

Arnold H.W. Woodruff

Qualifications: BSc. (Hons) Physics, University of Durham.
MSc. Applied Physics, University of Wales, Aberystwyth.

Professional Experience: 20 years.

Nationality: British.

Status: Married.

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Synopsis

- 20 years experience encompassing exploration, production and asset management for several oil companies of many national origins: (either on staff or as consultant: 1983-90 & 96-present). This has covered a wide variation of play types, Geoscience workstations (especially Landmark and GeoQuest), software and national cultures.
- Successfully managed Exploration and Production Consultancy (Rider-French Consulting, Cambridge, Ltd) on Cambridge Science Park from 1984 to 1988 through turbulent times 1986-87 through innovative business development based on UK exploration knowledge and communication skills.
- Working alongside some of the world's leading Geologists, became an early convert to seismic sequence stratigraphy: which was applied and also taught in the UK and overseas for Robertson Research International before joining Kerr-McGee in 1990.
- Used seismic sequence stratigraphy and full vertical incidence VSP dataset to unravel the complex Gryphon Tertiary Oilfield for Annex B in Dec 92. (Published 1993 Barbican Conference). First oil was in Oct 93 and the field has since proved a considerable geotechnical and commercial success.
- Did the initial Kerr-McGee analysis of the Phillips/Chevron Janice Field, leading to the successful farm-in and buy-out by Kerr-McGee that has subsequently proved much of the upside anticipated.
- More recently used sequence stratigraphy for several clients to help define Cretaceous and Tertiary prospectivity of the Atlantic Margin from the Irish Porcupine Basin in the south to the Norwegian Voring Basin in the north.
- Major Equity redetermination experience: being a key technical negotiator in the 15/21 group's 1992-94 highly successful defence of their Scott Field Equity against Amoco, Mobil and Enterprise; this involved technical and High-Court action at the Old Bailey, all had a very favorable outcome for the 15/21 group. Also involved in East Brae redetermination.
- As an exploration geophysicist, contributed directly to a number of hydrocarbon discoveries: including the first hydrocarbon discovery in Greece for 15 years (the 1989 Epanomi-1 gas discovery for DEP-EKY), and to date the only well in the Norwegian Arctic to test oil at 10,000+bbls/day (7120/6-1, for Norsk-Hydro).
- Seismic and VSP Acquisition planning, Processing and extensive 2D and 3D processing supervision as well as interpretation experience.

Experience

May 1998 - Present: PRODUCTION GEOSCIENCE LTD., Aberdeen.
Associate Consultant Geophysicist.

- Worked at Production Geoscience Ltd. (PGL) and in the Aberdeen offices of Britannia Operator Ltd. as lead technical member of a PGL team using latest integrated software (Openworks, Geolog, Syntool, IESX, Jason, PostStack/PAL, Seisworks). Re-evaluated the seismic attributes in relation to the reservoir stratigraphy: as a guide to the ongoing reservoir development of the giant UK Britannia Gas Field.
- Subsequently in-house development/evaluation projects, and onshore attribute project for Barbados National Oil Company.

Dec. 1997 - May 1998: TOTAL OIL MARINE PLC., Aberdeen.
Consultant Geophysicist.

- Worked for Total in their Aberdeen office (through PGL) on 3D interpretation of a highly complex faulted area of the Viking Graben in UK Quad 3. Using detailed VSP calibration followed by post processing on Landmark (Post Stack) of a prestack migrated dataset, the fault architecture was clarified. Three dimensional fault solutions lead to uprated reserves and a drilling proposal.

May 1997 - Nov.1997: STATOIL, Harstad, Norway.
Consultant Geophysicist.

- Worked for Statoil in their Harstad, Norway office (through IPRES, Chester) as a key member of a 4 person team re-evaluating the Exploration potential of a large area of the Atlantic Margin at a new stratigraphic level. Used seismic sequence stratigraphy, and the detailed seismic re-calibration of some 64 wells to refine the sequence stratigraphic model. The almost complete VSP dataset was used extensively for the calibrations.

Feb. 1997 - April 1997: BP EXPLORATION OPERATING CO. LTD., Aberdeen.
Consultant Geophysicist.

- Worked in BP's Aberdeen office (through PGL) to undertake rapid but full re-evaluation of Brae type complex Jurassic structural/stratigraphic prospect in Northern North Sea. Working on in-house GeoQuest systems from calibration of VSP's to final 3D interpretation report with over 50 maps encompassing structure, isopachs and attributes.

Jan. 1997 - Feb. 1997: GEOS INTERNATIONAL LTD., Aberdeen.
Consultant Geophysicist.

- Assisted in Geos Aberdeen office with the initiation of a large regional seismic sequence stratigraphic study in the Atlantic Margins by Geos International for BP.

April 1990 - Dec.1996: KERR-McGEE OIL (U.K.) PLC., London.
Exploration Geophysicist.

- Grade 22 staff member, (the senior geophysicist in the KMG London office). Recruited initially to unravel the complexities of the tertiary Gryphon Oilfield: recalibrated the 2D and 3D seismic to extensive VSP and well control. Supervised reprocessing, modelling and remapping of the field and took to Annex B. The field has since proved a major geotechnical and commercial success.
- UKCS Exploration 12th. to 16th. Licensing Rounds encompassing most of UKCS: helped build partner groups, supervised budgets, co-ordinated projects, including VSP, seismic plus grav. & mag. acquisition, processing, and interpretation. Did key geophysical mapping of significant leads on seismic workstations - GeoQuest IES and IESX, (previously Landmark experience prior to 1990). Author on 4 license application

documents resulting in successful award each time in spite of sometimes heavy competition, [eg. 16/1,2b (12th), 20/19,20 (16th)].

- West of Shetland licence mapping. Orcadian Basin licence mapping for agreed 7/16-1 location. Several farm-in appraisals for KMG, including first KMG map of the Janice Field. Geotechnical and budget presentations to partners and management in the US.

- Manager of Geophysics for 2 years (1991-92), supervising all aspects of geophysical planning, acquisition, processing and interpretation QC, before reorganisation divided the post into area asset groups, and a co-ordinator of Scott Field Equity redetermination was required.

- Geophysical, Geological and Management representative for KMG in 1992-94 Scott Equity redetermination alongside Pict and Deminex against Mobil, Amoco and Enterprise, (Amerada, 15/21 operator remained neutral). A key negotiator in limiting an Equity swing against us of 7-10% (Operator estimate) to 2.4%. 3D calibration using VSP's was key.

Aug.1988 - April 1990: THE ROBERTSON GROUP PLC., N.Wales/International.
Consultant Geophysicist.

- Structural and seismic-stratigraphic processing supervision and interpretation of several areas of Eastern Greece (onshore and offshore), including Compressional, Shear and Extensional tectonic regimes: leading to 4 onshore well prognoses - 3 of which have now been drilled and proven gas discoveries.

- Included 6 months in Athens working directly for DEP-EKY.

- Developed and taught internationally the Robertson Seismic Sequence Stratigraphy School, together with D.N.Stewart (Ex Exxon). Emphasised the importance of VSP based calibrations.

- Developed and taught the Robertson Seismic Processing School in North Wales.

Oct. 1984 - Aug. 1988: RIDER-FRENCH CONSULTING, CAMBRIDGE, LTD.
Geophysical Manager, and Consultant Geophysicist.

- Organised and generated successful Geophysical Spec. projects for office staff of up to 8 professionals jointly with Western Geophysical (offshore) and SSI (onshore) through 1986/87 Oil Company cutbacks.

- Initiated software/hardware development project with Western Geophysical, and Laser-Scan Labs on the Science Park for a A0 size 1000dot per inch flat workstation screen.

- Placed Geophysicists for UK and overseas Oil Co. Clients.

- Supervised and technically lead in house client work: including structural and seismic-stratigraphic evaluation of UK Central Graben, Outer Moray Firth, Viking Graben, with emphasis on the Eocene and other Tertiary sedimentary sequences.

- Also structural and stratigraphic analysis of the Central Graben Margins, Forth Approaches and Midland Valley with emphasis on the Carboniferous and pre-Zechstein structural response to Palaeozoic Shear; for several oil co. clients.

- Acquisition and processing of marine 2D, including extensive velocity picking, at Western Geophysical, Isleworth. Also spec. survey suggestion and design.

- Troll Field interpretation appraisal, on behalf of Hydro/Statoil/Saga consortium, for Unitisation: based on high resolution stratigraphy and flatspot positioning.

- Operator's evaluations of Licensed Acreage, Norway; including depth map on which the critical 7120/6-1 oil discovery was drilled (see synopsis).

modelling to resolve several structural problems in Norwegian Barents Sea - for major

consortium including Norsk Hydro, Statoil, Shell and Elf. This project led to successful conclusion and twin publication in NPF Modelling Conference, Norway 1986 - at which author was co-recipient of the best paper award.

- Evaluation and processing of onshore UK seismic tie-line projects: Cheshire Basin and environs, with objective of resolving Carboniferous and Permo-Triassic structuration.
- Project management and co-ordinating geologists and geophysicists in multidisciplinary exploration team.

Oct. 1983 - Oct. 1984: NORSK HYDRO, Harstad, Norway.

Consultant Geophysicist.

- Structural and stratigraphic analysis of licensed blocks in Tromso and Hammerfest Basins, including severe diapiric tectonics (salt and shale).
- Open Areas appraisal of Barents Shelf acreage for Norwegian 9th and 10th rounds.
- Geophysical Management of most projects for active operators exploration office, including 2D, 3D and VSP: acquisition, processing and interpretation. Reporting directly to Exploration Manager. Also considerable amount of teaching and supervision of junior Norwegian Staff.

Jan. 1982 - Oct. 1983: ELF UK, London.

Project Geophysicist,

- Responsible to Chief Geophysicist for all aspects of Exploration projects - from acquisition through processing to interpretation, close collaboration with geological experts. Latterly working as independent Explorationist.
- Worked open areas for license applications, licensed blocks, and regional re-evaluation of Quad 9; Frigg to Beryl and Bruce area, leading to the 9/9a-6 discovery and the East Bruce Extension.

Nov. 1979 - Jan. 1982: ELF UK, London.

Geophysicist.

- Worked under Area Geophysicist: West of Shetland, Rockall Trough, West of Ireland, North of 62deg., Southern North Sea. Seismic Interpretation, plus integration with Gravity and Magnetic data.
- Several reprocessing projects, learnt seismic processing working on the job jointly with several contractors.
- Attended full spectrum of industry courses with IHRDC, GeoQuest, and Elf internal.

May 1975 - Nov. 1979: BRITISH ANTARCTIC SURVEY, Cambridge.

Geophysicist.

- Spent two field seasons (six months each) in the Antarctic collecting magnetic, seismic, radio echo and gravity data in the Antarctic Peninsula area.
- Subsequently two years of processing and interpretation at Cambridge HQ.

Professional Affiliations

Member of: S.E.G., E.A.G.E. (both PG and EG sections), P.E.S.G.B., The Institute of Physics (C.Phys.), B.A.A., The Planetary Society, Pasadena, The Athenaeum, London.

References

Dr. Malcolm Rider,
Director,
Rider-French Consulting Ltd.,
PO Box 1, Rogart,

Keith Williams,
(Past Chief Geophysicist, then
Exploration Manager Kerr-McGee),
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