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Composition and Province of the Upper Nubian Sandstone Reservoir, SE Sirte Basin Libya.

Sadeg M. Ghnia\textsuperscript{1*}, Ali Karbub M. Karboub\textsuperscript{2}

\textsuperscript{1}Department of Geophysics, Faculty of Art and Science Mesallata, Al-Mergib University, Libya.

\textsuperscript{2}Waha Oil Company Exploration Department, Tripoli, Libya.

* Corresponding author email: sghnia@yahoo.com

Abstract

This study investigates the composition and province for the Upper Nubian Sandstone within the Hameimat Trough, SE Sirte Basin, Libya. In this paper, detailed petrographic analysis technique was carried out. This include conventional optical microscopy, scanning electron microscopy (SEM) with EDX, and back--scattered electron image analysis, cathode-luminescence (CL) was also used, including cold stage analysis.
The petrographic analysis of core samples revealed that the Upper Nubian sandstone is grain-supported with dominant point to straight grain contacts. The sandstone has a monocrystalline quartz content ranging from 94% to 100% of total detrital quartz. They contain both solid and fluid inclusions. Solid inclusions are dominated by rutile and traces of zircon and muscovite. Polycrystalline quartz with more than three sub-crystals and having straight to slightly curved contact are common. Feldspar grains are rare, averaging 0.65% of total rock volume. Rock fragments are also very rare and average 0.4% of total rock volume. They are dominated by cherts that show uniform microcrystalline quartz with no relict of the original texture. Heavy minerals are dominated by zircon and rutile, averaging 0.4% of the total rock volume.

The average detrital composition of the Upper Nubian Sandstone with respect to QFL analysis is 98.40% quartz, 0.77% feldspar and 0.82% rock fragments. This detrital composition classifies the Upper Nubian Sandstone as quartz arenite.

The detrital grains analysis for the upper Nubian Sandstone indicate that the sandstone was derived from cratonic interior and recycled orogenic fields. Consequently, the province of the Upper Nubian Sandstone was mainly pre-existing sedimentary rocks and part of the material was also sourced from Precambrian crystalline basement of acidic to intermediate composition and possibly from contemporary volcanics.
الملخص

تبحث هذه الدراسة في تكوين ومصدر الحجر الرملي النوبي العلوي ضمن منخفض الحمييات، بجنوب شرق حوض سرت، ليبيا. في هذه الورقة، تم تنفيذ تحليل بتروغرافي (SEM) مفصل. وتشمل هذه التقنية، المجهر الضوئي التقليدي، المجهر الإلكتروني الماسح (SEM) مع الاشعة الاكتروني - المرتدة لتحليل الصور، وتم أيضا استخدام التألق الكاثودي (CL) وبما في ذلك تحليل المرحلة الباردة.

وكشف التحليل البترعراقي للعينات اللبية الصخرية بأن نسيج الحجر الرملي النوبي العلوي مدعوم الحبيبات وأن الإتصال بين الحبيبات تماسى إلى خطي. الدراسة أظهرت أن الحجر الرملي يحتوي على نسبة الكوارتز الأحادي تتراوح ما بين 94% إلى 100% من إجمالي الكوارتز الأنماطي. وأنه يحتوي على شوائب صلبة وسائلة. وبالنسبة للشوائب الصلبة فإن معادن الزركوتن والزريركون هي السائدة. وأما الكوارتز المتعدد الكريستالات بأكثر من ثلاثة بلورات فرعيه فهو السائد. حبوب معدن الفلسبار نادرة ومتوسط 0.65% من إجمالي حجم الصخور. شطايا الصخور هي أيضا نادرة جدا ومتوسط 0.4% من إجمالي حجم الصخور وبيمن عليها صخور المشتهر التي تظهر موحدة ومكونة من الكوارتز الميكروكريستالي.

في الحجر الرملي، حيث بلغ متوسطها 0.4% من إجمالي حجم الصخور. متوسط التكوين الفنتاني للحجر الرملي النوبي العلوي فيما يتعلق بالتحليل QFL هو 98.40% الكوارتز، الفلسبار 0.77% و 0.82% شطايا الصخور. هذه التركيبة تصنف الحجر الرملي النوبي العلوي على أنه كوارتز أرينيت.

يشير تحليل المكونات الفنتانية للحجر الرملي النوبي العلوي إلى أن مكونات الحجر الرملي مستمدة من حقول الكريتونك والصخور المعاد تدويرها. ونتيجة لذلك، كان مصدر الحجر الرملي النوعي العلوي هو الصخور الرسوبية الموجودة أساسا من قبل وجزءا من الصخور الرسوبية لعصر ما قبل الكمبري وأيضا الصخور البركانية الحمضية إلى متوسطة الحموضة وربما من البركانيات المعاصرة.
Keywords: Upper Nubian Sandstone, Monocrystalline quartz, Polycrystalline Quartz, Feldspar, Rock fragment, Rutile, Zircon.

Introduction

This paper presents the results of composition and province study of the Upper Nubian Sandstone reservoir within Hameimat Trough, south east Sirte Basin, Libya. In the Hameimat Trough Figure (1), the Nubian lithofacies consists of sandstone and shale and is subdivided into three units currently named, in ascending order, as; Lower Nubian Sandstone, Varicoloured Shale and Upper Nubian Sandstone (Rossi et al., 1991). The Upper and Lower Nubian Sandstones form the main hydrocarbon reservoirs in the area. The current study focuses in the Upper Nubian Sandstone.

The composition and province analysis is based on petrographic characteristics and XRF data obtained for major elements analysis of the sandstone. Objectives include identification of the different detrital minerals, determination of their abundance, and intergranular relationships. This is followed by classification on the basis of their original detrital mineralogical composition.
Thin sections (polished and normal) were made with blue-dyed epoxy and point-counted at 300 counts per sample. Analysis were undertaken by using conventional optical microscopy, scanning electron microscopy (SEM) with EDX, and back-scattered electron image analysis, cathode-luminescence (CL) was also used, including cold stage analysis.

Sandstones are a mixture of mineral grains and rock fragments derived from the weathering a wide variety of pre-existing parent rocks. This means that sandstone grains are products of complex processes that acted on the grains, from their release from the source rocks, until their burial and lithification. These processes are pre-depositional (weathering and transportation), syn-depositional (depositional environment) and post-depositional (diagenesis). In other words,
sandstone composition changes with time in response to change in the associated physical and chemical parameters that act on the grains. These changes may involve dissolution, precipitation or alteration during diagenesis. However, detailed petrographic and geochemical study of sandstones and determination of the sequence of diagenetic events can provide a useful tool for identification of source rocks, interpretation of climate, burial history, and hence factors that control reservoir quality.

Quartz is the most resistant and hence the most abundant detrital mineral in most sandstones. It is common in source rocks such granitoid igneous rocks, gneiss, and schists. It is hard, lacks cleavage and resistant to chemical weathering due to the presence of strong bond between silicon and oxygen, and the absence of metallic cations that could be replaced during chemical weathering. Quartz therefore has a high survival potential. Because of this, however, it takes on very little imprint of the geological processes which have acted on it since its release from source to its deposition, and is of less use in province studies than feldspar and rock fragments. Nevertheless, attempts have been made to use quartz for source rock identifications (e.g. Blatt and Christie, 1963; Blatt, 1967; Basu et al., 1975).

Quartz grains in sandstone can be divided into groups, monocrystalline (grains with single quartz crystal) and polycrystalline (grains with two or more quartz crystals). Each grain may then be characterized according to its optical behavior, shape, crystal boundaries, and type of inclusions.
Undulose extinction is usually a reflection of strain in the crystal lattice, and therefore detailed examination of crystal extinction properties can help differentiate between sediment derived from plutonic and low and high grade metamorphic rocks. Blatt and Christie (1963) stated that undulose extinction is the optical expression of a strained crystal and that most rocks have been subjected to some sort of plastic deformation, either during crystallization or after formation. They also concluded that the only rocks that contain high percentage of non-undulatory quartz are volcanic extrusive and quartz arenites of Precambrian and Palaeozoic age. The degree of rotation required for extinction of quartz grains depends on the degrees to which the grains have plastically been deformed and on the angular relationship between the c-axis and the plane of the thin sections. The use of universal stage is thus very important in determining true undulatory extinction angles.

The characteristics of polycrystalline quartz have been used by many workers to differentiate different parent rock types (e.g. Blatt, 1967; Folk, 1974; Basu et al., 1975, Basu, 1985; Young, 1976). These characteristics include grain shape, number and size of crystallite; internal crystal boundaries, extinction behavior, deformation lamellae and bands.

Blatt (1967) studied the various characteristics of quartz grains and concluded that for any grain size, polycrystalline quartz from gneisses were more finely polycrystalline than grains from plutonic rocks. He also added that polycrystalline grains with six or more different crystals is very likely to be derived from foliated metamorphic rocks. Basu et al., (1975) showed that careful petrographic study of undulose
and polycrystalline quartz variation makes possible distinction between plutonic, low and high grade metamorphic sources. Polycrystalline quartz grains are less stable, and thus less abundant than monocryalline quartz grains in sandstone.

Young (1967) described different deformation features of polycrystalline quartz grains. These are non-undulose, elongated original crystals, new crystals and polygonal crystals. He also introduced the terms stable and non-stable. The unstable polycrystalline quartz grains are those characterized by undulose sutured subcrystal contact, deformation bands, bimodal crystal size with large elongated crystals. The stable types are small, polyhedral and non-undulose.

**Terrigenous-framework grains.**

Thin sections of core samples from the Upper Nubian Sandstone were selected for petrographic data calculation and analysis. The results show that the Upper Nubian Sandstone reservoir is mineralogically very mature. Detrital minerals consists predominantly of quartz, with minor amounts of feldspar, rock fragments, mica, and heavy minerals. Generally the Upper Nubian Sandstone is texturally very mature and characterized by grain-supported fabric.

Grain size ranges from very fine to coarse, but fine to medium-grained sandstone is most common. Sorting appears to be directly related to depositional facies in that coarse grained, cross-bedded sandstone is generally well sorted whereas fine grained, massive sandstone is moderately to poorly sorted. Grain shape largely ranges from sub-angular to sub-rounded, although some rounded grains are also present.
In many samples, particularly where clay or iron coating of detrital grains is absent, distinguishing between detrital grains and silica overgrowth is difficult and sometimes impossible. The use of cathodoluminescence, however, makes clear and easy distinction of the original grain from the silica cement. Grain contacts are mostly point to straight (Figure 1), although some concavo-convex contacts are locally present. Sutured contacts are very rare.

![Figure 1. Grain supported fabric with point to straight grain contact (X100).](image)

**Quartz**

Quartz mineral within the upper Nubian Sandstone comprises monocrystalline and polycrystalline crystals. Monocrystalline quartz grains are more abundant, since the less stable polycrystalline quartz grains have been broken down thus favoring increase of monocrystalline population. They range from 97.5% to 100% with average of 98% of total quartz. They exhibit both straight or non-
undulose and undulatory extinction. Non-undulatory extinction is the more common form throughout the studied samples (Figure 2). Undulose extinction of quartz grains various from strongly to slightly undulose.

Figure 2. Monocrystalline quartz grains with nonundulose extinction (X100).

Monocrystalline quartz grains are rounded to sub-rounded although some have slightly elongated shape. Fluid and solid inclusions are common. Fluid inclusions are present as vacuoles of different shapes, sub-rounded, irregular, and elliptical. They are normally found in straight lines across the quartz grains and along the detrital grain-overgrowth boundary.

Solid inclusions (Figure 3) are dominated by rutile needles, traces of zircon and muscovite. Rarely, some monocrystalline quartz grains have the clarity, idiomorphism, fractures and embayments that indicate a volcanic provenance (Folk, 1974).
Figure 3. Monocrystalline quartz grains with solid inclusion extinction (X100).

Polycrystalline quartz grains range from 0% to 6% with mean value of 2% of total quartz component. They consist chiefly of elongated original crystallite, and polygonal crystals (Walker and Pettijohn, 1971). The grains comprise more than 3 subcrystals with straight to slightly curved crystal contact and exhibit undulose extinction (Figure 4). Polycrystalline quartz with nonundulose extinction, 2-3 subcrystals with straight crystallite contacts are less common. In instances, polycrystalline quartz grains display complex structure with sutured contacts, preferred crystallographic orientation with more than 3 subcrystals (Figure 5). This suggests that the grain was probably derived from metamorphic rocks.
Figure 4. Polycrystalline quartz grains with more than 3 subcrystals (X100).

Figure 5. Polycrystalline quartz grains displaying preferred crystallographic orientation (X100).
Feldspar

Although feldspar forms 60% of igneous and metamorphic rocks, its presence in sandstone is relatively low, from 10-15% (Blatt, 1992). The reason is that feldspar are unstable in the sedimentary environment. The presence of feldspar in any sandstone is controlled by relief, climate and tectonic setting. Feldspars have been subdivided into many categories on the basis of their chemical and physical characteristics. The use of compositional average to examine the chemical behavior of detrital feldspar grains population has been described by Milliken (1989).

Feldspar grains for analysis were marked under transmitted light microscope and then examined using SEM with back scattered electron imaging at a magnification of X350-X400. Compositional analysis were undertaken using the EDS microprobe. The microprobe was operated at 30 nA sample current, 1500mA emission current and 15 kv excitation voltage. Counting time was 45 sec. Analysis that give totals less than 95% or greater than 102% feldspar molecule (weight %) were eliminated. The remaining analysis were recalculated in terms of An + Or + Ab totaled 100% by weight. Repeated analysis indicate accuracy to within ±2% of the major component present. Feldspar in the Upper Nubian Sandstone is very rare and where present is altered. It ranges from 0 to 1.67% with average of 0.65% of the total rock. Feldspar composition data shows 100% albite. The grains, where present, are partially dissolved and the remnant of the grains is commonly present in oversized pore-spaces which are partially filled with clay minerals (kaolinite and occasionally illite); alteration products of the feldspar (Figure 6). The dominance of kaolinite suggests that the original
feldspar was K-feldspar, and that the alteration processes took place at lower temperature. In other instances relicts of feldspar grains are present in the pore-space without alteration products (Figure 7). This indicates that most of the feldspars have been removed by dissolution. Removal of K feldspar from the Upper Nubian Sandstone appears to be a surface-controlled process which take place preferentially along cleavage planes (cf. Berner and Holdren, 1979).

Figure 6. Remnant of feldspar grains present is secondary pore space with kaolinite (X100).
Figure 7. Relict of dissolved feldspar grain (X100).

Rock fragments

Rock fragments (including chert) are not common and make about 0.4% only of the total rock volume. Chert is the most dominant lithic type consisting of rounded to sub-rounded, uniform microcrystalline quartz (Figure 8) with no relict of original structure.
The presence of chert in sandstone indicates a sedimentary source (Pettijohn et al. 1987). Other lithic grains show high degree of alteration and are probably of plutonic origin).

**Mica**

Mica, represented by muscovite, is extremely rare and forms about 0.1%. The grains are mechanically compacted and partly altered and may also show partial dissolution (Figure 9).

**Heavy minerals**

Heavy minerals are dominated by zircon and rutile. They range up to 1.67% of the rock volume, averaging 0.4%. Generally they are smaller than the associated quartz grains as a result of specific gravity differences. Rutile grains are generally rounded to subrounded (Figure 10) and occasionally elongated. This probably indicates that the grains are reworked and mainly derived from pre-existing sedimentary rocks.
CL-image (see Figure 12) also shows rounded to sub-rounded framework grains and some displaying subhedral crystal shape (Figure 11). This probably indicates that some zircon grains are first cycle and derived from plutonic source terrain.

Figure 9. Deformed and selectively dissolved muscovite grain (X100).

Figure 10. Rounded rutile grain in the Upper Nubian Sandstone (BSE-image).
Figure 11. Zircon grain in the Upper Nubian Sandstone showing subhedral crystal shape (BSE-image).

Figure 12. CL photograph showing subrounded to rounded framework grains (X100).
Classification of the Upper Nubian Sandstone

Various sandstone classifications have been made, based on a variety of criteria. Some are based upon theoretical aspects, some emphasize the mineral composition, and others use field description.

The classification used in this study is that of Dott (1964) modified by Pettijohn et al. (1987). This classification, in addition to framework grains quartz, feldspar and rock fragments, secondary criteria to differentiate between clean sands or arenites and matrix-rich sands or wackes. The arenite sands contain less than 15% matrix whereas wackes contain more. Arenites with less than 5% of both feldspar and rock fragments are called quartz arenite. Arkosic arenites are those with 25% or more feldspar and less rock fragments than feldspar. The sandstone with at least 25% rock fragment and less amount of feldspar are called lithic arenites. In this classification petrographic data were recalculated on the bases of three main mineral framework components, quartz (Q), feldspar (F), and rock fragments (L) including chert.

Generally, the Upper Nubian Sandstone consists largely of quartz grains with very minor amounts of feldspar and rock fragments. Petrographic data reveals that the rock has an average composition, with regard to QFL, of 98.40% quartz, 0.77% feldspar, and 0.82% lithic fragments. QFL plot of the Upper Nubian Sandstone show it to be quartz arenite (Figure 13).
Province of the Upper Nubian Sandstone

Mineralogy of a sedimentary rock is a result of complex interplay of many factors related to province, weathering, transportation, and diagenesis (Bhatia, 1983). This means that determination of provenance must be treated with care since provenance signature might be obscured by later processes. Many workers have related framework sandstone mineralogy to provenance and tectonic setting (e.g. Dickinson, 1970; Mack, 1984; Dickinson, 1985; Dutta and Suttner,
Dickinson (1985) related detrital sandstone composition to the tectonic setting of its source area. He defined four main provenance regions which are: (a) stable craton, (b) basement uplift, (c) magmatic arc and (d) recycled orogeny.

Based on a framework grain quartz-feldspar-lithic (QFL) plot (Dickinson, 1985) of the upper Nubian Sandstone indicate continental block and recycled orogenic (Figure 14) although a slight shift toward the recycled orogenic is evident. This probably suggests more recycled material was available. This is due to the very small proportion of lithic and feldspar grains and suggests that the sediment was mainly derived from pre-existing sedimentary terrain during which a progressive loss of unstable grains such as feldspar and rock fragments resulted in more mineralogically mature rocks. The other minor contributory source was continental terrain which includes crystalline basement in the interior of the craton. Textural evidence indicates local presence of sub-angular to angular grains together with well-rounded grains (Figures 15). The former was probably derived from crystalline basement while the latter probably came from sedimentary source.
Figure 14. Provence of the Upper Nubian Sandstone different tectonic setting boundary obtained from Dickinson, 1985.

Figure 15. CL image of angular quartz grains present together with sub-rounded to rounded quartz grains in the Upper Nubian Sandstone (X100).
**Conclusion**

Petrographic analysis of terrigenous framework grains reveals that the Upper Nubian Sandstone is mineralogically very mature and consists predominantly of quartz with minor amounts of feldspar and rock fragments. Grain size ranges from fine to coarse sand although very coarse grain sand size is locally present. The grains are generally sub-angular to sub-rounded. The fabric of the grain-supported with point to straight grain contacts are more dominant and suture grain contact is very rare. The Upper Nubian Sandstone has a monocrystalline quartz content ranging from 94% to 100% of total detrital quartz. The grains exhibit unit and undulatory extinction with the former being the more abundant. They contain both solid and fluid inclusions. Solid inclusions are dominated by rutile and traces of zircon and muscovite. Polycrystalline quartz with more than three sub-crystals, undulose extinction and having straight to slightly curved crystallite contact, are more common than those with less than three crystallites. Feldspar grains are rare, averaging 0.65% of total rock volume. They show two phases of alteration. Firstly they were partially to completely dissolved. Secondly the feldspar remnant has been completely albitized. Rock fragments are also very rare and average 0.4% of total...
rock volume. They are dominated by cherts that show uniform microcrystalline quartz with no relict of the original texture. Mica grains are extremely rare they average 0.1% of total rock volume and are mechanically deformed around more resistant framework grains and are represented by muscovite. The average detrital composition of the Upper Nubian Sandstone in terms of QFL is 98.40% quartz, 0.77% feldspar and 0.88% rock fragments. This detrital composition classifies the sandstone as quartz arenite. The detrital analysis for the Upper Nubian Sandstone indicate that the sandstone was derived from cratonic interior and recycled orogenic fields. It is therefore concluded that the province of the Upper Nubian Sandstone was mainly pre-existing sedimentary rocks. Part of the material was also sourced from Precambrian crystalline basement of acidic to intermediate composition and possibly from contemporary volcanics.
References


شهد عالمنا حضارات إنسانية كثيرة ومتنوعة عبر فترات زمنية مختلفة منذ بداية تكون المجتمعات البشرية. هذه المجتمعات البشرية احتجت إلى وسيلة للتخاطب بين أفرادها، وفانت اللغة التي بها تمكن الإنسان من سد كل حاجاته.

واللغة تتنوع وتتخذ أشكال وسمات المجتمع البشري الذي يستعملها. كما أنها تتغير إيجاباً أو سلباً عبر الزمن. و الكلمات كأحدى مكونات اللغة، منها ما يختفي، ومنها ما ينقص استعماله، ومنها ما يحدث حسب الحاجة البشرية وتطور الذي يطرأ على الحياة اليومية. كما أن بعض الكلمات تتغير طريقة نطقها وأحياناً كتابتها بالإضافة إلى التغيرات النحوية التي تحدث لكثير من اللغات البشرية.

هذا البحث تناول بعض التغيرات التي تطرأ على اللغة الإنجليزية وتأثيراتها المتعددة على أفراد المجتمع الواحد بتنوع أحياله واختلاف مستوياتهم العلمية والثقافية. كما تناول تأثير المجتمعات غير المتحدثة باللغة الإنجليزية لكلغة أساسية، على تراكيبها ونطقها واستعمالها على مختلف أوجهها، ومدى تأثير المعلمين والمتعلمين بهذه التغيرات.
Our planet witnessed various civilizations throughout a long period of time since the mankind began to gather in small societies. This created a need to invent a tool that facilitates communication amongst members of each society. It is language which fulfilled this need representing unique identities of every group of inhabitants. Language is the way by which individuals reflect, describe and express their thoughts, feelings and needs. It is generally agreed upon today that language, like everything, is subject to constant changes that may start from the birth of language and possibly continue endlessly. Therefore, this essay will first consider the general phenomenon of language change. Then, some aspects of language in which change may occur will be described. In the third part, causes of this change will be discussed and followed by a discussion of some attitudes and impressions towards language change to see who might criticise this change and who will accept it as a kind of English new style, fashion or evolution. In order to enrich the dissection, a survey consisting of a series of interviews has been held with both native and non-native speakers to seek attitude towards English language change nowadays.

Apparently, languages go through a cycle of several stages of both significant and minor changes that start from the early stages of their birth and continue happening over time that may cause the creation of different versions of the original languages, or maybe leading them to their graves. According to Aitchison (1994), there is nothing stable in the world and language, similarly to everything, is transforming constantly. This change may sometimes lead to the birth of a new language. For example, English language evolved as a result of the phenomenon of language change that occurred through a successive of
processes. As Hogg and Denison (2006) state that the Germanic branch of Indo-European has taken several stages of alterations that resulted in the emergence of a number of languages of which English is one.

However, language change may diverge from a society to another. Changes may occur in different aspects of language such as in vocabulary, speaking, writing or even in the grammatical structure of the language itself. One of the clearest changes in writing was illustrated by Beard (2004), who pointed to the roughly use of punctuation in writing nowadays compared with the eighteenth and nineteenth centuries. Furthermore, while some words and expressions are constantly becoming less beneficial to the language, other new words and expressions are created to fulfil the description of newly evolved tasks and purposes. Trask (1994) gives an example of producing a recent English word which is ‘Ms’ that is used to address both married and unmarried women. Although Trask considers this example as a relief to speakers who might be unaware of the status of the female addresses, he appears to miss that this use of ‘Ms’ might be on the expense of ‘Mrs’ which can disappear from the lexis of English language because of the generalised use of ‘Ms’. In addition, several changes have occurred in the grammatical structure and pronunciation of language. For instance, while older English people are likely to stress the first syllable of ‘controversy’, younger speakers stress the second one (British Library, n. d.).

Language change might be attributed to a number of factors such as culture mixture and scientific development and inventions. These created a need to adding new words to the language in order to
describe the new arrivals. The causes of language change have been researched, but some difficulties appeared in sorting them in regard to their significance. The previous contributions in language change studies stated that changes in any language may be due to a blend of factors that represent different aspects of human life such as the physical and environmental features which can be considered as a part of language change devices. Additionally, change cannot be attributed to an individual factor but rather to a multiple causative ones (Aitchison, 1994). Harris 1969 (cited in Aitchison 1994, p. 106) argued that “the explanation of the cause of language change is far beyond the reach of any theory ever advanced.” Although it is not feasible to count all causative aspects of language change, some scholars have provided a categorising system of those aspects. For instance, Marchello-nizia (2003) and Aitchison (1994) divided them into internal and external dimensions. The former dimension represents the sociolinguistic features, whereas the latter represents the psycholinguistic ones. External causes are viewed from the social scope, that is; from outside the language system, whereas the internal factors are concerned with changes that occur in the structure of language besides the structure of the speakers’ minds (Aitchison, 1994).
On the other hand, Algeo (2010) divided the causes of language change into syntagmatic change, paradigmatic or associative change, and social change. The first change occurs when certain words and sounds affect nearby words and sounds. As an example, people have different versions of the word ‘sandwich’ that might be represented by ‘sanwich, sanwidge, samwidge, or sammidge’. This is due to positions of sounds that affected the original word from inside throughout the normal speech flow. The second change happens when some words and sounds are affected by others that are not present but might be associated with. For instance, the word ‘ladeboard’ (the side of a ship) was replaced with ‘port’ in order to avoid being confused with its associated word ‘starboard’. The third change refers to the constant additions to the language created by producing new words for describing recent inventions. For example, the appearance of the word ‘google’ being necessitated by the World Wide Web for seeking information via the internet.

It is undeniable that language change is an unavoidable fact. Languages are considered as being alive because they continually evolve to meet their users’ continual needs, while non-changeable language can be considered dead. Although some attitudes towards language change carry a degree of negativeness and dissatisfaction, change in language is a truth that cannot be described as a good or a terrible phenomenon because it goes on as life does. Nowadays, one may hear complaining about the process of non-standardization of English which is viewed as abusing the spoken and written forms of language. Doubtlessly, the idea of protecting English language from corruption is not a new goal as there have been several previous
attempts to operate special institutions that targets protecting language from degradation (Campbell, 2004). Nonetheless, English is continuing an astonishing evolvement to follow all human requirements (British Library, n. d.).

Meanwhile English language is changing continuingly throughout time, some kinds of change have been rejected, but this rejection is worthless as language evolvement carries on. For example, there is a disagreement amongst speakers regarding the use of ‘hopefully’. Young speakers use the latter lexeme as in; ‘Hopefully we’ll arrive in time for lunch’. Meanwhile this expression is acceptable to young people, the same is not true for middle-aged or older people and some conservative speakers who refuse using the modified form of ‘hopefully’ and prefer using the previous sentence as ‘I hope we’ll arrive in time for lunch.’ Despite rejecting the use of ‘hopefully’ by some members of the English society, it continues to take place in the English language. Additionally, it has been noticed that complaints about such change are made by native speakers who might either be well educated or have a genuine concern about the language itself. The issue that requires attention is not accepting or allowing fast changes in language result in communication break-down between children and their grandparents or make difficulties in reading works that have been written by our ancestors (Trask, 1994).
Moreover, what may accelerate English language change is having many varieties of English. This variation may cause communication break-down between different societies that speak English. For instance, ‘Ebonics’ (African American English accent in California) can easily understand each other, but people from other communities, like London, may find it difficult to understand them (Aitchison, 2003). Therefore, communication between diverse individuals using various speech ways may cause different changes amongst any language (Algeo, 2010).

According to Deutscher (interviewed by the American Scientist assistant, October 2005), the trend of English language change cannot be described as being either getting better or bad since the function of language in the past and now is efficient. For example, while languages are losing some of their words, they in the same time, are developing themselves by creating new words. Though Deutscher said that the fear of language decay is an exaggerated deep-rooted concern attributable to considering language as an important emblem of identity, he, on the other hand, seems to contradict himself as he believes that there is not any relationship between the language change and national individuality. To illustrate this final concept, he provides the example that the Ireland identity has been kept although they switched their language to English.
An interview survey has been conducted in order to seek attitudes of both native and non-native speakers of English towards defining language change, causes of change, and the extent to which language change could have negative or positive consequences. First, in regard to providing a definition for the studied phenomenon, interviewees generally appear to agree that language change is the gradual process whereby a language permanently changes its linguistic forms and items over time. This final statement stresses that the process of language change is gradual and permanent that affects all the language aspects such as grammar, phonology, and vocabulary.

As far as causes of language change are concerned, interviewees have provided some of the potential causes that can be summarised under the following categories; political, social and technological causes. Apparently, the interviewed sample appears to be aware of the external causes of change, but unaware of internal ones.

In regard to the effects of language change, the sample represented a mixture of different opinions. Overall, natives appear to appreciate it more than non-natives who seem quite concerned. Language change can be good as it gives different groups of people their unique identities, and allows expressing new ideas, thus, it was described as ‘fun and fashionable’. Simultaneously, those who valued the impact of language change appear to be quite conservatives towards this phenomenon as they feared that it may isolate communities that unaware of or resistant to the new changes. Consequently, it can affect the mutual intelligibility between people, and may make some people feel inferior and widen the gap between various social groups. Additionally, language change may affect the status of English as a
global language because it might hinder mutual communication between native and non-native English communities as natives may use new varieties resulted from those changes which non-natives are not familiar with. It also may make teaching and learning English more difficult. This final concept seems to concern some of the non-natives interviewees more. The fear is how to cope with and follow changes in English language in contexts in which it is taught and learned as a foreign language. One important issue has been aroused regarding whether to consider changes in English language and include them in the curriculum, or just stick to the Standard English. In other words, the obstacle that confronts teachers is how to deal with new expressions such as *I'm lovin it* that was displayed by McDonalds’ restaurants. Does the teacher teach his/her students view this statement as being wrong as it breaks grammatical and spelling rules of English, or just make those learners accept it as a kind of newness, addition, or change in English? In either choice, there will be a problem. Teaching only the Standard English will cause a shock to learners if they come to contact with natives. On the other hand, teaching new Changes is not that easy and possible since some contexts are hardly to catch the actual changes; i.e., changes occurred may not considered in the teaching curriculums in some contexts especially the EFL contexts where English is not so vital in communication in those contexts.

On the other hand, some interviewees viewed language change as neither bad nor good, but rather as a natural inevitable process in a healthy, living language that expresses thought and creativity of its speakers. Although this opinion continues to reject that language change may cause communication breakdowns between different
native generations and communities, it expresses the likelihood that it may cause problems to non-native speakers when confronted with various varieties of English spoken across the world. What has been suggested here is relying on the Standard English to solve this problem which leads us again to question of how, for EFL contexts, to deal with changes in English whether to include them in the teaching curriculums or ignore them.

To conclude with, processes of change accompany languages endlessly since emergence. This kind of language change gives every generation in each single community, from small families to large societies, their unique identities and differentiates them from others. It is a natural phenomenon that has negative and positive consequences. The question that requires attention and research is how to reduce the negative sides and increase the positives. Additionally, the vital concern is how to deal with this change in our teaching syllabi and curricula.
Bibliography:


**Appendix:**

Interview Questions:

1. What is your native language?
2. What is language change?
3. In what language aspects may the change occur?
4. What are the causes of English language change?
5. Is language change good or bad? Why?
6. What problems English language change may cause?
7. May English language change cause communication breakdown between:
   - Young and old people.
   - Native and non-native users.
   - Different communities speak the same language.
8. May English language changes affect the status of English as a global...