



CARLO IPPOLITO MIGLIORINI: 1891-1953

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Introduction

Carlo Migliorini, one of the most brilliant Italian geologist in the thirties and forties, left many traces of his skill and deep intelligence, also in the oil sector, since he has been the Head of Exploration Department of AGIP during the first 20 years of the life of the Company. He put the basis of the future lines of the AGIP exploration not only in Italy, but also abroad, in Africa, Middle East, Romania and Albania.

The born of AGIP probable was achieved with the discovery in 1944 of the Caviaga Gas Field, i.e. the first large natural gas field in Europe (12 billion m³ reserves).

The relevant structure was detected utilizing a seismic survey, which was performed by Western Geophysical Company crew. This American Company was chosen after two exploratory missions, which Mr. Tiziano Rocco, chief geophysicist of AGIP working under Migliorini, had made in Germany and in United States, in order to assess the status of art of the seismic surveys and its applicability.

The years of the preparation

Carlo Ippolito Migliorini has been one of the most important scholar among the Italian geologists. He was born in Bibbiena in the Arezzo Province (Tuscany)



Figure 1: Carlo Ippolito Migliorini during WWI

on 13 August 1891 from Italian father, Migliorotto Migliorini Lawyer, and English mother, Elène Fowke.

Very early he showed a great interest for Geology so that at the age of 15 was member of the Italian Geological Society and was one of the most assiduous frequenters of the Geological Institute of Florence.

Immediately after having finished his studies in Florence he went to England, in Cornwall, where he attended the

Camborne School of Metalliferous Mining where he graduated in 1912, at the age of 21, as Mining Engineer. Immediately began his geological activity first in Cornwall and later on in Portugal.

He participated to the war and received a bronze medal and a Distinguished Service Cross (Figure 1).

Immediately after the war he went back to his beloved geological activity and initially took part in a geological mission to Anatolia where he distinguished for his tectonic interpretations. In 1920 he took a post at the *Italian Institute of Colonial Agriculture* in Rhodes, where he remained until 1934 and during this period he made important studies in the majority of the Dodecanese Islands in



Figura 2: Carlo Ippolito Migliorini in his Fifties

quarrying and hydrology.

During his stay in Rhodes he met and married in 1926 with an enchanting lady: Miss Vera Sanine Ivanovna of very noble Russian family who had had the chance to escape the Russian revolution.

The Geological Vision

The activity of our personage has been mostly devoted to find a geological model for the evolution of the Apennines, the mountainous chain that constitutes the backbone of the Italian peninsula. We can better appreciate now his efforts taking into account that in the last half a century a number of



petroleum wells have been drilled in Italy in that area, which have contributed to unveil tectonic, stratigraphy and mechanic of the geounit movements.

In 1933 in a short, but very conceptual note (*Remarks on a peculiar effect of the Orogenesis*, **Considerazioni su di un particolare effetto dell'Orogenesi**, Boll. Soc. Geol. It. LII, 1933. Italian Geological Society Bulletin, LII, 1933), Migliorini starts elaborating his theory mentioning the opportunity to consider, during orogeny, one initial phase of lateral compression of the crust, the orogenic landslides, and eventually the movements of isostatic adjustments. Migliorini has developed, in the course of the years, these three items which we are presenting them as separate items but in effect they were part of a unique vision of the earth movement and pulse.

Macigno Formation. In 1943 Migliorini publishes his first note on the *Macigno* formation. From field studies he can derive that each layer of these sandstones is the result of sedimentation of a turbiditic cloud coming from distant area so that the *Macigno* formation brings with it a sedimentary terrigenous message as it arrives from a Tyrrhenian



Figure 3: Professor Philip Henry Kuenen, 1902/1976

area subject to arching. A few years later, in 1948 at the International Geological Congress held at London in 1948 he had the opportunity to meet with Professor Henry Philip Kuenen, geologist (1902-1976 Figure 3), who, basing his work on laboratory experiments had arrived at analogous conclusions.

The two scientists thus jointly published a work which since then became a classic

on the redeposition of clastic sediments (*Kuenen and Migliorini: 1950, Turbidity currents as a cause of graded bedding, Journal of Geology No.58*).

Orogenic Landslides. The advancing mechanism of the so-called *argille scagliose* (scaly-clays) was explained by Migliorini who introduced the more general idea of *orogenic landslide* where these shales behaved like geotectonic lubricants. In fact the West-East slides, which were generated by the arching of sedimentary units advancing in this direction i.e. from west to east, involved clastic sediments and limestones.

Composite Wedges. The theory of the advancing arching and orogenic landslide has been developed by Migliorini even in dynamic term. So he has furnished a structural model applicable to Central Apennines, mostly based on field studies. This model has been subdivided by Migliorini in four tectonic elements which are separated each other and had been uplifted for crustal shortening. This model is better known as *Composite Wedges* where each wedge is defined by compressional faults both in the western flank (high dip faults) and in the eastern flank (low dip faults with overthrusting). This model can be applied to other mountain chains and gave a mechanical explanation to the deformations of autochthonous rock bodies.

Working for Oil

In 1934 he organized in Rhodes the Annual Congress of the Italian Geological Society and in this occasion he met with Professor Alessandro Martelli, Geologist, President of the Italian Geological Society and, as well, and from 1927 to 1932 Minister of National Economy, President of A.G.I.P. from 1932 to 1934, Martelli convinced Migliorini to work with A.G.I.P. and so in 1934 he moved from Rhodes to Rome. Thus he began his activity as a petroleum geologist and from 1934 to 1943 devoted his activity in researches in Italy, Eritrea, Ethiopia, Somaliland, Dahlak Archipelago, Yugoslavia, Hungary, Rumania and Libya.

In January 1939 he was appointed as Responsible of the Geological Studies and Researches of A.G.I.P. in Rome with two departments working with him: one Geological Unit (Roberto Signorini) and one Geophysical (Tiziano Rocco). In the same time he did not neglect the scientific research and during 1939 he obtained the *libera docenza* i.e. the authorization to lecture in the Universities.

From 1940 onward the Migliorini unit reported directly to Central Direction for Researchers and Production headed by Mr. Carlo Zanmatti who in turn reported to the President of A.G.I.P.

His working with A.G.I.P. was brilliantly achieved with special studies on the Marche region (Central Italy), but his geological value was evident after his

study on the geology of Tocco da Casauria (little city in Abruzzi where Henry Salvatore, the Founder of Western Geophysical was born in 1901). Here Migliorini foresaw that, contrary to the theories of the period, the area was dominated by overthrust movement.

This idea was confirmed by results of one exploratory well drilled over there. He organised and directed three expeditions to Somaliland and Ogaden from 1936 to 1939 collecting important geological information.

But his main activity was devoted to Italy where many successes were achieved thanks to the technical improvements of the period and a great professional competence. In fact the exploration activity was addressed to regional general programs; seismic reflection with the utilization of

USA seismic crew from Western Geophysical Company was regionally used in Po Valley, electrical logs were recorded and, for the first time in Europe, the Micropaleontology was utilized as chronological and correlation instrument (Professor Enrico Di Napoli Alliata, young Prince from Naples). What a difference as compared to 1936 when the Responsible of the Geophysical Unit had been sacked because had gone to USA to assess the seismic performance without having received the Government approval.

No place in Italy has been neglected by Migliorini: from Abruzzi to Po Valley, where he recommended the drilling of the seismic structures which were coincident with the gravity anomalies, from the *Fossa Bradanica* (Bradano Trough) to Sicily.

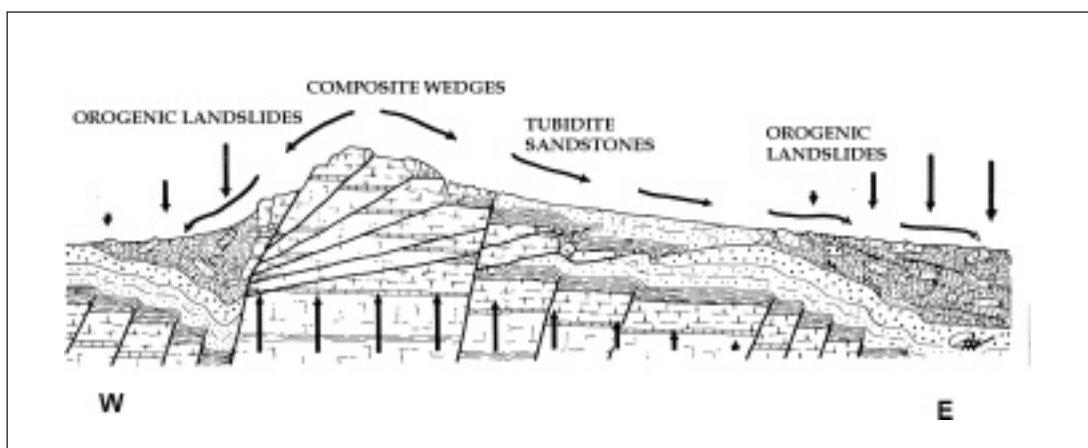


Figure 4: Migliorini, 1948 "I Cunei Composti nell'orogenesi" (Composite Wedges in Orogenesis) Italy: West-East Geological Cross Section



*Figure 5: Ruwenzori, 10 February 1953.
Last journey of Carlo Ippolito Migliorini (second from right).*

By the end of the war, in 1944, he retired being unwilling to move from Rome to the North of Italy.

At the end of the WWII he resumed his geological activity initially in Italy with the Anglo-Iranian Oil Company and the Italian R.P.M. in the Bradano Trough and abroad in Somaliland with Sinclair.

He worked as well as consultant to Montecatini for oil researches in Abruzzi and for sulphur in Sicily.

During 1952-1953 he made his last researches in the field of geothermal

energy in Larderello (Tuscany) and in Uganda where he was invited to study the possibility to develop this type of energy (Figure 5).

The journey to Uganda was the last he made for geology, a sad and desperate journey was waiting him in Florence where he passed away on 4th March 1953.

His body is buried in the Cemetery of the Laurel in Florence, but his intelligence, his soul are here between us to teach a way of life and a way of work.