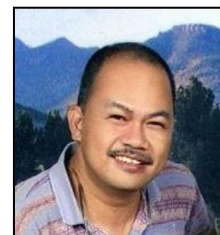


## Curriculum Vitae

### Emmanuel John M. CARRANZA

Born on 08 October 1962 in Legazpi (Philippines)



#### Professional mission:

To develop and disseminate expertise/knowledge in predicting mineral prospectivity and estimating undiscovered mineral endowment through understanding of relevant mineral systems and application of geographic information system and remote sensing technology.

#### Career highlights:

- Has worked and is working at forefront of research in predictive modeling of mineral prospectivity
- Has written a book on “Geochemical Anomaly and Mineral Prospectivity Mapping in GIS”
- Has edited 10 geoscience journal special/thematic issues
- Has published at least 165 papers in international peer-reviewed scientific journals
- Has published at least 45 papers in international peer-reviewed conference proceedings
- Has published at least 35 papers in international non-peer-reviewed conference proceedings
- Has H-index of 49 and has been cited at least 7,500 times (see Google Scholar - <https://scholar.google.de/citations?user=gjmWqDEAAAAJ&hl=en&oi=ao>)
- Has delivered 6 invited keynote lectures/presentations at international geoscience conferences
- Has delivered at least 30 invited special topic lectures/presentations to academe/industry
- Has convened 10 sessions at international geoscience conferences
- Has supervised to completion 8 Ph.D. and 31 M.Sc. graduates
- Has delineated mineralised land via systematic drainage geochemical surveys

#### Fields of academic specialisation or research interests:

1. Geochemistry for mineral exploration, ore genesis and geo-environmental studies
2. Spatial mathematics/statistics for predictive modeling of mineral resources and geo-hazards
3. Remote sensing for geological/mineral exploration

#### Education:

1. **Ph.D. in GIS-Based Mineral Potential Mapping**  
Delft University of Technology, Delft, The Netherlands, 01 June 1997 – 04 February 2002  
(with full scholarship from the Netherlands Fellowships Programme)
2. **M.Sc. in Mineral Exploration (with Distinction)**  
International Institute for Aerospace Survey and Earth Sciences (ITC), Delft, The Netherlands, 28 Sept. 1993 – 28 Oct. 1994 (with full scholarship from the Netherlands Fellowships Programme)
3. **Post-Graduate Diploma in Mineral Exploration**  
International Institute for Aerospace Survey and Earth Sciences (ITC), Delft, The Netherlands, 12 Sept. 1989 – 03 Aug. 1990 (with full scholarship from the Netherlands Fellowships Programme)
4. **B.Sc. in Geology**  
Adamson University, Manila, Philippines, 1979-1983  
(with full scholarship from the Philippines Mines and Geosciences Bureau)

**Employment:**

1. **Professor**  
Geological Sciences  
School of Agricultural, Earth and Environmental Sciences  
University of KwaZulu-Natal  
Westville Campus, Durban, South Africa  
18 Sept. 2017 – present
2. **Adjunct Associate Professor (Computational Modelling Applied to Exploration & Mining Geology)**  
Economic Geology Research Unit, Department of Earth and Oceans  
James Cook University  
Townsville, Queensland, Australia  
04 Jan. 2016 – present
3. **Visiting Professor**  
Institute of Geosciences  
State University of Campinas  
Campinas, São Paulo, Brazil  
01 Aug. 2015 – 31 Aug. 2017
4. **Associate Professor (Computational Modelling Applied to Exploration & Mining Geology)**  
Economic Geology Research Unit, Department of Earth and Oceans  
James Cook University  
Townsville, Queensland, Australia  
03 Jan. 2013 – 03 Jan. 2016
5. **Assistant Professor (GIS Predictive Modelling in Geological/Mineral Exploration)**  
Faculty of Geo-Information Science and Earth Observation (ITC)  
University of Twente (UT)  
Enschede, The Netherlands  
01 Jan. 2010 – 30 Nov. 2012
6. **Assistant Professor (GIS Predictive Modelling in Geological/Mineral Exploration)**  
Dept. of Earth Systems Analysis, Int'l. Inst. for Geo-Information Science and Earth Observation (ITC)  
Enschede, The Netherlands  
01 Dec. 2003 – 31 Dec. 2009
7. **Researcher**  
Dept. of Earth Systems Analysis, Int'l. Inst. for Geo-Information Science and Earth Observation (ITC)  
Enschede, The Netherlands  
01 Dec. 2001 – 30 Nov. 2003
8. **Supervising Geologist**  
Mines and Geosciences Bureau (MGB)  
Regional Office No. 5, Legazpi City, Philippines  
Aug. 1993 – Aug. 2001
9. **Senior Geologist**  
Mines and Geosciences Bureau (MGB)  
Regional Office No. 5, Legazpi City, Philippines  
Sept. 1988 – Aug. 1993

**10. Geologist**

Mines and Geosciences Bureau (MGB)  
Regional Office No. 5, Daet, Camarines Norte, Philippines  
May 1983 to Sept. 1988

**Short courses attended:**

1. 1-day **Workshop on Designing and Writing Effective Assessment**, 7 November 2013, James Cook University, Australia
2. 1-day **Advisor Training Workshop**, 6 November 2013, James Cook University, Australia
3. 1-day **Training Course on European Research Council Starting Independent Researcher Grant**, 8 June 2011, University of Twente, The Netherlands
4. 1-day **Short Course on How to Write an (International) Competitive Proposal**, 18 April 2011, University of Twente, The Netherlands
5. 2-day **Training Course: Base Module of gOcad**, 8-9 June 2006, Technopôle de Nancy-Brabois, France
6. 1-day **Short Course on Eliciting Expert Opinion in Resource Assessment**, 21 August 2004, during the 32nd International Geological Congress, Florence, Italy
7. 25-hour **Course for Teaching and Learning in Higher Education**, 27-30 January 2004, Service Dept for Information Technology, Library and Education (ITBE), University of Twente, The Netherlands
8. 5-day **Short Course on Basics of ArcGIS**, 15-22 September 2003, ITC, Enschede, The Netherlands
9. 3-day **Short Course in Presentation Skills for Nonnative English Speakers**, 21-23 April 1999, Spring Semester 1999, ITC, Enschede, The Netherlands
10. 5-day **Short Course in Technical Writing for Nonnative English Speakers**, 30 March – 3 April 1998, Spring Semester 1998, ITC, Enschede, The Netherlands

**Awards:**

1. **Tribute to a Rock Mentor "The Prime Educator"** granted by the Adamson University for "His expert knowledge in mineral prospectivity and in discovering mineral endowment through GIS and remote sensing technology makes him a specialist educator and high achiever". Tribute given on 6 January 2014 in Adamson University, Manila, Philippines.
2. **Most Outstanding Geology Alumni Award** granted by the Adamson University Geology Alumni Association (AdUGAA) Inc. in recognition for outstanding achievements in the field of academe, research, publications and for being an exemplary ambassador of the AdUGAA. Award given on 19 December 2009 in Adamson University, Manila, Philippines.
3. **Best Presentation Award** granted by the Division of Exploration Technology, Mining and Materials Processing Institute, Japan, for his outstanding presentation of a high quality paper Regional-scale Geothermal Prospectivity Mapping in West Java (Indonesia) by Application of Data-driven Evidential Belief Functions. Award given at the 9th International Symposium on Mineral Exploration, Bandung Institute of Technology, Bandung, Indonesia, 19-21 September 2006.
4. **ITC Research Award 1998** granted by the Board of the "Stichting ITC - Fonds" for his publication of outstanding merit on A catchment basin analysis of reconnaissance geochemical-geological data from Albay Province, Philippines. Award was given at the ITC (International Institute for Geo-Information Science and Earth Observation) Dies Natalis Ceremony, Enschede, The Netherlands, 17 December 1998.
5. **Award of Excellence** presented by Adamson University (Manila, Philippines) on 18 February 1984 for having obtained the 8th Place in the Geologist Licensure Examination

given by the Board of Geology, Professional Regulation Commission (Philippines) on August 1983.

**Work experiences:****A. In University of KwaZulu-Natal, South Africa (2017 – present)**

1. Supervision of B.Sc. Honours students (2018 – present)
2. Teaching under-graduate level students in the Discipline of Geosciences (2017 – present).

**B. In James Cook University, Australia (2013 – 2016)**

1. Coordinator of Teaching and Learning for Earth Sciences in the Department of Earth and Oceans, College of Science, Technology and Engineering (2014 – 2016).
2. Coordinator of subjects taught in the Department of Earth and Oceans, College of Science, Technology and Engineering (2013 – 2016).
3. Principal co-investigator of project: Characterising and Assessing Prospectivity of Intrusion-related Hydrothermal Mineral Systems in North-east Queensland (October 2014 – present), funded by the Future Resources Program, Queensland Department of Natural Resources and Mines, Australia.
4. Principal co-investigator of research project: Minute Mineral Maps: Ciphers to Hidden Prospects in Frontier Regions in Brazil (2015 – 2017), funded by the Science without Borders Program, Brazilian National Council for Scientific and Technological Development (CNPq), Brazil.
5. Supervision of B.Sc. Honours, M.Sc. and Ph.D. research students (2013 – present)
6. Teaching under-graduate level students in the Department of Earth and Oceans (2013 – 2016).

**C. In Int'l. Inst. for Geo-Information Science and Earth Observation (ITC) – University of Twente, The Netherlands (2002 – 2012)**

1. Co-investigator in ITC's research project: 4D-Earth (January 2011 – 2012).
2. Co-investigator in ITC's research project: Earth System Science (December 2003 – December 2010).
3. Teaching post-graduate level students in ITC's educational programme Applied Earth Science or AES (formerly Earth Resources and Environmental Geosciences or EREG) (2001 – 2012).
4. Supervision of M.Sc. and Ph.D. students conducting research in applications of spatial data analysis and remote sensing to characterize mineral resource prospectivity and/or mine-related environmental impact (2001 – 2012).
5. Collaboration with the Council for Geoscience South Africa and Geological Survey of Sweden, in 2012–2013, on predictive bedrock mapping and predictive mapping of gold prospectivity in the Giyani greenstone belt.
6. Consultancy to Boliden Mineral AB on catchment basin analysis of drainage geochemical anomalies (2010).
7. Collaboration with the Geological Survey of Sweden (SGU) on predictive bedrock mapping (2009–2010).
8. Collaboration with the Geological Survey of Sweden (SGU) on predictive mapping of prospectivity for volcanogenic massive sulphide deposits in the Skellefte district (2007–2008).
9. Collaboration with the Geological Survey of Finland (GTK) on map compilation (1:500,000 scale) of southwestern block of Tanzania (2006). This involved re-

interpretation of geology based on existing geological maps (1:100,000) and processing/analysis/synthesis of airborne magnetic and radiometric data, satellite multispectral imagery and digital elevation models. Establishment of a unified geological map legend based on modern internationally accepted criteria.

10. Principal co-investigator of ITC research project: Geospatial Data Infrastructure for Mineral Resources Development (January 2002 – December 2005).
11. Developed teaching/training materials for refresher courses for mid-career geoscience professionals.

**D. In Mines and Geosciences Bureau, Philippines (1983 – 1996) (\*as project leader)**

1. \*Detailed geochemical survey and exploration drilling for gold in Catanduanes (1996)
2. \*Orientation geochemical survey for chromite exploration in the Bicol Region (1996)
3. \*Follow-up detailed geochemical survey for gold in Bulan, Sorsogon (1993)
4. Submarine cable route geophysical survey in San Bernardino Strait between Samar and Sorsogon (1992)
5. \*Semi-detailed geochemical survey for gold in Bulan, Sorsogon (1992)
6. \*Reconnaissance geochemical survey in Panganiran Quadrangle, Albay Province (1991)
7. \*Reconnaissance geochemical survey for gold in Quaternary volcanic areas in the Bicol Region\* (1989)
8. \*Evaluation of gypsum deposits in the Bicol Region (1989)
9. \*Geological/geochemical exploration in reportedly gold-mineralized areas in Bicol Region (1988)
10. Geological hazards mapping in the Bicol Region (1988)
11. \*Geological study of gold rush areas in Jose Panganiban, Camarines Norte (1987)
12. Technical assistance to small-scale miners in Camarines Norte (1987)
13. \*Geological assessment of bentonite deposits in Legazpi City (1986)
14. \*Ceramic resources study in the Bicol River Basin Development Program Area (1985)
15. Stratigraphic study of Catanduanes Formation, Catanduanes Island (1984)
16. Geological/geochemical exploration for gold in foreshore areas, Jose Panganiban, Camarines Norte (1983)
17. Investment profile study for lime manufacturing in the Bicol Region\* (1983)

**Invited lectures/presentations:**

**A. Keynote presentations at international geoscience conferences:**

1. **Developments in GIS-based Mineral Prospectivity Mapping: An Overview** – keynote presentation, Mineral Prospectivity: Current Approaches and Future Innovations in Predictive Geosciences, BRGM, Orléans, France, 24–26 October 2017.
2. **Developments in GIS-based Mineral Potential Mapping** – keynote presentation, 2nd Annual Scientific Conference, “Geoscience for a Changing World”, Council for Geoscience, 2–3 March 2017, Pretoria, South Africa.
3. **Analysis and Mapping of Stream Sediment Geochemical Anomalies: Should We Logratio-transform the Data?** – keynote presentation, 25th International Applied Geochemistry Symposium, Rovaniemi, Finland, 22–26 August 2011.
4. **Spatial Analysis of Mineral Occurrence Controls and Prospectivity** – keynote presentation, 45th Brazilian National Geological Congress, Belém, Pará, Brazil, 26 September – 01 October 2010.

5. **From Mapping of Mineral Prospectivity to Quantitative Estimation of Undiscovered Mineral Resources** – keynote presentation, 11th International Symposium on Mineral Exploration (ISME-XI), Geological Survey of Finland, Espoo, Finland, 7–8 September 2010.
  6. **Geo-information Science and Earth Observation for Geo-resource Characterization** – keynote presentation, Hanoi Geoengineering 2004 International Workshop, Hanoi, Vietnam, 15 October 2004.
- B. Special topic lectures/presentations to academe or industry
- 2017:
1. **Geochemical Anomaly Mapping** – series of lectures delivered in the IAEA Training Workshop on Modelling of Uranium Related Geochemical Exploration Data, East China Institute of Technology, Nanchang, China, 4–7 December 2017.
  2. **Geochemical Anomaly Mapping** – series of lectures delivered in the IAEA Training Workshop on Uranium Geochemistry in the Asia-Pacific Region, TINT, Bangkok, Thailand, 16–19 May 2017.
  3. **GIS-based Mineral Prospectivity Mapping** – series of lectures and practicals delivered in a training workshop for geologists of the Council for Geoscience, South Africa, 28 February – 1 March 2017.
- 2016:
4. **From Mineral Potential Modeling to Quantitative Mineral Resource Assessment** – series of lectures delivered in the IAEA Training Workshop on Assessment of Undiscovered Uranium Resources, CNEA, Buenos Aires, Argentina, 24–28 October 2016.
  5. **Geochemical Mapping** – series of lectures delivered in a course workshop for technical staff of the Instituto Colombiano de Geología y Minas (INGEOMINAS), Bogotá, Colombia, 18–21 April 2016.
  6. **Remote Sensing** – lecture series given to graduate students at the China University of Geosciences, Beijing, China, 10–13 January 2016.
- 2015:
7. **Interpretation of Structural Controls on Mineralisation based on the Spatial Distribution of Mineral Deposits** – presentation given to Exploration and Minerals Projects, Brazil Exploration, VALE S/A, 21 August 2015.
  8. **From Mapping of Mineral Prospectivity to Quantitative Estimation of Undiscovered Mineral Resources: A case study for surficial U, British Columbia, Canada** – IAEA-USGS QURE (Quantitative Uranium Resources Evaluation) Workshop, Denver Federal Center, 6–10 July 2015.
- 2014:
9. **Spatial Analysis of Mineral Occurrence Controls and Prospectivity** – lecture given to undergraduate geology and mining engineering students, Adamson University, Manila, Philippines, 11 December 2014.
  10. **Incorporating Mineral Prospectivity Analysis in Quantitative Estimation of Undiscovered Mineral Resources** – presentation at the 6th Brazilian Symposium on Mineral Exploration, Ouro Preto, Minas Gerais Brazil, 11–14 May 2014.
  11. **From Mapping of Mineral Prospectivity to Quantitative Estimation of Undiscovered Mineral Resources** – Distinguished Lecture, Adamson University, Manila, Philippines, 6 January 2014.

2012:

12. **Preparing and Writing a Paper for International Peer-reviewed Journal** – lecture delivered to M.Sc. students of the School of Earth Sciences and Resources, China University of Geosciences, Wuhan, P.R. China, 17 October 2012.
13. **Geochemical Data Analysis & Applications** – lecture delivered to M.Sc. students of the School of Earth Sciences and Resources, China University of Geosciences, Wuhan, P.R. China, 18 October 2012.
14. **GIS-based Mineral Prospectivity Mapping** – lecture delivered to M.Sc. students of the School of Earth Sciences and Resources, China University of Geosciences, Wuhan, P.R. China, 19 October 2012.
15. **Exploration Geochemical Data Analysis and Mineral Prospectivity Mapping** – lectures delivered to M.Sc. students of the School of Earth Sciences and Resources, China University of Geosciences, Beijing, P.R. China, 9-12 October 2012.
16. **Use of GIS in Mineral Exploration** – lecture delivered to 2nd year students B.Sc. Geology students, James Cook University, Townsville, Queensland, Australia, 30 April 2012.

2011:

17. **GIS-based Mineral Prospectivity Mapping** – lectures and practical exercises delivered to M.Sc. students in Earth Sciences, Geology Department, University of Tunis, Tunisia, 12–14 December 2011.
18. **Modern Techniques in Mapping of Geochemical Anomalies and Mineral Prospectivity** – lectures delivered in a course workshop at Shahrood University of Technology, Shahrood, Iran, 23–24 November 2011.
19. **Geochemical Anomaly and Mineral Prospectivity Mapping in GIS** – lectures and practical exercises delivered in a course workshop for staff of the Geological Survey of Finland, Rovaniemi, Finland, 1–3 September 2011.
20. **Mineral Potential Mapping using GIS** – lectures delivered to course participants in the International School of Geoscience Resources (IS-Geo), Korea Institute of Geoscience and Mineral Resources (KIGAM), Daejeon, South Korea, 15–16 June 2011.
21. **Estimation of Undiscovered Mineral Resources from a Mineral Prospectivity Map** – lecture delivered to staff of the Institute of Geological Survey in Henan Province, P.R. China, 02 June 2011.
22. **Mineral Prospectivity Mapping** – lectures delivered to M.Sc. students of the School of Earth Sciences and Resources, China University of Geosciences, Beijing, P.R. China, 30–31 May 2011.
23. **Multi-purpose Geochemical Exploration** – lectures and practical exercises delivered in a course workshop for technical staff of the Instituto Colombiano de Geología y Minas (INGEOMINAS), Bogotá, Colombia, 9–13 May 2011.

2010:

24. **Geochemical Anomaly and Mineral Prospectivity Mapping in GIS** – lectures and practical exercises delivered in a course workshop for participants coming from the academic field of geosciences and the mining exploration industry, held at the University of Campinas, Campinas, Sao Paulo, Brazil, 4–7 October 2010.
25. **Mineral Potential Mapping using GIS** – lectures delivered to course participants in the International School of Geoscience Resources (IS-Geo), Korea Institute of Geoscience and Mineral Resources (KIGAM), Daejeon, South Korea, 8–9 June 2010.
26. **Catchment Basin Analysis of Stream Sediment Geochemical Anomalies** – lecture delivered to M.Sc. students of the Applied Geochemistry and Environmental Geology Laboratory, Department of Energy Resources Engineering, College of Engineering, Seoul National University, Seoul, South Korea, 07 June 2010.

2007:

27. **GIS-based Prospectivity Mapping and Spatial Analysis** – lecture delivered to staff of the Geological Survey of Sweden, Uppsala, Sweden, 20 November 2007.
28. **Volcanogenic Massive Sulphide (VMS) Prospectivity Mapping in Skellefte** – lecture delivered to staff of the Geological Survey of Sweden, Uppsala, Sweden, 20 November 2007.
29. **Data-driven Evidential Belief Functions for Mineral Prospectivity Mapping** – research presentation in the Spatial Modeling Seminar, 2–3 October 2007, Rovaniemi, Finland.
30. **Predictive Mapping of Mineral Prospectivity in Areas without Known Mineral Deposits** – research presentation in the Spatial Modeling Seminar, 2–3 October 2007, Rovaniemi, Finland.
31. **Selection of Coherent Deposit-type Locations for Data-driven Modelling of Mineral Prospectivity** – research presentation in the Spatial Modeling Seminar, 2–3 October 2007, Rovaniemi, Finland.

2006:

32. **Characterisation of Geo-Resources and Associated Geo-environmental Hazards** – lecture delivered to staff of the Center of Geological Survey, Bandung, Indonesia, 22 September 2006.
33. **Geological Objects: Process-based Modelling to GIS-based Predictive Modelling** – lecture delivered to undergraduate/postgraduate students of the Geology Department, Bandung Institute of Technology (ITB), Bandung, Indonesia, 22 September 2006.
34. **Learn ‘What is Where’ to Know ‘Where is What’ – GIS-based Predictive Modelling of Geo-objects** – lecture delivered to undergraduate/postgraduate students of the Geology Department, Padjadjaran University, Bandung, Indonesia, 18 September 2006.

#### Postgraduate research projects supervised:

##### A. Ph.D. research projects:

1. Ghezelbash, R., **Optimization of Geochemical Anomaly Separation Methods and Providing Predictive Integrated Models for Prospectivity Mapping using Machine Learning** (ongoing research). Amirkabir University of Technology, Tehran, Iran.
2. Guerra Prado, E.M., **Mineral Exploration Targetting with Deep Machine Learning Algorithms** (ongoing research). State University of Campinas, Campinas, São Paulo, Brazil.
3. Motta, J., **Insights to iron-oxide-copper-gold deposits and orogenic gold endowment of the Amazon Craton (Brazil) from satellite-borne geophysical data** (ongoing research). State University of Campinas, Campinas, São Paulo, Brazil.
4. Wang, H. – **Quantitative Assessment Methods of Geochemical Patterns and its Application in Mineral Exploration** (Ph.D. defense 21-06-2016) (external supervision: China University of Geosciences, Wuhan, China)
5. Yousefi, M. – **Enhancing the Probability of Success in Mineral Potential Mapping** (Special emphasis on geochemical evidence layer in GIS) (Ph.D. defense 20-01-2013) (external supervision: Shahrood University of Technology, Shahrood, Iran)
6. Ma, X. – **Ontology Spectrum for Geological Data Interoperability** (Ph.D. defense 30-11-2011)
7. Ghosh, S. – **Knowledge-guided Empirical Prediction of Landslide Hazard** (Ph.D. defense 05-07-2011)
8. Owusu, E.A. – **Mineral Resource Assessment in Frontier Regions** (candidate died in a car accident prior to completion in 2009)
9. Farifteh, J. – **Imaging Spectroscopy of Salt-affected Soils** (Ph.D. defense 09-05-2007)

10. Debba, P. – **Sampling Scheme Optimization from Hyperspectral Data** (Ph.D. defense 20-06-2006)
  11. Porwal, A. – **Mineral Potential Mapping with Mathematical Geological Models** (Ph.D. defense 01-02-2006)
  12. Duker, A. – **Spatial Analysis of Factors of Mycobacterium ulcerans Infection** (Ph.D. defense 01-07-2005)
- B. **M.Sc. research projects:**
1. Haddad Martim, P.M., **Application of Fractals to the Development of Mineral Favorability Maps: example from the Carajás Iron Oxide Copper-Gold deposits, Brazil** (ongoing research). State University of Campinas, Campinas, São Paulo, Brazil.
  2. Younes Cárdenas, N., **Landslide Susceptibility Analysis Using Remote Sensing and GIS in the Western Ecuadorean Andes** (Unpublished MSc Natural Resource Management thesis, James Cook University, Townsville, Australia, November 2014)
  3. Saputra, S.E.A., **Remote Sensing Active Faults: A Case Study in Palu Koro, Central Sulawesi, Indonesia** (Unpublished MSc Environmental Earth Science major thesis, James Cook University, Townsville, Australia, July 2014).
  4. Aquino, J., **Studies of Structures and Mineralogy of Uchucchacua deposit, Peru** (Unpublished MSc Geology major thesis, James Cook University, Townsville, Australia, December 2013).
  5. Herbert, S., **Predictive Mapping for Orogenic-gold Prospectivity in Uganda** (Unpublished thesis for M.Sc. degree [with distinction] in Geo-Information Science and Earth Observations, University of Twente, Enschede, The Netherlands, February 2012, 83 pp.).
  6. Msechu, M.E., **Modeling of Prospectivity for Lode-Au Mineralization in the Kibaran of Uganda** (Unpublished thesis for M.Sc. degree in Geo-Information Science and Earth Observations, University of Twente, Enschede, The Netherlands, March 2011, 66 pp.).
  7. Nugraha, H.S., **Integration of Stream Sediment Geochemical and Airborne Gamma-ray Data for Surficial Lithologic Mapping Using Clustering Methods** (Unpublished thesis for M.Sc. degree in Geo-Information Science and Earth Observations, University of Twente, Enschede, The Netherlands, March 2011, 76 pp.).
  8. Belay, A.S., **Surface Mineralogical-Geochemical Characteristics of the Pali-Islica Epithermal-Au Deposit (SW Spain)** (Unpublished thesis for M.Sc. degree in Geo-Information Science and Earth Observations (with Specialisation in Earth Resources Exploration), ITC, Enschede, The Netherlands, March 2010, 62 pp.).
  9. Ngada, H., **GIS-based Predictive Mapping of Gold Prospectivity: A Case Study in the Busia Goldfield, Southeastern Uganda** (Unpublished thesis for M.Sc. degree in Geo-Information Science and Earth Observations (with Specialisation in Earth Resources Exploration), ITC, Enschede, The Netherlands, March 2009, 77 pp.).
  10. Woldu Sequar, G., **Neotectonics of the East African Rift System: New Interpretations from Conjunctive Analysis of Field and Remotely Sensed Datasets in the Lake Magadi Area, Kenya** (Unpublished thesis for M.Sc. degree [with distinction] in Geo-Information Science and Earth Observations (with Specialisation in Earth Resources Exploration), ITC, Enschede, The Netherlands, February 2009, 99 pp.).
  11. Beg, M.K., **Geo-spatial Analysis of Fluoride Contamination in Groundwater of Tamnar Area, Raigarh District, Chhattisgarh State, India** (Unpublished thesis for M.Sc. degree in Geo-Information Science and Earth Observations (with Specialisation in Geo-hazards), ITC, Enschede, The Netherlands, January 2009, 124 pp.).
  12. Mekonnen, S.W., **Geological and Mineral Potential Mapping by Geoscience Data Integration** (Unpublished thesis for M.Sc. degree in Geo-Information Science and Earth

- Observations (with Specialisation in Earth Resources Exploration), ITC, Enschede, The Netherlands, April 2008, 98 pp.).
13. Makyao, F., **Bedrock Geological and Mineral Prospectivity Mapping in Areas with Regolith Cover: case study in Kahama area, Lake Victoria Gold Field, Tanzania** (Unpublished thesis for M.Sc. degree in Geo-Information Science and Earth Observations (with Specialisation in Earth Resources Exploration), ITC, Enschede, The Netherlands, March 2008, 68 pp.).
  14. Ayalew Amara, S., **Spectral Remote Sensing of Hydrothermal Alteration associated with Volcanogenic Massive Sulphide Deposits, Gorob-Hope area, Namibia** (Unpublished thesis for M.Sc. degree in Geo-Information Science and Earth Observations (with Specialisation in Earth Resources Exploration), ITC, Enschede, The Netherlands, March 2007, 54 pp.).
  15. Alidu, S., **Classification of Birimian Gold Occurrences using their Geological and Geochemical Attributes: a case study in South Ashanti Belt, Ghana** (Unpublished thesis for M.Sc. degree in Geo-Information Science and Earth Observations (with Specialisation in Earth Resources Exploration), ITC, Enschede, The Netherlands, March 2007, 67 pp.).
  16. Faassen, C.M.A., **Regional-scale Spatial Attribute Classification of Mineral Deposit Occurrences for Data-driven Prospectivity Mapping** (Unpublished thesis for M.Sc. degree in Geology, Utrecht University, The Netherlands, May 2006, 100 pp.).
  17. Roij, A. van., **Integration of Airborne Geophysical Data and Spaceborne Multispectral Data for Geological Mapping and Mineral Potential Mapping in a Poorly Explored Region: a Case Study of the Kibi Area, Ghana** (Unpublished thesis for M.Sc. degree in Geology, Utrecht University, The Netherlands, April 2006, 126 pp.).
  18. Wibowo, H., **Spatial Data Analysis and Integration Regional-Scale Geothermal Prospectivity Mapping, West Java, Indonesia** (Unpublished thesis for M.Sc. degree in Geo-Information Science and Earth Observations (with Specialisation in Applied Geophysics), ITC, Enschede, The Netherlands, March 2006, 94 pp.).
  19. Raat, H., **Prediction of Archaean Shear Zone Hosted Gold Deposits by Quantification of their Spatial Association with Geological Features Interpreted from Remote Sensing Imagery - a case study of the East Pilbara, Western Australia** (Unpublished thesis for M.Sc. degree in Geology, Utrecht University, The Netherlands, June 2005, 129 pp.).
  20. Gebreselassie Abera, B., **Application of Remote Sensing and Spatial Data Integration Modeling to Predictive Mapping of Apatite-Mineralized Zones in the Bikilal Layered Gabbro Complex, Western Ethiopia** (Unpublished thesis for M.Sc. degree in Mineral Resource Exploration, ITC, Enschede, The Netherlands, March 2005, 54 pp.).
  21. Kargbo, S.A.P., **Mapping Sites Favourable for Placer Deposits in south-western Sierra Leone** (Unpublished thesis for M.Sc. degree in Mineral Resource Exploration, ITC, Enschede, The Netherlands, May 2004, 69 pp.).
  22. Bayanjargal, O., **Regional Alteration Mapping for Volcanic-hosted Massive Sulphide Exploration in the Pilbara, Australia** (Unpublished thesis for M.Sc. degree in Mineral Resource Exploration, ITC, Enschede, The Netherlands, March 2004, 45 pp.).
  23. Andrada de Palomera, R.P., **Application of Remote Sensing and Geographic Information Systems for Mineral Predictive Mapping, Deseado Massif, Southern Argentina** (Unpublished thesis for M.Sc. degree [with distinction] in Mineral Resource Exploration, ITC, Enschede, The Netherlands, February 2004, 73 pp.).
  24. Bouw, S., **Remote Sensing and Data-Driven Predictive Modelling, their Implications on Gold Mineralisations in the Zimbabwe Archaean Craton**

- (Unpublished thesis for M.Sc. degree in Geology, Utrecht University, The Netherlands, September 2003, 95 pp.).
25. Ahadjie, J.K., **Spatial Data Integration for Classification of Stream Sediment Geochemical Anomalies, Masbate Island, Philippines** (Unpublished thesis for M.Sc. degree in Mineral Resource Exploration and Evaluation, ITC, Enschede, The Netherlands, March 2003, 82 pp.).
  26. Suarez Rojas, A., **Predictive Mapping of Massive Sulphide Potential in the western part of Escambray Terrain, Cuba** (Unpublished thesis for M.Sc. degree in Mineral Resource Exploration and Evaluation, ITC, Enschede, The Netherlands, March 2003, 62 pp.).
  27. Rukezo, G., **Drainage Geochemistry of the Recsk-Lahoča Mining Area, Matra Mountains, Hungary** (Unpublished thesis for M.Sc. degree in Mineral Resource Exploration and Evaluation, ITC, Enschede, The Netherlands, March 2003, 131 pp.).
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  29. Chikambwe, E., **GIS-Based Predictive Mapping of Zones Favourable for Aquamarine-Bearing Pegmatites, Lundazi District, Zambia** (Unpublished thesis for M.Sc. degree in Mineral Resource Exploration and Evaluation, ITC, Enschede, The Netherlands, September 2002, 81 pp.).
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- C. **B.Sc. Honours research projects:**
1. Dhlamini, L., **Delineation of Groundwater Potential Zones in the Wilgerivier Formation** (ongoing BSc Geology honours project, University of KwaZulu-Natal, South Africa).
  2. Gangsaran, S., **Prediction of Landslide-prone Areas using GIS and Remote Sensing in the Ukhahlamba-Drakensberg Park** (ongoing BSc Geology honours project, University of KwaZulu-Natal, South Africa).
  3. Khanyile, S., **Landfill Site Selection using GIS and Remote sensing in the eThekweni Municipality** (ongoing BSc Geology honours project, University of KwaZulu-Natal, South Africa).
  4. Mdunge, W., **Geotechnical Properties and Behaviour of Quaternary Estuarine Deposits and their Influence on Foundation Selection** (ongoing BSc Geology honours project, University of KwaZulu-Natal, South Africa).
  5. Qwabe, S., **Mineral Prospectivity Mapping of Epithermal Gold Deposits in Mount Uac (Philippines)** (ongoing BSc Geology honours project, University of KwaZulu-Natal, South Africa).
  6. Doube, M.H., **Australia's Diamond Industry – a Glimpse of its Future from its Past and Present** (Unpublished BSc Geology honours thesis, James Cook University, Townsville, Australia, October 2015).
  7. Collins, L., **GIS-based spatial analysis for hominid fossils in caves in the Cradle of Humankind** (Unpublished BSc Geology honours thesis, James Cook University, Townsville, Australia, October 2014).

8. Caleo, T., **Distribution of Heat Producing Elements in the Mount Deane Granodiorite: Implications for Genesis and Economic Significance** (Unpublished BSc Geology honours thesis, James Cook University, Townsville, Australia, October 2013).

**Appointments to postgraduate examination committees:**

**A. As co-promotor of Ph.D. candidate:**

1. Ma, X. (30 November 2011) – **Ontology Spectrum for Geological Data Interoperability**. Twente University, The Netherlands.
2. Ghosh, S. (05 July 2011) – **Knowledge-guided Empirical Prediction of Landslide Hazard**. Twente University, The Netherlands.
3. Farifteh, J. (09 May 2007) – **Imaging Spectroscopy of Salt-affected Soils: Model-based Integrated Method**. Utrecht University, The Netherlands.
4. Debba, P. (20 June 2006) – **Sampling Scheme Optimization from Hyperspectral Data**. Wageningen University, The Netherlands.
5. Porwal, A. (01 February 2006) – **Mineral Potential Mapping with Mathematical Geological Models**. Utrecht University, The Netherlands.
6. Duker, A. (01 July 2005) – **Spatial Analysis of Factors Implicated in Mycobacterium ulcerans Infection in Ghana**. Wageningen University, The Netherlands.

**B. As external supervisor of Ph.D. candidate:**

1. Motta, J. (2020) – **Application of GOCE Satellite Gravity Data in Deriving New Insights to the Geotectonic Evolution of the Amazonian Craton, Brazil**. State University of Campinas, Campinas, São Paulo, Brazil.
2. Oosthoek, J.H.P. (2016) – **Strategies For Predicting Locations Of Past Hydrothermal Activity On Mars**. Jacobs University, Germany.
3. Wang, H. (2016) – **Quantitative Assessment Methods of Geochemical Patterns and Its Application in Mineral Exploration**. China University of Geosciences, Wuhan, China.
4. Yousefi, M. (2013) – **Enhancing the Probability of Success in Mineral Potential Mapping**. Shahrood University of Technology, Iran.

**C. As external examiner of Ph.D. thesis:**

1. Middleton, M. (2014) – **Hyperspectral Close-range and Remote Sensing of Soils and Related Plant Associations. Spectroscopic Applications in the Boreal Environment**. Aalto University, Espoo, Finland.
2. Tiwari, P.S. (2013) – **Identification of Albitite Zone Using Multisensor Data in Eastern Rajasthan**. Indian Institute of Technology (at Roorkee), India.
3. Jemmali, N. (2011) – **The Triassic of Northern Tunisia and Associated Mineralizations: Mineralogy, Geochemistry (Trace Elements and O, C, S, Pb Isotopes) and Genetic Models**. University of Tunis, Tunisia.
4. Nykänen, V. (2008) – **Spatial Data Analysis as a Tool for Mineral Prospectivity Mapping**. University of Oulu, Finland.
5. Feltrin, L. (2006) – **Probabilistic and Deterministic Models of Pb-Zn Mineralisation and Post-mineralisation Megabreccia in the Lawn Hill Region, Australia**. James Cook University, Australia.
6. Nakhapakorn, K. (2006) – **Influence of Socio-Economic and Environmental Factors Using GIS in Dengue Epidemic in Thailand**. Asian Institute of Technology, Thailand.
7. Mondlane, S. Jr. (2003) – **Controls on the Evolution and Distribution Patterns of Gold Mineralisation in the Manica-Mutare-Odzi Greenstone Belt (western Mozambique and eastern Zimbabwe)**. University of Zimbabwe, Zimbabwe.

**D. As external examiner of M.Sc. thesis:**

1. Soloshenko, K. (2010) – **Regional-scale, GIS-based, Mineral Prospectivity Analysis for Gold Deposits in the Tian-Shan Mountains of the Kyrgyz Republic**. University of Western Australia, Australia.

**Books and Book Chapters Published:**

1. **Carranza, E.J.M.**, 2008. Geochemical Anomaly and Mineral Prospectivity Mapping in GIS. Handbook of Exploration and Environmental Geochemistry, Vol. 11, Elsevier, Amsterdam, 351 pp.
2. Porwal, A., **Carranza, E.J.M.**, Hale, M., 2011. Spatial mathematical models for mineral potential mapping. In: P. Ghosh (Ed.), Numerical Methods and Models in Earth Science. New India Publishing Agency, New Delhi, pp. 99-119.
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2018:

1. **Carranza, E.J.M.**, 2018. Natural Resources Research Publications on Resourcing Future Generations, and Introduction of Papers in this Special Issue. Natural Resources Research 27, 125-141.
2. Chen, F., Wang, Q., Yang, S., Zhang, Q., Liu, X., Chen, J., **Carranza, E.J.M.**, 2018. Space-time distribution of manganese ore deposits along the southern margin of the South China Block, in the context of Paleo-Tethyan evolution. International Geology Review 60, 72-86.
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2. Hale, M., **Carranza, E.J.M.**, 2002. Geospatial data infrastructure for mineral resource development. Annual Report 2002, Centre for Technical Geoscience (TU Delft, ITC, WUR), The Netherlands, pp. 71-72.
3. **Carranza, E.J.M.**, 2001. Geologically-constrained mineral potential mapping. Annual Report 2001, Centre for Technical Geoscience (TU Delft, ITC, WUR), The Netherlands, pp. 65-66.
4. **Carranza, E.J.M.**, 2000. Geologically-constrained mineral potential mapping. Annual Report 2000, Centre for Technical Geoscience (TU Delft and ITC), The Netherlands, pp. 93-94.
5. **Carranza, E.J.M.**, 1993. Detailed Follow-up Geological-Geochemical Survey in Monte Calvario-Daganas Area, Bulan, Sorsogon Province, Technical Report, MGDS-DENR, January 1993, Legazpi City.
6. Juan, R.A., **Carranza, E.J.M.**, Domasig, W.F., 1989. Geology and mineralization of gold rush areas in Jose Panganiban, Camarines Norte, MGDS-DENR Technical Information Series No. TIS-R-5-13-89, January 1989, 35 pp.
7. **Carranza, E.J.M.**, 1987. Bentonite and bentonitic clay deposits in Homapon, Legazpi City, BMG-V Technical Information Series, June 1987, Daet, Camarines Norte.
8. Juan, R.A., **Carranza, E.J.M.**, 1987. Ceramics resources study. BMG-V Technical Information Series, January 1987, Daet, Camarines Norte.
9. **Carranza, E.J.M.**, 1986. Investment profile on lime manufacturing in the Bicol Region, BMG-V Technical Information Series, January 1986, Daet, Camarines Norte.

**Guest Editor of Geoscience Journal Special/Thematic Issues:**

1. **Analysis of Exploration Geochemical Data for Mapping of Anomalies** (Geochemistry: Exploration, Environment, Analysis, vol. 12, no. 3; 2017)
2. **GIS-Based Geochemical Anomaly and Mineral Prospectivity Mapping** (Natural Resources Research, vol. 26, no. 4; 2017)
3. **Geoinformatics in Applied Geochemistry** (Journal of Geochemical Exploration 164; 2016)
4. **GIS-based Mineral Potential Modelling and Geological Data Analyses for Mineral Exploration** (Ore Geology Reviews 71, 477-881; 2015)
5. **Fractal/Multifractal Modelling of Geochemical Data** (Journal of Geochemical Exploration, vol. 122, no. 1; 2012)
6. **Geochemical Characteristics of Mineral Deposits: Implications for Ore Genesis** (Geochemistry: Exploration, Environment, Analysis, vol. 12, no. 2; 2012)
7. **Primary Geochemical Characteristics of Mineral Deposits: Implications for Exploration** (Ore Geology Reviews, vol. 45, no. 1; 2012)
8. **Geochemistry for Geological-Environmental Studies** (Journal of Geochemical Exploration, vol. 111, no. 3; 2011)
9. **Geocomputation of Mineral Exploration Targets** (Computers & Geosciences, vol. 37, no. 12; 2011)
10. **Isotopic Geochemistry of Mineral Deposits – Implications for Ore Genesis** (Resource Geology, vol. 61, no. 4; 2011)

**Membership in Editorial Board of Geoscience Journals:**

- Editor-in-Chief, **Natural Resources Research** (since September 2012)
- Associate Editor, **Geochemistry: Exploration, Environment, Analysis** (since August 2010)
- Associate Editor, **Journal of Geochemical Exploration** (since March 2010)
- Associate Editor, **Ore Geology Reviews** (since January 2011)
- Associate Editor, **Arabian Journal of Geosciences** (since February 2017)
- Associate Editor, **Korean Journal of Remote Sensing** (since February 2017)
- Member, Editorial Advisory Board, **Computers & Geosciences** (since June 2010)
- Member, Editorial Board, **Resource Geology** (since November 2013)

**Memberships in Scientific Committees of International Conferences/Symposia:**

1. ISME-XV 15<sup>th</sup> **International Symposium on Mineral Exploration**, 26-28 November 2018, Kyoto, Japan
2. IAMG2018 **19th Annual Conference of the International Association for Mathematical Geosciences** (IAMG), 2-8 September 2018, Olomouc, Czech Republic
3. IAMG2017 **18th Annual Conference of the International Association for Mathematical Geosciences** (IAMG), 2-9 September 2017, Fremantle, Western Australia
4. ISME-XIII **13th International Symposium on Mineral Exploration**, 22-24 September 2014, Hanoi, Vietnam
5. IASME-WSEAS **6th International Conference GEOLOGY and SEISMOLOGY**, Kos Island, Greece, 14-17 July 2012
6. NAUN-WSEAS **3rd International Conference GEOGRAPHY and GEOLOGY (GEO '12)**, Athens, Greece, 7-9 March 2012
7. **25th INTERNATIONAL APPLIED GEOCHEMISTRY Symposium**, Rovaniemi, Finland, 22-26 September 2011.
8. WSEAS **4th International Conference ENVIRONMENTAL and GEOLOGICAL SCIENCE and ENGINEERING**, Barcelona, Spain, 15-17 September 2011
9. NAUN-WSEAS **2nd International Conference GEOGRAPHY and GEOLOGY (WORLDGEO '11)**, Corfu island, Greece, 14-16 July 2011
10. IASME-WSEAS **5th International Conference GEOLOGY and SEISMOLOGY**, Cambridge, U.K., 23-25 February 2011
11. WSEAS **3rd International Conference ENVIRONMENTAL and GEOLOGICAL SCIENCE and ENGINEERING**, Constantza, Romania, 3-5 September 2010
12. NAUN-WSEAS **1st International Conference GEOGRAPHY and GEOLOGY (WORLDGEO '10)**, Corfu island, Greece, 22-24 July 2010
13. IASME-WSEAS **4th International Conference GEOLOGY and SEISMOLOGY**, Cambridge, U.K., 23-25 February 2010
14. IASME-WSEAS **3rd International Conference GEOLOGY and SEISMOLOGY**, Cambridge, U.K., 24-26 February 2009
15. WSEAS **International Conference ENVIRONMENTAL and GEOLOGICAL SCIENCE and ENGINEERING**, Malta, 11-13 September 2008
16. IASME-WSEAS **2nd International Conference GEOLOGY and SEISMOLOGY**, Cambridge, U.K., 23-25 February 2008
17. IASME-WSEAS **1st International Conference GEOLOGY and SEISMOLOGY**, Portoroz, Slovenia, 15-17 May 2007

**Fellowships/Memberships in Professional/Learned Scientific Societies:**

1. **Registered Professional Geoscientist** (2014–present) – Australian Institute of Geoscientists

2. **Fellow** (2009–present) and **Councilor** (2009–2010, 2011–2012), **Member** (1991–2008) – Association of Applied Geochemists (formerly Association of Exploration Geochemists)
3. **Fellow** (2012–present) – Society of Economic Geologists
4. **Fellow** (2014–present), **Member** (2013–2014) – Australasian Institute of Mining and Metallurgy
5. **Fellow** (2014–present) – Australian Institute of Geoscientists
6. **Member** (2004–present) – International Association for Mathematical Geosciences
7. **Member** (2009–present) – International Association on the Genesis of Ore Deposits
8. **Member** (2009–present) – Society for Geology Applied to Mineral Deposits
9. **Member** (2010–present) – Geochemical Society

#### Sessions convened in conferences/symposia:

1. **Developments in Methods and Software Tools for Assessment of Non-renewable Resources**, International Association for Mathematical Geosciences IAMG2018, Olomouc, Czech Republic, 2–8 September 2018.
2. **Predictive Modelling of Resources and Hazards**, International Association for Mathematical Geosciences IAMG2018, Olomouc, Czech Republic, 2–8 September 2018.
3. **Mineral Prospectivity Modeling and Assessment of Undiscovered Mineral Resources**, Resources for Future Generations RFG2018, Vancouver, British Columbia, Canada, 16–21 June 2018.
4. **GIS-based geochemical data analysis and mineral prospectivity mapping**, 35th International Geological Congress, Cape Town, South Africa, 27 August – 4 September 2016.
5. **Geochemical Mineral Exploration**, Goldschmidt 2016, Yokohama, Japan, 26 June – 1 July 2016.
6. **Predictive Modelling**, 12th SGA Biennial Meeting, Uppsala, Sweden, 12–15 August 2013.
7. **Mineral Systems Approach to GIS-based Prospectivity Mapping Symposium**, 2013 FUTORES Conference, Townsville, Queensland, Australia, 2–5 June 2013.
8. **Geochemical Exploration and Mineral Prospectivity in GIS**, 25th International Applied Geochemistry Symposium, Rovaniemi, Finland, 22–26 August 2011.
9. **Geochemical Data Acquisition, Analysis, Modeling and Visualization for Geological/mineral Exploration**, Goldschmidt 2010, Knoxville, Tennessee, U.S.A., 13–18 June 2010.
10. **Integrated Modeling of Exploration Data**, 11th International Symposium on Mineral Exploration, Espoo, Finland 07–08 September 2010.

#### Conferences/Symposia/Workshops attended/participated:

1. 19<sup>th</sup> Annual Conference of the International Association for Mathematical Geosciences IAMG2018, Olomouc, Czech Republic, 2–8 September 2018.  
Papers presented (oral):  
**The Fractality of Landslides' Spatial Association with Spatial Factors**
2. International Symposium on Uranium Raw Material for the Nuclear Fuel Cycle URAM2-18, Vienna, Austria, 25–29 June 2018.  
Papers presented (oral):  
**Spatial Analysis of Prospectivity for Surficial Uranium Deposits: A Case Study in British Columbia, Canada**
3. Resources for Future Generations (RFG2018), 16–21 June 2018, Vancouver, British Columbia, Canada.

Papers presented:

- a. **Oral: Geochemical Mineral Exploration: Focusing on Negative Geochemical Anomalies**
- b. **Oral: How Many Undiscovered Hydrothermal Copper-Gold Prospects are there in Catanduanes (Philippines)?**
4. Mineral Prospectivity: Current Approaches and Future Innovations in Predictive Geosciences, BRGM, Orléans, France, 24–26 October 2017.  
Papers presented:
  - a. **Oral (keynote): Developments in GIS-based Mineral Prospectivity Mapping**
  - b. **Oral: The Efficiency of Logistic Function and Prediction-Area Plot in Prospectivity Analysis of Mineral Deposits**
5. Council for Geoscience 2nd Annual Scientific Conference, Council for Geoscience, Pretoria, South Africa, 2–3 March 2017.  
Keynote presentation:  
**Developments in GIS-based Mineral Potential Mapping**
6. 35th International Geological Congress, Cape Town, South Africa, 27 Aug. – 4 Sept. 2016  
Paper presented:
  - a. **Oral: GIS-based Mineral Systems Approach to Mapping of Prospectivity for Surficial Uranium Deposits**
7. Goldschmidt 2016, Yokohama, Japan, 26 June – 1 July 2016  
Papers presented:
  - a. **Oral: Geochemical Mineral Exploration: Should We Use Enrichment Factors?**
  - b. **Oral: Enhancement of Au Anomalies: Weight Bulk Leach Extractable Gold Data with Catchment Area**
  - c. **Poster: Renormalisation Constraints on Boundaries of Geochemical Anomalies**
8. APEX Mining Company Inc. – MONTE ORO Resources and Energy, Inc. In-house Technical Seminar, Quezon City, Philippines, 11-12 December 2014.  
Paper presented (oral):  
**Pyrite's fool's gold but ignoring it to find gold is foolish**
9. GEOCON 2014: The Filipino Geologist: New Frontiers and Global Challenges. Makati City, Philippines, 9-10 December 2014.  
Paper presented (oral):  
**Are there any undiscovered hydrothermal Cu-Au prospects in Catanduanes?**
10. 6th Brazilian Symposium on Mineral Exploration, Ouro Preto, Minas Gerais Brazil, 11-14 May 2014.  
Paper presented (oral):  
**Incorporating mineral prospectivity analysis in quantitative estimation of undiscovered mineral resources.**
11. 12th SGA Biennial Meeting, Uppsala, Sweden, 12-15 August 2013.  
Papers presented (oral):
  - a. **Data integration for interpretive bedrock mapping in the Giyani area (South Africa).**
  - b. **Metal sources and timing of Pb-Zn deposits associated to salt dome cap rocks in Northwest Tunisia: evidence from isotope (Pb, S) geochemistry**
12. Mineral Systems Approach to GIS-based Prospectivity Mapping Symposium, 2013 FUTORES Conference, Townsville, Queensland, Australia, 2-5 June 2013.  
Paper presented (oral):  
**Predictive mapping for orogenic gold prospectivity in Uganda**

13. GEOCON 2012: Geologist in Motion: Responding to the Opportunities and Challenges of our Dynamic Earth. Makati, Philippines, 10-11 December 2012.
14. 25th International Applied Geochemistry Symposium, Rovaniemi, Finland, 22–26 August 2011.  
Keynote presentation:  
**Analysis and mapping of stream sediment geochemical anomalies: should we logratio-transform the data?**
15. 45th Brazilian National Geological Congress, Belém, Pará, Brazil, 26 September – 01 October 2010  
Keynote presentation:  
**Spatial analysis of mineral occurrence controls and prospectivity**
16. 11th International Symposium on Mineral Exploration (ISME-XI), Geological Survey of Finland, Espoo, Finland 07-08 September 2010  
Keynote presentation:  
**From mapping of mineral prospectivity to quantitative estimation of undiscovered mineral resources**
17. Goldschmidt 2010, Knoxville, Tennessee, U.S.A., 13-18 June 2010  
Papers presented (oral):
  - a. **Leveling and analysis of till geochemical data: case study in the Skellefte district (Sweden)**
  - b. **Mapping of anomalies in continuous and discrete field models of stream sediment geochemical data**
18. 33rd International Geological Congress, Oslo, Norway, 06-14 August 2008  
Papers presented:
  - a. **Oral: A quantitative methodology to select training set of coherent deposit-type locations to improve data-driven modeling of mineral prospectivity**
  - b. **Poster: VMS prospectivity mapping in Skellefte, northern Sweden**
  - c. **Poster: Standardization of data elements: a primary step for a geological and mineral ontology**
19. Spatial Modeling Seminar, 2-3 October 2007, Rovaniemi, Finland.  
Invited papers presented (oral):
  - a. **Data-driven evidential belief functions for mineral prospectivity mapping**
  - b. **Predictive mapping of mineral prospectivity in areas without known mineral deposits**
  - c. **Selection of coherent deposit-type locations for data-driven modelling of mineral prospectivity**
20. Map Asia 2007 Conference, 14-16 August 2007, Kuala Lumpur, Malaysia.  
Paper presented (oral):  
**Predictive mapping of mineral prospectivity in areas without known mineral deposits**
21. 6th International AARSE Conference of Earth Observation & Geoinformation Sciences in Support of Africa's Development, 30 October – 2 November 2006, Cairo, Egypt.  
Papers presented (oral):
  - a. **Geological remote sensing and gold prospectivity mapping in Kibi area (Ghana)**
  - b. **Spatial association of gold deposits with remotely-sensed lineaments, South Ashanti Belt, Ghana**
22. 9th International Symposium on Mineral Exploration, Bandung, Indonesia, 19-21 September 2006  
Paper presented (oral):

- a. **Oral: Regional-scale geothermal prospectivity mapping in West Java (Indonesia) by data-driven evidential belief functions**
- b. **Poster: Spatial data analysis and integration in geothermal prospectivity mapping: a case study in West Java, Indonesia**
- 23. 5th European Congress on Regional Geoscientific Cartography and Information Systems, Barcelona, Spain, 13-16 June 2006  
Paper presented (oral):  
**Data-driven evidential belief predictive modelling of regional-scale geothermal prospectivity in West Java (Indonesia)**
- 24. 26th gOcad Meeting, Nancy, France, 6-9 June 2006
- 25. UNAM-ITC Research Workshop, Mexico City, Mexico, 23 March 2006.  
Paper presented:  
**Characterisation of geo-resources and associated geo-environmental hazard**
- 26. 12th Australasian Remote Sensing and Photogrammetry Conference, Fremantle, Western Australia, Australia, 18-22 October 2004.  
Paper presented (poster):  
**Analysis of Landsat TM and gamma-ray spectrometry datasets for VhMS Exploration, Western Australia**
- 27. Hanoi Geoengineering 2004 International Workshop, Hanoi, Vietnam, 15 October 2004  
Keynote presentation:  
**Geo-information science and earth observation for geo-resource characterization**
- 28. 1st Göttingen GIS & Remote Sensing Days: Environmental Studies, Göttingen, Germany, 07-08 October 2004.  
Paper presented (oral):  
**Remote sensing of temporal variations in spatial distributions of lahar and pyroclastic-flow deposits, western Mount Pinatubo, Philippines**
- 29. 32nd International Geological Congress, Florence, Italy, 20-28 August 2004  
Paper presented (oral):  
**Integration of stream order in drainage anomaly mapping**
- 30. NRSA-ITC Research Workshop, Hyderabad, India, 21-22 April 2004.  
Paper presented:  
**Characterisation of geo-resources**
- 31. IAMG 2003. Annual Conference of the International Association for Mathematical Geology. Portsmouth, U.K., 07-12 September 2003.  
Paper presented (oral):  
**Predictive mapping of lahar-inundation hazard zones: example from West Pinatubo area, Philippines**
- 32. 2nd MINEO Workshop: Hyperspectral Imaging and GIS in Mining-Related Impact Mapping and Monitoring, BRGM, Orléans, France, 11-13 December 2002.
- 33. AARSE 2002. 4th International Conference of the African Association of Remote Sensing of the Environment, Abuja, Nigeria, 14-18 October 2002.
- 34. IAMG 2001. Annual Conference of the International Association for Mathematical Geology. Cancun, Mexico, 06-12 September 2001.  
Paper presented (oral):  
**Geologically constrained fuzzy mapping of gold mineralization potential, Baguio district, Philippines**
- 35. IGARSS 2001. IEEE 2001 International Geoscience and Remote Sensing Symposium. Sydney, Australia, 09-13 July 2001.

Paper presented (oral):

**Remote detection of vegetation stress for mineral exploration**

36. Joint Meeting of the Society for Geology Applied to Mineral Deposits (SGA) and International Association on the Genesis of Ore Deposits (IAGOD). "Mineral Deposits: Processes to Processing". London, Great Britain, 22-25 August 1999.

Paper presented (oral):

**Porphyry copper deposits and strike-slip faults, Central Cordillera, Philippines**

37. IAMG '99. Annual Conference of the International Association for Mathematical Geology. Trondheim, Norway, 06-11 August 1999.

Paper presented (oral):

**Spatial relationships of porphyry copper deposits and strike-slip fault discontinuities and plutons, Benguet, Philippines**

38. GeoComputation'99. 4th International Conference on GeoComputation. Mary Washington College, Fredericksburg, Virginia, U.S.A., 25-28 July 1999.

Paper presented (oral):

**Geologically-constrained probabilistic mapping of gold potential, Baguio district, Philippines**

39. IGARSS '99. IEEE 1999 International Geoscience and Remote Sensing Symposium. Hamburg, Germany, 28 June – 02 July 1999.

Paper presented (poster):

**Image processing and GIS for hydrothermal alteration mapping, Baguio district, Philippines**

40. NATO Advanced Study Institute Meeting on Deposit and Geoenvironmental Models for Resource Exploitation and Environmental Security, Mátraháza, Hungary, September 06-18, 1998.

Paper presented (oral):

**Application of mineral deposit models and GIS to generate mineral potential maps as input for optimum land-use planning in the Philippines**

41. 1998 ITC Research Conference, The Netherlands, March 1998

Paper presented (oral):

**GIS and remote sensing for mineral exploration, Northwest Iran**

42. Seminar Workshop on the Geology, Mineral Resources and Energy Resources of the Bicol Region, Legazpi City, Philippines, 16-18 October 1996

Paper presented (oral):

**Lateral extent of Panganiran Ultramafics: evidences from stream sediment geochemistry**

43. One-day Seminar – Workshop on Porphyry Copper and Epithermal Deposits in Southwest Pacific (1996)

44. Annual Forum on Mineral Resources Development and Geosciences, PETROLAB, Diliman, Quezon City, Philippines, 1995

Paper presented (oral):

**Integration of geochemical-geological datasets for target area selection in Western Albay**

45. 8th Annual Geological Convention, Sulu Hotel, Quezon City, Philippines, 1995

46. IAMG '95. Annual Conference of the International Association for Mathematical Geology. Osaka, Japan, 1995

Paper presented (oral):

**A catchment basin approach to the analysis of reconnaissance geochemical-geological data from Albay Province, Philippines**

47. Seminar/Field Workshop on Geohazard Assessment and Coastal Zone Studies, Legazpi City, Philippines, 29 April 1995  
Paper presented (oral):  
**Geochemical mapping and the environment**
48. Environmental Compliance Monitoring Workshop, Caylabne, Cavite, Philippines, 1995
49. Regional Conference on Earthquake Risk Mitigation, Legazpi City, Philippines, 1992
50. Annual National Geological Seminar, PETROLAB, Diliman, Quezon City, Philippines, 1988  
Paper presented (oral):  
**Geology and mineralization of gold rush areas in Jose Panganiban, Camarines Norte**
51. GOLD '87, Manila, Philippines, 1987
52. CDG-BMG Seminar on Industrial Rocks and Minerals, Manila, Philippines, 1987
53. 1st International Seminar on Lahars and Landslides, Legazpi City, Philippines, 1987
54. Annual National Geological Seminar, PETROLAB, Diliman, Quezon City, Philippines 1987  
Paper presented (oral):  
**Bentonite and bentonitic clays in Homapon, Legazpi City**
55. Symposium on Ceramic/Volcanic Products and Technologies, Legazpi City, Philippines, 1985
56. Annual National Geological Seminar, PETROLAB, Diliman, Quezon City, Philippines, 1985  
Paper presented (oral):  
**Stratigraphic study of Catanduanes Formation**
57. Annual National Geological Seminar, PETROLAB, Diliman, Quezon City, Philippines, 1984

**Referees:**

1. **Dr. Martin Hale**  
Emeritus Professor, Mineral Exploration (ITC, The Netherlands)  
Emeritus Professor, Economic Geology (Utrecht University, The Netherlands)  
Email: prof.martin.hale@gmail.com
2. **Dr. Graeme Bonham-Carter**  
Emeritus Research Scientist  
Mathematical Applications to Geology Section  
Geological Survey of Canada  
Email: Graeme.bc1@gmail.com
3. **Dr. Anupma Prakash**  
Professor, Remote Sensing Geology and Geophysics  
University of Alaska Fairbanks, Geophysical Institute  
903 Koyukuk Drive, P.O. Box 757320  
Fairbanks, AK 99775-7320, USA  
Email: prakash@gi.alaska.edu
4. **Dr. Ernst Schetselaar**  
3-D Geological Modelling and Geological Remote Sensing Specialist  
3-D Earth Imaging and Modelling Section  
Geological Survey of Canada  
Email: ernst.schetselaar@nrcan.gc.ca
5. **Dr. Nigel Cook**  
Associate Professor  
Geology and Geophysics (School of Earth & Environmental Sciences)  
University of Adelaide  
Email: nigel.cook@adelaide.edu.au
6. **Dr. Alok Porwal**  
Associate Professor  
Centre of Studies in Resources Engineering  
Indian Institute of Technology Bombay  
Powai, Mumbai - 400 076 INDIA  
Email: aporwal@iitb.ac.in
7. **Dr. Sally Barritt**  
GeoWitch, Netherlands  
Email: geowitch@telfort.nl
8. **Dr. Edmund Sides**  
Principal Resource Geologist  
AMEC, London, U.K.  
Email: ed.sides@amec.com; edmundsides@hotmail.com

I hereby certify that the foregoing details are correct to the best of my knowledge.

  
EMMANUEL JOHN M. CARRANZA

Durban, South Africa; 17 October 2018