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The Lights of Iraq: Electricity Usage and the Iraqi War-fare Regime

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NB: A more detailed geo-spatial analysis with interactive graphs and images is available at Story Maps: Geo-Spatial Analysis Iraq

<https://arcg.is/1uWXrz>

Abstract

This article explores the lights of Iraq, Iraq's variety of capitalism (VoC) and its system of public and fiscal governance. The first section examines Iraq's VoC, which I define *oil-led state-captured capitalism* with associated *oil-led state-captured war-fare regime*. In formerly ISIS-occupied territories, war developments turned the system into an *Insurgent ISIS-captured capitalism with associated Insurgent ISIS-captured war-fare regime*. The second section investigates electricity usage. The nighttime lights analysis is based on near real-time big data. It includes high-resolution remote-sensing and satellite imagery from the NASA Earth Observatory. I use the Visible Infrared Imaging Radiometer Suite (VIIRS) sensor on the Suomi NPP satellite. Data on greenhouse gases are obtained through the AQUA and TERRA satellites derived from the Atmospheric Infrared Sounder (AIRS) and Moderate-resolution Imaging Spectroradiometer (MODIS) sensors. I also use the AURA satellite with the Ozone Monitoring Instrument (OMI) sensor, as well as the TERRA satellite with the Measurements of Pollution in the Troposphere (MOPITT) sensor. The third part discusses the repercussions of electricity usage for good governance, for good regulatory and for good fiscal practices, as well as for development and growth. The concluding part briefly discusses the “taxman approach” and the introduction of a new fiscal contract necessary to resolve negative incentives in oil-led war economies.

KEYWORDS: Iraq, political economy, ISIS, geo-spatial analysis, night lights, remote-sensing, satellite imagery, public governance, fiscal governance, *oil-led state-captured capitalism*, *oil-led state-captured war-fare regime*, state capture, policy capture.

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Introduction

Since the advent of the Saddam Hussein regime and, subsequent, first Gulf War of 1980-1988, Iraq underwent a difficult transition to democracy which has been characterized by the emergence of civil conflicts and system instability. The second Gulf War in 1991, the international economic sanctions during the period 1991–2003, and the fall of the Saddam Hussein regime in 2003 did not succeed to resolve the internal problems, but have often exacerbated pre-existing ethnic and religious tensions. This has resulted in an increasing number of casualties, which, from 2003 to 2011, have amounted to (publicly displayed) no less than 400,000 individuals and 4.5 million orphans (MIT 2018)¹. However, the real number of deaths is estimated to be much higher than the one reported by official statistics. Same considerations apply to the number of violent attacks which have increased significantly since the beginning of the conflict.

In 2018, Iraq had an estimated population of approximately 39 million inhabitants. About 75-80 percent Arabs, and the remaining 15-20 percent of Kurdish Turkoman and Assyrian origins. The Kurdish minority lives for the most part in northeastern Iraq (Kurdistan Regional Government, henceforth KRG). Islam is the official religion and accounts for almost 95-98 percent of the population. Shia Muslims correspond to 64-69 percent of the total population, while Sunni Muslims to approximately 29-34 percent. The remaining population is made of Christians (about 1 percent), Hindus, Buddhists, Jewish, and people not affiliated to the above mentioned religions².

Electoral engineering (Sartori 1994) has been key for the Iraqi transition to democracy, whose main goal has been to reduce the power of the Shiite majority, expanding the representation of the Sunnis. The intended consequence, most clearly expressed in the Iraq Study Group report of 2006 and in the 18 benchmarks of 2007, was to speeding up the de-baathification process. Simultaneously, it was supposed to limit the incentives for violence and sectarian conflict (Haggard and Long 2007, p. 2).

In order to bring democracy back to the table after decades of authoritarian subjugation, attempts at creating a more representative territorial structure have been made by national and international authorities. A proportional system of electoral representation was introduced after the fall of the Saddam Hussein's regime in 2003. As a consequence, since the first elections in 2005, several different lists of independent candidates (almost 36 in the elections of 2014) have emerged. The first free elections have been held in 2005 and have seen the victory of President Jalal Talabani

¹ MIT (2018), Iraq: The Human Cost of War. <http://web.mit.edu/humancostiraq/> (accessed 19 May 2018).

² CIA World Factbook (2018)

<https://www.cia.gov/library/publications/the-world-factbook/geos/iz.html> (accessed 19 May 2018).

and of Prime Minister Nuri al-Maliki (6 April 2005). Both have been re-elected in the polls of May 20, 2006. Mr Talabani, of Kurdish origin, represented, for the first phase of transition, the most prominent figure of the Patriotic Union of Kurdistan. Mr al-Maliki represented, instead, the leading figure of the Shia leading coalition ‘State of Law’. In the elections of 2014, Mr al-Maliki was re-elected as Prime Minister but was replaced in 2016 by a Shiite politician Haider al-Abadi³. Mr Fuad Masum, also of Kurdish origins, became instead the new President (Al-Jazeera 2014; Wikipedia 2015). In the national elections of 2018, 87 parties and 6,990 candidates tried to acquire a seat in the Iraq's parliament (Ibrahim 2018a,b). This was the result of political fragmentation caused by the subsequent waves of war. Shia leader Muqtada al-Sadr of the Sairoon Alliance won the parliamentary elections with 54 seats. Shia militia chief Hadi al-Amiri of Fatah (Conquest) Bloc obtained 47 seats. Former Prime Minister Haider al-Abadi of Nasr (Victory) Coalition obtained 42 seats (Al-Jazeera 2018; The Baghdad Post 2018a). Elections' results were soon subjected to disputes.

Close to the announced defeat of ISIS (Mansour 2017) and the unity of all Iraqis⁴, the fight against corruption (فساد [fasad]) became one of the main mobilization strategies of the 2018 national elections, and also the main keyword for identity politics (Shia, Sunni, Kurds, etc.), civicness, public authority, as well as for the associated economic and material incentives of public governance (IRIS 2018). Here, it is important to note that the fight against “The Corrupt” (الفاستدين [al-fāsideen]), seen as bad as ISIS (Mansour 2017), also includes religious normative connotations, such as those concerned with religious “immorality” (فجور [fajur]) and moral decay (الانحلال الأخلاقي [alanhalal alakhlaki]), and not simply refers to the “corruptible” (قابل للرشوة والفساد [qabil lilrashwat walfasad]), “purchasable” (للشراء [lilshira]), “dishonest” (غير أمين [ghyr 'amin], etc. individual.

In the light of a persistent electoral fragmentation of the political spectrum, Haggard and Long (2007, p. 3) have identified in the ‘engineer’s dilemma’ a critical situation for future stabilization and consolidation attempts in Iraq. The ‘engineer’s dilemma’ refers, in this case, to a situation where the presumed institutional change aimed at enlarging the representation of the Sunni minority has ended up in an unexpected increase of violence. Among the problems of political inclusion associated with this failure in constitutional and electoral engineering, the authors mention ‘the fragmentation of the combatants, their weak representation in the formal political process, and

³Washington Post (2014), Iraqi president names Haider al-Abadi new prime minister, defying al-Maliki. http://www.washingtonpost.com/world/iraqs-political-situation-dire-as-maliki-digs-in/2014/08/11/1c70942a-213a-11e4-958c-268a320a60ce_story.html (accessed 19 May 2018).

⁴ On a tweet on May 2018, the Shia leader Muqtada al-Sadr stated: “Iraqi people are twins in faith and brothers in Islam, nation and life [...] No more Kurdish demand for secession, no more Sunni calls for revenge and no more Shiite fighting. Unity, tolerance and peace are our target” (The Baghdad Post 2018b).

the presence of extremists and the associated process of outbidding' (Haggard and Long 2007, p. 3). The fiscal and federal structure, which continues to favor the two major allies (Shia and Kurds), also played a dominant role in reducing the prospects for peace and stability. Interestingly, always according to the authors (see Haggard and Long 2007, p. 8), these problems of 'engineering' have contributed to exacerbate the demands of radical nationalists to re-establish a Sunni hegemony, and increasing the jihadists' requests for an Islamic 'caliphate'.

An additional important and often neglected issue of Iraq's political system concerns the increasing autonomy of the Kurdistan National Assembly, which also thanks to the number of seats (111) and the relative power of the Kurdish minority, makes it *de facto* an autonomous regional state or, in other words, a 'state within a state' (UNPO 2013). This has clear repercussions not only for Iraq's future national unity and long-term stability, but also for future redistributive attempts. The territorial distribution of natural resources in the contemporary federal structure continues to favor existing winning coalitions, not avoiding the creation of insider-outsider divides. The limits of such a constructed 'consociational democracy', aptly highlighted by Lijphardt (1999), have become in this way more apparent (Haggard and Long 2007, p. 12). This can also be seen in the formulation of the new constitution, which, adopted by a referendum on 15 October 2005 (amended in 2013), has established a mixed legal system of civil and Islamic law, still subjected to multiple interpretations⁵. The challenge for the international community at large is, therefore, to establish new forms of 'culturally sensitive capitalism', able to integrate and to pacify different hostile factions of the society. The number of firms must increase, but also the human security and the economic integration of the affected population must do. In order to achieve these objectives, there is a need for a new political economy with new redistributive and fiscal priorities.

This article explores the lights of Iraq, Iraq's variety of capitalism (VoC) and its system of public and fiscal governance. The first section examines Iraq's VoC, which I define *oil-led state-captured capitalism* with associated *oil-led state-captured war-fare regime*. In formerly ISIS-occupied territories, war developments turned the system into an *Insurgent ISIS-captured capitalism with associated Insurgent ISIS-captured war-fare regime*. The second section investigates electricity usage. The nighttime lights analysis is based on near real-time big data. It includes high-resolution remote-sensing and satellite imagery from the NASA Earth Observatory. I use the Visible Infrared Imaging Radiometer Suite (VIIRS) sensor on the Suomi NPP satellite. Data on greenhouse gases are obtained through the AQUA and TERRA satellites derived

⁵According to the Arab Barometer for Iraq (2012, p.5), about 72 percent of respondents agree that 'religious practices should be kept as a private matter and separated from public life', 85 percent that 'religious leaders should not interfere in voters' decisions', whilst only 31 percent that 'Islamic law was appropriate for their country'.

from the Atmospheric Infrared Sounder (AIRS) and Moderate-resolution Imaging Spectroradiometer (MODIS) sensors. I also use the AURA satellite with the Ozone Monitoring Instrument (OMI) sensor, as well as the TERRA satellite with the Measurements of Pollution in the Troposphere (MOPITT) sensor. The third part discusses the repercussions of electricity usage for good governance, for good regulatory and for good fiscal practices, as well as for development and growth. The concluding part briefly discusses the “taxman approach” and the introduction of a new fiscal contract necessary to resolve negative incentives in oil-led war economies.

The Political Economy in Iraq

Iraq’s main development model remains heavily based on oil revenues and state transfers, which take the form of public subsidies, employment in the public sector and transfers to state-owned enterprises (World Bank 2014). Iraq's variety of capitalism (see Hall and Soskice 2001) can be described as an *oil-led state-captured capitalism*, subjected to well-known distributive “resource curse” problems (Ross 2012), including a resource predation and a resource-seeking foreign direct investment dependence mechanism (Stevens et al. 2015). I describe this: *oil-led state-captured capitalism* with associated *oil-led state-captured war-fare regime* (see Esping-Andersen 1990; Gough et al. 2004; Cerami and Stubbs 2013). In formerly ISIS-occupied territories, war developments turned the system into an *Insurgent ISIS-captured capitalism with associated Insurgent ISIS-captured war-fare regime*.

In 2012, the total budget revenues at disposal of the government corresponded to 102,327 billion Iraqi Dinars (ID), among which 94,378 billion ID came from oil revenues and 2,840 ID billion from taxes⁶. Individuals paid a very small amount of taxes, as the majority of state revenues and public services was financed through oil (World Bank 2014, Table 2.1, p.20). In 2016, oil revenues accounted to more than 90 percent of total revenues, whilst taxes amounted to only 2 percent. Income tax, corporate income tax, taxes on goods and services, property taxes and taxes on international trade were below the MENA region of 10 percent and an international comparator average of 15 percent (Feher et al. 2017, p. 16-19). In absence of a clear involvement of citizens in financing their own state and system of public governance, electoral requests become easily a gift of the political elites to ‘their’ citizens (Diamond 2008). In 2017, because of the economic recession following the protracted reduction in oil and gas prices, of war-fare related activities, as well as of ongoing political contestation and civil conflicts due to the ISIS presence (OECD 2016a), Iraq's GDP corresponded to 230.7 trillion IQDs (-0.8 percent in comparison to the previous year), of

⁶ In June 2012, 1 USD corresponded to 1166 Iraqi dinars.

which oil GDP was equal to 87.3 trillion IQDs (-3.5 percent) and non-oil GDP to 143.4 trillion IQDs (4.4 percent) (World Bank 2018, Table 56, p. 128)⁷.

In 2018, ten main transmission mechanisms of economic and fiscal crises could be identified in Iraq: (i) trade shocks; (ii) oil prices and oil price cycles shocks; (iii) exchange rate shocks; (iv) banking sector risks; (v) foreign direct investments shocks; and (vi) debt refinancing squeeze (that is - dependency on foreign financial markets for debt refinancing; see Stubbs et al. 2009). In addition, (vii) corruption, (viii) “oil resource curse”, (ix) state-capture and (x) policy-capture (OECD 2017a,b)⁸ related mechanisms also played a crucial role in the transmission of economic and fiscal crises.

War-fare amenities with associated damages (see World Bank 2018) also continue to create significant macro- and micro- economic vulnerabilities. They also alter the main sources of financing for public expenditures, subsequently, reducing the fiscal space available for public policies. Furthermore, they also exacerbate the problems associated with the international competitiveness of Iraq.

The Political Economy of War in Formerly ISIS-occupied Territories

In formerly ISIS-occupied territories⁹, almost one-third of Iraq (Mansour 2017), close to war-making activities, ISIS established a “war economy” based on resource predation. As introduced by Eaton (2018, p. 5), “the term ‘war economy’ encompasses economic activities dependent – directly or indirectly – on the dispensation or perpetuation of violence” put in place by *war economy profiteers*. This includes war-making income-generating activities, among which the acquisition of state assets of captured cities, smuggling (including the sale of commodities, goods, services, humans and parts of humans), extortion, taxation, and rents (e.g. land rents) (Eaton 2018). In 2017, the main sources of financing the ISIS state and war-fare regime included oil, natural gas, phosphate, cement, agriculture, revenues of criminal origin, extortion, kidnap and ransom, antiquities trafficking and donations (Swanson 2015; CAT 2016), which were redistributed among

7 In 2017, 1 USD corresponded to 1,171 Iraqi dinars.

8 The term “state capture”, derived from the concept of “regulatory capture”, refers to the ways in which private individuals capture state bureaucracies (including formal and informal norms) to manipulate public policy-making, including their ideas, interests and institutions (see Hall 1993), for their private interest (World Bank 2000, p. 3). The term “policy capture” refers, instead, to “public decisions over policies [that] are consistently or repeatedly directed away from the public interest towards a specific interest” (OECD 2017b, p. 1).

9 For recent maps, see 2016 ISIS-occupied territories available here, <https://www.weforum.org/agenda/2016/10/this-map-shows-how-much-territory-isis-has-lost-in-2016/> and 2017 map available here <https://dailybrief.oxan.com/Analysis/GA224615/Islamic-State-will-prepare-for-the-next-phase> (accessed 19 May 2018).

the population to acquire legitimacy and support (Almukhtar 2015; Callimachi 2018). This “caliphate-building” activity also implied the creation of its own ISIS currency (Milliken 2015).

In June 2014, ISIS’s estimated assets in Iraq corresponded to no less than \$875 million. Its major revenue sources were given by extortion and taxation activities in the Iraqi territory, which were estimated at \$600 million. In addition, \$500 million were stolen from state-owned banks, \$100 million from oil whose barrels were sold at half of the official price. \$20 million were raised by kidnapping ransoms (Almukhtar 2015).

In 2015, ISIS expanded increasing its “public policy investment” in people, paying its 20,000-30,000 fighters between \$350 and \$1500 per month according to their rank, skills and nationality (FATF 2015, pp. 29-30). Similar estimations made by Lister (2015) stated that there were approximately 30,000 ISIS armed members in early 2015, and about a half of these were foreigners of not Iraqi or Syrian origin. The ISIS total assets, presumably including also the occupied territories in Syria, should have, in reality, corresponded to \$2 billion, with an annual revenue of \$200 million to \$300 million (Waterbury 2015).

In 2016, ISIS oil revenues were estimated to range from \$250 million per year to nearly \$365 million per year. However, these numbers declined due to the airstrikes on tanks and oil refineries (Jones et al 2017, p.8)¹⁰. Between 2016 and 2017, ISIS money for funding the ISIS war-fare regime also came from stealing and redistributing credit cards, social security benefits, small loans, scooters, or even selling organs of dead fighters (for more information on such disgusting business, see also FATF 2017; May 2017). As in other countries, selling weapons was also used as a corruption mechanism (see Enough Project 2017), which was then re-employed for increasing the performance of the ISIS war-fare state.

At the end of 2017, daily commerce and agriculture (worth hundreds of million of dollars) rather than external donor or oil sales represented the main sources of funding for the ISIS new tax revenue regime (Callimachi 2018). Between 2014 and 2017, ISIS established at least 14 new administrative offices named “*diwan*” (including education, health, etc.) (Callimachi 2018). The term *diwan* stems from the Sultan of Sulu Sharif ul-Hashim's (who lived approximately in 1405) system of laws based on Quran¹¹. The *diwans* established by Sharif ul-Hashim can therefore be understood as the administrative and bureaucratic expressions of a Quran's interpretation of a

10 Up-to-date information on ISIS financing mechanisms, including wage salaries, is provided by Jones et al. (2017).

11 The original name of Sharif ul-Hashim was Sayyed walShareef Abubakar Abirin AlHashmi, which shows that he was supposed to be a direct descendant of the Prophet Muhammad.

caliphate tax financing system. In ISIS-occupied territories, local administrators are understood not as the owners of the land, but their protectors (Maulana, e.g. the Sultan) – and their administrators (the *Sheiks*).

Hence, the distinction between direct and indirect taxation in “Islamic State” territories is, to some extent, misleading, since taxes should rather be seen as “religious endowments” paid for the individuals’ benefiting of goods and services. In the new “tax farming” system¹², taxes, or “religious endowments” are important *steering mechanisms*¹³. They aim to change the behavior of people and become functional to the establishment and maintenance of a “state/caliphate”¹⁴.

Tax-steering or religious endowment-steering became, in this case, an important social mechanism of *consonance-driven desire formation* (Hedström 1998) with ‘environmental’, ‘cognitive’, as well as ‘relational’ repercussions (see MacAdam *et al.* 2001). Religious endowments have an impact on the closest surrounding conditions that affect the lives of individuals, as well as their psychological and behavioural patterns, with associated connections among people, groups and interpersonal networks (see also Mayntz 2003). This, consequently, may lead to social mechanisms of anger mobilization and contagion in collective action.

These religious “taxes” involved, for example, financing public and social security services, such as taxes for garbage collection, VAT, tariffs for trade, electricity, sanitation, fees for social security services, tax subventions (such as for the sheep milk) or tax deductions, taxes from oil extraction, land taxes and poll taxes, taxes on accessing the labour market, payroll taxes, personal income tax, property usage contracts and associated taxes (e.g. concession tax), withholding taxes, price subsidies, custom duties, and landholder taxes. In formerly ISIS-occupied territories, even bus tickets were part of the overall tax financing system regime, since they helped to fund the functioning of municipal local social security services¹⁵.

The System of Public Governance in Iraq

The system of public governance in Iraq depends on oil revenues and on the attachment of citizens

12 On tax-farming in Muslim societies, see Rothstein and Broms (2010) and Cerami (2015).

13 On steering mechanisms see Mayntz (2003).

14 In the bills and receipts it was written “The Islamic State, Caliphate on the path to prophecy”, see Callimachi Twitter Post (2018a) <https://twitter.com/i/moments/983112616146071553> (accessed 19 May 2018).

15 See Callimachi Twitter Post (2018b) <https://twitter.com/i/moments/982358498863407104> (accessed 19 May 2018).

to the labour market with a majority of public sector employees or, when not accessible, on informal arrangements provided by the members of the family, the tribe or the sect (Shia vs. Sunni). In order to protect uncovered citizens, the government has established a Public Distribution System based on state-sponsored fuel subsidies¹⁶ and food rations. The implications of this system are, first of all, high dependence from state-driven labour market performance and state-owned enterprises with a residual neo-liberal coverage for the non-employed, and, second, dependence on food rations distributed to approximately 33 million Iraqis (about 90 percent of the population) (El Mekkaoui de Freitas and Johnson 2012, p.9). The fiscal space for public policies, therefore, greatly depends on oil revenues, oil prices and oil price cycles and on the state-budget availability of funds (Feher et al. 2017, p.11, 12).

With regard to public governance and pensions, they rely on the social insurance principle, which implies that only workers in formal employment have a decent access to retirement. Self-employed persons, agricultural employees, temporary employees, household workers, and family labour are excluded from pension entitlements (US Social Security Administration 2016). Due to the high number of citizens employed in the public sector, near universal coverage aspirations result in increasing state budget inadequacies and low protections (Feher et al. 2017). This situation becomes particularly worrying in the case of disability and survivor pensions, especially in a war-setting environment, where the presence of, for example, land-mines create an increasing number of disabled citizens. The public distribution system is set to cover this deficit, but, as mentioned, it is often subjected to a lack of funds due to the drop in oil prices and adverse oil price cycles.

Similarly, health care governance is based on health social insurance. This would imply that in absence of state-sponsored provisions only employed persons would have access to health care services. Important to note is that subsequent wars in Iraq have destroyed most of the health facilities and this has resulted in a lack of infrastructures, medical equipment, personnel and medicines. As a report by UNOCHA (2015, p. 2) has shown, approximately 20 per cent of the population (7 million people) cannot access even the most basic health care services, with women and children particularly vulnerable to poverty related diseases, forced marriage and sexual violence. Public health emergency in Iraq requires the reestablishment of basic medical services, especially in those areas occupied by armed groups where about 50 percent of health professionals have fled¹⁷.

With regard to governance and protection against unemployment, jobs are mostly provided

16 From 2000 to 2016, oil, gasoline and kerosene prices for Iraqi families dramatically increased, but energy price subsidies decreased from 7.7 percent of GDP in 2013 to 2.2 percent of GDP in 2016 (IMF 2017).

17<http://www.save-iraq.info/download/205/>

by the state, unemployment insurance covers only a small part of the population. Usually, this involves those citizens who have worked in state owned enterprises and are attached to national and local political elites. Interesting to note is that employment protection law dates back to 1964 (with subsequent amendments) and, therefore, it has been established in a period antecedent to Saddam Hussein's rise to power. It is based on the social assistance principle, though highly residual in scope and coverage (US Social Security Administration 2016).

Finally, the governance of maternity and family benefits are also based on the social insurance principle and, thus, covering only a very small part of Iraq's women. In absence of full and decent employment, women continue to be seen as wives-mothers rather than active participants in the labour market. This is also, to some extent, represented in the attitudes of Iraq's population toward women. According to the Arab Barometer for Iraq (2012, p.28), approximately 72 percent of respondents state that 'men and women should have equal work opportunities', but 75 percent agreed that "men are better than women at political leadership".

The Public Governance System in Formerly ISIS-occupied Territories

Drawing on Charles Tilly's (1985) seminal work entitled *War Making and State Making as Organized Crime*, it is possible to affirm that the functions that several rebel and terrorist organizations linked to ISIS carry out in their everyday lives (in particular, protective, extractive, and redistributive) are equivalent to those of a state and, therefore, turn the organization or the rebel group into something more than a simple loose confederation of organized 'self-made' criminals. It is not by chance that their members, once emotionally and institutionally affiliated to the organization, have started to: (1) carry out 'intelligence' activities typical of a state, such as those linked to searching and punishing possible spies within the territory under their control; (2) tax for the passage from one city to another city of any illicit contraband (e.g. drugs, weapons, laundered cash and people); (3) collect profits, and protect and control the production areas; (4) recruit and provide subsistence to the marginalized peoples living in underdeveloped regions; and (5) deliver a range of public services to the population in need (see also Sanger and Davis 2014; see also the *ISIS Files* Callimachi 2018¹⁸).

In this process of nation-state building, rentierism has become a complementary mechanism of public governance and state formation made possible by the predation and redistribution of natural resources. This nation-building process has also required a system of propaganda that occurs mostly through social networks (Khatib 2015), as well as the construction of a Weberian

18 <https://www.nytimes.com/interactive/2018/04/04/world/middleeast/isis-documents-mosul-iraq.html>

bureaucratic structure, necessary to ensure the state fiscal capacity to reduce a ‘state failure’ and state collapse. In this context, the creation of an ISIS organized rentier state represented a further impediment to the process of democratization in Iraq, as it aligned socio-political norms to the patrimonial nature of social interactions with associated more radical religiously dominated loyalties (Thies 2015).

In order to increase its acceptance among the population, ISIS has also invested in infrastructures (such as building underground pipelines, employing engineers, etc.), in public services and in social benefits. It has also made regular payments to the families of members killed or captured. It has purchased diesel generators for distributing electricity and mobilized existing infrastructures to provide basic services, or engaging in agricultural production and taxation (FATF 2015, pp. 29-30). In ISIS-occupied territories, the largest expenditures in salaries estimated (between \$3 million and \$10 million every month) were, however, employed for ISIS police-state institutions, such as committees, media, courts, and market regulation; thus ensuring Tilly’s security function (see Almkhtar 2015). In the past, the access to public services and distribution of welfare benefits has depended, for the most part, on non-state and religious actors (see Gellner 1981; Benthall and Bellion-Jourdan 2003). These tasks are now carried out by ISIS religious leaders.

As a telling article by Shatz (2015) has demonstrated, the use of public employment in ISIS-occupied territories has had the intended consequence of radicalization and social deviance reinforcement. Financing ISIS has, for example, been made possible by ISIS “government” subsidies to “government” employees who lived in ISIS-occupied territories (*wilaya* or ‘protectorates’) (Khatib 2015). This money estimated, as mentioned, in several hundred million US\$ have not only reinforced the local system of patronage and clientelistic relations. They have also provided additional support for an involuntarily sponsored ISIS administrative local economy and local war-fare state, reinforcing the ISIS ‘clear, hold, build’ strategy (Khatib 2015; see also Callimachi 2018)¹⁹.

The importance of ISIS in changing cultural patterns in the Iraq public administration must be emphasized. It involves, for example, not only a radicalization and over-secularization of society, but also de-modernization. The increasing number of women who joined the organization as fighters (and, in case, martyrs) and built a new family (Saltman and Smith 2015) represents here a notable example of a new societal structure in the making, with associated emerging social order and social risks. This has a price also for gender-equality. According to FATF (2015, p. 13), in 2014 ISIS fighters paid for a female slave approximately \$13. In 2017, the price had increased between

¹⁹ According to FATF (2015, p. 30), ‘energy experts estimate that ISIS can rebuild a single mobile refinery in 10 days for 230,000 USD’.

\$35 or \$50 (Jones et al. 2017, p. 11).

ISIS-leaders had become the new “autocratic Leviathans”²⁰ of Iraq.

*The Lights of Iraq*²¹

Geo-spatial micro and macro econometrics based on near real-time big data can help to improve understanding of current GDP and GDP growth, or "True GDP" Growth and the size of its informal economy (Medina and Schneider 2018). It can also help to improve understanding of current and future income growth, presence of roads and infrastructures, wealth of cities, urban versus rural divides, the effects of diseases on growth (such as malaria), growth at the coast versus the interior, etc. (see Henderson et al. 2012; Donaldson and Storeygard 2016; Leitzell 2012).

According to Leitzell (2012), nighttime lights should be understood as a proxy of economic prosperity and shining. This is defined as “the condition of being successful or thriving, especially with reference to economic well-being”²². Investigating how energy consumption behaviors vary across different cultural settings, Román and Stokes (2015) have succeeded to shed new light on the cultural patterns according to which cities and “people illuminate the night”²³ and their life (such as during the Christmas and New Year’s season and the Holy Month of Ramadan). The number and the intensity of lights is, in fact, very often associated with the wealth of a city and of a nation (think, for example, to Berlin, Paris or New York night lights). Also geo-spatial data cannot be so easily falsified by governments. It is, in fact, no secret that politicians and dictators can easily falsify official GDP statistics for political objectives (see also Martinez 2018).

The following analysis employs high-resolution, remote-sensing and satellite imagery provided by the NASA Earth Observatory²⁴. Remote-sensing satellite imagery are made of millions of single pixels, which become the smallest units of scientific enquiry. NASA nighttime lights are derived from the Visible Infrared Imaging Radiometer Suite (VIIRS)²⁵ sensor on the SUOMI NPP satellite²⁶ (for an User Guide see especially, NOAA 2017). A special algorithm is developed to remove remaining clouds' and snow's shades. Data on greenhouse gases are obtained thanks to the

20 On the autocratic Leviathan and tax competition, see Genschel et al. (2016, p. 27).

21 A more detailed geo-spatial analysis with interactive graphs and images is available at Story Maps: Geo-Spatial Analysis Iraq <https://arcg.is/1uWXrz>

22 <https://www.merriam-webster.com/dictionary/prosperity> (accessed 19 May 2018).

23 <https://www.ncei.noaa.gov/news/seeing-holiday-lights-space> (accessed 19 May 2018).

24 <https://earthobservatory.nasa.gov/> (accessed 19 May 2018).

25 <https://jointmission.gsfc.nasa.gov/viirs.html> (accessed 19 May 2018).

26 <https://jointmission.gsfc.nasa.gov/> (accessed 19 May 2018).

AQUA²⁷, AURA²⁸ and TERRA²⁹ satellites and derived from, respectively, the Atmospheric Infrared Sounder (AIRS), the Ozone Monitoring Instrument (OMI) and the Moderate-resolution Imaging Spectroradiometer (MODIS) sensors. The validity of the use of multi-satellites screening has been confirmed by Román et al. (2018).

Using the SUOMI NPP satellite and VIIRS sensor, Román and Stokes (2015, p. 183) have also shown that in the cities of Iraq, war, regional political conflicts and contestation, as well as civil conflict were determinant in changing energy service supply and demand. As discussed by Michael Carlowicz (2016), from 2012 to 2016, Iraq faced differential growth and development phases depending on the previously mentioned economic transmission mechanisms, including those associated with war-fare amenities. Until 2016, some areas on the Tigris and Euphrates rivers and close to Mosul saw some decrease in electricity usage (and therefore of lights and of prosperity shining), while areas around Baghdad, Irbil and Kirkuk saw some more significant increases because of the temporary improvement of the security situation (see Appendix Fig. 1 and Fig. 2).

Over the period 2017-2018, prosperity shining decreased in Baghdad and its surrounding region, in Irbil, in Mosul and in Kirkuk, as well as in the Tigris and Euphrates rivers more in general (see Fig. 4 and Fig. 5, March 9, 2017 to March 31, 2018). This decrease in electricity usage was the result of the economic recession following the protracted reduction in oil and gas prices, of war-fare related activities, as well as of ongoing political contestation and civil conflicts due to the ISIS presence (OECD 2016a) (see Fig. 3 and Fig. 4). In the Basrah area, the lack of production and processing of energy, as well as low voltages and frequency were the main causes for electricity system instability and reduced prosperity shining (The Baghdad Post 2018c).

Greenhouse gases (water vapor, carbon monoxide, carbon dioxide, methane, nitrous oxide and ozone) are responsible for global warming. Both through the slow and fast carbon cycle, they contribute to environmental insecurity. Water vapor accounts for about 50 percent, clouds for 25 percent, small particles (such as aerosols) and minor greenhouse gases (e.g. methane and carbon monoxide) account for the rest of temperature anomalies (NASA 2011)³⁰. Greenhouse gases are not only responsible for global warming and environmental insecurity³¹, but they can also trigger

27 <https://aqua.nasa.gov/> (accessed 19 May 2018).

28 <https://aura.gsfc.nasa.gov/> (accessed 19 May 2018).

29 <https://www.earthobservatory.nasa.gov/Features/Terra/> (accessed 19 May 2018).

30 https://earthobservatory.nasa.gov/Features/CarbonCycle/?src=features_hp&eocn=home&eoci=feature_archive&src=share (accessed 19 May 2018).

31 The number of rare species of breeding birds in the area is an additional indicator of environmental quality. In Iraq, there are approximately 18 bird species at risk

asthma attacks, aggravate breathing difficulties and can cause death from respiratory and heart diseases (Burgess et al. 2007, p.47).

Whilst the primary contributor to air, land and water pollution in Western Europe is the transport sector, followed by the industry (see Burgess et al. 2007, ch. 3, p. 48), in Iraq oil pollution and the consequences of war-fare can be seen as main causes for environmental insecurity. As portrayed in Figures 6-14, the *oil-led state-captured capitalism* in Iraq creates not only rising environmental problems, but also increases, to a larger extent, the asymmetries between higher levels of economic development, higher levels of air, land and water pollution and mounting pressures in the labour market and in the war-fare regime architecture (including health related risks) (see Gough 2013, p. 8; see also Gough 2016, pp. 24-47). This implies implementing innovative good regulatory practices in order to meet emerging social, economic and environmental challenges. More specifically, Fig. 14 shows aggregate levels of carbon monoxide and nitrogen oxide, which, as discussed by the NASA Earth Observatory (2018), are both major air pollutants emitted by cars and by other industrial sources, such as oil and gas plants. The areas of Basrah, Baghdad, Kirkuk, Irbil and Mosul are the zones where air quality is the poorest. This can be explained by oil and gas related emissions, as well as by war and conflict related amenities, such as those related to the fight against ISIS terrorists.

The SUOMI NPP satellite with the VIIRS sensor is also useful for natural resource discovery and production (Henderson et al. 2012; Donaldson and Storeygard 2016). Using satellite multi-spectral imaging and ground-truth pre-war-fare output data, Do et al. (2018) have estimated that in ISIS-occupied territories the terrorist group was able to produce approximately 56,000 barrels per day (bpd) from July-December 2014, which dropped to 35,000 bpd in 2015, being further reduced to 16,000 bpd in 2016. Assuming an oil price in the black market of 20-45 USD per barrel, the daily oil related budget available to ISIS should have corresponded to 320,000 USD and 720,000 USD per day. Close to agricultural revenues (see Callimachi 2018), these oil earnings represented interesting sources of funding for new ISIS-sponsored public policies and social cooptation activities, but they also resulted in new environmental challenges that were particularly harmful for the occupied population.

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(<http://chartsbin.com/view/40237>). See List of Birds in Iraq (https://en.wikipedia.org/wiki/List_of_birds_of_Iraq) and Earth Endangered Creatures (<http://www.earthsendangered.com/profile.asp?gr=B&sp=4587>) (accessed 19 May 2018).

As mentioned (see Fig. 3 and Fig. 4 show), during the period from March 2017 to March 2018, Baghdad, and Iraq more in general, were subjected to a decrease in electricity usage and, subsequent, prosperity shining. Electricity infrastructural damage reduced the availability of public services and utilities and, subsequently, reinforced ISIS cooptation capabilities through the delivery of basic public services. Offices and shops closed. ISIS labour delivery capacity and social bondage activities increased (Callimachi 2018). What should not be forgotten here is that ISIS camps are difficult to target. In Syria, for example, they are located in open space places with no clear boundaries (Squarcini 2015). Hence, who hits whom is still an open question.

The reduction in electricity usage has also resulted in a subsequent reduction in human and economic activity, as well as in the progress and in the socio-technical advancement of the Iraqi society³². Re-switching the lights on³³ has become an important task in order to avoid recession, increase formal employment (e.g. through entrepreneurship) and GDP, whilst reducing informal economic activities with obvious reduction of official taxes. As mentioned, the Iraqi oil-led political economy model is now primarily centered on war-fare debt damage consolidation (the *war damage debt refinancing squeeze* problem), which has reduced the space for fiscal policies.

Analyzing NASA images, a recent BBC (2017) report has demonstrated that in Syria, in areas where citizens could turn their lights on at night, they also could get access to life-saving medical equipment and, hence, this had the potential of improving citizens' lives. The decrease in electricity usage and night lights in Iraq from March 2017 to March 2018, especially in ISIS-occupied territories, has meant that the lives, the access to health facilities, the health and social security of the citizens living in these places shrunk considerably. Electricity availability and usage during the period 2017-2018 has played also a determinant role in reducing the access to water and sanitation facilities, greatly enlarging hygiene's and health risks' factors.

Despite massive efforts made, the decrease in electricity usage from March 2017 to March 2018 has also meant a decrease in the availability of schools and educational services. Underage individuals could simply not go to school because of electricity infrastructural destruction or reduction in energy service supply and demand. Unfortunately, problems of education remain even more preponderant in ISIS-occupied territories,

Electricity is crucial for keeping public services alive. As electricity usage shrank from March 2017 to March 2018, the efficiency of public facilities with associated performance outcome

32 see OECD 2018 series *Better Policies for Better Societies* available at <http://www.oecd.org/about/publishing/betterpoliciesseries.htm> (accessed 19 May 2018).

33 <https://www.earthobservatory.nasa.gov/IOTD/view.php?id=91431> (accessed 19 May 2018).

shrunk. The decrease in electricity usage also includes digital technology divides between war-fare damaged and the non war-fare damaged zones of Iraq.

Because of the fall in electricity usage from March 2017 to March 2018, and the subsequent increase in the informal economy, women's vulnerabilities have also grown. As noted by Karshenas and Moghadam (2006), women's participation in the labour market has often and unjustifiably been seen by the ruling elites as anti-Islamic (see discussion on women as wives-mothers above). Even when integration in the labour market has occurred, it has served primarily to reconfigure state functions and to provide legitimacy to the regime (Krause 2009). Feminization of poverty has, hence, been the most obvious result, and this has especially occurred in ISIS-occupied territories.

Electricity plays a determinant role also in the food production chains. Farms, factories and machines can be shut off, either by destruction or by electricity disruption. As lights decreased in Iraq from March 2017 to March 2018, food production also decreased. War damages do not improve the food and nutrition situation of the Iraqi population (FAO 2017). In 2018, 2.4 million Iraqis are still in need of food security assistance (FAO 2018)³⁴, whilst the country continues to be highly dependent on commercial food imports (Devereux 2017).

Co-optation – broadly understood as the capacity of the ruling elite to bind strategic actors via formal and informal institutions (Merkel and Gerschewski 2011) has shifted also toward ISIS-leaders as new co-opters (or *war economy profiteers*, see Eaton 2018), who have aimed at substituting egalitarian policy participation by ensuring the inclusion of strategically important radical parts of the population into the economy and into its ultra-confessional politics.

In order to increase the electoral turn-out, many parties started to increment their investments in public infrastructures shortly before the 2018 elections (IRIS 2018, p.20). From April 2015 to May 2015, Iraq faced, in fact, an exponential growth in night light shining (see Fig. 5). This included not only areas on the Tigris and Euphrates rivers, but also Baghdad, Hawija, Irbil, Kirkuk, Mosul, Ramadi, Tal Afar and the Basrah area. The announced defeat of ISIS, the temporary improvement of the security situation and the simultaneous occurrence of the Holy Month of Ramadan certainly played a role in this growth of prosperity shining, though social cooptation activities implemented to increase electoral acceptance should also be mentioned as key factors for improved war damage reconstruction and, subsequent, electricity usage.

34 <http://www.fao.org/iraq> (accessed 19 May 2018).

Conclusion

As an important ecosystem, the Iraqi public governance architecture has been used as means to ensure polity and policy loyalty (see Hirschman 1970, 1978). As is clear from the discussion above, understanding ISIS' public governance evolutions, including processes of variation, as well as the associated mechanisms of selection and replication of institutions and public governance practices (Lewis and Steinmo 2012, p. 314) becomes necessary.

However, at this stage it is still difficult to locate future Iraqi political and fiscal policies. In absence of a clear involvement of citizens in financing their own system of democratic governance (OECD 2016b), electoral requests become easily a gift of the political, or religious, elites to 'their' citizens (Diamond 2008). From an analytical point of view, it seems to be of interest to emphasize the importance of public integrity (OECD 2017b). But, the next obstacle to good public governance concerns the introduction of an effective tax-financing model, which remains an important means for the implementation of de-commodification, de-stratification and de-clientelization strategies³⁵.

As argued by Eaton (2018, p.2) for the case of Libya's war economy, a strategy of co-opting networks of war economy profiteers has often been established. But failures in coercion capacity have led to administrative, governance and security failures. The same observation holds true for *positive incentives* which might increase instead of decreasing war-making and war-profiteering activities, if co-optation activities are characterized by abuse, bad governance and corruption. The profit margins of war economy beneficiaries and militias must, however, be decreased. Hence, whilst continuing to assure that people are not being exposed to harm, danger and terror, reconverting the *tax finance system* to more worthy causes involves a reconversion of the *central governance architecture*. This implies the necessity of ensuring public integrity and good governance (see OECD 2017a,b) through new tax-farming and tax-steering mechanisms, which are determinant to avoid state- and policy- capture (see also OECD 2016b). I call this, the "taxman approach".

Financing for a new political economy presupposes, in fact, that funds can be raised not only through traditional forms of financing, such as direct and indirect taxation, but also through oil revenues, profits from capital investment, as well as from foreign direct investments, official donor assistance³⁶, remittances (Cerami and Stubbs 2013), and private-public partnerships. The

35 On de-commodification, de-stratification and de-clientelization strategies, see Esping-Andersen (1990) and Gought et al. (2001).

36 See OECD (2018).

https://public.tableau.com/views/AidAtAGlance/DACmembers?:embed=y&:display_count=no?&:showVizHome=no#1

establishment of a new “fiscal contract” seems necessary also to address the “dictatorship dilemma”, according to which dictators or religious Leviathans can foster their acceptance among the population and electoral representation through new forms of social cooptation (see Genschel et al. 2016). Considering these circumstances, the available data strongly suggest that the ways in which “people illuminate the night” (Román and Stokes 2015) and their life will be strongly correlated to the positive introduction of a new fiscal contract and new steering-mechanisms. However, the new delivery capacity of Iraq's *oil-led state-captured capitalism* with associated *oil-led state-captured war-fare regime*, including its new fiscal contract, must be seriously examined. This also implies taking into consideration possible positive incentives and the creation of unforeseen adverse social bondage activities.

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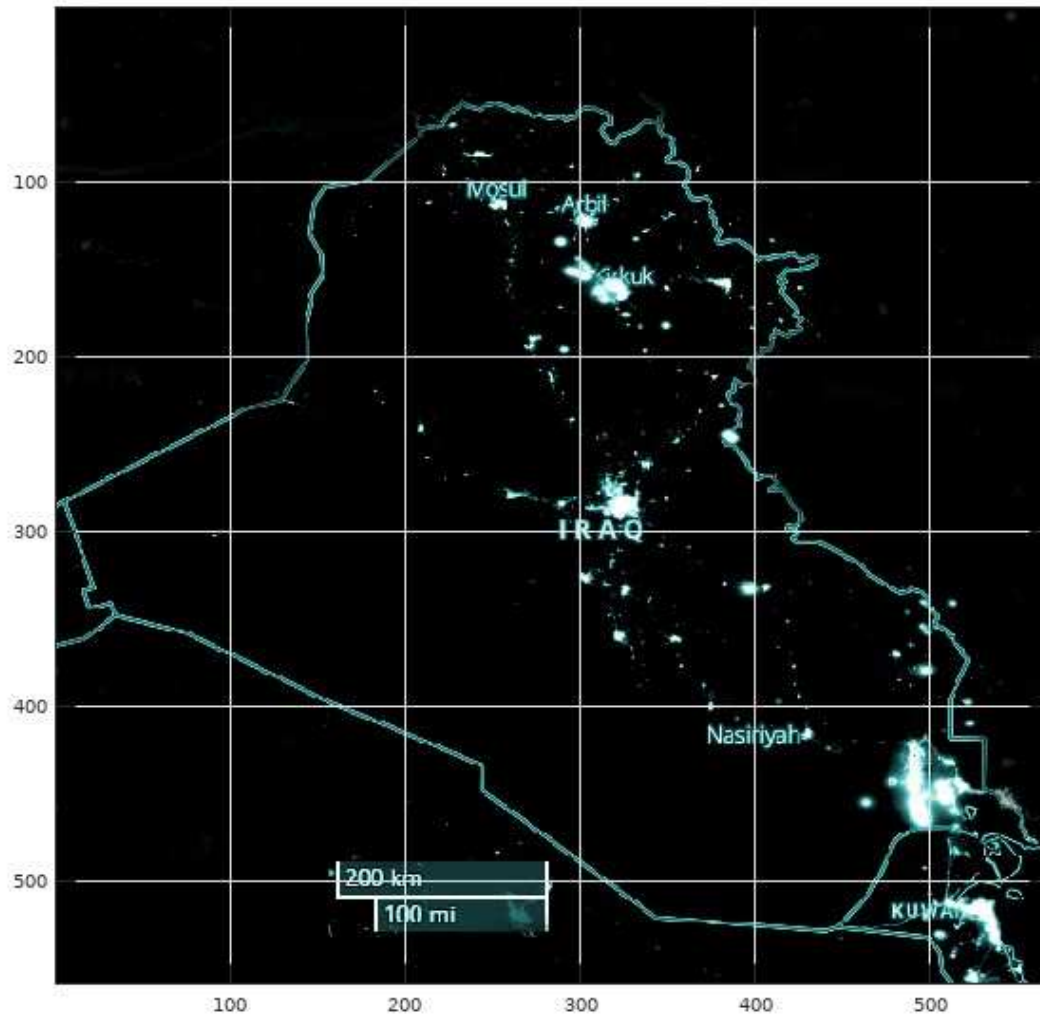
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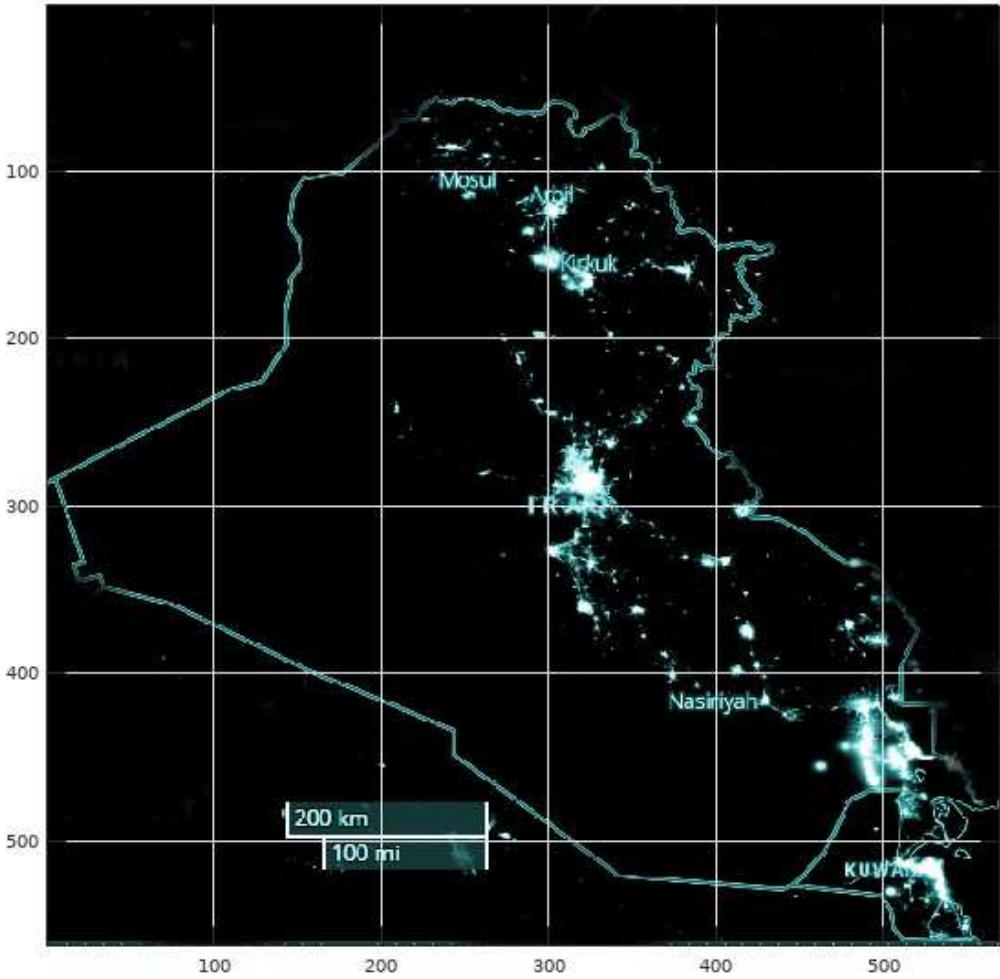
ANNEX

Fig. 1 Prosperity Shining Iraq 2012 SUOMI-NPP/VIIRS



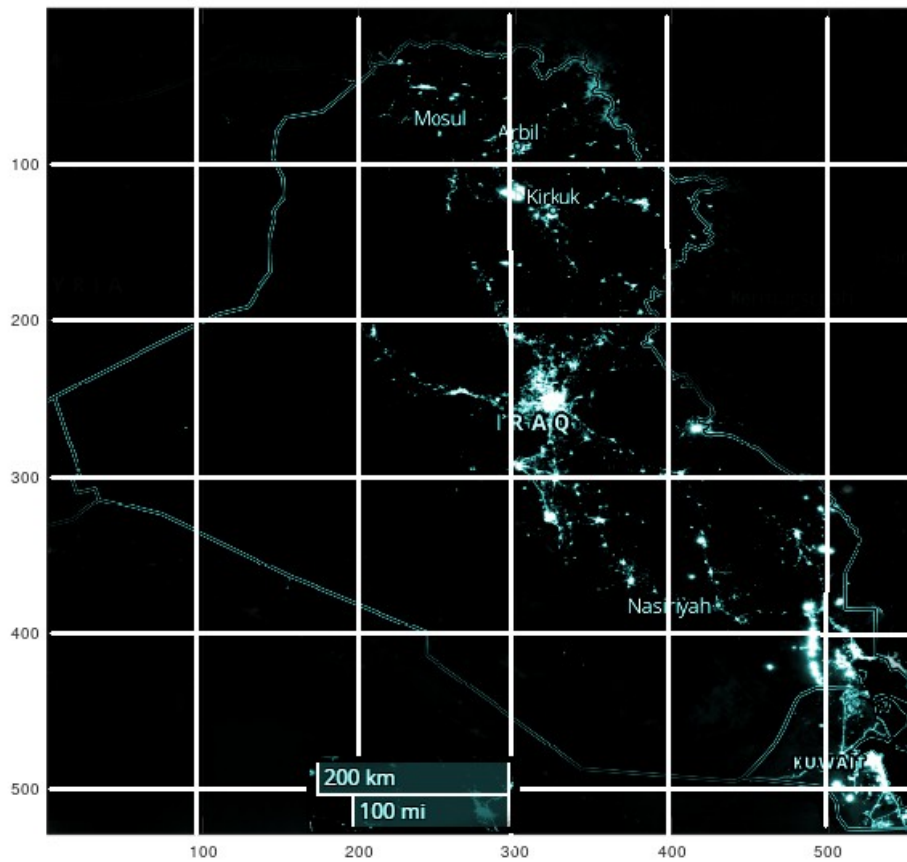
Source: SUOMI-NPP VIIRS (2018). Available at: <https://jointmission.gsfc.nasa.gov/viirs.html>

Fig. 2 Prosperity Shining Iraq 2016 SUOMI-NPP/VIIRS



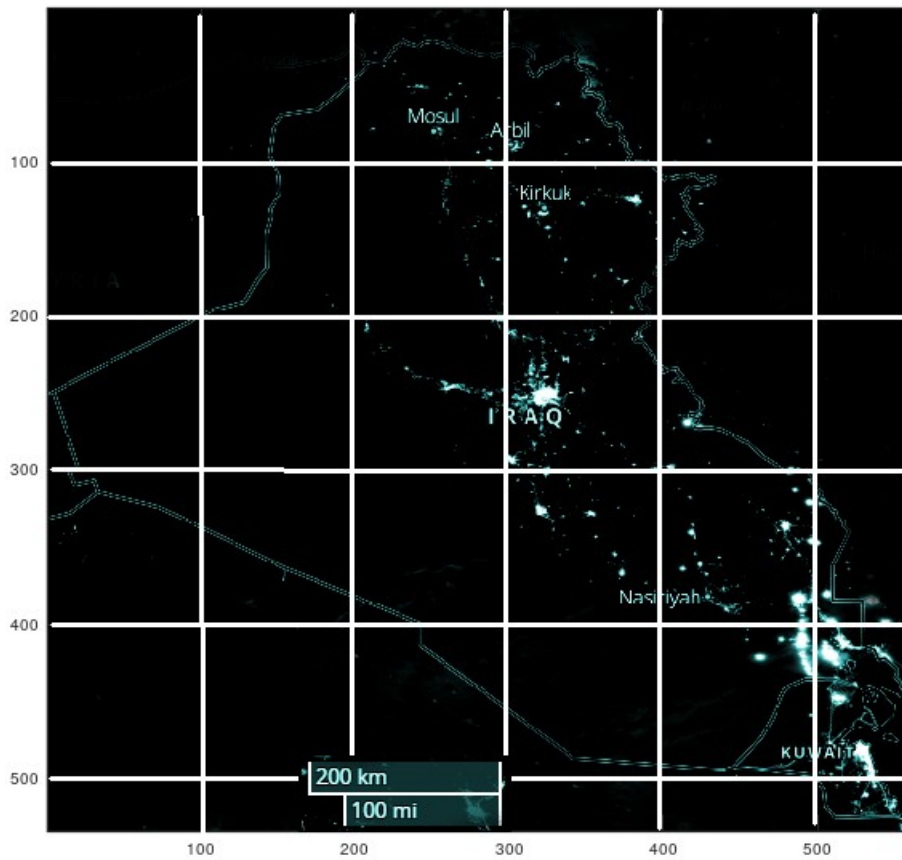
Source: SUOMI-NPP VIIRS (2018). Available at: <https://jointmission.gsfc.nasa.gov/viirs.html>

Fig. 3 Prosperity Shining Iraq March 9, 2017 SUOMI-NPP/VIIRS



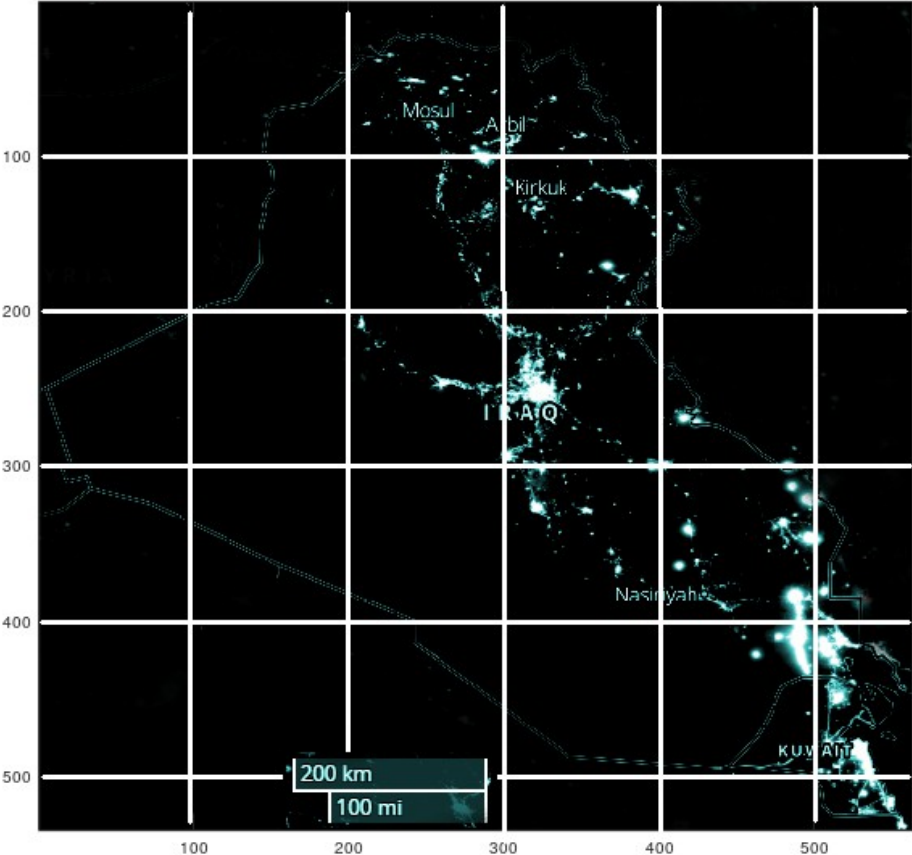
Source: SUOMI-NPP VIIRS (2018). Available at: <https://jointmission.gsfc.nasa.gov/viirs.html>

Fig. 4 Iraq Map March 31, 2018 Prosperity Shining SUOMI-NPP/VIIRS



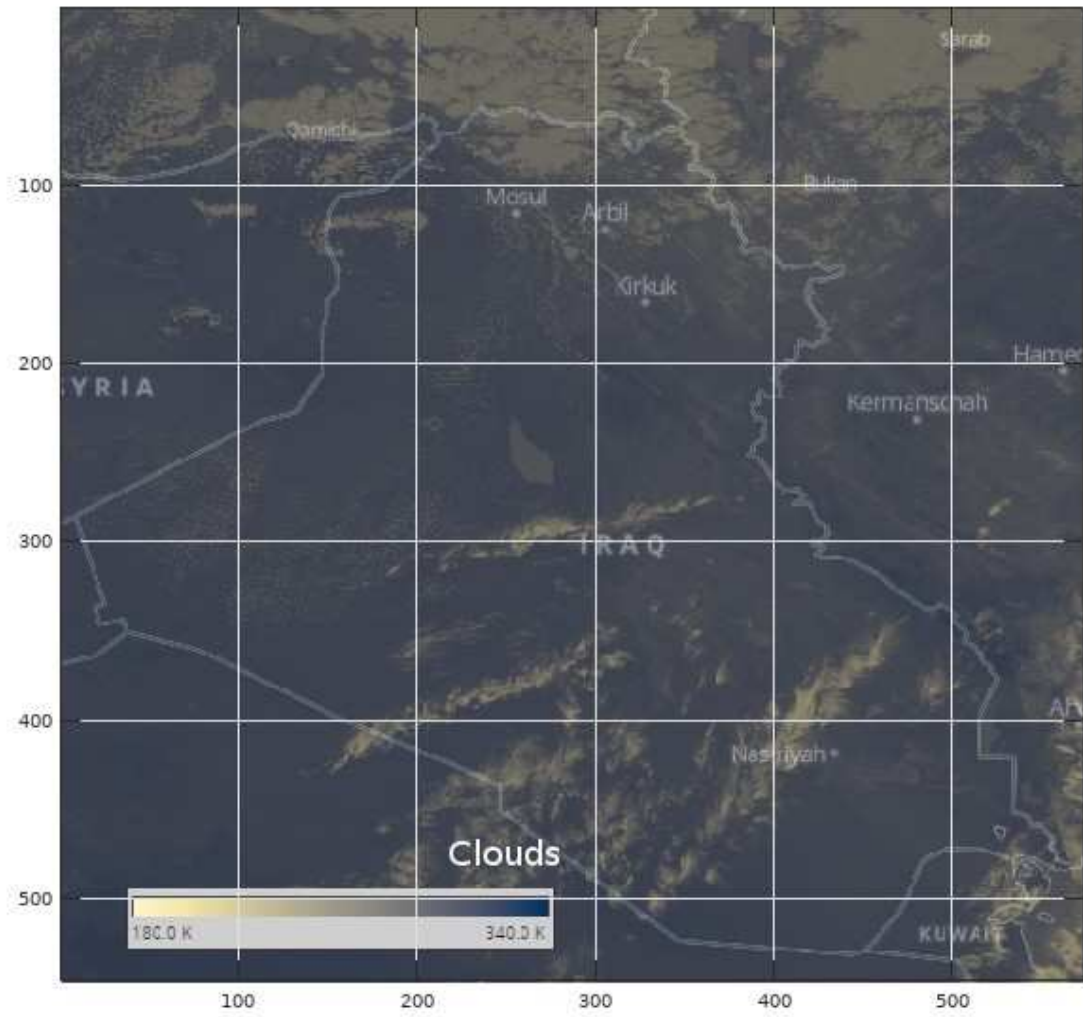
Source: SUOMI-NPP VIIRS (2018). Available at: <https://jointmission.gsfc.nasa.gov/viirs.html>

Fig. 5 Iraq Map May 26, 2018 Prosperity Shining SUOMI-NPP/VIIRS



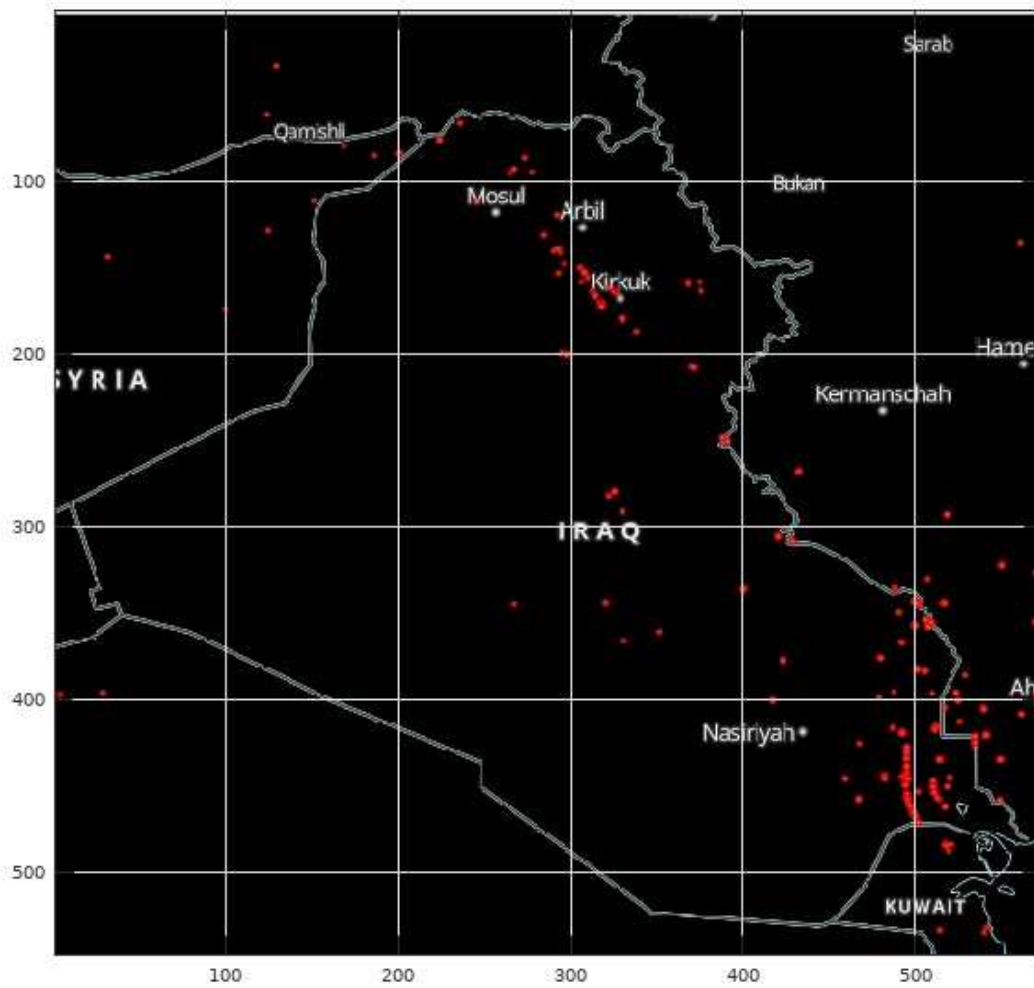
Source: SUOMI-NPP VIIRS (2018). Available at: <https://jointmission.gsfc.nasa.gov/viirs.html>

Fig. 6 Brightness Temperature (Band I5, Day) March 31, 2018 SUOMI-NPP/VIIRS



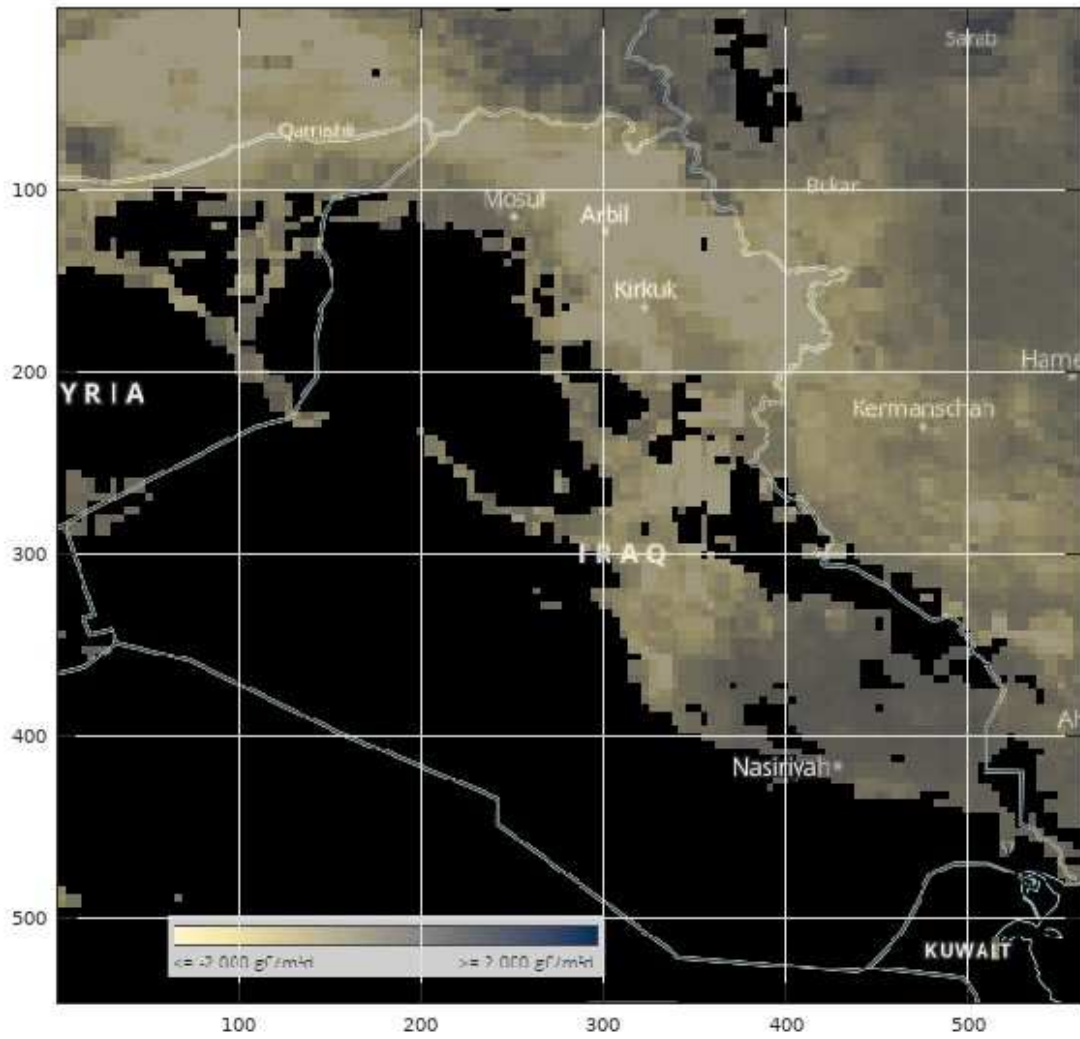
Source: SUOMI-NPP VIIRS (2018). Available at: <https://jointmission.gsfc.nasa.gov/viirs.html>

Fig. 7 Fires and Thermal Anomalies Day/Night March 31, 2018 SUOMI-NPP/VIIRS



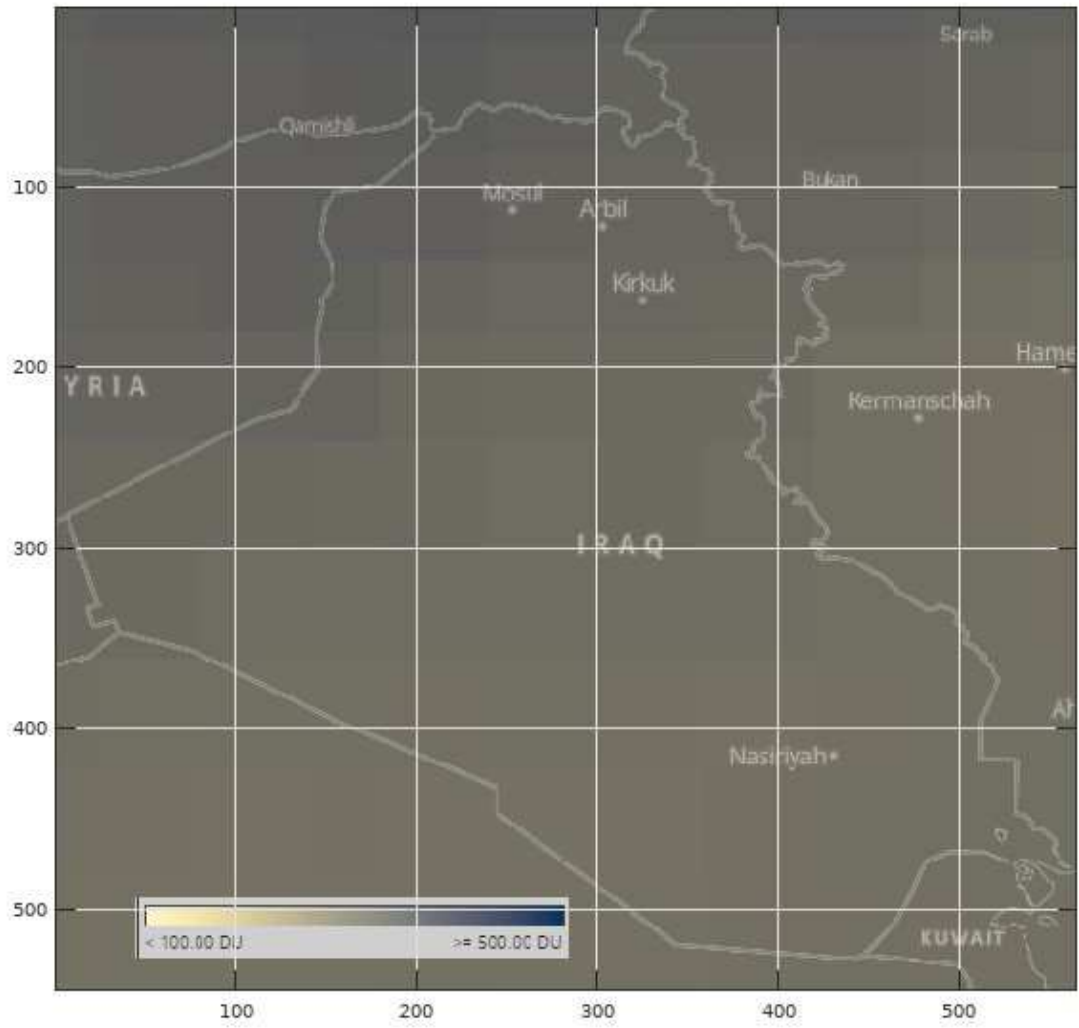
Source: SUOMI-NPP VIIRS (2018). Available at: <https://jointmission.gsfc.nasa.gov/viirs.html>

Fig. 8 Net Ecosystem Carbon Dioxide (CO₂) Exchange March 31, 2018 SUOMI-NPP/VIIRS



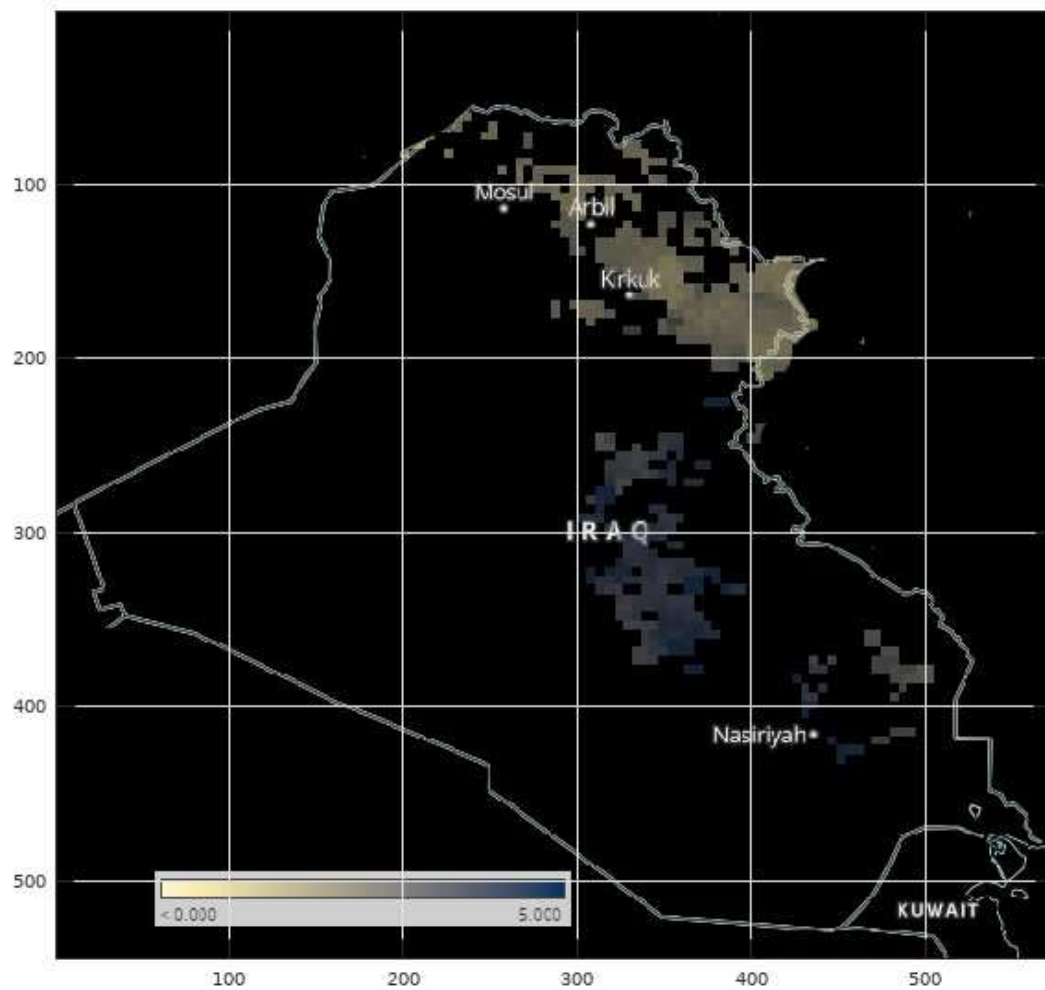
Source: SUOMI-NPP VIIRS (2018). Available at: <https://jointmission.gsfc.nasa.gov/viirs.html>

Fig. 9 Ozone March 31, 2018 AURA/OMI



Source: AURA OMI (2018). Available at: <https://aura.gsfc.nasa.gov/>

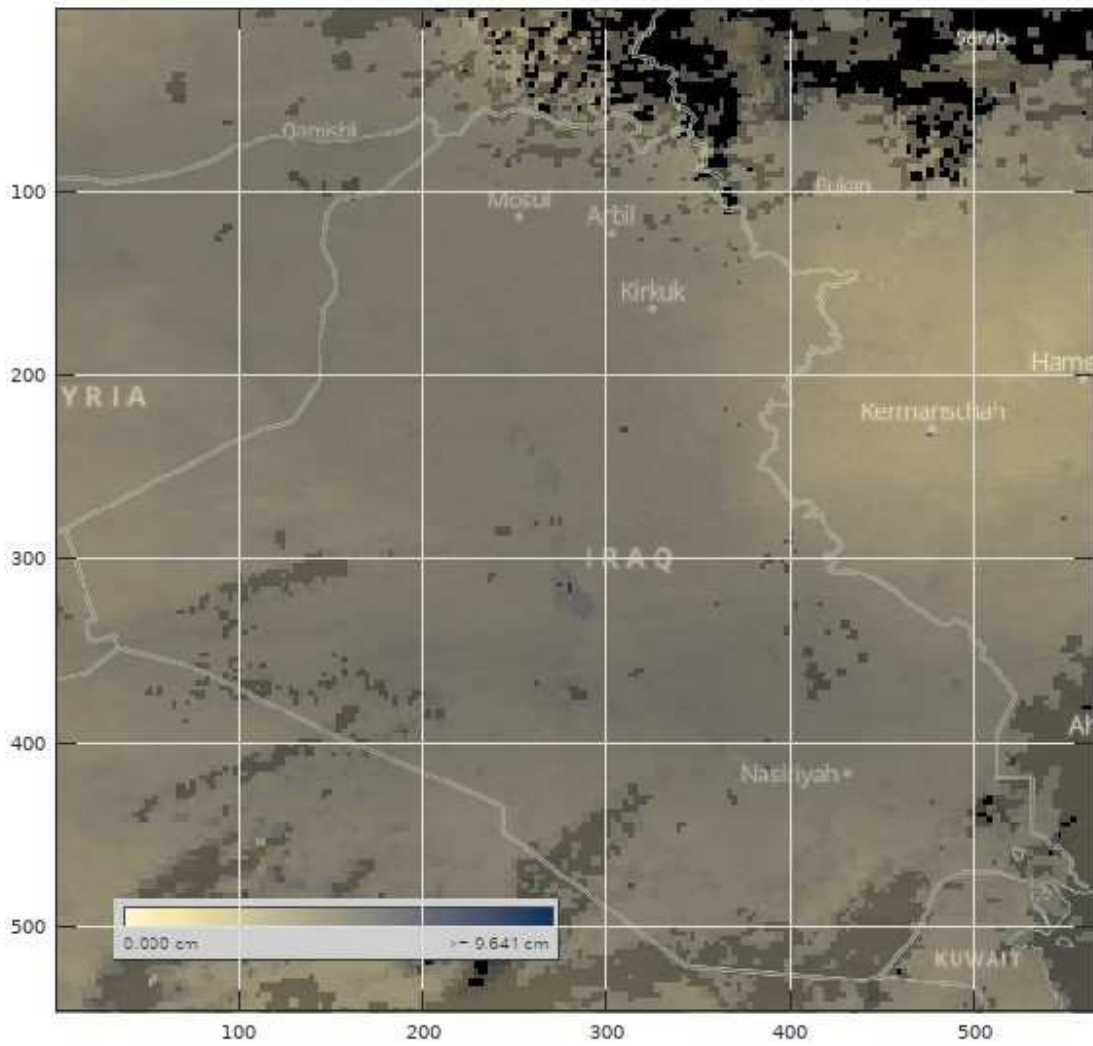
Fig. 10 Aerosol Optical Depth March 31, 2018 TERRA/MODIS



Source: TERRA MODIS (2018). Available at:

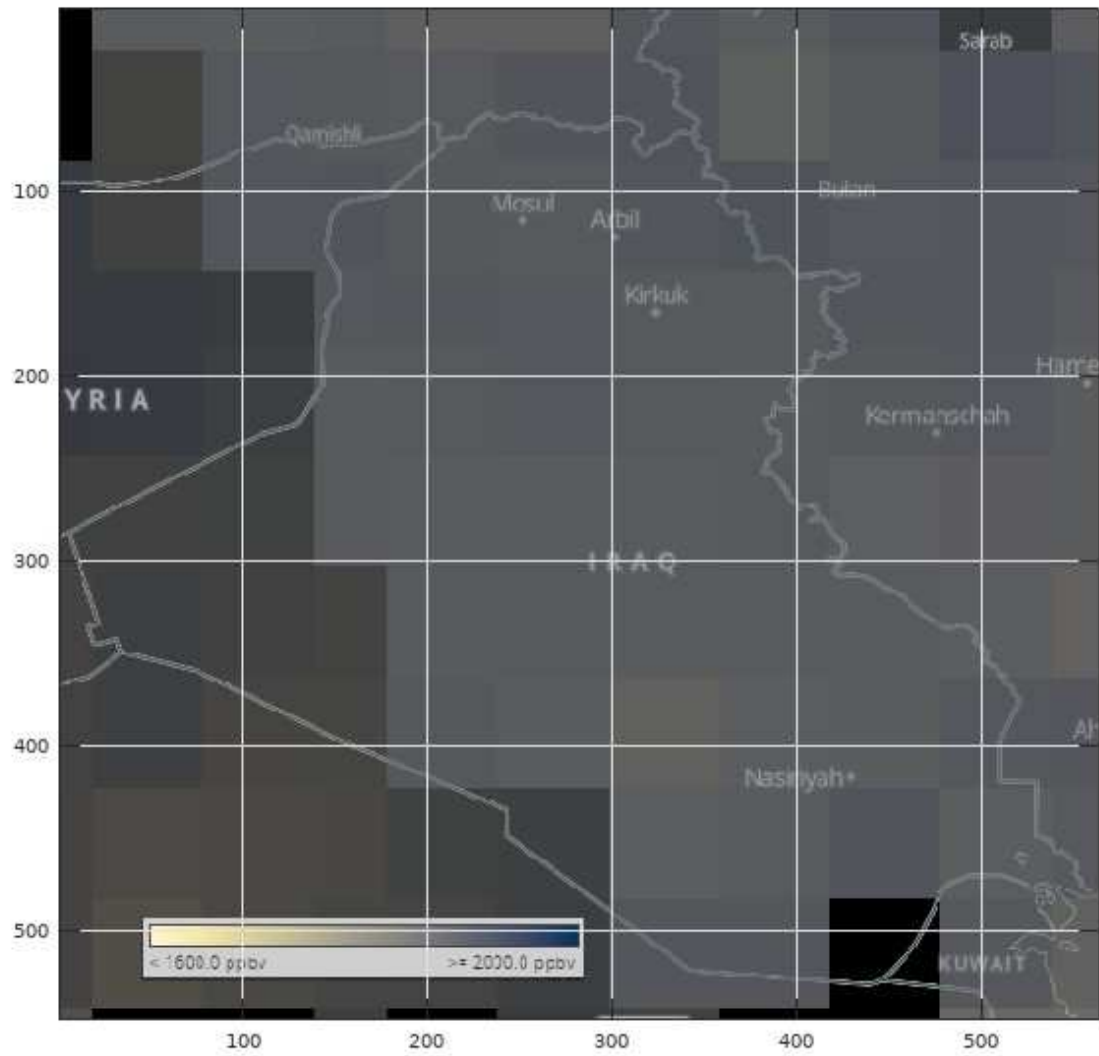
<https://www.earthobservatory.nasa.gov/Features/Terra/>

Fig. 11 Water Vapor March 31, 2018 TERRA/MODIS



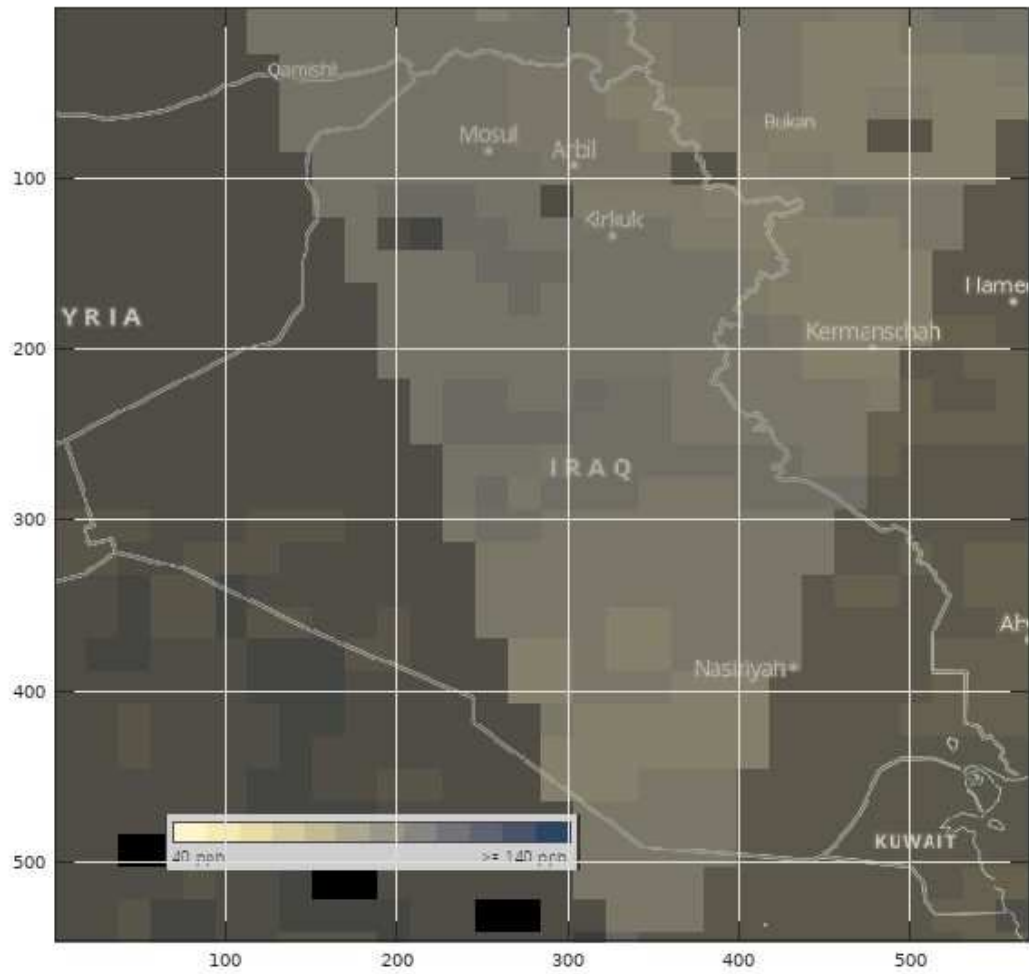
Source: TERRA MODIS (2018). Available at:
<https://www.earthobservatory.nasa.gov/Features/Terra/>

Fig. 12 Methane March 31, 2018 AQUA/AIRS



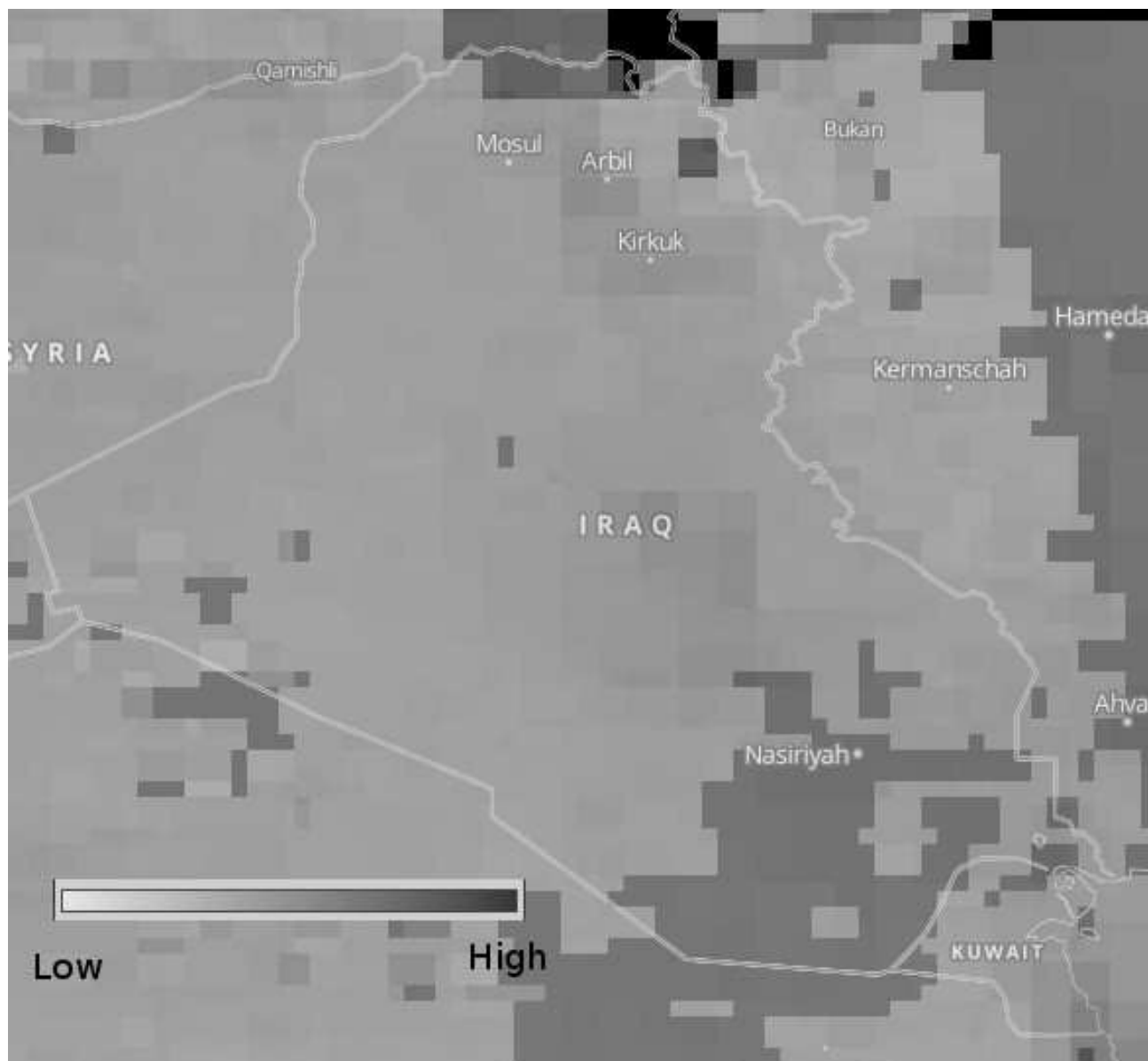
Source: AQUA AIRS (2018). Available at: <https://aqua.nasa.gov/>

Fig. 13 Carbon Monoxide March 31, 2018 AQUA/AIRS



Source: AQUA AIRS (2018). Available at: <https://aqua.nasa.gov/>

Fig. 14 Carbon Monoxide+Nitrogen Dioxide March 31, 2018 AURA OMI and TERRA/MOPITT



Source: AURA OMI & TERRA Measurements of Pollution in the Troposphere (MOPITT) Near real-time data (2018). Available at: <https://www.earthobservatory.nasa.gov/Features/Terra/>