

**First Plenary Session
and Opening Ceremony**

**Keynote Address by G. Konecny
Honorary Member of ISPRS**

OPENING CEREMONY

for the

XVIII CONGRESS of the INTERNATIONAL SOCIETY FOR PHOTOGRAMMETRY AND REMOTE SENSING

in

the Ceremonial Hall of the Imperial Palace Hofburg

Johann Strauss II:
"Cagliostro" - Overture
"Annen-Polka" with Ballet

Opening of the Vienna Congress of ISPRS
Congress Director Karl Kraus,
Vienna University of Technology

Johann Strauss II:
"Wiener Blut"

**Welcome by the International Society for
Photogrammetry and Remote Sensing (ISPRS)**
ISPRS President Shunji Murai,
University of Tokyo

Johann und Josef Strauss:
Pizzicato Polka

**Welcome by the International Union for Surveys
and Mapping (IUSM)**
IUSM Vice President Ivan Müller,
Ohio State University

Johann Strauss II:
"Tritsch-Tratsch Polka" with Ballet

**Proposal for ISPRS Honorary Membership
of Prof. Dr. Fritz Ackermann**
ISPRS Secretary General Lawrence Fritz,
Lockheed Martin Corporation, USA

Johann Strauss II:
Perpetuum mobile - Musical Joke

**Welcome by Austrian Society for Surveying and
Geoinformation (ASG)**

ASG President August Hochwartner

Johann Strauss II:
"Donauwalzer" with Ballet

**Reception
hosted by the
Austrian Society for Surveying and
Geoinformation**

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Johann Strauss II:
Gipsy-Baron-March

**Presentation of the Brock Gold Medal Award to
Dr. Yuri Tyufin**

ISPRS First Vice President Kennert Torlegard,
The Royal Institute of Technology, Stockholm

**Presentation of Otto von Gruber Award to Dr.
Hans-Gerd Maas**

ISPRS Second Vice President Armin Gruen,
ETH Zürich

**Keynote Address by Gottfried Konecny,
University of Hannover**
"Paradigm Changes in ISPRS from the First to the
Eighteenth Congress in Vienna"

Johann Strauss II:
"Auf der Jagd" - Polka

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Johann Strauss Chamber Orchestra
(Conductor & Violin: Johannes Wildner)

Members of the Ballet from the Vienna State Opera

Moderation: Ms. Schächter-Hold and
Ms. Osorio-Kupferblum

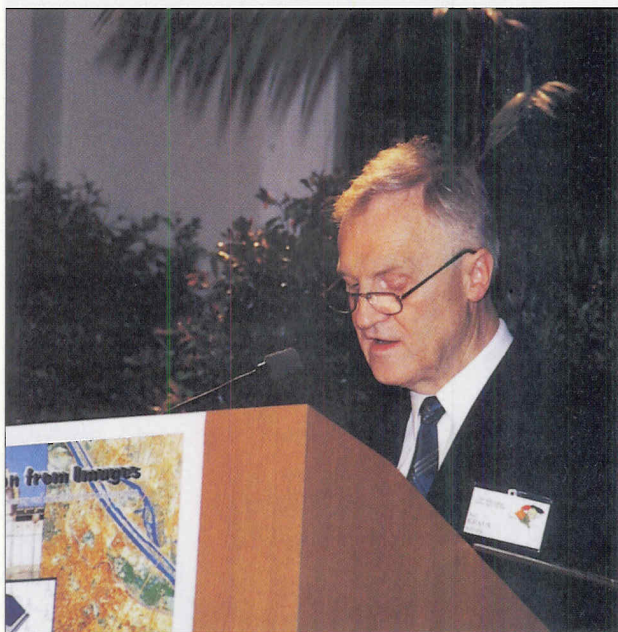
OPENING OF THE VIENNA CONGRESS OF ISPRS

Congress Director **KARL KRAUS**, Vienna University of Technology

**Sehr geehrte Damen und Herren!
Willkommen in Wien im Festsaal der Hofburg.
Distinguished Guests, Ladies and Gentlemen,**

Welcome to Vienna in the festival hall of the Imperial Palace of the former Habsburg emperors' residence. After four years of preparation I have the honor to open the 18th Congress of the ISPRS on behalf of the Austrian Society of Surveying and Geoinformation. We are very proud to be the host of such a special and global event.

At the Washington Congress in 1992 I presented ten reasons for hosting the next Congress in Austria. The delegations of the General Assembly accepted these reasons. They gave the Austrian Society the mandate for hosting the 18th Congress. In the following I will repeat these ten reasons and I will add how we fulfilled these announcements.



1. In 1996, on the occasion of its 1000-year-celebration, Austria will present itself to the world as a country of freedom, prosperity, and public peace, a country which can welcome guests from all over the world.

Ladies and Gentlemen,

It is true that Austria is at present a country of freedom, prosperity and public peace. But we should not forget that we had a terrible war in former Yugoslavia in the period from 1992 until 1996, not far from here. Back to our Congress: We have approximately 2.000 guests from 80 different countries.

2. Vienna is well-known for its cosmopolitan outlook and for being one of the world's leading convention venues.

3. Vienna can even offer two big convention venues: The Hofburg Congress Center with its traditional flair for exclusive conferences in the heart of Vienna, and the Austria Center with modern conference technology.

Ladies and Gentlemen,

After the Washington Congress the following discussion was on the table, either Hofburg Congress Center or the modern Austria Center. We made an "as well as decision". The opening ceremony is here in the Hofburg and tomorrow we will continue in the Austria Center

4. Vienna is notable as a center of culture as well as of high technology.

Ladies and Gentlemen,

The opening of our Congress with the Johann Strauss Orchestra and members of the Ballet of the State Opera is our response to this announcement. Additionally, if you go through the streets of Vienna and if you visit the numerous museums, you will see and feel the culture and the history.

Regarding high technology I would like to mention, that we used the full capacity of modern telecommunication in the phase of preparation of this Congress. All our announcements were available on world wide web via Internet, and the communication with approximately 600 officials and authors was done by email. In the past three years we established an ISPRS network around the globe.

5. Starting from Vienna many excursions can be made.

Ladies and Gentlemen,

I am sure that you will enjoy our social programme and our programme for accompanying persons in the next ten days.

6. Vienna is the birthplace of the ISP(RS) which was founded by Prof. Dr. Eduard Doležal, an Austrian, in 1910.

7. In 1913, the first ISP(RS) - Congress took place in Vienna.

Ladies and Gentlemen,

I appealed to the delegates in Washington: it is high time that the Congress returns to Vienna back to its roots. Now it

is here. During the 18th Congress we will make many references to Eduard Doležal and the origin of ISPRS. For

example last Saturday the ISPRS Council visited the memorial place of Eduard Doležal in Baden, a small city near Vienna. In two days we will have an Extraordinary General Assembly of the officials and the delegates at the Vienna University of Technology, the birthplace of ISPRS.

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Ladies and Gentlemen,

I appealed to the delegates in Washington: it is high time that the Congress returns to Vienna back to its roots. Now it is here. During the 18th Congress we will make many references to Eduard Doležal and the origin of ISPRS. For **8. The designated Congress Director, Karl Kraus former Rector of the Vienna University of Technology, has many key contacts among the representatives of the state, the provinces, and the municipalities, which would be very useful in the preparation of such an important event as the ISPRS-Congress.**

Ladies and Gentlemen,

In the meantime I mutated from the designated Congress Director to the real Congress Director. As Congress Director I found many open doors. The greatest success was with the Ministry of Science, Transport and the Arts. This ministry gave the financial support for the so-called Doležal Award. It will be presented to persons from developing and reform countries, who are successful in the field of photogrammetry or remote sensing or GIS. Next Thursday 62 persons from 32 different countries will be honoured.

9. Other representatives of the Austrian Association hold high positions in the Federal Office of Metrology and Surveying. This office with 2000 employees has vast experience in organizing congresses involving several thousand participants.

Ladies and Gentlemen,

This statement gives me the opportunity to thank my organizing committee, which consists not only of employees from the Federal Office of Metrology and Surveying and the Institute for Photogrammetry and Remote Sensing of the Vienna University of Technology, but also of persons from private companies, from the Municipality of Vienna and from the Vienna University of

Agricultural Sciences. I thank them in an unconventional way. They worked so independently and so efficiently, that I found time enough to finish the new Volume 2 of my textbook "Photogrammetry".

10. A great many of the Austrian users and scientists are engaged successfully throughout the world in photogrammetry and remote sensing.

Ladies and Gentlemen,

Many of them are here in this festival hall today. Thank you for your promotion of the Vienna Congress. Regarding Austrian scientists I will mention one personally. My predecessor as head of the Institute for Photogrammetry and Remote Sensing at the Vienna University of Technology, **Prof. Karl Neumaier** is attending this opening ceremony. This is not extraordinary, but if I add that he is 98 years old, you understand, why I mention his name with greatest respect. We should give him a special applause. He told me many stories about Eduard Doležal.

This was my opening address. Thank you again for coming to Vienna. I wish you pleasant days at our Congress.



WELCOME ADDRESS BY SHUNJI MURAI, ISPRS PRESIDENT

Mr. President of the Austrian Society for Surveying and Geoinformation, August Hochwartner, Mr. Congress Director, Professor Karl Kraus, Distinguished Delegates, Distinguished Guests, Ladies and Gentlemen!



On behalf of the International Society for Photogrammetry and Remote Sensing, I extend a cordial welcome to the 18th International Congress of Photogrammetry and Remote Sensing to all of you. Since our society was founded in 1910 and the first Congress was held in 1913 here in Vienna, Austria, under the strong leadership of Professor Eduard Doležal, we are very pleased to return to the original starting point. We owe our presence here to Professor Karl Kraus, our Congress Director and his team who have prepared this Congress. On behalf of all participants, I would like to thank this team and the many organisations in Austria who dedicated great efforts to make this Congress possible in this beautiful and historical city of Vienna. For this we thank our Austrian hosts.

My first duty as the President was to keep the ISPRS tradition that has been inherited by the past presidents, particularly Dr. Fred Doyle, Professor Gottfried Konecny and Professor Kennert Torlegard since the Society has changed the name from ISP to ISPRS in 1980. The ISPRS's tradition is a democratic spirit and open attitude.

It is very sad for me to report to you that two Honorary Members have passed away in the past four years. Mr. Jean Cruset, Honorary Member as well as the last President in the age of ISP, 1976-1980, and Professor Placidino Machado Fagundes, the past Congress Director at Rio Congress in 1984 passed away. In addition, a former Council Member, Professor W. Bachmann, who served as Secretary General (1964-1968) and Vice President (1968-1972) passed away.

In their memory, I ask you to rise for a moment of silence. Thank you,

My second duty was to restructure the Society to meet the requirements of the age. The present is called "computer age", "information age", "space age", "multi-media age" and so on. In these past four years, the population has increased by four hundred millions, several tens of millions computers were installed, several hundreds of thousands of satellite scenes were taken and several million maps were digitised in the world. The question is how to recognise the requirements of our profession.

We have to recognise and accept the following changes:

- from analogue to digital form,
- from air survey to space remote sensing,
- from paper to electronic media,
- from static to dynamic measurements,
- from single to multiple disciplines,
- from centralised to distributed systems,
- from manual to automatic operations,
- from closed to open data policy.

These changes have strongly influenced the restructuring of our institutions and profession. In this sense, the ISPRS is going to propose to amend the Statutes and Bylaws at General Assemblies to be held during this Congress. I sincerely request the delegates to support the proposals. Otherwise the Society will not be able to survive.

My third duty was to activate all Technical Commissions and Working Groups for the benefit of the Society. I am very proud to report to you that the activities of 7 Technical Commissions and 46 Working Groups were the most exciting and fruitful in terms of technical progress, compared with the past. In this respect, I thank all of the Technical Commission Presidents and Working Group Chairmen for their great contribution to our Society. I believe that all these achievements will be reflected in the technical sessions with high quality paper presentations in this Congress.

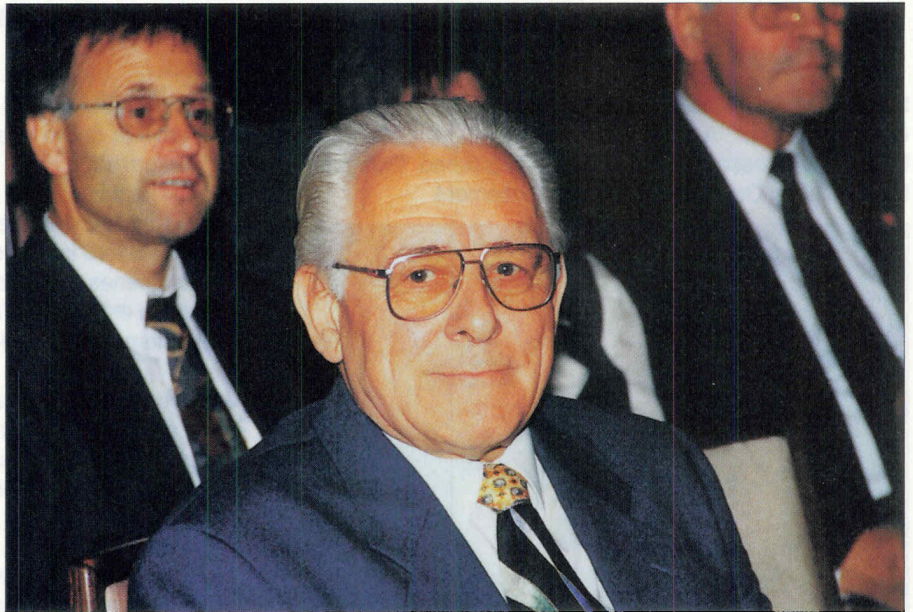
You will share information about most advanced technologies such as very high resolution satellite imagery, synthetic aperture radar (SAR) interferometry, laser scanners with GPS/INS, image understanding to extract spatial information from images, etc., through technical sessions and exhibitions of this Congress.

My fourth duty was to determine how to communicate more effectively with ISPRS Members. The Council has decided to offer a better information service to our Members. I believe that the information flow was much improved in the past four years. Particularly I thank Mr. Lawrence W. Fritz, our Secretary General for his tremendous efforts to publish the new ISPRS Annual Report.

Finally I appreciate fully the excellent preparation that Professor Karl Kraus and his team have accomplished. I believe that the Vienna Congress will be a most exciting and successful one, full of excellent papers and exciting exhibitions.

Thank you.

*Professor
Dr. Friedrich Ackermann
Honorary Member of ISPRS*

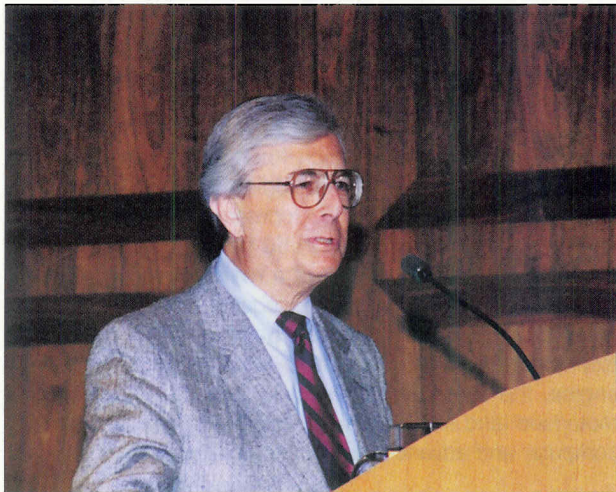


*Dr. Yuri Tyufliyn (centre)
Brock Gold Medal 1996*

*Dr. Hans Gerd Maas
Otto von Gruber Award 1996*



After another Waltz-intermezzo the Vice President of the International Union for Surveys and Mapping, Prof. **Ivan Muller** of the Ohio State University, welcomed the participants and guests in the name of the Union for Surveys and Mapping, which is the umbrella of ISPRS, FIG (Fédération Internationale des Géomètres), IHO (International Hydrographic Organisation), IAG (International Association of Geodesy) and ICA (International Cartographic Association) and wished great success for this second Viennese Congress of ISPRS.



Thereafter followed the great event, the proposal to and the approval by the General Assembly for Honorary Membership of Prof. Dr. Friedrich Ackermann. The complete text of the laudatio by the Secretary General of ISPRS, **Lawrence W. Fritz**, can be read in the special Awards Chapter, the next in this book.



After the great applause **Friedrich Ackermann** re-ponded that he always had an excellent team at the University of Technology Stuttgart and with it he had really reached very much. He thanked the Secretary General for the laudatio and the Council as well as the Plenary Assembly for the great honour and he also thanked everybody who has contributed to his carrier.

After the "Perpetuum Mobile" the President of the Austrian Society of Surveying and Geoinformation, the host society of this congress, President BEV Dipl.-Ing. **August Hochwartner** congratulated Prof. Ackermann and welcomed the guests in Vienna:



It is a pleasure for the Austrian Society for Surveying and Geoinformation (ASG) to welcome you to the 18th Congress in Vienna.

It is an honourable task for the Austrian Society for Surveying and Geoinformation, which developed from the union of the former Austrian Association of Geodesy and from the former Austrian Society of Photogrammetry, to be the host of this congress. The Austrian surveyors, photogrammetrists and remote sensing scientists feel privileged that Austria is the centre for this renowned geoscientific event in this special year 1996, when Austria is celebrating its 1000 years anniversary of the first mentioning of the name "Ostarrichi".

Austria has always been a country of communication. I am convinced that the ISPRS Congress 1996 will be characterised by the principles of communication and international exchange of opinion. This congress also focuses on the great Austrian Hofrat Prof. h.c.mult. Eduard Doležal, the founder of the Austrian Society for Photogrammetry; excellent scientific knowledge and readiness to exchange experiences joined to create an impressive lifework.

The local congress organising committee under the leadership of Congress Director Univ. Prof. Dr.-Ing. Karl Kraus, has been taking care to prepare this congress according to these principles. This aim will be reached, if our guests take home with them the experiences of this congress.

So I sincerely wish all the participants and the organising committee a successful 18th ISPRS Congress in Vienna.

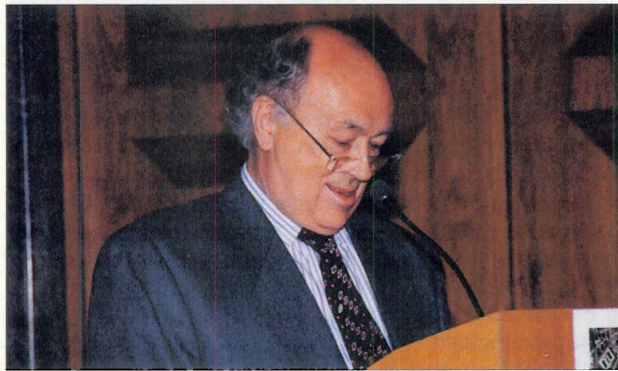
August Hochwartner invited everybody to take part in a little welcome reception during the break in the Wintergarden and the Ceremonial Hall of the Imperial Palace.

After this friendly event the Vicepresident of ISPRS, Prof. Dr. Kennert Torlegard, Sweden, awarded the Brock Gold Medal to Dr. Yuri Tyuflin, Russia, for his excellent work done for the mapping of the moon. Then the second Vice President of ISPRS, Prof. Dr. Armin Grün, ETH Zürich, handed over the Otto von Gruber Award to Hans Gerd Maas, ETH Zürich, for his contribution to dynamic 3D-processes.

The Waltz-intermezzo finally led to the Keynote Address presented by Prof. Dr. Gottfried Konecny, Honorary Member of ISPRS.

**Paradigm Changes in ISPRS
from the First to the Eighteenth Congress in Vienna**
by Gottfried Konecny

It is a special honour, that I have been asked by the Congress Director Karl Kraus to deliver this keynote address. This means very much to me. Like Eduard Doležal, the founder of the International Society for Photogrammetry and Remote Sensing, I was born in the territory of what was once the Austro-Hungarian monarchy. This territory was a melting pot between many nations in Central Europe. The monarchy can be considered as a forerunner for a United Europe, which we are trying to establish now, but one century ago such an effort was still doomed to fail.



Nevertheless Vienna was the cultural centre of this territory. What better could express its significance than the music we have just enjoyed. Doležal, born in 1862, and myself, born in 1930, both of Moravian roots, always considered Vienna as our cultural home. It is not a coincidence that the International Society for Photogrammetry and Remote Sensing was founded here in Vienna in 1910, and that it was founded by a multicultural individual such as **Eduard Doležal**.



Eduard Doležal as Rector of the Technical University

The topic of my address is "Paradigm Changes in dISPRS from the First to the Eighteenth Congress in Vienna". I owe this topic to my respected friend Friedrich Ackermann, who recently on his visit to Hannover presented a paper with the title "Digital Photogrammetry - a Paradigm Shift". Paradigm changes have been defined by the German American science philosopher Thomas Kuhn,

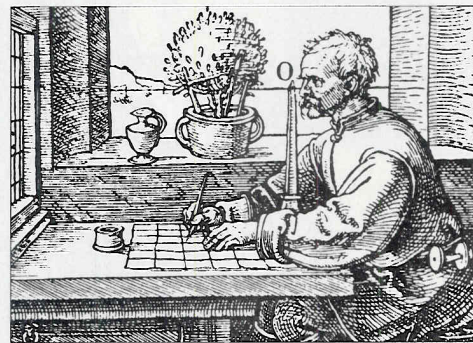
who traced the development of the natural sciences, and found that progress came about by the fact that the same event previously considered a negative influence, suddenly became positive in a jump advancing progress. He cited the Copernican World Concept, Newton's mechanics, the theory of the atom, the biological evolution, and the theory of relativity as examples.

Ackermann found that paradigm shifts is also applicable to digital photogrammetry, and I suggest to expand this thought to the four phases in which photogrammetry has evolved from plane table photogrammetry, to analogue to analytical and to digital photogrammetry.

Thomas Kuhn's ideas are not in contradiction to those of Nikolai Dmitrijevitch Kondratjev. Kondratjev was an economist in the Soviet Union of the 1920's who analysed the economic development of the World and found that progress evolves in 50 year cycles. Each cycle begins with a paradigm shift of a major invention, which is followed by rapid development, subsequent application and gradual stagnation, until a new paradigm shift occurs. His examples are the mechanical weaving and the steam engine, the utilisation of electricity and the introduction of motorised land and air transportation. We can now add the computer and advances to communications to this list.

Inventions had been there before, but they needed paradigm shifts until the respective cycles could begin. Surprisingly the development of photogrammetry in phases follows such cycle patterns.

Let me explain this: The geometrical properties of perspective images were known through many centuries starting in the Italian Renaissance. The painter Albrecht Dürer, whose paintings are hanging only a few 100 meters away from here in the Art Museum, wrote a first text on the use of the perspective in 1525. (The following picture shows a sketch out of Dürer's text)

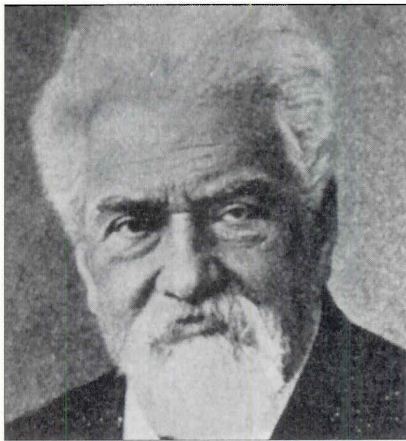


But the possibility to capture the perspective automatically by photography came through the invention of Niépce in 1826 and its improvement by Daguerre in 1837. This discovery was presented by Arago in 1839 to the French Academy of Sciences, and in the same year Baron von Ettinghausen heard it and brought it to Vienna. Emperor Ferdinand and Metternich were impressed, but not much happened thereafter. The father of what he then called "iconometry" became **Aimé Laussedat** 1851 in France, who presented a survey of the city of Paris in 1859 to the French Academy, without receiving much recognition.



Aimé Laussedat, the founder of iconometry

Independently, the German architect **Albrecht Meydenbauer** began to use "photogrammetry", as he termed it, when he used images to survey the cathedral of the city of Wetzlar in Germany. He, too, had a long struggle of convincing his superiors before him, until he succeeded to convince the German emperor William in 1885 to establish an "Image Archive" for Cultural Monuments in Berlin.



Albrecht Meydenbauer, the founder of architectural photogrammetry

In these times **Eduard Doležal** grew up in Mährisch Budwitz in Moravia. At the age of 14 his father, a weaver, had to move to Vienna for economic reasons. This brought Doležal the opportunity to graduate from a good high school and to become a teacher for mathematics and descriptive geometry. During this studies he enrolled in relevant courses at the Technical University, which he passed with distinction. He then became a teacher for geometry in Sarajewo in 1889 in a new technical school. Due to his dedication he soon became director of that school. Seven years later he returned to the Technical University Vienna where he was given the opportunity to work as an engineer to teach the new discipline photogrammetry. To prepare himself better for this task he spent the summer 1896 with Meydenbauer in Berlin. In the

summer of 1897 he joined the Military Geographic Institute in Vienna, which had introduced photography to survey Alpine mountains.



Mährisch Budwitz in Moravia, Eduard Doležal's home town

During this activity he came into close contact with **Theodor Scheimpflug**, a visionary photogrammetrist, being preoccupied with balloon photogrammetry, the theory of rectification, and of radial triangulation. Scheimpflug died young. At his grave in 1911 he spoke "He was way ahead of his time. Because of this his ideas found little support, especially in his country, but brought much disappointment".



Theodor Scheimpflug, early inventor of aerial photogrammetry



Three famous German pioneers of photogrammetry: Carl Koppe, one of the first users in engineering; Wilhelm Jordan, one of the first users on expedition; Sebastian Finsterwalder, father of glacier and analytical photogrammetry

Doležal was so fascinated with Scheimpflug's ideas that both travelled to Braunschweig in 1898 to attend the Congress of German natural scientists and physicians, where they met all important German photogrammetrists like **Carl Koppe**, who used photogrammetry for the construction of the Gotthard tunnel, **Wilhelm Jordan**, who had used it on expeditions in Libya, and **Sebastian Finsterwalder**, who was known because of his photogrammetric glacier surveys.

1899 he accepted a professorship at the Mining Academy in Leoben. He returned to the Technical University of Vienna as professor in 1905, soon to take up the presidency of the University from 1908 to 1909. In these times of nationalistic turmoil among the students his international liberal and reconciling leadership was well respected from all sides.

At the University he introduced guest lectures in photogrammetry, and one after-math session resulted in the creation of an Austrian Society for Photogrammetry in 1907, at which he was appointed chairman. The first lecturer of that society was Doležal with a paper on Aimé Laussedat, who had just passed away. In 1908 he created the "International Archives for Photogrammetry", a multilanguage publication series.

While attending Carl Zeiss' seminary in Jena on stereo-photogrammetry introduced by Carl Pulfrich he met Max Gasser, and was present at the foundation of the German photogrammetric society.



Carl Pulfrich, the inventor of the Stereocomparator, and Max Gasser, the inventor of the Gasser-Projector and founder of the German Society for Photogrammetry

On July 4, 1910 Doležal founded the International Society for Photogrammetry. The Austrian and the German groups became the first two sections. It was now Doležal's task to organise the first international photogrammetric congress. It took place from 24 to 26 Sept 1913 in Vienna. It had over 300 participants from many nations.

Only 10 papers were presented at this congress, they were review papers by Doležal, papers about stereo restitution by von Orel as well as contributions on aerial photogrammetry built on the developments of Scheimpflug. But the exhibit brought about many applications developed in France, Italy, Germany, the Austro-Hungarian Monarchy, Norway, Sweden, England, Spain, Canada, and the USA.

The 1st International Congress showed the signs of a paradigm change. Many applications were still devoted to practical works shown in the exhibition with the aid of plane table photogrammetry, for which the graphical restitution procedures had their roots during the preceding centuries. But the papers of the Congress concentrated on photogrammetry as a new stereo-measurement tool and the potential of imaging from the air rather than from the ground.

The significant events were the introduction of stereovision and the invention of the floating mark by **Friedrich Stolze** in 1892, the construction of the Stereocomparator by **Carl Pulfrich** in Jena in 1901, the design and construction of analogue restitution devices, the stereoautograph by **Eduard R. von Orel** in 1907, the invention of the motorised aeroplane by **Orville and Wilbur Wright**, the "Wright brothers", in 1903, the construction of the first aerial survey camera for overlapping vertical photos by **E.O. Messter** in 1915, and **Max Gasser's** patent of an optical photo projector for stereoviewing in 1915.

This was the time when each of the nations, doing photogrammetry cherished its own technical history higher than that of other nations. In South Africa we hear that Fourcade had invented the Stereocomparator, and in England we find that Thompson had designed the first stereo-restitution instrument. In Germany even the opinion is prevalent that Lilienthal was the inventor of the aeroplane, even though it did not have a motor.



Eduard Ritter von Orel, inventor of the Stereoautograph

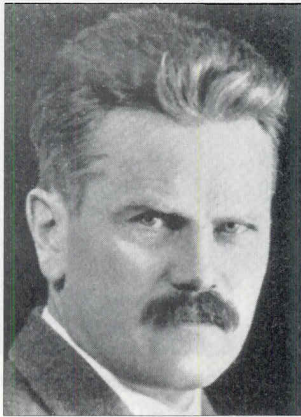
The Dutch entertainer Rudi Carell puts it that way: "You can recognise a good idea by the fact that it is stolen."

Did somebody steal? Who was it? Or is a good idea generally invented twice independently? In our society we do not need lone heroes, but we need people like Doležal to pull forces together to have a synergistic outcome, which is more important than a wreath on a lonely grave.

During the first World War the use of aerial photography became dominant. The war had, of course, disrupted the relations established by Doležal. But his international stature greatly helped to reassemble the

World's photogrammetrists in 1926 in Berlin. Here the paradigm change became very visible.

While terrestrial applications were not forgotten at this second Congress, the predominant number of the 18 papers presented was on aerial photography and on aerial photogrammetric restitution instruments. The exhibit showed a great number of different optical, optical-mechanical and mechanical instruments for the restitution of aerial photos. Photogrammetry had become the art to avoid computations, or as **Otto von Gruber** put it: "He who computes much does not think."



Otto von Gruber, a born Austrian, famous for the Gruber points and the orientation methods

And yet Doležal, who had become Honorary President, remarked in Berlin: "Germany and Austria have made a significant and important contribution to the development of photogrammetry. On all continents photogrammetry and especially aerial photogrammetry is being used now, but the Germans are almost not involved in this effort."

Nevertheless industry was represented at the Congress exhibit, not only manufacturers of instruments, but also the first private aerial survey companies.

The 3rd Congress in Zürich in 1930 was marked by continued interest of the photogrammetric instrument industry from Switzerland, Germany and France. The scientific preoccupation was with orientation procedures on the instruments. Aerial triangulation and orthophotography came up as topics.

The 4th Congress in Paris 1934 demonstrates that rectification was used increasingly. Italian photogrammetric industry joined the other exhibitors, and the attempt to determine the orientation by auxiliary systems such as the Finnish horizon camera was made.

The 5th Congress in Rome in 1938 was already marked by international tensions. Doležal, the Honorary President could not be there, but wrote a welcoming note, possibly with a double meaning: "Man proposes - God disposes". **Willem Schermerhorn** of the Netherlands, a friend of Otto von Gruber, who had worked in New Guinea developing aerial triangulation in what was called "Colonial Photogrammetry" at the time, was elected President of the Society.

Little did he know then that the 6th Congress would have to wait to be held in Scheveningen as late as 1948. Schermerhorn, who despite of his friendship with Germans had to suffer imprisonment during the war years, nevertheless wrote in the Archives of 1948: "We hope this Volume will come into the hands of all those interested in photogrammetry, the word is meant in its widest sense all over the world, and thus it will help in furthering the application of this tool to the benefit and welfare of the world." This perhaps also meant into the hands of the Germans, who had temporarily not been admitted to the Congress after the war years, to the new nations, such as Indonesia, who had not yet become members of the Society, and to those who did not use aerial photos for mapping but for interpretation of resources and the state of the environment.



Willem Schermerhorn, founder of the ITC

In 1948 Schermerhorn laid down the present ISPRS Commission structure from 1 to 6, which at the 7th 1952 Congress in Washington as augmented by Commission 7 dealing with interpretation. Schermerhorn soon thereafter became Prime Minister of the Netherlands. He was instrumental in making Indonesia independent and in creating the ITC, which gave to 1000's of international students the technology transfer to be able to map the empty portions of the globe by photogrammetry, a mapping technology which had proved highly successful in the US, in Britain, in the USSR and in Germany to map the war sites of World War II, but which was now better to be used to help in resource development of the third world. The need for this activity was known to Doležal as early as 1911, when he wrote: "85 % of the earth's surface are topographically unknown, the knowledge depends greatly on vague descriptions by explorers."

During the 7th Congress in Washington Germany became readmitted to the Society. It had to rebuild its photogrammetric manufacturing and service industry. Internationally the trend for analogue stereomapping and for graphically interpolated aerial triangulation became fully developed.

European organisations were perhaps too much occupied with doubts, whether photogrammetry could be applied to large scale problems of the urban environment and the cadastre, while organisations of other continents saw it as the only solution to map their territory.

The 8th Congress in Stockholm of 1956 and the Congress in London of 1960 mark the beginning of another paradigm change, the switch from analogue to analytical photogrammetry. By that time the electronic computer had been invented by Zuse in 1941 in Germany, but more widely known is Aiken's development in the USA in 1943. At about 1956 it had become available to photogrammetrists. Whoever had the joy of learning to program a time-optimised IBM 650 in machine language understands that Thompson, Schut and Karl Rinner were merely able to translate perspective geometry principles into analytical solutions.

The way had been paved first by Sebastian Finsterwalder, who calculated a restitution of two balloon photos point by point over the area of Gars am Inn in Bavaria. The manual calculation of the orientation of the photos from ground control and the intersection of all topographic points took 3 years from photography in 1900 to the publication of results in 1903. This fundamental analytical work has heavily criticised by the inventor of the prunner of the Multiplex, Max Gasser, for its incapacity to deliver results fast. It was particularly **Karl Rinner**, from Graz, Austria, who had a solid mathematic knowledge of projective and perspective geometry who formulated the various analytical orientation steps in an elegant vector algebra model, which was still lacking in Finsterwalder's time.

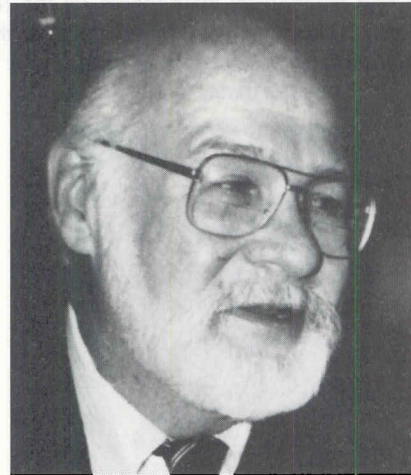


Karl Rinner, theoretician of analytical photogrammetry

But the biggest paradigm-jump was probably initiated by **Helmut Schmid**, who as a collaborator of Wernher von Braun had reached the United States in late 1945 with the task to build up ballistic photogrammetry by analytical means. As former assistant to Hugerhoff in Dresden he had known least squares adjustment and he knew the formulation of the collinearity equations published in Gast's textbook of Photogrammetry of 1930 and their linearization in von Gruber's papers. **Duane Brown**, who worked with Helmut Schmid from 1952 to 1955 at the Ballistic Research Laboratories at Aberdeen Proving Grounds writes about this as follows:

"The laboratory had a virtual global monopoly on electronic computing power. This unique circumstance combined with Schmid set the stage for the rapid transition from classical photogrammetry to the analytic approach."

Duane Brown contributed to this development by adding matrix methods and statistical analysis. He states that government-sponsored research results in the US was distributed by reports, which generally did not go abroad. One such report of 1970, in which Duane Brown introduces self calibration was brought by me to Germany when I came to Hannover in 1971, and I am happy to have acted as a mail-man when I gave it to Dr. Bauer for eventual use.



Duane Brown, pioneer of terrestrial precision photogrammetry

Duane Brown writes: "At the Congress I was frankly surprised at a most significant paper entitled: "Bundle Adjustment with Additional Parameters" by Bauer and Müller. I did not expect progress to be rapid to embrace practical implementation. The significance lay not so much in the program, but its actual application to the Oberschwaben test block prepared by Friedrich Ackermann. This brought amazing improvements of accuracies, 300% in position, 50% in height."

At the 10th Congress in Lisbon 1964, at the 11th Congress in Ottawa 1972 the paradigm shift to analytical solutions may have been won for aerial triangulation involving point determinations, but the analytical plotter invented by **Uki Helava** in 1957 and the image correlator invented by Hobrough in 1958 were still not considered as acceptable solutions, even though their use has been demonstrated as innovations in Lisbon for U.S. military systems. Instrument manufacturers still produced what we could call today the last dinosaurs of photogrammetry in many forms and variations.

It is noteworthy, however, that just during the Ottawa Congress in 1972 NASA launched the first Landsat satellite, opening the way to applications of remote sensing on a world-wide scale. Landsat was an earth oriented extension of first developments in analytical and digital technology which has been made in the U.S. with NASA-systems exploring the moon and the planets of the solar system. The Society established its first working groups to develop satellite image restitution technology.

The 13th Congress 1976 in Helsinki was particularly significant to indicate a paradigm change from analogue to analytical photogrammetry. Industry had almost exclusively switched over from the production of analogue

instruments to analytical plotters, and even orthophoto devices began to use analytical control.



Uki Helava, the inventor of the Analytical Plotter and pioneer in digital photogrammetry

At the 14th Congress 1980 in Hamburg remote sensing and photogrammetry activities were merged in all technical commissions, and since then ISPRS has the name "Photogrammetry and Remote Sensing". Out of respect for our forefathers, like Doležal, Photogrammetry still remained first in the name, even though the reverse order would seem more logical. Digital techniques of image processing began to be applied.

The 15th Congress 1984 in Rio de Janeiro and the 16th Congress 1988 in Kyoto were the first major Society events in the continents of South America and Asia offering the opportunity to become a true international society spanning the developments over the globe.

The 17th Congress 1992 in Washington was a confirmation of this trend when participants from 74 countries attended the Congress.

Starting with the Kyoto Congress another paradigm change became visible. While digital processing in terms of grey level filtering, multispectral analysis, geometric transformation, image correlation and image analysis from low level to high level has been the concern since the 1960's in research practical applications have evolved in industrial applications and in supplying data for geographic information systems, in which geocoded vector and raster image data are merged together in photogrammetric digital work stations. The capabilities of high resolution and hyperspectral imaging, of radar imaging and interferometry, and of laser scanning from satellites or aircraft are increasing, and the distribution of images through Internet or Intranet is at the doorsteps. Indeed we live in exciting time.

When will the next paradigm jump occur?
I don't know: Wernher von Braun once said, basic research is what I do, when I don't know what I am doing.

I apologise to you in two respects:
I may have overemphasised in my review the local historic events, but at my age I know that nobody is perfect.

And I may, have omitted many important contributions of our living photogrammetrists. But remember, recognition is a plant, which grows on graves.

In this respect we can truly admire Eduard Doležal. He has given our Society direction, which was followed by others. And this is our tradition, which we can be proud of.

After Hamburg 16 years ago ISPRS meets in Europe again, after 83 years photogrammetrists are back in Vienna, the cradle of our Society.

I enjoy being in Vienna today, and I hope you do, too.



The musical intermezzos have been presented by the Johann Strauss Chamber Orchestra with its very enthusiastic conductor and violinist Johannes Wildner. Members of the Vienna State Opera Ballet danced wonderfully, presented Johann Strauss and Viennese music to the auditorium impressively. The following article tells more about the Strauss family.

