehicles. Bird elaborated his approach that uses splines to map a random thermal and, based on that thermal model, adjusts the flight path for maximum climb rate. In simulations, he explored the effectiveness of this approach in comparison to other thermal-centering methods that are commonly used in soaring. Especially for complex thermal shapes, this approach appears to have merits. Nevertheless, the thermaling strategy described by Reichmann, decreasing bank angle in stronger lift and increasing bank in weaker lift, appears to be similarly effective.

Next, Gary Osoba discussed the use of dynamic maneuvering in "Is it time for practical dynamic maneuvering in soaring?" Unlike dynamic soaring, dynamic maneuvering takes advantage of constant maneuvering and varying load factors to use the energy that is present in small, structured turbulence. An example is the micro gust that sailplanes with very light wing loadings utilize on a regular basis. An example of such a sailplane is the Carbon Dragon. The successful use of those small-scale structures, however, requires constant maneuvering through a series of little and localized events. In order to support this theory, the speaker showed several flight logs where those strategies were employed.

The last paper, "Experimental comparison: Integrating wake rake and wake survey," presented by Götz Bramesfeld, described an integrating wake rake that can be used to predict profile drag coefficients. His coauthors were E. Pifer, B. Vieira, and A. Premi. In general, drag measurements are made by using traversing total pressure probes to determine the momentum deficit that exists in the wake. The deficit is directly related to the profile drag of an airfoil. In contrast, an integrating wake rake uses a number of total-pressure probes that span the wake behind a wing section. The pressures from these probes are feed into a plenum, and the pressure in the plenum is a pneumatically "integrated." The pressure losses in the wake are a measure of the profile drag. The fact that traversing is not necessary makes an integrating rake attractive for rapid drag measurements and flight testing. The theory of the wake rake was presented and the calibration of the device in a wind tunnel was discussed. The comparison between the traversing wake probe drag data and that obtained with the integrating rake are in reasonable agreement. Thus, the integrating system shows promise for future flight test and drag measurements.

Tuesday, 14 August 2012, Scientific session

In the first presentation of the morning session, "Improving an atmospheric numerical model using meteorological and glider flight recorder data," Ward Hindman (co-authors S. Saleeby and O. Liechti) explained an atmospheric numerical model com-

posed of formulas that approximate the physical processes that control the weather. Given the initial state of the atmosphere, the formulas, then, are solved on a digital computer producing weather predictions. Such predictions are routinely used at glider contests to help set the tasks. The top finishers at the contests utilize the atmospheric conditions the best and their flight recorder data were compared to the predictions to validate the predictions. The Colorado State University Regional Atmospheric Modeling System (CSU-RAMS) was used to make the predictions. Meteorological data and flight recorder data from select 2006 through 2009 east coast USA glider contests were used to validate the predictions. The depths of the convective boundary layer measured by the recorders were compared with the predicted depths because the depths are directly related to the surface temperature and dew-points. As a result, it was found the predicted surface temperatures and dew-points were systematically in error. The predictions were improved significantly by adjusting, in the RAMS, the surface radiation model and the surface flux model. This result demonstrates the usefulness of glider flight recorder data to improve an atmospheric numerical model.

The next paper was presented by Ward Hindman entitled "An on-line meteorological self-briefing system for glider pilots." In this paper, Ward described an experiment that imported from Europe to the USA a unique, on-line meteorological self-briefing system for glider pilots. His colleagues, Drs. Olivier Liechti of Analysen und Konzepte of Winterthur, Switzerland and Ralf Thehos and Erland Lorenzen of the German Weather Service (DWD), developed the glider pilot self-briefing system. The system resides at the DWD (www.flugwetter.de). Using the system, a pilot is able to 'fly' a planned task through a numerical weather prediction (NWP) to determine the task's feasibility. After the flight, the NWP can be checked using the resulting flight-recorder file. During the 2009 soaring season, the system was operated for the East Coast USA and Colorado. The East Coast system was validated using flight recorder data from glider contests and, with a few qualifications, was found successful (no contests occurred in Colorado). The validation was presented in Ward's first paper at this Congress. In this paper, this revolutionary system was explained and demonstrated and the results of the USA experiment were reported. Thirty-four USA pilots signed up and six submitted the results of their evaluation. The evaluations were positive. Nevertheless, the system was unavailable for the 2011 season and remains unavailable as of this presentation because an operational USA NWP model is needed to replace the DWD model. For completeness, an on-line meteorological self-briefing system for the world's glider pilots, that mimics some features of the DWD system, is at www.xcskies.com.

The first presentation of the afternoon session entitled "OSTIV's Mountain Wave Project (MWP)" was given by Rene Heise. A general overview of the MWP objectives and project results from the successful exploration and research missions to the Andes, Alps and Pyrenees was given, including an out-

look to the next challenge, to fly the Himalayan mountains. An analysis based on the combination of the Scorer-parameter and a 2-dimensional stationary linearized mountain wave model allowed a prognostic assessment of orographic turbulence in different mountain regions of the world, and of conditions favorable to mountain wave flying. A global, relocatable numerical weather forecasting model together with this analysis is the basis for an operational wave and turbulence forecast. The 2000km World Record Flight (FAI category Free Distance; OSTIV Kuetner Prize) of the MWP chief pilot Klaus Ohlmann demonstrated impressively the capability of this approach to use interpreted model-parameters in combination with a route optimization for outstanding glider flights. The availability of data from many wave flights enabled a verification of the meso-scale forecasting model and fine tuning/adjustment of the applied parameterization. Of further value was an analysis of 130 MWP-flights during 1999-2011 to filter out structures of wave-climbs with mathematical and statistical data mining methods in GNSS-recorder files (IGC-files). With these results, an initial wave-climatology of the Andes was produced and was used to visualize a turbulence classification of the rotor-wave system for briefing products in general and commercial aviation in particular. The accuracy of the GPS-logger derived data (wave climbs) with airborne measurements of vertical velocity during the MWP-Expedition Mendoza 2006 was tested using a Geographic Information System (GIS). The high resolution measurement flights into the lower stratosphere over the Andes near Mendoza were the first scientific measurements of turbulence (TKE) in that region and allowed a validation of indirect soundings of atmospheric parameters, as well. A further example of the interdisciplinary co-operation of the MWP with institutes and universities are the measurements of physiological parameters during flights such as at St. Auban in 2011. Parameters such as heart frequency variability, pulse oximetry and body temperature were measured using non-invasive sensor technologies. Typical applications were presented for such data: high altitude flight physiology preparations and recommendations for pilots ("Human Factors").

Next, on Jörg Dumann's behalf, Ward Hindman presented a talk titled "Proposal for an extended didactic approach to a coherent understanding of atmospheric gravity waves for glider pilots." For many decades, glider pilots have in mind a simplified conceptual model of mountain lee-wave vertical motion deduced from the picture of a balloon oscillating up and down in a stable layered air mass. The didactical reduction to such a simplified model was checked in this paper. The basic wave physics were reviewed through instructive animations of wave motions in fluids and gases. As a result, the conceptual model was expanded to reveal the lee-wave is created by a horizontal confluence of an accelerated and downward deflected air mass at the leeward valley floor producing a hydrodynamically generated high-pressure rotor-region that emits energy to the windward, causing stationarity of the wave, as well as a vertical and/or downwind emission in different proportions. This in turn leads to the emergence of a vertically propagating lee-wave, trapped lee-wave or mixed

type, depending on the prevailing aerial stratification. These results produce an unconstrained explanation of the situation as well as coherent answers to all the questions the established model of a “ballooning air parcel” leaves open.

After a break, Ward Hindman presented the study “The role of atmospheric stability and the wind shear exponent (Hellmann Coefficient) on soaring potential” on behalf of the authors Z. Aslan and A. Tokgozlu. Atmospheric convection and prediction of its characteristics are essential for planning gliding activities. Climate-change and the potential increase in the frequency of severe weather conditions, which greatly affect soaring activities, are the primary foci of their short-range forecasting and now-casting efforts in recent years. This paper presented an investigation, using temporal and wavelet analyses, of some stability parameters for predicting instability in and near the vicinity of Isparta, Turkey located in the hilly region just north of the Mediterranean Sea. The data were from morning and evening radiosonde launches and hourly measurements from a mobile wind tower for 2001 and 2002. The stability parameters were the bulk Richardson number (Ri) and the Hellmann Coefficient (HC). The Ri defines the balance between instability (Convective Available Potential Energy, CAPE) and wind shear (speed and directional shear with height) in an environment conducive to the formation of thunderstorms. The wind profile over flat and reasonably homogeneous terrain is well modeled using the logarithmic law where the power law exponent is a function of atmospheric stability and is called the HC. In their detailed hourly, daily, monthly and seasonal analyses of the HC, temporal wind profiles were compared to stability variations defined by the Ri to estimate the HC values. Also, wavelet analyses were employed to extract significant characteristics from temporal variations of the Ri and the HC. Higher mean Ri values (slightly stable to extremely stable) occurred in the late afternoon. This work demonstrates that wavelet analysis can be used to study the inter-daily and the inter-annual variability of climate variables for a specific region.

The final presentation was presented by Ward Hindman on behalf of E. Aydinöz (a recent baccalaureate graduate of Istanbul Technical University and glider pilot) and her mentor M. Kadioglu. The aim of this study entitled “Application and evaluation of the TOPTHERM model” was to test TOPTHERM forecasts with the Soaring Index and actual meteorological data and reports for Munich, Germany. The forecasts were analyzed using

Java TopTask, a web-based, soaring flight planning algorithm of the German Weather Service (DWD, www.flugwetter.de). Java TopTask (1) visualizes TOPTHERM weather forecasts on an interactive map and barograph, (2) plans and optimizes soaring flights in thermal, ridge and wave lift and (3) simulates recorded soaring flights (IGC files) with TOPTHERM weather forecasts. Data and methodology were as follows: radiosonde data, Soaring Index, meteorological cards which display actual weather, diagrams and bulletins were used to validate TOPTHERM forecasts. Munich was chosen because it is covered by TOPTHERM forecasts and its radiosonde data, meteogram cards and bulletins were available at the same time as the TOPTHERM forecasts. Output of TOPTHERM shows information about the distribution of vertical velocity (i.e. glider climb rate) in convection, cloud formation, levels of possible cloud base and cloud top and weather forecast as a function of time-of-day. TOPTHERM forecasts were saved for 12 GMT and were used to compare with other data for seven days (1–7 January 2012). The results and conclusions of the study were (1) the TOPTHERM and meteogram analysis with temp (Skew-T Log-P) diagrams have major importance on flight plans of gliders, (2) Soaring Index estimates intensity of expected dry or moist thermal, (3) tests of statistical significance were not possible due to the small sample size (seven days). However, observations were consistent with Soaring Index results for the same time; the TOPTHERM forecasts and Soaring Index results were coherent, (4) more data is needed for the analysis of TOPTHERM reliability. In addition, this kind of study is advised for the Inönü /THK (Turkish Aeronautical Association) region in which soaring flights are performed in Turkey.

Wednesday, 15 August 2012, Closing dinner

The Congress concluded with this traditional dinner during which luminaries from the contest “broke bread” with congress participants. After enjoying a unique and appropriate Tex-Mex buffet, extremely brief and popularized summaries of the Technical and Scientific sessions were given, after which collegial banter erupted and diminished as the contest personnel left to get back to work.

This event concluded the XXXI OSTIV Congress. The next congress will be in two years again parallel to the World Gliding Championship either in Räyskälä, Finland or Lezno, Poland. The readers are encouraged to begin to prepare and submit papers for the XXXII OSTIV Congress.