OSTIV PAPERS — (Cont.) . . . .

Papers Read at the Fourth OSTIV Congress

(EDITOR'S NOTE: Following is a continuation of the papers read at the Fourth Organisation Scientifique Et Technique International Du Vol A Voile, OSTIV, in Madrid. This will complete the series started in the March-April issue of Soaring.)

11. Control of the Boundary Layer on Sailplanes, by Dr. A. Raspet (U.S.A.). This paper conveys to the sailplane designer an idea of the performance improvements attainable by suppression of early boundary layer transition and separation and possibly by suction, by reference to extensive flight research with specially instrumented sailplanes.

12. Possibilities of Drag Reductions on Sailplanes, contributed by H. Carmichael (U.S.A.), presented by A. Yates. The paper has not yet been published in the United States.

IV. General and Miscellaneous objects were the topics of the following papers:

13. Artificial Horizons and Direction Gyros for Sailplanes, by S. H. Yates (England). He gave a vivid account of the possibilities of gyro instruments particularly well suited for soaring flight.

14. Mechanism of Bird Flight, submitted by Prof. M. Boel (Belgium) presented by Cartier. His analysis was somewhat controversial.

15. The Problem of the Provision of Qualified Pilots to Meet Present and Future Needs of Civil Aviation, by L. F. Hesselink (Holland), who made a strong case for the fostering of glider and sailplane flight programs.

V. The mechanism and flight hazards of Thunderstorms were the problems of the following lectures:

16. On the Physics of the Cumulonimbus, by Dr. F. Rossman (Germany), concentrated on observations of thunderstorms in mountainous regions and in the tropics.

17. German Thunderstorm Research in 1939-40, by Prof. H. Koschmieder (Germany), reported on details of observations of an extensive network of correlated observation stations in Central Germany, concerning localized gusts, squalls and rainfall.

18. Thunderstorm Structure and Dynamics, prepared by Prof. H. R. Byers (U.S.A.), presented by Dr. J. Kuettner. The lecture explained how thunderstorms are composed of individual cells which go through a definite life cycle, and mentioned the part which Sailplanes played in the "Thunderstorm Project." The icing hazard is emphasized.

19. Icing and Hailstone Hazard inside Cumulonimbus, contributed by Dr. J. H. Ludlam (England), read by Dr. R. S. Scorer. He, too, discussed the structure, dimension and dynamics of cumulus clouds as determined by terrestrial observation methods and then elaborated on the mechanism of hailstone formation and ice accretion on the aircraft.

20. Periodic Phase Shifts of Stationary Wave Thunderstorms and their Control by Semiduirnal Pressure Oscillations, by Prof. W. Georgii (Argentina). He gave a vivid account of terrestrial and flight observations of peculiar weather conditions accompanying the presence of extensive maritime air masses and of upper level convection phenomena.

VI. A large number of papers were devoted to the Theory of Lee Waves: they constitute significant contributions to the understanding of this phenomenon and the meteorological conditions which may govern it. It was perhaps the first time that so many meterology-mathematicians had an opportunity for personal discussion, which was most fruitful.

21. Barostromatic Airflow, by Dr. R. S. Scorer (England). This term defines an airflow largely determined by static stability. Perturbation theory is studied for the cases of windflow over a ridge, a hill, a plateau. The height to which the influence is transmitted depends on the vertical variation of wind and temperature and on the obstacle profile.

22.The Physical Significance of the Boundary Conditions in the Theory of Leewaves, by Prof. G. Lyra (Germany). He extended his original theory of the mechanism of the leewaves to encompass the important influence of the vertical variations of the wind speed.

23. The Formation of Leewaves as an Initial Value Problem, by Prof. D. E. Hoeiland (Norway). Mathematical treatment of surface wave formation over an uneven bed leads to resonance phenomena up to a critical velocity.

24. Internal Gravity Waves over a Long Narrow Ridge, by De V. Colson (U.S.A.), presented by Dr. J. Kuettner. He postulated that the waves be damped out at the top of the atmosphere, derives the stream function equation for the proper boundaries from which the wind velocity components can be computed by numerical integration. The effect of the orographic feature are shown.

25. About Some Effects of the Vertical Wind Shear in the Problem of Mountain Waves, by Prof. P. Queney (France). He analyzed the damping effect of the vertical wind shear on the waves and found that a pronounced change of the shear at a definite level greatly influences the dynamic stability and how the upward decrease of the wave amplitude depends on the shear.

26. The Effects of Tropopause and Vertical Wind Shear on Leewaves in a Stable Atmosphere, by M. G. Wurtele (U.S.A.). The paper discussed with connection between the tilt of the wave crests and troughs and the vertical shear and with a tropopause there is a critical shear value above which lee waves cannot persist.

27. Lee Waves in Non-Uniform Flow, by Dr. J. Zierep (Germany, now Switzerland), who presented a generalized mathematical treatment of the leewave generation in a wind of arbitrary wind profile for various types of mountain profiles.

28. On the Dynamics of High Foehn Waves, by Dr. F. Rossman (Germany), who ascribed the wave asymmetry to the moisture precipitation over the windward slope and evaporation over the leeward slopes. This has a bearing on the location of lift, turbulence and icing.

29. Thermal Flight in Mountainous Regions, by Dr. F. Hoehndorf (Germany), who pointed out that the micrometeorological effects of mountain and valley winds which can assume Foehn character provide a different mechanism for the release of thermals than do the winds over the plains.

VII. Meteorological and flight Observations on Stationary Waves were reported from six countries.

30. Wave Flights in Great Britain, by Alan Yates, who told a fascinating story of his own flights at relatively modest altitudes by utilizing waves generated by the hilly country of central England and of the problems of limited visibility because of low clouds.

31. Wave Flow in Lee of Mountains, compiled by Dr. Jiri Foerchtgott (Czechoslovakia), presented by J. Kuettner. The simple title does not convey the magnitude of the observational material gathered by the author in thirty-five cases of leewaves at five sites in Czechoslovakia, explored with the aid of instrumented gliders and thirteen meteorological stations in mountainous regions of moderate height. Some insight into the geometry of the wave and rotor flow was thus gained.

32. Observations and Aerological Analysis of Stationary Clouds Over the Taunus Mountains, collected by Dr. H. Wachter (Germany), pictures taken in the vicinity of the moderately high Taunus Mountains in Western Germany illustrated the difference between orographically generated standing waves under Foehn conditions on the one hand and lenticular clouds forming under conditions of an inversion above a high wind layer independently of the cross mountain flow on the other.

33. Stationary Waves over Spain, by Dr. M. Mastans Camargo (Spain). The Foehn phenomenon in Spain is masked by valley floor winds, but stationary waves accompanying the passage of a low pressure system into the Mediterranean have been extensively exploited by Spanish soaring pilots to survey their position and shape and their potential temperature field.

34. High Foehn Waves over the Eastern Alps, by Dr. Ursel Vieweg Pielsticker. She showed and explained instructive time lapse pictures of the progress of Foehn and wave clouds taken towards the Austro-Bavarian Alps where Kloeckner made his first conquest of the tropopause in wave soaring.

36. Double Theodolite Pilot Balloon Observations and their Application to Vertical Motion Study, prepared by de Ver Colson (U.S.A.) and described by Dr. W. Eichenberger. The precise space tracking of pilot balloons at Bishop during the Rierra Wave Project flight seasons confirmed the approximate locations of successive up and down drafts and the wave lengths. Clues were obtained by which the presence of strong vertical currents can be inferred from anomalies observed at stations where only single theodolite techniques are available.

37. The Sierra Wave Project, by Dr. Wolfgang B. Klemperer and Dr. Joachim Kuettner. An educational color film illustrating the general purpose of the Mountain Wave Project (which is sponsored by the Geo-physics Research Directorate and scientifically directed by the University of California at Los Angeles) and was shown and explained. The film covered the field and flight operations and contained samples of cloud and instrument pictures taken on the ground and in the air. Some of the experiences gained in two seasons of instrumental sailplane flights in the leewaves of the Sierra Nevada near Bishop, California to altitudes of 44,000 feet while followed by optical and electronic tracking instruments were related.

38. Cross Country Flight in Atmospheric Waves, by Dr. Joachim Kuettner. He described his exciting experiences in the spectacular 375 mile flight in four hours from Bishop to Williams, Arizona, at great altitudes on the last day of this years Sierra Wave Project flight season.

VIII. The next group of papers concerned the Jet Strum in the atmosphere and its concomitant high level turbulence.

39. A Study of Meteorological Conditions Accompanying High Level Turbulence, contributed by Prof. G. R. Trefry, (Australia) presented by A. Yates. This report dealt with observed cases of clear-air turbulence encountered at levels between 15,000 and 35,000 feet and associated with the occurrence of a deep stable wind layer above a marked region of high wind shear, which at other times gives rise to traveling waves.

40. Effects of Orographies on the Horizontal Component of the Wind Velocity, by Dr. Holst Merbt (Sweden), expounded a powerful mathematical treatment of the problem of the wind flow across mountain ranges which supplements those offered by Lyra and Quency. It indicates under what orographic and meteorological conditions a jet profile tends to form over lee continents.

41. On the Possibility of Soaring in the Jet Stream, by Dr. Joachim Kuettner, who adduced both theoretical considerations and meteorological observations to speculate on the propagation of gravitational waves along the jet stream, which would offer opportunities to carry sailplanes over great distances at high ground speed.

IX. Several lectures dealth with joint problems of general meteorological and soaring flight which did not lend themselves to be classed with any of the preceding subjects so that they can best be comprised under a chapter General Interest:

42. Meteorological Conditions for Extremely Long Distance Soaring Flights, by R. Maletzke (Germany), who advocated exploring the possibilities of transoceanic soaring flights along the sear side of meteorological depressions.

43. How Can Europe Contribute to the Development of Sailplane Research? by E. Kloeckner (Germany). He mapped out a program of developments which would be best suited to be tackled by European countries in view of their economic situations.

44. New Methods and Devices for the Recovery of Energy from Thermals, by W. Spilger (Germany). He pictured a phantastic sounding grandiose scheme of harnessing the huge power of thermal currents by triggering them so that they could be fed into stategically located tiltable propeller-impelers which would furnish useful power for agricultural and irrigation projects designed to reclaim land otherwise doomed to deterioration by uncontrolled wind, dust and thunder storms.