Comment on ‘Assessing ExxonMobil’s climate change communications (1977–2014)’ Supran and Oreskes (2017 Environ. Res. Lett. 12 084019)

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Abstract

Supran and Oreskes (Environ. Res. Lett. 12 084019) employ a textual content analysis and comparison of 187 climate change communications from ExxonMobil (and its predecessor companies) to determine whether a discrepancy exists between published opinion pieces (‘advertorials’) and internal technical documents. Based on their analysis, the authors conclude that the company (ExxonMobil) misled the public. That conclusion is premised on at least two methodological flaws. First, the authors largely compared data from two different companies who were direct competitors to determine whether there was a discrepancy between them. Ignoring that before 1999 Exxon Corporation and Mobil Oil Corporation were two separate companies, the authors compare the internal documents of one company to the public statements of another in an effort to find discrepancies in the messages conveyed. Second, the publication assessed only a small subset of available advertorials. The authors note that ‘the company [Mobil] took out an advertorial every Thursday between 1972 and 2001’ or approximately 1560 times. Yet they chose to review only the 36 advertorials (or less than 3%) that were selected by another entity, Greenpeace, which has a well-documented history of animosity toward ExxonMobil. The authors’ reliance on limited data sets and their comparison of two unlike data sets call into question the publication’s conclusions.

In ‘Assessing ExxonMobil’s climate change communications (1977–2014)’ [1], Supran and Oreskes claim that ExxonMobil purposely deceived the public by communicating a position on climate change in a series of published advertorials that is inconsistent with other statements contained in internal documents and published in technical journals. To reach that conclusion, the authors conducted textual content analysis and compared 187 documents generated between 1977 and 2004.

The publication is premised on at least two methodological flaws. First, the publication largely compared data from two different companies to determine whether there was a discrepancy between them. This comparison ignores that before 1999, Exxon Corporation and Mobil Oil Corporation were two separate companies; they were incorporated and headquartered in different states and did not share management or employees.

It would be illogical therefore to compare the internal documents of one company during the pre-merger period (Exxon) with the contemporaneous public statements of the other company (Mobil). Yet the authors have done just that, obscuring the separateness of the two corporations by ‘refer[ring] to ExxonMobil Corporation, Exxon Corporation, and Mobil Oil Corporation as “ExxonMobil” throughout the publication and regardless of whether the companies were independent at the relevant point in time.

Tables 1–4 show the data set that was used for the publication. The vast majority of the public statements evaluated by the authors were issued solely by Mobil before the merger. Of the public statements, 25 of 36 (approximately 70%) pre-date the merger and were generated entirely by Mobil. Conversely, the overwhelming majority of internal documents from

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1 The authors acknowledge that ‘advertorials are sourced from a collection compiled by PolluterWatch.’ PolluterWatch is a project of Greenpeace, an activist group engaged in a long running anti-ExxonMobil campaign.
| Index | Year | 1st Author (affiliation) | Other Authors (affiliation) | Exxon Employee | Title of Document | Source | Company |
|-------|------|--------------------------|-----------------------------|----------------|------------------|--------|---------|
| 1     | 1982 | Garvey                  | Prahl; Nazimek; Shaw        | Garvey; Prahl; Nazimek; Shaw | Exxon Global CO\textsubscript{2} Measurement System | IEEE Trans. Instrum. Meas. | Exxon |
| 2     | 1983 | Hoffert (NYU)           | Flannery; Callegari; Hsieh (NYU); Wiscombe (NYU) | Flannery; Callegari | Evaporation-Limited Tropical Temperatures as a Constraint on Climate Sensitivity | Journal of the Atmospheric Sciences | Exxon |
| 3     | 1984 | Flannery                | N/A                         | Flannery       | Energy Balance Models Incorporating Transport of Thermal and Latent Energy | Journal of the Atmospheric Sciences | Exxon |
| 4     | 1984 | Flannery                | Callegari; Hoffert (NYU)    | Flannery; Callegari | Energy Balance Models Incorporating Evaporative Buffering of Equatorial Thermal Response | Climate Processes and Climate Sensitivity, Geophysical Monograph Series | Exxon |
| 5     | 1985 | Hoffert                 | Flannery                    | Flannery       | Model Projections of the Time-Dependent Response to Increasing Carbon Dioxide | Projecting the Climatic Effects of Increasing Carbon Dioxide, United States Department of Energy | Exxon |
| 6     | 1985 | Flannery                | Callegari; Hoffert (NYU); Hsieh (NYU); Wainger (NYU) | Flannery; Callegari | CO\textsubscript{2} Driven Equator-to-Pole Paleotemperatures: Predictions of an Energy Balance Climate Model with and without a Tropical Evaporation Buffer | The Carbon Cycle and Atmospheric CO\textsubscript{2}; Natural Variations Archean to Present, Geophysical Monograph 32 | Exxon |
| 7     | 1988 | Thomas                  | Denton                      | Thomas; Denton* | Conceptual studies for CO\textsubscript{2}/natural gas separation using the controlled freeze zone (CFZ) process | Gas Separation and Purification | Exxon |
| 8     | 1991 | Kheshgi                 | Hoffert (NYU); Flannery     | Flannery       | Marine Biota Effects on the Compositional Structure of the World Oceans | J. Geophys. Res. | Exxon |
Table 2. Pre-Merger Non–Peer Reviewed Documents Cited in Supran & Oreskes Study.

| Index | Year | 1st Author (affiliation) | Other Authors (affiliation) | Exxon Employee | Title of Document | Source | Company |
|-------|------|-------------------------|-----------------------------|----------------|------------------|--------|---------|
| 1     | 1980 | Shaw                    | N/A                         | Shaw           | Draft statements of findings and recommendations | National Commission on Air Quality CO₂ Workshop | Exxon |
| 2     | 1981 | Hoffert (NYU)           | Callegari; Hsieh (NYU)      | Callegari      | A Box-diffusion Carbon Cycle Model with Upwelling, Polar Bottom Water Formation and a Marine Biosphere | Carbon Cycle Modeling, SCOPE 16 | Exxon |
| 3     | 1981 | Angell (NOAA)           | Flannery; many others (none from Mobil) | Flannery      | The Atmosphere | Proceedings of the Workshop on First Detection of Carbon Dioxide | Exxon |
| 4     | 1982 | Warner Jr. (Mobil)      | N/A                         | N/A            | Energy and the Environment: the Next Decade Inventing the Future: Energy and the CO₂ ‘Greenhouse’ Effect | UNEP Industry and Environment Special Issue 1982 | Mobil |
| 5     | 1984 | David Jr.               | N/A                         | David Jr.      | The sensitivity of CO₂ projections to ocean processes | Climate Processes and Climate Sensitivity, Geophysical Monograph Series | Exxon |
| 6     | 1989 | Kheshgi                 | N/A                         | Kheshgi        | Research relevant to the integrated assessment of climate change Accounting for the Missing Carbon-Sink with the CO₂-Fertilization Effect | Third International Conference on Analysis and Evaluation of Atmospheric CO₂ Data | Exxon |
| 7     | 1992 | Hadlow                  | N/A                         | Hadlow         | Update of Industry Experience With CO₂ Injection | SPE Annual Technical Conference and Exhibition, 4–7 | Exxon |
| 8     | 1995 | Kheshgi                 | N/A                         | Kheshgi        | Research relevant to the integrated assessment of climate change Accounting for the Missing Carbon-Sink with the CO₂-Fertilization Effect | Proceedings of the Third Japan-US Workshop on Global Change Modeling and Assessment | Exxon |
| 9     | 1995 | Jain (UIUC); Wuebbles (UIUC) | Kheshgi                   | Kheshgi        | Use of carbon isotopes for the calibration of global carbon cycle models | Tsukuba Global Carbon Cycle Workshop | Exxon |
| 10    | 1995 | Jain (UIUC)             | Kheshgi; Wuebbles (UIUC)   | Kheshgi        | Use of carbon isotopes for the calibration of global carbon cycle models | Tsukuba Global Carbon Cycle Workshop | Exxon |
| 11    | 1996 | Edmonds (PNNL)          | Brown (PNNL); Wise (PNNL); Kheshgi; Sands (PNNL) | Kheshgi        | Agriculture, Land Use, and Commercial Biomass Energy Climate change: do not ignore the facts ‘Global Warming: who’s right?’—Exxon Spring Publication, The Lamp | Pacific Northwest National Lab, prepared for the US Dept. of Energy ‘Global Warming: who’s right?’—Exxon Spring Publication, The Lamp | Exxon |
| 12    | 1996 | Raymond                 | N/A                         | Raymond        | Climate change: do not ignore the facts ‘Global Warming: who’s right?’—Exxon Spring Publication, The Lamp | 'Global Warming: who's right?'—Exxon Spring Publication, The Lamp | Exxon |
| 13    | 1996 | Adler                   | N/A                         | Adler          | Global warming. What to think? What to do? ‘Global Warming: who’s right?’—Exxon Spring Publication, The Lamp | | Exxon |
| Index | Year | 1st Author (affiliation) | Other Authors (affiliation) | Exxon Employee | Title of Document | Source | Company |
|-------|------|--------------------------|----------------------------|----------------|-------------------|--------|---------|
| 14    | 1997 | Flannery                 | Kheshgi; Marland (ORNL);   | Kheshgi        | Geoengineering    | Engineering response to global climate change: planning a research and development agenda | Exxon |
|       |      |                          | MacCracken (USGCRP)        |                | climate          |        |         |
|       |      |                          |                            |                | response          |        |         |
|       |      |                          |                            |                | agenda            |        |         |
| 15    | 1997 | Raymond                  | N/A                        | Raymond        | Energy—key to growth and a better environment for Asia-Pacific nations | Speech at World Petroleum Congress (October 13, 1997) | Exxon |
| 16    | 1998 | Raymond                  | N/A                        | Raymond        | Global climate change, everyone’s debate | N/A [Pamphlet] | Exxon |
| 17    | 1999 | Kheshgi                  | Archer (Chicago)           | Kheshgi        | Modeling the Evasion of CO2 Injected into the Deep Ocean | Greenhouse Gas Control Technologies | Exxon |
| 18    | 1999 | Kheshgi                  | Jain (UIUC)                | Kheshgi        | Reduction of the atmospheric concentration of methane as a strategic response option to global climate change | Greenhouse Gas Control Technologies | Exxon |
| Index | Year | 1st Author | Other Authors | To | CC | Title | Company |
|-------|------|------------|---------------|----|----|-------|---------|
| 1     | 1977 | Shaw       | N/A           | Harrison | Alpert | Environmental Effects of Carbon Dioxide | Exxon |
| 2     | 1978 | Black      | N/A           | Turpin    | N/A   | The Greenhouse Effect | Exxon |
| 3     | 1978 | Shaw       | N/A           | David Jr  | N/A   | Untitled (request for a credible scientific team) | Exxon |
| 4     | 1978 | Weinberg   | N/A           | Gornowski | N/A   | CO2 | Exxon |
| 5     | 1979 | Shaw       | N/A           | Weinberg  | Werthamer | Research in Atmospheric Science | Exxon |
| 6     | 1979 | Mastracchio| N/A           | Hirsch    | Black  | Controlling Atmospheric CO2 | Exxon |
| 7     | 1979 | Garvey     | Shaw; Broecker; Takahashi | Machta | N/A   | Proposed Exxon Research Program to Help Assess the Greenhouse Effect | Exxon |
| 8     | 1980 | Weinberg   | N/A           | Shaw; Werthamer | N/A | Exxon's View and Position on 'Greenhouse Effect' | Exxon |
| 9     | 1980 | Eckelmann  | N/A           | O'Loughlin | David | Exxon's View and Position on 'Greenhouse Effect' | Exxon |
| 10    | 1980 | Shaw       | N/A           | Kett      | McCall | Exxon Research and Engineering Company's Technological Forecast CO2 Greenhouse Effect | Exxon |
| 11    | 1980 | Werthamer  | N/A           | Weinberg  | N/A   | CO2 Greenhouse Communications Plan | Exxon |
| 12    | 1981 | Gervasi    | N/A           | Northington | Preston | CO2 Emissions Natuna Gas Project | Exxon |
| 13    | 1981 | Shaw       | N/A           | David     | Barnum | CO2 Position Statement | Exxon |
| 14    | 1981 | Cohen      | N/A           | Glass     | Weinberg | Untitled (catastrophic effects letter) | Exxon |
| 15    | 1981 | Long       | N/A           | Lucchesi  | Barnum | Atmospheric CO2 Scoping Study | Exxon |
| 16    | 1982 | Weinberg   | Cohen; Callegari; Flannery | N/A | N/A | CO2-Greenhouse Effect; Corporate Research Climate Modeling | Exxon |
| 17    | 1982 | Glaser     | N/A           | Cohen     | N/A   | CO2 ‘Greenhouse’ Effect | Exxon |
| 18    | 1982 | Natkin     | N/A           | Weinberg  | Forshee | CRL/CO2 Greenhouse Program | Exxon |
| 19    | 1982 | Cohen      | Levine; Natkin | Callegari | N/A   | Untitled (consensus on CO2 letter) | Exxon |
| 20    | 1982 | Cohen      | N/A           | Kimon     | Berner | Untitled (Esso project terminated letter) | Exxon |
| 21    | 1983 | Gervasi    | N/A           | Downing   | Gates  | Background Paper Environmental Issues Natuna Gas Project | Exxon |
| 22    | 1983 | Natkin     | N/A           | Preston   | Gervasi | Untitled (ocean storage environmental concerns letter) | Exxon |
| 23    | 1984 | Flannery   | Callegari; Nair; Roberge | N/A | N/A | The Fate of CO2 from the Natuna Gas Project if Disposed of by Subsea Sparging | Exxon |
| Index | Year | 1st Author (affiliation) | Other Authors (affiliation) | To | CC | Title                                                                 | Company                      |
|-------|------|--------------------------|-----------------------------|----|----|----------------------------------------------------------------------|------------------------------|
| 24    | 1984 | Callegari                | N/A                         | N/A| N/A| Corporate Research Program in Climate/CO2-Greenhouse                | Exxon                        |
| 25    | 1984 | Shaw                     | N/A                         | N/A| N/A| CO2 Greenhouse and Climate Issues                                    | Exxon                        |
| 26    | 1985 | Flannery                 | N/A                         | N/A| N/A| CO2 Greenhouse Update 1985                                          | Exxon                        |
| 27    | 1985 | Shaw                     | Henrikson                   | Lab Directors/Program Managers | Cohen | CR Interactions (handout for June 12th meeting with Lee Raymond) | Exxon                        |
| 28    | 1988 | Carlson                  | N/A                         | Levine | N/A | The Greenhouse Effect                                                | Exxon                        |
| 29    | 1989 | Levine                   | N/A                         | N/A| N/A| Potential Enhanced Greenhouse Effects, Status and Outlook           | Exxon                        |
| 30    | 1989 | Flannery                 | N/A                         | N/A| N/A| Greenhouse Science                                                   | Exxon                        |
| 31    | 1994 | Bernstein               | N/A                         | Members of Global Climate Coalition | N/A | Primer on Climate Change Science                                    | Exxon, Mobil (Global Climate Coalition) |

Table 3. (Continued).
Table 4. Pre-Merger Advertorials Cited in Supran & Oreskes Study.

| Index | Date       | Title                                      | Company |
|-------|------------|--------------------------------------------|---------|
| 1     | 7/6/1989   | People Who Live in Greenhouses             | Mobil   |
| 2     | 6/9/1994   | 33/50: An experiment that works            | Mobil   |
| 3     | 9/28/1995  | The sky is not falling                     | Mobil   |
| 4     | 12/12/1996 | A policy agenda for tomorrow               | Mobil   |
| 5     | 7/18/1996  | Less heat, more light on climate change    | Mobil   |
| 6     | 7/26/1996  | With climate change, what we do not know can hurt us | Mobil |
| 7     | 3/6/1997   | Stop, look and listen before we leap       | Mobil   |
| 8     | 6/23/1997  | Climate change: let us get it right        | Mobil   |
| 9     | 7/31/1997  | The Senate Speaks                          | Mobil   |
| 10    | 8/14/1997  | When facts do not square with the theory, throw out the facts | Mobil |
| 11    | 10/16/1997 | CNN and the value of instant replay        | Mobil   |
| 12    | 10/23/1997 | Global climate change                      | Mobil   |
| 13    | 10/30/1997 | Reset the alarm                            | Mobil   |
| 14    | 11/6/1997  | Science: what we know and do not know      | Mobil   |
| 15    | 11/13/1997 | Climate change: a prudent approach         | Mobil   |
| 16    | 11/20/1997 | Climate change: where we come out          | Mobil   |
| 17    | 12/4/1997  | Climate change: a degree of uncertainty    | Mobil   |
| 18    | 12/18/1997 | The Kyoto conference                       | Mobil   |
| 19    | 1/29/1998  | Post Kyoto, what’s next?                   | Mobil   |
| 20    | 11/5/1998  | The Kyoto Protocol: a painful response     | Mobil   |
| 21    | 4/15/1999  | Helping Earth breathe easier               | Mobil   |
| 22    | 7/29/1999  | Where we are and where we may be heading   | Mobil   |
| 23    | 8/5/1999   | Some ways to make a difference             | Mobil   |
| 24    | 8/12/1999  | Scenarios for stabilization                | Mobil   |
| 25    | 8/19/1999  | Lessons Learned                            | Mobil   |

the pre-merger period were generated by Exxon. In fact, only two out of 78 documents (approximately 3%) can be attributed to Mobil. All (29 out of 29) peer-reviewed articles, virtually all (17 out of 18) non-peer-reviewed documents, and virtually all (30 out of 31) internal documents considered by the publication in the pre-merger time period are attributable to Exxon. Accordingly, the bulk of the publication is devoted to comparing Mobil’s public statements to Exxon’s publications and internal documents during a period of time when Exxon bore no responsibility for Mobil’s public statements and Mobil bore no responsibility for Exxon’s publications and internal documents. Having compared fundamentally dissimilar data sets in search of a discrepancy, the authors committed a fundamental methodological error that renders their conclusions invalid.

Second, the publication assessed only a small subset of available advertorials. The authors report that the ‘the company [Mobil] took out an advertorial every Thursday between 1972 and 2001’ or approximately 1560 times. Yet they chose to review only 36 advertorials (or less than 3%) that were cherry-picked by another entity, Greenpeace, an activist group engaged in a long running anti-ExxonMobil campaign.2 This reliance on limited and non-representative data sets (generated with undisclosed selection criteria) further calls into question the validity of the data used to support the publication’s conclusions.

Based on these two methodological flaws, it is clear that valid conclusions cannot be drawn from the data sets analyzed.

As further proof that the article is fundamentally flawed, at ExxonMobil’s request, Dr Kimberly Neuendorf, a professor at Cleveland State University who developed the content analysis method the authors relied on and cited in their research, conducted a review of the publication [2], and found the content analysis contained ‘numerous fundamental and fatal flaws.’

Dr Neuendorf concluded the content analysis used in the publication ‘is unreliable, invalid, biased, not generalizable, and not replicable.’ Dr Neuendorf said the publication did not provide scientific support for either a discrepancy among ExxonMobil’s climate change communications, or a claim that ExxonMobil misled the public.

In addition to data selection deficiencies, Dr Neuendorf identified defects in the coding of documents. According to Dr. Neuendorf, ‘To maintain objectivity, content analysis coding ought to be conducted by coders who are at arm’s-length with regard to the research.’ Dr Neuendorf observed that the authors’ ‘selection of themselves as coders is inappropriate because they are not blind to the purpose of the research or independent of each other.’

2 The authors acknowledge that ‘[a]dvertorials are sourced from a collection compiled by PolluterWatch,’ which is a project of Greenpeace.
Dr Neuendorf’s comments on the process and the coding further reinforce our assertion that several errors were made in the process of developing the argument. The publication does not provide scientific support for either a discrepancy among ExxonMobil’s climate change communications, or a claim that ExxonMobil misled the public.

In light of the authors’ comparison of two unlike data sets, their reliance on limited and targeted data sets, and their questionable coding practices, the conclusions set forth in the publication cannot be credited.

Any data that support the findings of this study are included within the article.

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**References**

[1] Supran G and Oreskes N 2017 Assessing ExxonMobil’s climate change communications (1977–2014) *Environ. Res. Lett.* 12 08401

[2] Neuendorf K A 2018 Evaluation of the study ‘Assessing ExxonMobil’s climate change communications (1977–2014)’ by G Supran and N Oreskes 2017 *Environ. Res. Lett.* 12 084019 Report [https://corporate.exxonmobil.com/-/media/Global/Files/climate-change/Neuendorf-Report.pdf](https://corporate.exxonmobil.com/-/media/Global/Files/climate-change/Neuendorf-Report.pdf)