

# INTERNATIONAL LAW AND PRACTICE

## Arctic Networks and Legal Interpretations of the UN Commission on the Limits of the Continental Shelf

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### Abstract

The United Nations Commission on the Limits of the Continental Shelf is expected to play an essential role in delineating the rights of the Arctic states to seabed resources in the Arctic Ocean. In this article, the authors look to the effect of scientific discourse on Commission authority. The authors argue that in addition to the conferral of its authority by the United Nations Convention on the Law of the Sea, the Commission draws its authority in the Arctic from the way its regulatory frameworks, aimed at containing or closing off disputes about jurisdiction and sovereign rights, correlate with discursive practices used by transnational networks to reach scientific agreement.

### Key words

constructivism; international law; interpretation; science; UN Commission on the Limits of the Continental Shelf

## I. INTRODUCTION

Pursuant to the UN Convention on the Law of the Sea<sup>1</sup> both coastal states and the United Nations Commission on the Limits of the Continental Shelf (the Commission) are authorized to interpret Article 76 and apply it to determine the limits of a state's continental shelf. The authority of a coastal state derives from its entitlement to set the limits of its own continental shelf.<sup>2</sup> The authority of the Commission derives from the requirement that a state's limits must be established on the basis of Commission recommendations in order to be final and binding.<sup>3</sup> The problem, however, with conferring authority to interpret, and thereby define what constitutes compliance on multiple entities, is that the Convention recognizes multiple sources

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1 1982 United Nations Convention on the Law of the Sea, 1833 UNTS 397 [hereinafter the Convention]. The Convention is to be interpreted and applied together with the Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982, 28 July 1994, 1836 UNTS 3 [hereinafter 1994 Part XI Implementation Agreement] as a single instrument.

2 *Ibid.*, Art. 76(7); Ann. II, Art. 4.

3 *Ibid.*, Art. 76(8); Ann. II, Art. 4.

of valid legal interpretation – but no settled mechanism for ascertaining which will govern. As such, it is possible that states will act at odds with each other or with the Commission and still be construed as complying with international law. Various regional conflicts related to Commission authority attest to the ongoing relevance of this issue for all state parties.<sup>4</sup>

In so far as claims in the Arctic may be the product of extensive scientific research but still be contested, they perfectly illustrate the interpretive problems created by Article 76 and its effect on determining compliance with international law. Delineation has proven to be an interpretative task for Arctic states as well as for the Commission because Article 76 implicates different scientific theories of shelf measurement.<sup>5</sup> For example, the terms, ‘oceanic ridge’, ‘submarine ridge’, and ‘submarine elevation’ are not defined in the Convention and have been interpreted differently.<sup>6</sup> Interpretive differences have also arisen over issues such as how a coastal state calculates the fixed points by which to measure the 2,500 metre isobath,<sup>7</sup> how to connect a fixed point where part of the coastal state’s shelf extends to the 200 nautical miles and part extends beyond,<sup>8</sup> and how the thickness of sedimentary rocks, referred to in Article 76(4)(a)(i) should be interpreted where the topography is irregular.<sup>9</sup> These issues and others<sup>10</sup> have meant that maritime delimitation in the Arctic remains contested on many fronts.<sup>11</sup>

Despite these differences, the Commission on the Limits of the Continental Shelf is expected to play an essential role in delineating the rights of states to seabed

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- 4 For discussion of the issue in the Arctic, see T. L. McDorman, ‘The Role of the Commission on the Limits of the Continental Shelf: A Technical Body in a Political World’, (2002) 17(3) *Int’l J. Mar. & Coast. L.* 30; T. L. McDorman, ‘The International Legal Regime of the Continental Shelf with Special Reference to the Polar Regions’ in N. Loukacheva (ed.), *Polar Law Textbook II* (2013), 77, at 83 (unexpected number of states claiming shelf beyond 200 nm). For discussion in relation to South China Sea, see M. Sheng-ti Gau, ‘Recent Decisions of the Commission on the Limits of the Continental Shelf on Japan’s Submission for Outer Continental Shelf’, (2012) 11 *CJIL* 487. For discussion in relation to the South Atlantic, see A. Serdy, ‘Interpretation of UNCLOS Article 76 and the Negative Recommendation of the Commission on the Limits of the Continental Shelf on Ascension Island’, (2013) 2(3) *CJICL* 591.
- 5 T. Pedersen, ‘The Svalbard Continental Shelf Controversy: Legal Disputes and Political Rivalries’, (2006) 37 *Ocean Dev. & Int’l L.* 339; M. A. Allain, ‘Canada’s Claim to the Arctic: A Study in Overlapping Claims to the Outer Continental Shelf’, (2011) 42(1) *J. Mar. L. & Comm.* 1. For discussion, see T. H. Heidar, ‘Introduction’, in P. J. Cook and C. M. Carleton (eds.), *Continental Shelf Limits: The Scientific and Legal Interface* (2000), 3–7.
- 6 Convention, *supra* note 1, Art. 76(3). For discussion of the ridge issue, see H. Brekke and P. A. Symonds, ‘The Ridge Provisions of Article 76 of the UN Convention on the Law of the Sea’, in M. H. Nordquist, J. N. Moore, and T. H. Heidar (eds.), *Legal and Scientific Aspects of Continental Shelf Limits* (2004), 169; R. Macnab, ‘Submarine Elevations and Ridges: Wild Cards in the Poker Game of UNCLOS Article 76’, (2008) 39 *Ocean Dev. & Int’l L.* 223; M. Weber, ‘Defining the Outer Limits of the Continental Shelf across the Arctic Basin: The Russian Submission, States’ Rights, Boundary Delimitation and Arctic Regional Cooperation’, (2009) 24(4) *Int’l J. Marine and Coastal L.* 653.
- 7 Convention, *supra* note 1, Art. 76(5).
- 8 *Ibid.*, Art. 76(4)–(7); See Committee on ‘Legal Issues of the Outer Limits of the Continental Shelf’, in International Law Association Report of the Seventy Second Conference (2009), 215, 223–5.
- 9 See L. D. M. Nelson, ‘The Continental Shelf: Interplay of Law and Science’, in N. Ando et al. (eds.), *Liber Amicorum Judge Shigeru Oda* (2002), 1235–53.
- 10 For instance, parties maintain that differences over which method should be used to measure the median delimiting state boundaries; what zone or coasts should be used to fix the median line; what relevance islands play; what prior behaviour is relevant, and what the geomorphology supports, have all made Arctic delimitation contentious.
- 11 Several maritime boundaries have been settled. Agreements have been reached between Norway and Russia; Canada and Denmark (Greenland); Russia and the United States; Iceland and Norway; Denmark and Norway, as well as between Denmark, Greenland, and Iceland.

resources in the Arctic Ocean. Many predict delineation of the limits of the extended continental shelf in the Arctic to be one of those rare instances in international relations: where states will act as if their legal and sovereign rights can be made certain by reference to international law outlined in Article 76 of the Convention and interpreted by the Commission.<sup>12</sup> Each of the Arctic States with extended shelves – Canada, Norway, Russia, the United States, and Denmark (Greenland) – has been actively mapping the Arctic Ocean in order to delineate their respective rights in accordance with Article 76 and, apart from the United States, has submitted to the Commission.<sup>13</sup> They collectively issued the Ilulissat Declaration of 29 May 2008 in which they stated ‘that an extensive international legal framework applies to the Arctic Ocean’ and that ‘the law of the sea provides for important rights and obligations concerning the delineation of the outer limits of the continental shelf’.<sup>14</sup> Moreover, these statements have been strengthened by public pledges of policy makers to peacefully resolve their disputes in accordance with Article 76.<sup>15</sup> In short, against a background of potential disputation, it is predicted that Arctic states will adopt a markedly dutiful approach to the determination of their rights through law as submitted to the Commission.<sup>16</sup>

The legal literature has generally mirrored political expectations that the Commission can close off or narrow disputes in the Arctic through its determination of compliance.<sup>17</sup> Positivist in its orientation, legal scholarship on shelf delineation in the Arctic mostly focuses on the impacts of particular interpretations for state parties. This literature is mindful of non-legal influences on treaty interpretation, especially science, but generally in so far as the provision of technical data will permit states to prove that the components of the seabed reflect treaty terms.<sup>18</sup> For example, Oude Elferink, Elizabeth Ridell-Dixon, Ted McDorman, and Ron MacNab each reject the characterization of Arctic states scrambling for resources, instead

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- 12 M. Byers, *Who Owns the Arctic? Understanding Sovereignty Disputes in the North* (2009); E. Riddell-Dixon, ‘Canada’s Arctic Continental Shelf Extension’, (2008) 39(4) *Ocean Dev. & Int’l L.* 343.
- 13 Canada made a ‘partial’ submission in December 2013 which did not include the Arctic continental shelf. Further analysis is being undertaken with reference to the Lomonosov Ridge. Denmark/Greenland made its submission in December 2014 and, pointedly, included the geographic North Pole as part of its extended continental shelf.
- 14 The Ilulissat Declaration, 28 May 2008.
- 15 See, e.g., Canada’s statement that continental shelf mapping process is ‘not adversarial’, in *Northern Strategy: Our North, Our Heritage, Our Future* (Department of Indian and Northern Affairs, Government of Canada, 2009).
- 16 J. D. Carlson, et al., ‘Scramble for the Arctic: Layered Sovereignty, UNCLOS and Competing Maritime Territorial Claims’, in (2013) Vol. XXXIII No. 2 SAIS Review 21–43. For a contrary view, see N. Matz-Luck, ‘Planting the Flag in the Arctic Waters: Russia’s Claim to the North Pole’, (2009) 2(1) *Göttingen Journal of International Law* 235.
- 17 For the same argument, see J. Øystein, ‘The Commission on the Limits of the Continental Shelf: An Administrative, Scientific or Judicial Institution’, (2014) 45 *Ocean Dev. & Int’l L.* 171, at 171.
- 18 See, e.g., A. G. Oude Elferink, ‘The Continental Shelf in the Polar Regions: Cold War or Black Letter Law’, (2009) 40(1) *Netherlands Yearbook of International Law* 121, at 181 (law is paramount); T. McDorman, ‘The Continental Shelf Beyond 200 NM: Law and Politics in the Arctic Ocean’, (2009) 18 *Journal of Transnational Law and Policy* 155 (law will determine rights); MacNab, *supra* note 6 (effect of Commission); E. Riddell-Dixon, ‘Canada and Arctic Politics: The Continental Shelf Extension’, (2008) 39 *Ocean Dev. & Int’l L.* 343 (orderly determination by law). For broader discussion, see M. H. Nordquist, J. N. Moore, and T. H. Heidar (eds.) *Legal and Scientific Aspects of the Continental Shelf Limits* (2003); Cook and Carleton (eds.), *supra* note 5.

pointing to the orderly collection of data needed to prove claims in law.<sup>19</sup> While these scholars may or may not agree between themselves on the scope or effect of Commission authority, that authority is generally presumed to operate in accordance with a rationalist construct in which science is conducted and used for the purposes of containing or closing legal disputes about jurisdiction and sovereign rights.<sup>20</sup>

When, however, treaty interpretations and the science that supports those interpretations instead generate conflict, positivist accounts of Commission authority may be of limited explanatory value. This is because, when science is uncertain in an account of authority that relies on scientific agreement, law can cease to have determinative or predictive value. Fear that significant disputes will arise should the Commission not endorse the Lomonosov Ridge as a natural prolongation of Russia, Canada, or Denmark (or endorse all three), illustrates this possibility.<sup>21</sup> Should these Arctic states claim competing rights based on differing scientific arguments, interpretive uncertainties are likely to justify objections to conceptions of compliance forwarded by the Commission and fuel legal disputes rather than settle them.<sup>22</sup> Naturally, most legal scholars anticipate disputes over the interpretation and application of law but, absent the legal authority of the Commission to resolve them, relegate settlement to the realm of politics.<sup>23</sup> While providing analytical interpretations of treaty language, these accounts fail to explain how state interests are mobilized in relation to international law when those interests diverge and can therefore fail to theorize how law obtains meaning in the broader social context of international relations. Analytical jurisprudence on the meaning of text remains necessary but ultimately not sufficient for determining effect.

Building on scholarship that has identified the role of scientific discourse in global governance,<sup>24</sup> and more specific observations of scientific discourse in Arctic shelf delineation,<sup>25</sup> the authors found Commission authority partly in law and partly

19 Ibid.

20 For application of this approach to specific legal issues, see H. Brekke and P. Symonds, 'Submarine Ridges and Elevations of Article 76 in Light of Published Summaries of Recommendations of the Commission on the Limits of the Continental Shelf', (2011) 42(4) *Ocean Dev. & Int'l L.* 289; Weber, *supra* note 6; I. Basaran, 'The Lomonosov Ridge and the Overlapping Outer Continental Shelf Claim to the North Pole', (2015) 46(1) *J. Mar. L. & Comm.* 1; A. Grantz, 'Treatment of Ridges and Borderlands Under Article 76 of the United Nations Convention on the Law of the Sea: The Example of the Arctic Ocean', in Nordquist, et al., *supra* note 18.

21 See V. Golitzyn, 'Continental Shelf Claims in the Arctic Ocean: A Commentary', (2009) 24 *International Journal of Marine and Coastal Law* 401.

22 For discussion, see C. G. Lathrop, 'Continental Shelf Delimitation Beyond 200 Nautical Miles: Approaches Taken by Coastal States Before the Commission on the Limits of the Continental Shelf', in D. A. Colson and R. W. Smith (eds.), *International Maritime Boundaries* (2011), 4139–60. For the role of non-coastal states in disputes, see A. G. Oude Elferink, 'Establishment of Outer Limits of the Continental Shelf beyond 200 Nautical Miles by the Coastal State: The Possibilities of Other States to Have an Impact on the Process', (2009) 24 *Int'l J. Marine & Coastal L.* 535; M. Sheng-ti Gau, 'The Commission on the Limits of the Continental Shelf as a Mechanism to Prevent Encroachment upon the Area', (2011) 10(1) *CJIL* 3.

23 See, e.g., McDorman, *supra* note 18, at 161; Allain, *supra* note 5, at 36–37.

24 A. Orford, 'Scientific Reason and the Discipline of International Law', (2014) 25(2) *EJIL* 369; D. Kennedy, 'Challenging Expert Rule: The Politics of Global Governance', (2005) 27 *Syd. J. Int'l L.* 5; M. Finnemore, *National Interests in International Society* (1996); S. Jasanoff, *The Fifth Branch: Science Advisers as Policy Makers* (1990).

25 B. Baker, 'Law, Science and the Continental Shelf: The Russian Federation and the Promise of Arctic Cooperation', (2011) 25 *Am. U. Int'l L. R.* 251; O. Young, 'Review Article: The Future of the Arctic: Cauldron of Conflict

in the transnational technocratic regime that governs shelf science.<sup>26</sup> This article therefore echoes the concern of legal process scholars, such as Øystein, Suarez, and Cavnar, that depictions of the Commission as a legally-constituted body insufficiently explain its authority. Instead, much like these scholars, the authors look to how the Commission's administrative, procedural, or soft law powers are used to bolster and affect compliance.

Here, however, the authors adopt a constructivist approach to better describe how Arctic states address the uncertainty of Article 76 through a reliance on scientific consensus to provisionally close off debates about treaty interpretation. Using constructivism to obtain an empirical account of law, the authors look to the discursive practices of science to show that the Commission's regulatory authority is constantly affirmed and reaffirmed through its interaction with Arctic states as producers, consumers, and verifiers of science.

While the hard law or soft law authority of the Commission can be attributed in part to the language of the Convention, the authors argue that its authority is also sourced to the way its approach to scientific verification and consensus-building correlates with the discourses of scientific shelf communities in both domestic and transnational contexts. In making this argument, the authors use an empirical approach to identifying the processes through which law operates but for the pragmatic purpose of identifying the efficacy of international law when there are interpretive differences.<sup>27</sup> By identifying how science is used to interpret international law but also how science is used to navigate conflicting interpretations, this article provides an explanatory account of how international law operates in action and begins to consider its pragmatic use for Arctic relations.

In Part II of the article, the authors introduce the law at issue in delineating the limits of the continental shelf. In this part, the authors identify that the Commission's legal authority is likely to be tenuous where scientific interpretation of the scientific data remains contested, leaving legal explanations of compliance under-theorized. In Part III the authors review the literature that has linked the relevance of scientific reasoning to international law and in Part IV demonstrate that the parties use co-operative research, dissemination, and publication to bolster their submissions to the Commission. The effect for coastal states is to incentivize the use of the Commission's own discursive practices to reach agreement or consensus prior to submission and thereby increase the potential to have their desired interpretations adopted.

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or Zone of Peace?', (2011) 87(1) Int'l Affairs 185; T. Koivurova, 'The Dialectic of Understanding Progress in Arctic Governance', (2013) 22(1) Mich. St. Int'l L. Rev. 1; Lathrop, *supra* note 22; Nelson, *supra* note 9.

26 Øystein, *supra* note 17, at 171–85; S. V. Suarez, 'Commission on the Limits of the Continental Shelf and Its Function to Provide Scientific and Technical Advice', (2013) 12 CJIL 339; A. Cavnar, 'Accountability and the Commission on the Limits of the Continental Shelf: Deciding Who Owns the Ocean Floor', (2009) 42 Cornell Int'l L. J. 387.

27 For discussion of legal process as part of legal realism in relation to international law, see G. Shaffer, 'The New Legal Realist Approach to International Law', (2015) 28(2) LJIL 189.

## 2. THE UN CONVENTION ON THE LAW OF THE SEA

### 2.1. Textual uncertainty

The central function of the United Nations Convention of the Law of the Sea is to establish a number of maritime zones and define the rights and responsibilities of nations in their use of the world's oceans. One of those zones is the extended continental shelf. The Convention confers all coastal states with a continental shelf of 200 nautical miles, irrespective of the physiographic width of each state's shelf,<sup>28</sup> and confers an extended continental shelf beyond 200 nautical miles where the shelf is a natural prolongation of the state's land territory.<sup>29</sup> Pursuant to Article 76(4), the outer limits of the shelf will depend on either: (i) a line drawn by reference to points at which the thickness of the sediment is at least one per cent of the shortest distance to the foot of the continental slope; or (ii) a line drawn by reference to points no more than sixty nautical miles from the foot of the slope.<sup>30</sup>

Knowing where the limits of a coastal state's continental shelf are located has several implications for the rights and responsibilities of coastal states as well as other nation-states. Certainty allows coastal states to explore, plan, and license resource extraction and to exercise authority over activities permitted to non-coastal states on the shelf, such as marine scientific research.<sup>31</sup> While formally establishing the outer limits of the continental shelf is not a prerequisite for the exercise of state jurisdiction in the extended continental shelf,<sup>32</sup> the attraction of capital investment needed for resource development is dependent upon the certainty of sovereign rights. Moreover, the international community has an interest in the determination of the outer limits of the continental shelves of all coastal states, as anything beyond the extended continental shelf is the international seabed and managed by the International Seabed Authority.<sup>33</sup> Since the international seabed belongs to the common heritage of mankind, and confers future income on the international community, the determination of the outer limits is of the utmost interest to all nation-states.

Despite the seemingly legal nature of delineation, contention over interpretation in relation to the Arctic Ocean stems from the well-recognized problem that the Convention makes use of scientific terms in a legal context, which can depart significantly from accepted scientific definitions and terminology.<sup>34</sup> The legal complexity of determining the outer edges of the extended continental shelf is therefore partially due to the technical and definitional difficulties of determining its scientific requirements.<sup>35</sup> Yet, legal complexity is also ascribed to the dissonance between

28 Convention, *supra* note 1, Art. 76(1).

29 *Ibid.*, Art. 76(1), 76(4). The Convention defines the extended continental shelf as comprising the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin.

30 *Ibid.*, Art. 76(4).

31 *Ibid.*, Art. 246.

32 *Ibid.*, Art. 77(3).

33 *Ibid.*, Arts. 1(1), 133, 136.

34 See *supra* note 5.

35 McDorman, *supra* note 4.

science and law. As Philip Symonds notes: ‘the concept of a legal continental shelf defined by a series of rules or formulae is quite distinct and different from the morphologically-defined continental shelf of a geographer’.<sup>36</sup>

As a matter of law, indeterminacy in treaty text is dealt with in the Vienna Convention as interpretation. Interpretation of binding agreements rests upon the ‘ordinary meaning’ of the relevant terms, as supplemented by related documents and behaviour.<sup>37</sup> Where the ordinary meaning is ambiguous, the Vienna Convention permits the parties to also draw upon the preparatory work of the negotiators of the treaty and the circumstances of its conclusion or finalized text.<sup>38</sup> However, as may be imagined, treaty meaning often remains ambiguous and contested. For instance, differences often arise over how the legal terms (continental shelf; seabed; subsoil; submarine areas; natural prolongation; and continental margin) are to be characterized and established.<sup>39</sup> Differences in terms then manifest in the technical data asked of submitting states, and in their evaluation.

Interpretive questions regarding the Alpha-Mendelev and Losomonov Ridges, for example, illustrate how different theories about the Arctic Ocean shelf compete and develop in relation to each other and their impact on shelf limits. The central Arctic Ocean Basin is divided into several smaller basins by ridges that run through them, including the Lomonosov and Alpha-Mendelev Ridges. The central legal issue for Russia, Canada, and Denmark is whether these two ridges are submarine elevations or oceanic ridges and whether they are natural prolongations of their land mass.<sup>40</sup> Oceanic ridges will not normally be associated with the continental shelf and will not extend a state’s continental shelf limits. As such, it is unlikely that a state will forward a theory that the elevation is an oceanic ridge. In contrast, elevations that are submarine ridges can extend a state’s claim up to 350 nautical miles.<sup>41</sup> Alternatively, if a state can prove that the elevation is a natural component of the continental margin, then it can potentially claim 100 nautical miles past where the depth of the ocean reaches 2,500 meters.<sup>42</sup> Consequently, these elements were expected to form the basis of submissions by Arctic states, as indeed has happened in the submission to the Commission made by Denmark/Greenland in December 2014.

The issue in these latter types of claims is whether the constraint line is 350 nm because it is a submarine ridge, or whether the shelf can extend as far as 100 nm from the 2,500-m isobath (i.e. beyond 350 nm) because the ridge is a natural prolongation of the continental margin. Canada, for example, faces this challenge in proving to the Commission that the features of the Lomonosov and Alpha ridges are

36 P. A. Symonds et al., ‘Characteristics of Continental Margins’, in Cook and Carleton (eds.), *supra* note 5, at 26.

37 1969 Vienna Convention on the Law of Treaties, 1155 UNTS 331, Art. 31.

38 *Ibid.*, Art. 32.

39 See, e.g., Commission on Legal Issues of the Outer Continental Shelf, *supra* note 8, at 223–5; on how the thickness of sedimentary rocks, referred to in Art. 76(4)(a)(i) should be interpreted where the topography is irregular.

40 For discussion, see Brekke and Symonds, *supra* note 20, at 289–306; Weber, *supra* note 6, at 665–70; Macnab, *supra* note 6.

41 Convention, *supra* note 1, Art. 76(5).

42 *Ibid.*, Art. 76(6).



natural prolongations of the North American continent. The difficulty for Canada is that the bathymetry in that region shows a trough north of Ellesmere Island that seemingly separates the ridges from the mainland and which would detract from Canada's assertion that the ridges are natural prolongations.<sup>43</sup> Facing different interpretations of the bathymetry, Canada undertook a multi-year project to image the crustal structure below the seafloor and to compare the results with those from the adjacent continent.<sup>44</sup> Based on new data and reasoning applied by the Commission in several recent recommendations regarding relative depths, It is likely that Canada hopes to persuade the Commission that its interpretation of the geomorphology of the Lomonosov Ridge would be accepted as evidence of natural prolongation.

In addition to questions of appurtenance, differences have also developed over what distinguishes ridges that are attached to the margin from those that are a natural prolongation of it. If a submarine ridge is a natural prolongation of the land territory but not a natural component of the margin, the Convention suggests that the maximum claim would be 350 nm. Consequently, states must present evidence to support the claim that the ridge is a natural prolongation *and* evidence that it is a natural component of the continental margin, meaning that there is a geological affinity between the ridge and the territory.<sup>45</sup> However, states lack consensus on whether the crustal types from the territory and the ridge are similar and have forwarded conflicting theories as to how the Alpha ridge was originally formed.<sup>46</sup>

## 2.2. Commission mandate

The ability of the Commission to generate the certainty needed for shelf delineation has largely been ascribed to the authority it exercises in pursuing its mandate. The Commission affects legal certainty and compliance through its power to review coastal state submissions and issue recommendations on claims to the extended continental shelf.<sup>47</sup> As the only body that could potentially arbitrate competing and dichotomous understandings of the Treaty and the science needed to meet its requirements, its recommendations have a legal effect.<sup>48</sup> In this formulation, the Commission is to take on the role of evaluator through its activities as an independent body but is also to act as an interpreter of both technical and legal norms.

To be clear, the Convention has not conferred authority on the Commission to rule on the coastal state's legal interpretation of the rules in the Convention. Rather, its

43 See, e.g., US concerns in its *notes verbales* on the Russian submission. Representative of the United States of America to the United Nations, *United States of America: Notification Regarding the Submission made by the Russian Federation to the Commission on the Limits on the Continental Shelf* (2002).

44 J. Verhoef, D. Mosher, and S. Forbes, 'Defining Canada's Extended Shelves', (2011) 38(2) *Geoscience Canada* 85, at 92.

45 Brekke and Symonds, *supra* note 20, at 302.

46 This distinction formed the basis of the 2002 US Notification to the Russian submission regarding the Alpha-Mendelev Ridge. For discussion, see Baker, *supra* note 25, at 270.

47 Annex II of the Convention.

48 D. R. Rothwell, 'Building on the Strengths and Addressing the Challenges: The Role of the Law of the Sea Institutions', (2004) 35 *Ocean Dev. & Inst'l L.* 131, at 133 (Commission's quasi-judicial role will impact delineation).



role is to evaluate whether the proposed limits have been established by the coastal state using recognized scientific norms and the application of appropriate methodology.<sup>49</sup> In reviewing submissions, the Commission is not meant to represent the interests of any one state (coastal or non-coastal) or that of the International Seabed Authority, whose interests are also affected by its findings. However, it is meant to represent the entire international community and so it must evaluate coastal state submissions with a mind to the rights of all state parties. To this end, the mandate of the Commission has been constructed as technical and scientific.<sup>50</sup> It is intended to verify whether the formulae have been correctly applied or whether a submarine elevation is indeed of the nature claimed by the coastal state. However, in advising and recommending, the Convention generates interpretations that determine the substantive content required for shelf delineation.

As the International Law Association has stated:

the Commission has to be presumed to be competent to deal with issues concerning the interpretation or application of Article 76 or other relevant article so the Convention to the extent this is required to carry out the functions which are explicitly assigned to it.<sup>51</sup>

The Commission actively obtains legal direction from different legal advisors,<sup>52</sup> and its work has legal consequences.<sup>53</sup> The Commission at least implicitly takes positions on the technical analysis of data. Moreover, by referencing its prior decisions or recommendations, the Commission informally creates precedents upon which states and the tribunal rely. As Andrew Guzman writes, 'because international organizations can coordinate international interactions to increase the likelihood that states will submit to the authority of dispute-resolution bodies, such organizations have an important role.'<sup>54</sup> Where the Commission draws upon its ability to decide like cases in a like manner, it too positions itself as an important actor in the interpretation of international law.

Ultimately, the Commission's mandate means that the unilateral character of coastal state delineation is subject to endorsement or condemnation by the

49 K. Bartenstein, 'Flag Planting', (2009) 65 Int'l J. 187, at 192.

50 Commentators have opined that the proper position of the Commission in the outer limit delineation process is that of a *legitimizer* of state claims, which acts as a technical safeguard against state party exaggeration. See McDorman, *supra* note 4, at 319.

51 International Law Association, Second Report (by C. Bernasconi and G. Betlem) on *Transnational Enforcement of Environmental Law*, International Law Association, Berlin Conference (2004), Report of the Seventy-First Conference, Berlin, 2004, at 5.

52 For example, for procedural issues, it relies on the Division for Ocean Affairs and the Law of the Sea of the United Nations Office of Legal Affairs. See, e.g., Scientific and Technical CLCS Guidelines, section 7. For substantive legal issues, it seeks advice from the Legal Counsel of the United Nations. See, e.g., *Legal Opinion as to the Most Appropriate Procedure in Cases Where It Might Be Necessary to Institute Proceedings Following an Alleged Breach of Confidentiality*, Doc. CLCS/14 (18 May 1999).

53 For discussion, see S. T. Gudlaugsson, 'Natural Prolongation and the Concept of the Continental Margin for the Purpose of Article 76', in M. H. Nordquist, J. N. Moore, and T. H. Heider (eds.), *Legal and Scientific Aspects of Continental Shelf Limits* (2004), 61, at 63–64; J. E. Noyes, 'Judicial and Arbitral Proceedings and the Outer Limits of the Continental Shelf', (2009) 42 Va. J. Transnat'l L. 1211, at 1232.

54 A. Guzman, 'A Compliance Based Theory of International Law', (2002) 90 Cal. L. R. 1823 at 1829. For an argument that distinguishes between the efficacy of inter-state and transnational tribunals, see R. O. Keohane, A. Moravcsik, and A. Slaughter, 'Legalized Dispute Resolution: Interstate and Transnational', (2000) 54(3) *International Organizations* 457.

Commission. The combined effect of interpreting data in light of the Convention's language is to confer both technical and legal authority on technical experts and thereby authorize them to interpret what constitutes the outer limits of the continental shelf and what evidence is needed to establish it. As a result, the Commission has become a key international actor to interpret what constitutes compliance with Article 76 for coastal states.

### 2.3. Commission uncertainty

While the Commission has drawn on its mandate to interpret the Convention several factors could militate against Commission interpretations. First, it is not entirely clear that states did consent to confer interpretive or delineating authority on the Commission. On a plain reading of Article 76(7), coastal states are permitted to exercise their rights over the continental shelf independent of the Commission's declaration.<sup>55</sup> The Commission's implicit competence to interpret the Convention has been accepted as necessary to the task of making recommendations but most would agree that it does not replace the competence of state parties to interpret it as well.<sup>56</sup> Conflict between state parties and the Commission in other jurisdictions attests to this wider problem. For example, disagreement with the United Kingdom over the interpretation of Article 76 in regards to the Ascension Islands prompted the UK to issue a public criticism of the Commission's authority.<sup>57</sup>

Second, states may be reluctant to reinforce the power of a supra-national organization that takes decisions farther from individual citizens and democratic control exercised through sovereign action.<sup>58</sup> Andrew Guzman notes that there is increasing anxiety in the United States that delegations to international institutions create a significant threat to domestic sovereignty.<sup>59</sup> To be sure, a decision to establish a group of international technocrats charged with making non-binding recommendations can be distinguished from the formal delegation of authority.<sup>60</sup> However, accountability gaps on issues, such as the confidentiality of state submissions and recommendations by the Commission, have raised questions about the capacity of procedure to affect state interests.<sup>61</sup> Based on these types of considerations, scholars have argued that states will likely resort to strong criticisms of Commission interpretations and processes.<sup>62</sup>

55 Convention, *supra* note 1, Art. 76(7) ('The coastal state shall delineate ...'). Also see Art. 2(3) ('The rights of the coastal State over the continental shelf do not depend on occupation, effective or notional, or on any express proclamation').

56 Report of the Eleventh Meeting of State Parties to the LOS Convention, Doc. SPLOS/73 of 14 June 2001, para. 75, available at [www.un.org/Depts/los/meeting\\_states\\_parties/documents/splos\\_73](http://www.un.org/Depts/los/meeting_states_parties/documents/splos_73) (statements of delegates on the topic) (accessed 12 August 2015).

57 Note No. 08/11 of 11 January 2011, addressed to the Secretary-General of the United Nations by the Permanent Mission of the United Kingdom of Great Britain and Northern Ireland, available at [http://www.un.org/depts/los/clcs\\_new/submissions\\_files/gbro8/gbr\\_nv\\_11jan2011.pdf](http://www.un.org/depts/los/clcs_new/submissions_files/gbro8/gbr_nv_11jan2011.pdf) (accessed 12 August 2015).

58 A. T. Guzman and J. Landside, 'The Myth of International Delegation', (2008) 96(6) Cal. L. R. 1693, at 1693.

59 *Ibid.*

60 *Ibid.*

61 See R. Macnab, 'The Case for Transparency in the Delimitation of the Outer Continental Shelf in Accordance with UNCLOS Article 76', (2004) 35 Ocean Dev. & Int'l L. 1, at 14–16.

62 Cavnar, *supra* note 26, at 425–6.

Third, a state party may not agree with the interpretation of data adopted by the Commission. Prior difficulty accessing the Arctic Ocean and the ocean floor has meant that all data derived from shelf research is new, and much of the way that data has been interpreted is untested. Moreover, theories of shelf structure have changed significantly since the terms of the Convention were finalized and opened for signature in 1982. Advances in technology and methodology used to map the ocean floor are at the core of theory change that can limit the persuasiveness of state submissions. As Bernard Coakley and Betsy Baker have noted:

Article 76 was written at a time when narrow-beam bottom sounder data was the primary bathymetric mapping tool. As a result, it was built on a remarkably simplistic view of the seafloor that has been completely overturned by the swathe [of] bathymetric data collected over the last two decades.<sup>63</sup>

The effect of technological change on shelf delineation is to constantly bring the relevance of data, into question. Uncertainty in the interpretation of the data has led to multiple and contested theories about the structure and formation of the shelf by submitting states and those commenting on state submissions. In these circumstances, coastal states may choose to object to Commission interpretations.

Ultimately, multiple centres of interpretation can undermine the role of the Commission as a generator of certainty. Dichotomous interpretations could manifest as the express rejection of Commission interpretations of Article 76, or a rejection of how the Commission interprets the type of data submitted to support a claim. Rejections can arise immediately or can arise in future negotiations for delimitation between states with opposite or adjacent coasts or in the licensing of resource extraction projects in contested areas. Naturally, continental shelf boundary delimitation between states is a separate process from the establishment of the outer limits of a continental shelf. Delimiting the continental shelves of states with opposite or adjacent coasts involves drawing international maritime boundaries, whereas delineation of the outer limits could generate more restrictive limits.

Moreover, processes and recommendations of the Commission are without prejudice to the bilateral delimitation of boundaries. However, overlapping continental shelf entitlements mean that continental shelf delineation is expected to impact negotiations for delimitation in the region. States may therefore be reluctant to comply with Commission recommendations where legal and scientific rulings remain uncertain and can negatively impact future negotiations. As Monique André Allain argues, Article 76 may exacerbate the contention between the Arctic States, rather than settle them, as states will most likely use its ambiguities to object to their neighbours' claim or to justify their own.<sup>64</sup>

63 B. Coakley and B. Baker, 'Mapping for Advocacy – Using Marine Geophysical Data to Establish the Limits of Extended Continental Shelves Under the Convention on the Law of the Sea', (2008) 89 *EOS Trans. AGU Fall Meeting Supp.*, Abstract GC33B-0780, quoted in B. Baker, *supra* note 25, at 251–81.

64 Allain, *supra* note 5, at 4.

### 3. CONSTRUCTING SCIENTIFIC AUTHORITY IN INTERNATIONAL LAW

The varying interpretive positions that can be taken on Article 76 and contestation over the import of the data mean that the exercise of authority does not in and of itself explain why Commission interpretations would be persuasive for coastal states. Instead, answering why Arctic states are likely to comply requires digging deeper into the social processes that engender compliance. A constructivist explanation of international law provides this deeper insight.

Within a constructivist approach, an international treaty like the Convention is identified as a causal agent that gives rise to social practices that impact the interpretation of law.<sup>65</sup> Rules are seen to affect behaviour, in part by constituting how agreement will be reached. Constructivism focuses upon the identities of actors as generators of interests and the legal interpretations that result.<sup>66</sup> While theorists focus on different aspects of how legal processes can engender self-enforcing compliance,<sup>67</sup> the key to understanding compliance is to see the formal act of accepting legal obligation as signalling the beginning of a broad process of lawmaking that is carried out by actors using particular discourses.<sup>68</sup>

In relation to the Arctic, and especially delineation of the continental shelf, the power of scientific actors has been remarked upon by a small group of legal and political scholars that has identified the unique role they play in Arctic law and governance. For example, Jensen Øystein has recently undertaken an extensive review of how the Commission's authority is operationalized through its judicial role to interpret and apply law but also through its role as a scientific and administrative body. On the basis of a functional analysis of its practices, he argues that the Commission is best understood as an institution that embodies all three characterizations.<sup>69</sup> Similarly, Suzette Suarez analysed the functional work of the Commission vis-à-vis technical submissions and the work of its advisors. Based on her findings she has concluded that the fundamental nature of the relationship between the coastal state and the commission is co-operative, and not competitive.<sup>70</sup> Using legal process to establish authority, these two scholars have followed the approach pioneered by Lasswell and McDougal under the rubric of the New Haven School to determine the international processes by which the Commission exercises its authority.<sup>71</sup> More

65 For example, Finnemore and Sikkink have posited that international norms have a life cycle composed of three stages: emergence, acceptance, and internalization. M. Finnemore and K. Sikkink, 'International Norm Dynamics and Political Change', (1998) 52(4) *Int'l Org* 887.

66 J. Brunnee and S. J. Toope, *Legitimacy and Legality in International Law: An Interactional Account* (2010).

67 For example, J. Brunnee and S. J. Toope, 'Persuasion and Enforcement: Explaining Compliance with International Law', (2002) 13 *Finn. Ybk. Int'l L.* 273 (identity); Guzman, *supra* note 54; T. M. Franck, 'Legitimacy in the International System', (1988) 82 *Am. J. Int'l L.* 705, at 705; H. Koh, 'Why Do Nations Obey International Law?', (1997) 106 *Yale L.J.* 2599, at 2646.

68 M. Finnemore and S. J. Toope, 'Alternatives to Legalization: Richer Views of Law and Politics', (2008) 55 *Int'l Org.* 743, at 750. For discussion of multi-dimensional policy networks, which operate outside of legitimated policy networks, see E. Kirk, 'Marine Governance, Adaptation and Legitimacy', (2011) 22(1) *Ybk Int'l Env. L.* 110.

69 J. Øystein, *The Commission on the Limits of the Continental Shelf: Law and Legitimacy* (2014).

70 Suarez, *supra* note 26, at 349.

71 H. D. Lasswell and M. McDougal, *Jurisprudence for a Free Society: Studies in Law, Science and Policy* (1992), 803–33.

importantly, they argue that understanding the extent of Commission authority involves a more complex understanding of functional legal practice than previously provided in the literature.<sup>72</sup>

Oran Young, a vocal proponent of understanding the importance of scientific communities in international relations, also argues in favour of analysing the role of institutions, with special attention to the actors who produce scientific knowledge.<sup>73</sup> Young's work on the Arctic has offered consistent study on the forces and actors that shaped agenda formation by states. With special attention to environmental regimes related to the Polar Regions, trans-boundary air pollution and ozone depletion, Young has expressed considerable optimism in the ability of scientific knowledge to promote a co-operative approach and better governance systems in the Arctic.<sup>74</sup> Betsy Baker has similarly argued that the effect of Article 76 has been to create a transnational network of lawyers, scientists, policy makers, and politicians in the Arctic that are governed by scientific norms.<sup>75</sup> Baker sources recent co-operation between Arctic states in gathering and sharing data as indicative of how theories about the Arctic Ocean shelf are competing and developing.<sup>76</sup> What is important about this scholarship is that it has identified the role of scientists and scientific organizations as key actors in an international legal regime. Young and Baker identify that key agents trigger an interaction of scientists at the international level, who forward interpretations of international legal norms and then work to persuade Arctic states to internalize those interpretations.<sup>77</sup>

However, while the scholarship to date has identified the role of scientific actors and the institutions in which those actors operate, it has not yet identified what is unique to scientific institutions and actors that support Commission authority. It is here that a constructivist approach to identifying the role of scientific discourse in generating agreement offers some insight. As Chayes argues, states can persuade violators to comply through discourse among parties, treaty organization, and community.<sup>78</sup>

A constructivist approach, which focuses on iterative processes of justificatory discourse and persuasion, helps to identify that where international law relies heavily on technical standards that must be mediated by scientists, scientific methods for achieving consensus play a large role in defining the process for resolving disputes and uncertainty.<sup>79</sup> Thus, in addition to identifying the actors that impact interpretation, a constructivist approach focuses on the language and mode of communication used by those actors to generate agreement and settle disputes.

72 Øystein, *supra* note 17, at 171–2.

73 O. R. Young and G. Osherenko, *The Age of the Arctic: Hot Conflicts and Cold Realities* (1989); O. R. Young, *Creating Regimes: Arctic Accords and International Governance* (1998); O. R. Young and G. Osherenko (eds.) *Polar Politics* (1993). Also see, E. C. H. Keskitalo, *Negotiating the Arctic: The Construction of an International Region* (2003).

74 Young, *supra* note 25, at 192.

75 Baker, *supra* note 25, at 263.

76 *Ibid.*

77 For a similar description of process, see Koh, *supra* note 67, at 2617–27 (book review).

78 A. Chayes and A. H. Chayes, *The New Sovereignty: Compliance with International Regulatory Agreements* (1998), 28.

79 For example, see Finnemore, *supra* note 24 (effect of UNESCO on creation of domestic science, bureaucracies); Lasswell and McDougall, *supra* note 71.

The reliance on scientific agreement or consensus arises most often in international law when used to legitimize legal and political decision-making.<sup>80</sup> International organizations seeking to create international standards or a way to determine whether they have been met must reach agreement on what the science requires and whether it is met by the practice in question.<sup>81</sup> However, law's use of science is inextricably reliant on the legitimacy generated by internal scientific processes. As Christian Joerges comments of the role of experts in international law, 'where experts and scientists cannot agree, they nonetheless continue to interpret their controversies as a learned exercise and entrust the scientific community with the competence to assess their claims'.<sup>82</sup>

Sociological studies of scientific processes long ago identified a pattern to how scientists identify disputes and settle them. As originally described by one of the earliest sociologists of science, Robert Merton, several versions of truth (i.e. theories) compete to become recognized as 'facts'.<sup>83</sup> Peer processes are expected to move knowledge from uncertain to certain or from theory to fact. This engages scientists in a complex social process of persuasion expected to lead to consensus or at least provisional agreement. While consensus is not a guarantee of accuracy, scientists will still use their own recognized processes (mainly around the dissemination of knowledge) for building this agreement; yet always leave open the possibility that new information can again bring agreement into question.

Generally, scientists seek to disseminate certified knowledge through peer reviewed publication and presentations to peer groups. Authority, in this formulation, derives from what Robert Merton has called 'empirically confirmed and logically consistent statements of regularities'.<sup>84</sup> However, scientific authority does not always derive from consensus generated over a long history of publication and public presentation. Scholarship on the role of science in democratic societies, mostly associated with science and technology studies, has identified that governmental needs for scientific consensus in key policy areas have created new fora in which scientists integrate scientific findings with law and policy as well as new techniques for generating agreement.<sup>85</sup> Where science remains inconclusive but consensus serves a regulatory purpose, states will actively generate expert authority by facilitating or managing the production of scientific consensus needed for a policy decision even if the science might be viewed as inadequate or inconclusive.<sup>86</sup>

In the international context, reaching consensus in these circumstances involves the use of co-operative strategies, such as commissioned committees, information

80 Jasanoff, *supra* note 24.

81 S. Jasanoff, *Science and Public Reason* (2012).

82 C. Joerges, 'Law, Science and the Management of Risks to Health at the National, European and International Level – Stories on Baby Dummies, Mad Cows and Hormones in Beef', (2001) 7 *Colum. J. Eur. L.* 1, 15.

83 R. Merton, 'The Normative Structure of Science', in *The Sociology of Science: Theoretical and Empirical Investigations* (1942), 267–78.

84 *Ibid.*

85 Jasanoff, *supra* note 24; Jasanoff, *supra* note 81.

86 For discussion of techniques, see *ibid.*; J. E. Vinuales, 'Legal Techniques for Dealing with Scientific Uncertainty in Environmental Law', (2010) 43 *Va. J. Transnat'l L.* 437; L. Salter, 'Science and Peer Review: The Canadian Standard Setting Experience', (1985) 10(4) *Science Technology & Human Values* 37, at 37.

sharing, discourse, capacity building, and negotiation.<sup>87</sup> These strategies have been identified as effective techniques for compliance.<sup>88</sup> Experts, working on behalf of their own states, actively seek out convergence on particular scientific theories and interpretations of common data. Rather than obtain consensus from publications alone, consensus is gleaned from the level of agreement evidenced by co-operative practices. This type of managed consensus seeks to gain peer recognition from the 'chains and networks of overlapping scientific neighbourhoods' that connect different scientific communities and guarantee the discovery of scientifically meritorious knowledge.<sup>89</sup>

There are certainly problems with managed consensus in the legal and policy context that undermine its use as an indicator for widespread agreement. Because the exigencies of the political and regulatory processes make demands upon science to generate consensus in a time-sensitive manner, the science is heavily mediated by state involvement and is often treated with some scepticism. These constraints can result in science-based policies that encourage scientists to circumvent or alter accepted methods used to prove the existence of scientific norms.<sup>90</sup> Scientists are often faced with either compromising their norms, or developing alternative processes for generating consensus.<sup>91</sup> As a consequence, traditional norms for evaluating expertise and formulating consensus can be absent from state-directed research or policy science. Moreover, the results from facilitated consensus are plagued by concerns that negotiation reflects bias, interest, or groupthink, rather than agreement on facts, and therefore has limited its relevance for indicating true consensus.<sup>92</sup>

Nonetheless, despite these limitations, there is a growing recognition of 'hard won consensus' as a proxy for long-term processes. One definition of the term 'hard-won consensus' is agreement which emerges only after vigorous debate and a thorough examination of the range of alternative explanations. It is one in which centrifugal tendencies are strong and the experts are drawn into agreement only reluctantly and after careful consideration. For instance, Brent Ranalli has used the term to explore the motivation for using negotiation to overcome disagreement over climate change science.<sup>93</sup> Information about risks caused by climate change, ozone depletion, and disease is often inadequate or incomplete, leading to a struggle to define the scientific and legal terms that attempt to regulate those risks.<sup>94</sup> The effect has been to encourage the proliferation of plausible perspectives on the causes and solutions to these problems and thereby exacerbate claims that the science is

87 Chayes and Chayes, *supra* note 78.

88 *Ibid.*

89 M. Polanyi, 'The Republic of Science: Its Political and Economic Theory', (2000) 38 *Minerva* 1, at 7.

90 For factors that impact the generation of consensus, see B. Marti and E. Richards, 'Scientific Knowledge, Controversy and Public Decision-Making', in S. Jasanoff et al. (eds.), *Handbook of Science and Technology Studies* (1995), 506–26 (on effects of funding); S. Epstein, *Impure Science: AIDS, Activism and Politics* (1998) (on effects of politics).

91 D. W. Belousek, 'Scientific Consensus and Public Policy: The Case of *Pfisteria*', (2004) 4 *J. Phil., Science and Law*.

92 B. Ranalli, 'Climate Science, Character, and the "Hard-Won" Consensus', (2012) 22(2) *Kennedy Institute of Ethics Journal* 183 at 185.

93 *Ibid.*

94 For discussion, see H. Collins and R. Evans (eds.), *Rethinking Expertise* (2009), 8.



inconclusive. Advocates often present a significant amount of scientific material to corroborate their respective positions, leaving the relative merits of the competing scientific evidence to be a matter for persuasion.

Rather than explain negotiated consensus as a product of bias, interest, or group-think, the hard won consensus relies on the active pursuit of dialogue and expertise in negotiation.

Jacqueline Peel also reports a phenomenon of negotiated consensus in her recent investigation into the use of science in international law.<sup>95</sup> Peel examined several international contexts in which parties negotiated their differences over regulatory policies based on scientific disputes including: the settlement of health and environment disputes under the WTO's General Agreement on Tariffs and Trade,<sup>96</sup> consensus seeking processes of the Codex Alimentarius Commission on global food safety standards, and negotiations for the Cartagena Biosafety Protocol governing the transboundary movement of GMOs.<sup>97</sup> Peel argues that science-based arguments can limit the effectiveness of the agreements, especially where risk estimates are captured and used strategically to foster trade barriers. As a result, parties must negotiate, through their experts, which standards to adopt. Similarly, international co-operation to reduce pollution in the Mediterranean Sea was traced by Haas to a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain for a legal issue.<sup>98</sup> In Haas' study, opposing positions on the value of particular pollution controls by Mediterranean states were overcome by empowering a group of experts to generate agreement on effective controls.<sup>99</sup>

Taken together, these various studies of international law and regulation indicate that scientific agreement has become foundational to defining compliance of states and other actors. Where experts are essential to the interpretation of international law, scientific norms and the formation of consensus can effect that interpretation. Naturally, this is not always the case as science can continue to be used to foster disagreement.<sup>100</sup> However, in order to understand in what circumstances scientific communities can bring certainty and settle conflict, it is necessary to identify how expert consensus is operationalized in particular international regimes. This is what the following study of the work of the Commission and transnational actors in the Arctic does.

95 J. Peel, *Science and Risk Regulation in International Law* (2010).

96 1994 General Agreement on Tariffs and Trade, Marrakesh, 55 UNTS 194, 1867 UNTS 187.

97 2000 Cartagena Protocol on Biosafety to the Convention on Biological Diversity, 2226 UNTS 208.

98 P. M. Haas, 'Knowledge, Power and International Coordination', (1992) 46(1) *Int'l Org.* 27.

99 See also, J. Bruneo and S. Toope, 'The Change Nile Basin Regime: Does Law Matter?', (2002) 43 *Harv. Int'l L.J.* 105.

100 For an example in relation to the International Whaling Commission see, M. Heazle, 'Scientific Uncertainty and the International Whaling Commission: An Alternative Perspective on the Use of Science in Policy Making', (2004) 28(5) *Marine Policy* 361.

## 4. THE ROLE OF SCIENTIFIC DISCOURSE IN COMMISSION AUTHORITY

### 4.1. The Commission's use of science

Just as the formation of scientific agreement has influenced the interpretation of international law in other regimes, it also plays a large role in the work of the Commission. Naturally, the prominent role of scientific discourse in shelf delineation can largely be attributed to the technical mandate of the Commission. The Commission is required to evaluate the relevance of the data submitted by states against its claims. Where there is agreement on knowledge presented in support of that claim, the Commission is expected to support it. Moreover, the Commission draws on its characterization as a technical or scientific body to legitimize decisions made pursuant to this mandate.<sup>101</sup> The Commission's twenty-one members must be experts in geology, geophysics, or hydrography. This expertise is meant to dictate the evaluation of state claims,<sup>102</sup> and stand in direct contrast to most international tribunals and courts, which include lawyers in the determination of legal rights. The exclusion of lawyers from the list of members speaks to significant agreement between state parties that legal expertise is not primarily relevant to the evaluation of state claims. It is the scientific training and knowledge of the members that is expected to bear on delineation.

The 'Scientific and Technical Guidelines' (the Guidelines) promulgated by the Commission also make it clear that the Commission addresses uncertainties in the treaty with scientific or technical methods. The Guidelines offer statements by the Commission as to the criteria needed to establish a claim and are intended to provide an important scientific and technical reference for the consideration of submission and preparation of the Commission's own recommendations. As Schachter noted in 1967, the ability of rules to adapt to new understandings in science and technology allows them to 'leave room for future development and many-sided approaches'.<sup>103</sup> Much like other global intergovernmental organizations that exercise specific competencies through rules, such as the World Meteorological Organization (WMO) or the Food and Agriculture Organization (FAO), the Guidelines centralize interpretation, expertise and compliance in the Commission in order to address uncertainty.<sup>104</sup>

In many ways, the impact of the Guidelines on the scientific and technical standards to be used by state parties is somewhat straightforward. The Guidelines instruct parties which methods will be used to determine whether the data is sound and relevant. States generate data that either conforms to the Guidelines or is consistent with them. However, the Guidelines undertake more than listing what technical processes or scientific data is needed. They also establish the authority of the

<sup>101</sup> Ibid.

<sup>102</sup> Convention, *supra* note 1, Art. 76(8), Annex II Art. 2(1).

<sup>103</sup> O. Schachter, 'Scientific Advances and International Law Making', (1967) 55 Cal. L. Rev. 423, at 426.

<sup>104</sup> For discussion, see D. Avgerinopoulou, 'Review Bodies in Multilateral Environmental Agreements – Competences, Coherence, Coordination' (4th Global Administrative Law Seminar, New York University School of Law and University of Rome, Viterbo, Italy, 12–14 June, 2009), available at <http://www.iijl.org/GAL/documents/V5.Avgerinopoulou.pdf> (accessed 12 August 2015).

Commission to address remaining uncertainties. The Commission has stated that its aim is to clarify the interpretation of scientific, technical, and legal terms contained in the Convention that depart from scientific definitions and terminology or that permit several equally acceptable interpretations.<sup>105</sup> Practically, this regulatory context renders the Commission the most important interpreter of the science needed to meet the requirements of Article 76. For instance, it is in each state's interest to maximize their own claim by establishing that the topographical features are natural prolongations of the margin, rather than ridges.<sup>106</sup> Yet, as discussed above, it is unclear which criteria a state should use to establish that the Arctic features are a natural prolongation of the continental margin.<sup>107</sup> Commission members have circulated opinions about what kind of data will support shelf claims and have publicized them through the Commission's regulations, prior recommendations, and publications on the topic, but have also maintained a preference, through the Guidelines, for dealing with the issue of ridges on a case-by-case basis.<sup>108</sup> Because it has not established an overarching procedure for distinguishing between them, it is left to state practice, state contestation, and the Commission to assess the validity of claims on the topic.

Another way that the Commission engages with generating scientific conformity is through its role as advisor to states and through its involvement in training.<sup>109</sup> In addition to considering the submission of coastal states, the Commission is tasked with providing scientific and technical advice, if requested by the coastal state during the preparation of the submission.<sup>110</sup> Under Rule 55 of the Rules of Procedure, it is the task of the Committee on the Provision of Scientific and Technical Advice to Coastal States to attend to requests for advice by coastal States in accordance with Article 3(1)(b) of Annex II of the Convention. However, to date, no coastal state has submitted an official request for advice, preferring instead to obtain the advice of particular Commission members or former members directly.<sup>111</sup> While transactions between states and members have been treated as confidential, it is conceivable that Commissioners will provide advice on scientific and technical matters, as well as procedural and other relevant legal issues.<sup>112</sup> In doing so, the Commission and/or Commissioners communicate their views on the technical and scientific information needed by coastal states for successful submissions.

105 See Commission on the Limits of the Continental Shelf, Scientific and Technical Guidelines of the Commission on the Limits of the Continental Shelf, 1.3, UN Doc. CLCS/11 (1999) (prepared by the Commission on the Limits of the Continental Shelf) [hereinafter CLCS Guidelines].

106 See N. M. Antunes and F. M. Pimentel, 'Reflecting on the Legal –Technical Interface of Article 76 of the LOSC: Tentative Thoughts on Practical Implementation 20' (presented at ABLOS Conference Addressing Difficult Issues in UNCLOS, 2003), available at [http://www.gmat.unsw.edu.au/ablos/ABLOS03Folder/monaco03\\_rept.pdf](http://www.gmat.unsw.edu.au/ablos/ABLOS03Folder/monaco03_rept.pdf) (12 August 2015).

107 For a summary of the issue, Weber, *supra* note 6, at 653–68.

108 CLCS Guidelines, *supra* note 105, para. 7.2.11.

109 For discussion, see Suarez, *supra* note 26, at 354.

110 Convention, *supra* note 1, Art. 3, Annex II.

111 Suarez, *supra* note 26, at 360 (reporting that 43 out of 61 submitting states obtained advice).

112 *Ibid.*

Faced with the requirement to advocate on the basis of technical data, each of the Arctic littoral states has gone to significant effort to define shelf research as a national priority and carry out the scientific research necessary to their claims. Due to cost restrictions, coastal states often use standard mapping technology and contract out the mapping required for submission to the Commission. However, each of the Arctic states boasts a wealthy economy, extensive bureaucracies, and experience with oil and gas development as a major source of national revenue. The result has been the creation of large bureaucracies comprised of technical and scientific experts on continental shelves that inform how states will frame a research agenda and what data will be submitted in support of state claims.

For instance, Canada's scientific work on the continental shelf is led by a collection of geographers and geologists who work under the auspices of the Geological Survey of Canada (Natural Resources Canada (NRCan)) in tandem with the Department of Foreign Affairs, Trade and Development (DFATD). The effect of the creation of research agendas and science bureaucracies has been to generate a significant amount of domestic expertise in Arctic states. Much like specialists tasked with shelf delineation in other Arctic countries, these specialists advise the national government, which aims to use the data in support of its claims. Bringing their expertise to bear on interpreting the data obtained, these scientists ultimately structure and alter what legal position a country may take before the Commission. They interpret data that would be supportive of particular claims and engage regularly with legal and policy actors who formulate national policy on shelf delineation. In generating theories of shelf-formation needed to substantiate national claims, these disparately trained scientists form national communities of thought that aim to influence the Commission.

#### **4.2. Transnational use of science**

The difficulty states face in submitting their data to the Commission is that they cannot ensure that the Commission will agree that the data is supportive of the claim. Consequently, should a state want to convince the Commission of its technical understanding of the shelf, it would presumably need to provide evidence of a very high level of scientific agreement. The Commission is unlikely to reject the veracity of the data submitted, but it is likely to question whether there is consensus that the data evidences the legal characteristics of the shelf, as traditional forms of validating consensus are often absent. There is little published information on Arctic shelf research and those scientists engaged in Article 76 mapping are a particular subset, set apart by their policy goal to substantiate as expansive a claim as possible. To be sure, scientists mapping the shelf are trained in disciplines as wide ranging such as geology, geography, chemistry, biology, and ecology. However, it is difficult to imagine that the Commission will judge the conclusions drawn by the state on its scientific merit without regard for the fact that the research is motivated by national characteristics and that the submitting state is partial to its own interests.

Because the circulation of contested theories could serve to undermine state submission, state actors, including state scientists, have begun to circulate transnationally. As Baker writes, '[b]y necessity, lawyers, scientists, and policymakers involved in Article 76 mapping educate each other about how these changes affect implementation of the Convention, and about how their respective disciplines approach the Convention and its requirements'.<sup>113</sup> Yet, shelf scientists do not exchange information merely out of the need to corroborate and confirm findings. Rather, much as has been observed in other international contexts, shelf scientists actively seek convergence on particular scientific theories and interpretations of common data for the purposes of managing state consensus. By relying on co-operative strategies such as information sharing, capacity building, and negotiation, state scientists attempt to actively manage scientific consensus in order to generate consensus on treaty interpretation and application. Through these networks they adopt co-operative, rather than adversarial approaches, to the generation and interpretation of data.<sup>114</sup>

#### 4.2.1. *Networks for sharing data*

There are a number of fora in which Arctic shelf lawyers, scientists, and policy makers have come together to address their interpretations of Article 76. The most regular method of transnational engagement is found in the annual meetings of Arctic state researchers to share data and analysis gathered from the continental shelf. First hosted by Russia in 2003, Russian scientists presented the content of the Russian Federation's submission to the Commission and shared charts, maps, and data used to support this submission. Since 2007, Canadian, Danish, and Russian scientists have held annual meetings to discuss technical matters pertaining to the shelf.<sup>115</sup> In 2009, representatives of the foreign ministries were invited to participate and US scientists were invited to observe. In 2010, the list expanded to include Norwegian officials, thereby ensuring that all five Arctic coastal states were represented.<sup>116</sup>

These meetings have provided an important regular forum for domestic shelf researchers and bureaucrats to advocate for particular interpretations of the data they have obtained from shelf exploration, and the relevance of the data for their separate submissions. In addition to these annual meetings on state submissions, officials confer in speciality workshops and meetings that aim to focus on sub-research questions or convene particular types of researchers on a topic. For instance, the United States and Russia held a joint workshop to present data and theories on plate tectonic evolution of the Arctic, with a focus on north-east Russia.<sup>117</sup>

<sup>113</sup> Baker, *supra* note 25.

<sup>114</sup> B. Kingsbury and R. B. Stewart, 'Legitimacy and Accountability in Global Regulatory Governance: The Emerging Global Administrative Law and the Design and Operation of Administrative Tribunals of International Organizations', in S. Flogaitis (ed.), *International Administrative Tribunals in a Changing World* (forthcoming)

<sup>115</sup> E. Riddell-Dixon, 'Meeting the Deadline: Canada's Arctic Submission to the Commission on the Limits of the Continental Shelf, (2011) 42 *Ocean Dev. & Int'l L.* 368.

<sup>116</sup> *Ibid.*

<sup>117</sup> *Joint US-Russia Workshop on the Plate Tectonic Evolution of Northeast Russia*, National Science Foundation Works, 9–12 December 2004 Stanford University, Stanford CA.

These types of meetings touch on a wide array of findings but recent presentations have revolved around characterizing the types of ridges located in the Arctic Ocean. The subject of ridges has been in dispute between the parties since the Convention was first negotiated. Since that time various countries and international organizations have issued conflicting opinions on how to define provisions relating to ridges; each one adding to the confusion as to which definition is applicable in the Arctic.<sup>118</sup> In order to generate shared understanding, state scientists and legal actors have organized these conferences and workshops in which they present otherwise confidential data in order to persuade other state scientists and legal actors of the validity of their positions. These types of meetings are preceded by extensive data collection from the continental shelves of the Arctic coastal states, but can also be preceded by publication. Scientific publications from insiders is not common but there have been several instances.<sup>119</sup> For instance, in 2012, Canadian scientists published an article on the topic in *Geophysical Journal International*, a peer reviewed journal. They reported that the geology of the saddle area on the Lomonosov ridge was different from the deep ocean floor and presented data from sampling on large parts of the ridge. Based on their findings, they concluded that, ‘the Ridge is a continental sliver rifted from the Eurasia margin’.<sup>120</sup>

That both policy scientists and diplomats attend multi-state workshops on behalf of their governments, present confidential data, and discuss their intended submissions indicates how active governments have become in generating scientific consensus on shelf research.<sup>121</sup> By sharing research findings and concerns about potential obstacles, representatives from each of the countries seek to anticipate and address the scientific questions and concerns that would impact Commission validation. In doing so, each state attempts to persuade other states of the validity of interpretations that would be beneficial to itself and yet consistent with the state of knowledge in the field.

This seemingly academic network therefore presents an opportunity for state experts to meet and exchange ideas without the need for official meetings. It allows states to exchange data and knowledge without the formal trappings of international relations and diplomacy. Peter Haas noted this same effect in the Technical Working Groups on Marine Scientific Research and Marine Environmental Pollution in the Mediterranean. He notes that the workshop ‘is a meeting place for the regional

118 P. A. Symonds and H. Brekke, ‘A Scientific Overview of Ridges Related to Article 76 of the UN Convention on the Law of the Sea’, in Nordquist et al., *supra* note 53, at 147; and Brekke and Symonds, *supra* note 6, at 179. Organizations that have made statements include the Commission, in Scientific and Technical CLCS Guidelines, *supra* note 105, The Outer Continental Shelf Committee of the International Law Association, The Division for Ocean Affairs and Law of the Sea, and the International Hydrographic Organization, International Hydrographic Organization, ‘Standardization of Undersea Feature Names’ (2001) Bathymetric Publication No. 6, at 2–25.

119 Symonds and Brekke, *supra* note 118, at 141–68; MacNab, *supra* note 6; T. Gorski, ‘A Note on Submarine Ridges and Elevations with Special Reference to the Russian Federation and the Arctic Ridges’, (2009) 40 *Ocean Dev. Int'l L.* 56.

120 H. R. Jackson, T. Dahl-Jensen, the LORITA Working Group, ‘Sedimentary and Crustal Structure from the Ellesmere Island and Greenland Continental Shelves on the Lomonosov Ridge, Arctic Ocean’, (2010) 182(1) *Geoph. J. Int'l* 11, at 13.

121 For discussion of alternative methods for analysing how governments engage with a variety of actors, see Kirk, *supra* note 68.

scientific community, and functions as an integrative force bringing the epistemic community together in one particular setting'.<sup>122</sup> Moreover, he notes, 'the workshop process also seems to be the only forum where regional experts may meet officially and 'express views in ways which cannot prejudice national positions'. This suggests that the workshops are indeed an important venue also in terms of easing political tensions arising from misinterpretation and asymmetrical information.<sup>123</sup> In testing their hypothesis and theories against each other in these informal settings, shelf scientists and policy actors therefore use discursive practices of scientific contestation and persuasion to develop consensus on shelf formation. While state interests are always in the background, scientific discourses are decidedly in the foreground of these encounters.

#### 4.2.2. *Networks for collecting and analyzing data*

In addition to the active dissemination of data, consensus on shelf delineation is also generated as a product of increased co-operation and co-ordination of research in the Arctic. Given the difficulties, expense, and uncertain impact of collecting relevant data in the Arctic Ocean, many states have committed to exchanging data, co-operating in gathering it, and most importantly, in some cases, coming to agreement on its relevance to their claims. It remains open to any state to make a full submission to the Commission without any data co-ordination with other states but the cost of the research and the risk of disputes over its content militate against it. States have therefore endeavoured to generate shared understandings of uncertain facts, such as the geology of ridges, and use the same methods by which to compare their data.

Arctic coastal states have increasingly co-operated in the generation and use of science in their submissions. In May 2008, the five Arctic states signed the Ilulissat Declaration, committing themselves to co-operating closely, respecting 'the collection of scientific data concerning the continental shelf'.<sup>124</sup> Collaborative practices in exploration and mapping reflects deep-seated support by states for these types of political commitments. For example, state scientists from Canada and Denmark began collaborating when they chartered a Russian and a Swedish icebreaker to conduct surveys in the eastern Arctic.<sup>125</sup> The 2006 LORITA (Lomonosov Ridge Test of Appurtenance) project with Denmark and the 2008 ARTA (Alpha Ridge Test of Appurtenance) used seismic testing to collect seismic refraction data. The data from LORITA was interpreted jointly by Canada and Denmark, which reached the conclusion that there is continuity of the continental crust from the coasts of Canada and Greenland across the trough and onto the Lomonosov Ridge.<sup>126</sup>

In 2009, a Russian scientist participated as an observer on a subsequent joint Canadian-Danish survey of the Lomonosov Ridge. Building on past co-operation, the survey was designed to assess the affinity of the Ridge with the nearby continental

122 P. M. Haas, 'Knowledge, Power and International Policy Coordination', (1992) 46(1) Int'l Org., 1, at 27.

123 Ibid.

124 Ilulissat Declaration 2008, *supra* note 14, at 7.

125 Press Release, Nat. Resources Can., Using Science to Delineate the Limits of Canada's Continental Shelf (2007), available at [http://cgc.mcan.gc.ca/org/atlantic/pdf/unclos\\_e.pdf](http://cgc.mcan.gc.ca/org/atlantic/pdf/unclos_e.pdf) (accessed 12 August 2015).

126 Verhoef et al., *supra* note 44, at 92.



margin. These scientists have since worked together to collect and interpret the data and have co-published their findings in several peer reviewed journals. It is therefore telling that this co-operation has led to findings that seem to support a potential claim by Canada and Denmark that the ridge is attached to the plates of North America and Greenland.<sup>127</sup> Similar results have come from co-operation between Canadian and US scientists who have jointly collected data in the Western Arctic since 2008. Scientists from both countries have shared data but have also interpreted the data to formulate shared understandings of shelf formation and structure. These scientists are now working on co-publishing several articles and have presented their research at scientific conferences.<sup>128</sup>

Arctic scientists have also participated in the joint collection, synthesis, and dissemination of bathymetric data collected in the Arctic. Starting in 1997, scientists collaborated to produce the International Bathymetric Chart of the Arctic Ocean (IBCAO) by consolidating data from various national databases.<sup>129</sup> The goal of IBCAO is to develop a digital database that contains all available bathymetric data north of 64°, for use by mapmakers, researchers, institutions, and others whose work requires a detailed and accurate knowledge of the depth and the shape of the Arctic seabed.<sup>130</sup> The use of IBCAO data in shelf delineation engages domestic and transnational epistemic communities in a process of direct and explicit negotiation of methods, interpretation, and theories. Rather than having to convince the Commission of the validity of their techniques and procedures, states can rely on co-operatively collected and synthesized data in projects like IBCAO as a proxy for peer processes customarily used to establish consensus. IBCAO has produced several versions of a chart of the seabed that will be common to each of the Arctic coastal states' submissions. Moreover, in producing the charts, investigators have met regularly since 1996 to discuss the co-ordination of scientific and technical procedures specifically required for the implementation of Article 76 in the Arctic. Participants noted that investigators agreed to construct common models 'so that inconsistencies between their respective results are caused by varying methods of interpretation, and not by incompatibilities between data holdings'.<sup>131</sup>

Beyond co-operation on the collection and analysis of data is the possibility that states can make co-ordinated submissions to the Commission.<sup>132</sup> This enables parties to share the costs of researching and analysing data, to produce a more complete and rigorous data set, and to enhance transparency. Most importantly, it internalizes any

127 Cont'l Shelf Project, LORITA-1 (Lomonosov Ridge Test of Appurtenance): Fieldwork During April/May 2006 North of Canada/Greenland, [http://a76.dk/expeditions\\_uk/lorita-1\\_uk/index.html](http://a76.dk/expeditions_uk/lorita-1_uk/index.html) (accessed 12 August 2015). Press Release, Natural Res. Can., Undersea Data: Canada and Denmark Agree on Joint Survey (14 July 2005) available at <http://www.international.gc.ca/continental/collaboratin.aspx> (accessed 12 August 2015).

128 Riddell-Dixon, *supra* note 115 (noting this data was also presented at the 2010 Meetings of the American Geophysical Union).

129 IBCAO website <http://www.ngdc.noaa.gov/mgg/bathymetry/arctic/arctic.html> (accessed 12 August 2015).

130 *Ibid.*

131 R. Macnab et al., 'Cooperative Preparations for Determining the Outer Limits of the Judicial Continental Shelf in the Arctic Ocean: A Model for Regional Collaboration in Other Parts of the World?', (2001) *Ibru Boundary & Sec Bull.* 86, at 87.

132 Based on difficulties obtaining agreement, coastal states are likely to submit claims and documentation in support of their claims separately, see Lathrop, *supra* note 22, at 4154.

unresolved disputes within the group. States seeking to establish claims regarding oceanic features that are yet unidentified would fare better in having their claims accepted where there is consensus. As Byers suggests, Russia, Denmark, and Canada could advance a common view of the character of the Lomonosov Ridge based on shared interpretations of submarine ridges and elevations in Article 76.<sup>133</sup> Similarly, they could agree on a common geological history of the Arctic Ocean seabed as a means to optimize the chances for success of their submissions.<sup>134</sup> Because each considers the Lomonosov Ridge to be a natural component of their respective continental margins, they are likely to consider whether they could forward a theory of formation that supports only their own claims or whether it is possible to forward a theory of the ridge that supports all three.

Lastly, while direct co-operation between state scientists on the continental shelf seems like the most obvious tool to achieve state consensus, it is grounded in a long and strong tradition of scientific/research co-operation in the Arctic region – even during the ‘Cold War’. Institutions such as the Arctic Council – through its Working Groups<sup>135</sup> – and the International Arctic Science Committee (IASC)<sup>136</sup> have been instrumental and highly effective in promoting scientific dialogue. Much like other international organizations tasked with gathering and disseminating information, these Arctic organizations, and others, have established secretariats created under international agreements to warehouse knowledge used to assess compliance.<sup>137</sup> In participating in these organizations at the behest of their home states, scientists contribute to a building consensus on a broad range of topics.

For example, numerous scholars have noted that scientific engagement at the Arctic Council is rooted in a history of environmental co-operation, indigenous engagement, and scientific discourse.<sup>138</sup> Through its various subcommittees, state-delegated scientists engage in a process of issue identification, standard setting, and regulation on various topics of importance to Arctic states and, in doing so, establish broader co-operative relationships. For its part, IASC brings together Arctic research interests on an ongoing basis, particularly through its decadal research planning process known as the ‘International Conference on Arctic Research Planning’ (ICARP). ICARP II, which took place in Copenhagen (10–12 November 2005) was a key driver in defining the research program of the International Polar Year (IPY) 2007–2008 – which also became a major global platform for co-operation and

133 M. Byers *International Law and the Arctic* (2013), 109–112.

134 *Ibid.*, at 112 (on coordinated submissions).

135 <http://www.arctic-council.org/index.php/en/about-us/working-groups/114-resources/about/working-groups> (accessed 12 August 2015).

136 <http://www.iasc.info/> (accessed 12 August 2015).

137 This role is especially important in environmental regimes, where technical data grounds compliance-claims. See D. T. Avgerinopoulou, ‘Review Bodies in Multilateral Environmental Agreements – Competences, Coherence, Coordination’, 4th Global Administrative Law Seminar, New York University School of Law and University of Rome, Viterbo, Italy, (12–14 June 2009) available at <http://www.iilj.org/GAL/documents/V5.Avgerinopoulou.pdf> (accessed 12 August 2015).

138 Keskitalo, *supra* note 73, at 161–2, 166; A Nilsson, ‘A Changing Arctic Climate: Science and Policy in the Arctic Climate Impact Assessment’, (2009) 50 *Environment & Policy* 77; T. Koivurova, ‘Limits and Possibilities of the Arctic Council in a Rapidly Changing Scene of Arctic Governance’, (2010) 46(2) *Polar Record* 146.

knowledge-sharing.<sup>139</sup> ICARP III was approved at the Arctic Science Summit Week (ASSW) in April 2015, permitting state delegated scientists to engage in a process of standard setting and regulation.<sup>140</sup> The effect is to use scientific discourse on various topics to frame political issues.<sup>141</sup>

## 5. CONCLUSION

Explanations for the authority of the Commission on the Limits of the Continental Shelf generally assume that states accept the UN Convention as binding. In so far as the Convention requires certainty about the physical characteristics of the shelf, the provision of technical data is expected to define what constitutes compliance by allowing states to prove that the components of the seabed meet the characteristics of the legal terms. In this formulation, scientific experts on the Commission affirm or contest the work of domestic scientific actors, who provide technical data in support of state claims. The effect of this account is to leave one with the impression that disputes over sovereignty are factual questions that are capable of being answered through the rigorous examination of data to be obtained by the parties. Science is therefore conducted and used for the purposes of containing or closing technical disputes about jurisdiction and sovereign rights and thereby providing certainty.

Nevertheless, accounts of the Convention that rely on the use of science to generate certainty may be of limited explanatory value when treaty interpretation generates uncertainty. Claims of Arctic coastal states to the outer limits of the Continental shelf illustrate the interpretive problems created by Article 76 and its effect on determining compliance with international law. Moreover, it is not only the Arctic where contested interpretations have grounded disputes over authority. Differing claims in the South China Sea<sup>142</sup> and the South Atlantic<sup>143</sup> have also been accompanied by differing interpretations of Article 76 and supportive data. Claims in each of these cases are the product of extensive scientific research expected to create certainty. Nonetheless Commission interpretations are unlikely to settle inter-state disputes. Instead, the diffusion of authority in the face of definitional uncertainty creates the potential for multiple and dichotomous interpretations of Article 76. Since law and science are uncertain and potentially open to equally valid and competing interpretations, states may act at odds with each other or with the Commission and still be construed as complying with international law. Approaches that attribute the peaceful resolution of disputes to the Convention therefore perpetuate a myth of sorts. They don't address the possibility that science can generate uncertainty in international law. Consequently, these accounts suffer from the tenuous ability to understand how interests are mobilized in relation to international law or international institutions more generally when interests diverge.

<sup>139</sup> <http://www.ipy.org/> (accessed 12 August 2015).

<sup>140</sup> <http://icarp.iasc.info/> (accessed 12 August 2015).

<sup>141</sup> Keskitalo, *supra* note 73, at 28–30.

<sup>142</sup> Sheng-ti Gau, *supra* note 4.

<sup>143</sup> Serdy, *supra* note 4.

This article has instead forwarded the argument that state parties in the Arctic are likely to comply with Commission interpretations where uncertainty remains because they manage how consensus can be reached. Drawing on a constructivist approach to establishing legal authority, the authors have identified the role that scientific discourse plays in this particular application of international law. In the model of managed consensus described here, Arctic states are not fortuitous beneficiaries of scientific co-operation on shelf science. Rather, a managed consensus model sees scientific representatives of those states as active participants in generating the types of questions policy science needs to answer but also active participants in data collection, dissemination, evaluation, and interpretation. In communicating with transnational networks, state scientists and other policy actors set out to persuade others of the veracity of their theories but also to identify how theories operate for the combined benefit of multiple states. This type of active persuasion manifests in early co-ordination of research technologies, mandatory requirements for consistent data presentation, and ultimately shared interpretations.

This approach does not source the Commission's authority to the Convention as a singular and final transfer of responsibility. Rather, as it relates to the Arctic, the Commission's authority is constantly affirmed and reaffirmed through its interaction with state parties as producers, consumers, and verifiers of science, and, most tellingly, through their management of consensus. The Convention and the rules made pursuant to it, draw participants into routinized activities regarding the validation of gathering and interpreting data. By looking at how science is used as a consciously mediated form of international relations, the normative force of the treaty is dislocated from the strict confines of positive law. While the treaty may have been the genesis of the Commission, its force for delineation in the Arctic can instead be sourced to the way its processes correlate with the discourses of scientific shelf communities in both domestic and transnational contexts. The force of the Commission's interpretations for Arctic states is therefore dependent upon its place within networks through which states forward a co-operative approach to verification and consensus building.

Based on the level of co-operation in Arctic shelf delineation, some commentators have begun to predict its implications for regional relations between Arctic states. For instance, Baker argues that broader regional co-operation in mapping is expected to predict ongoing co-operation between Arctic states and state scientists.<sup>144</sup> It is hoped that extensive state experience working through technical solutions might mitigate political tensions created by potentially overlapping rights to the shelf. Workshops such as those held to identify common research interests in the region could possibly serve as blueprints for collaborative work in other fields.<sup>145</sup> Baker draws upon joint seabed mapping, such as that between Canada and the US, as the proper foundation for other activities in the disputed triangle, such as

<sup>144</sup> Joint US-Russia Workshop on the Plate Tectonic Evolution of Northeast Russia (9–12 December 2004), <http://pangea.stanford.edu/research/structure/nerussia/index.html> (stating that the primary goal of the workshop was to 'to frame a long-term scientific plan and to outline potential collaborative projects that utilize existing expertise, databases, laboratories and institutional capabilities') (accessed 12 August 2015).

<sup>145</sup> Baker, *supra* note 25.

hydrocarbon cross-border unitization agreements, joint development, marine protected areas, and integrated management that fills the regulatory gaps in the region. Co-operation in gathering and sharing data, and discourse over theories of ocean shelf development allow the parties to develop a co-operative dynamic that facilitates future agreement.<sup>146</sup> To Baker, basic Arctic geosciences could provide a useful realm of co-operative endeavour that models the type of co-operation needed for the requirements of Article 76 of the Convention. In short, scientific co-operation is key to political co-operation and legal action.

Whether co-operation before the Commission is linked to co-operation on other Arctic endeavours is not entirely clear. It seems likely that a culture of scientific co-operation is likely to support further engagement on other issues that come up between the parties but also shared among them. As Young has explored, scientific knowledge has been used to promote a co-operative approach and better governance systems in the Polar Regions – especially related to trans-boundary air pollution and ozone depletion. As the research of the Arctic Council Working Groups illustrates, Arctic states have certainly been influenced by science-based policy to identify shared issues and have shown a great capacity to research them as a region. Whether this level of co-operation will result in effective shared action across the Arctic remains to be determined by future co-ordination. Moreover, what broader implications the approach advocated here might have for submissions to the Commission in other regions are not entirely clear. Differences in the history of state conflict, including the nature of territorial disputes and power imbalances, as well as the capacity of parties to support independent scientific bureaucracies able to engage with the Commission and other states' scientists will certainly impact its relevance. However, where regional and state capacity to engage in science is matched by a willingness to use it, it seems likely that Commission authority will be bolstered by the common use of scientific discourse.

Ultimately, this article has identified that, much as others have identified the use of scientific discourse to understand the force of international regulation, the Commission's authority over Arctic states should be contextualized within the transnational technocratic regime that governs Arctic science. Networks related to the Arctic continental shelf are not fashioned in one particular form. They can be formal or informal, enduring or provisional, inter-state or collaborative. However, they share an objective of sharing scientific data and building consensus through the standardization of scientific method and interpretation. Because it is agreement on interpretation that drives political agreement on shelf delineation and ultimately delimitation, it is the process of obtaining scientific agreement that is relevant to understanding the authority of the Commission in the Arctic. An empirical analysis of how this authority is generated, as provided here, should augment any understanding of authority that relies on treaty terms and enrich discussion on how law can be used to address international disputes.

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<sup>146</sup> Ibid.