

**FIFTY-FOURTH SESSION OF THE IPCC
Electronic Session, 26 July – 6 August 2021**

IPCC-LIV/Doc. 5, Rev.1¹
(6.VIII.2021)
Agenda Item: 3
ENGLISH ONLY

**ACCEPTANCE OF THE ACTIONS TAKEN AT THE FOURTEENTH SESSION OF
WORKING GROUP I**

**Working Group I contribution to the IPCC Sixth Assessment Report (AR6),
Climate Change 2021: The Physical Science Basis**

**Changes to the Underlying Scientific-Technical Assessment to ensure consistency
with the approved Summary for Policymakers**

(Submitted by the Co-Chairs of the IPCC Working Group I)

¹ Two additional lines were added to this revised version.

P54/WGI-14 - Changes to the underlying scientific-technical assessment to ensure consistency with the approved SPM

SPM Page:Line	Chapter/Su pp. Material	Chapter Page:Line	Summary of edit to be made
Box SPM.1.1	1	7:35	Add "illustrative" before "scenarios", to read "A new set of illustrative scenarios,"
Box SPM.1.1	1	7:35	Add after "scenarios, ": "that cover the range of possible future developments of anthropogenic drivers of climate change found in the literature"
Box SPM.1.1	1	7:39	Add after "low-emissions pathways.": "They start in 2015, and include scenarios with high and very high GHG emissions (SSP3-7.0 and SSP5-8.5) and CO2 emissions that roughly double from current levels by 2100 and 2050, respectively, scenarios with intermediate GHG emissions (SSP2-4.5) and CO2 emissions remaining around current levels until the middle of the century, and scenarios with very low and low GHG emissions and CO2 emissions declining to net zero around or after 2050, followed by varying levels of net negative CO2 emissions (SSP1-1.9 and SSP1-2.6).
Box SPM.1.1	1	7:39	Replace "The feasibility or likelihood of individual scenarios is not part of this assessment" with "Emissions vary between scenarios depending on socio-economic assumptions, levels of climate change mitigation and, for aerosols and non-methane ozone precursors, air pollution controls. Alternative assumptions may result in similar emissions and climate responses, but the socio-economic assumptions and the feasibility or likelihood of individual scenarios is not part of the assessment, ..."
Box SPM.1.1	1	23:13 (Table Section 2, entry on "emissions scenarios", right column)	replace "in the context of medium-high emission scenarios" with "in the context of intermediate-high emission scenarios"
Box SPM.1.1	1	23:15 (Table Section 2, on "emissions scenarios", right column)	replace "future medium or high" with "future intermediate or high"
Box SPM.1.1	1	26:3 (Table Section 2, on "key climate indices", left column)	replace "medium" with "intermediate"
SPM	1	30 Box.1.1, Figure 1	Replace "Observed changes in the atmosphere, oceans, cryosphere and biosphere provide unequivocal evidence of a world that has warmed. {2.3}" with "It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred. {SPM.A.1}"
SPM	1	30 Box.1.1, Figure 1	Replace "Present-day global concentrations of atmospheric carbon dioxide (CO2) are at higher levels than at any time in at least the past two million years (high confidence) {2.2}" with "The probability of low-likelihood, high impact outcomes increases with higher global warming levels (high confidence). {SPM.C.3.2}"
SPM	1	30 Box.1.1, Figure 1	Replace "Global mean sea level (GMSL) is rising, and the rate of GMSL rise since the 20th century is faster than over any preceding century in at least the last three millennia (high confidence) {2.3.3}" with "The last time global surface temperature was sustained at or above 2.5°C higher than 1850–1900 was over 3 million years ago (medium confidence). {SPM.B.1.1} There is low confidence in long-term (multi-decadal to centennial) trends in the frequency of all-category tropical cyclones {SPMA.3.4}"

P54/WGI-14 - Changes to the underlying scientific-technical assessment to ensure consistency with the approved SPM

SPM Page:Line	Chapter/Su pp. Material	Chapter Page:Line	Summary of edit to be made
SPM	1	30 Box.1.1, Figure 1	Replace "It is virtually certain that the average surface warming will continue to be higher over land than over the ocean and that the surface warming in the Arctic will continue to be more pronounced than the global average over the 21st century. {4.3.1, 4.5.1}" with "It is <i>virtually certain</i> that hot extremes (including heatwaves) have become more frequent and more intense across most land regions since the 1950s. {SPM.A.3.1}"
SPM	1	30 Box.1.1, Figure 1	Replace "Based on multiple lines of evidence the best estimate of ECS is 3 °C, the likely range is 2.5 °C to 4 °C and the very likely range is 2 °C to 5 °C. It is virtually certain that ECS is larger than 1.5 °C.{7.5.5}" with "Based on multiple lines of evidence, the <i>very likely range</i> of equilibrium climate sensitivity is between 2°C (<i>high confidence</i>) and 5°C (<i>medium confidence</i>). The AR6 assessed best estimate is 3°C with a <i>likely range</i> of 2.5°C to 4°C (<i>high confidence</i>).... {SPM.A.4.4}"
C1	1	57:10	Change 'obscure or intensify' to 'mask or enhance'
C1	1	57:27	Change 'obscured or intensified' to 'masked or enhanced'
Box SPM.1.1	1	62:18	replace "medium" with "intermediate"
B5, footnote 22	1	65:35-38	Change all text to: Low-likelihood, high impact outcomes (LLHI): Outcomes/events whose probability of occurrence is low or not well known (as in the context of deep uncertainty) but whose potential impacts on society and ecosystems could be high. To better inform risk assessment and decision-making, such low-likelihood outcomes are considered if they are associated with very large consequences and may therefore constitute material risks, even though those consequences do not necessarily represent the most likely outcome.
Box SPM.1.1	1	97:52	Add "set of illustrative" before "scenarios", to read "new set of illustrative scenarios,"
Box SPM.1.1	1	98:34	Add "illustrative" before "SSP scenarios", to read "A core set of five illustrative SSP scenarios ..."
Box SPM.1.1	1	103:2	Add "illustrative" before "SSP scenarios", to read "The core set of five illustrative SSP scenarios ..."
Box SPM.1.1	1	104:1 (middle column, entry SSP3-7.0)	replace "A medium to high" with "An intermediate to high"
Box SPM.1.1	1	104:1 (middle column, entry SSP3-7.0-lowNTCF)	replace "medium to high" with "intermediate to high"
Box SPM.1.1	1	104:2 (middle column, entry SSP5-8.5)	Add "CO2 emissions roughly double from current levels by 2050." after "policy."
Box SPM.1.1	1	104:3 (middle column, entry SSP5-8.5)	Add "CO2" after "zero" to read "net zero CO2 emissions"
Box SPM.1.1	1	104:4 (middle column, entry SSP3-7.0)	Add "CO2 emissions roughly double from current levels by 2100." after "narrative."
Box SPM.1.1	1	104:5 (middle column, entry SSP2-4.5)	Add "CO2 emissions remaining around current levels until the middle of the century." after ", Box 1)."
Box SPM.1.1	1	110:19	replace "medium" with "intermediate"
C1	1	Figure 1.13	Change 'obscure or intensify' to 'mask or enhance' in figure intent title
C3	1	Figure 1.16	Edit caption to use 'low-likelihood outcomes' rather than 'low-likelihood scenarios' (two places)
Box SPM.1.1	1	Figure 1.25	change "Middle" to ""intermediate"

P54/WGI-14 - Changes to the underlying scientific-technical assessment to ensure consistency with the approved SPM

SPM Page:Line	Chapter/Su pp. Material	Chapter Page:Line	Summary of edit to be made
SPM A.4.2	1	Appendix A1	Add approved SPM statement to summary Appendix: Human-caused net positive radiative forcing causes an accumulation of additional energy (heating) in the climate system, partly reduced by increased energy loss to space in response to surface warming. The observed average rate of heating of the climate system increased from 0.50 [0.32 to 0.69] W m ⁻² for the period 1971–2006, to 0.79 [0.52 to 1.06] W m ⁻² for the period 2006–2018 (high confidence). Ocean warming accounted for 91% of the heating in the climate system, with land warming, ice loss and atmospheric warming accounting for about 5%, 3% and 1%, respectively (high confidence).
SPM A.4.1	1	Appendix A1	Add approved SPM statement to summary Appendix: Human-caused radiative forcing of 2.72 [1.96 to 3.48] W m ⁻² in 2019 relative to 1750 has warmed the climate system. This warming is mainly due to increased GHG concentrations, partly reduced by cooling due to increased aerosol concentrations. The radiative forcing has increased by 0.43 W m ⁻² (19%) relative to AR5, of which 0.34 W m ⁻² is due to the increase in GHG concentrations since 2011. The remainder is due to improved scientific understanding and changes in the assessment of aerosol forcing, which include decreases in concentration and improvement in the calculation.
SPM A.1	1	Appendix A1	Add approved SPM statement to summary Appendix: Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred.
SPM A.1.2	1	Appendix A1	Add approved SPM statement to summary Appendix: Each of the last four decades has been successively warmer than any decade that preceded it since 1850. Global surface temperature in the first two decades of the 21st century (2001–2020) was 0.99 [0.84– 1.10] °C higher than 1850–1900. Global surface temperature was 1.09 [0.95 to 1.20] °C higher in 2011–2020 than 1850–1900, with larger increases over land (1.59 [1.34 to 1.83] °C) than over the ocean (0.88 [0.68 to 1.01] °C)
SPM A.1.7	1	Appendix A1	Add approved SPM statement to summary Appendix: Global mean sea level increased by 0.20 [0.15 to 0.25] m between 1901 and 2018. The average rate of sea level rise was 1.3 [0.6 to 2.1] mm yr ⁻¹ between 1901 and 1971, increasing to 1.9 [0.8 to 2.9] mm yr ⁻¹ between 1971 and 2006, and further increasing to 3.7 [3.2 to 4.2] mm yr ⁻¹ between 2006 and 2018 (high confidence). Human influence was very likely the main driver of these increases since at least 1971.
SPM A.2.1	1	Appendix A1	Add approved SPM statement to summary Appendix: In 2019, atmospheric CO ₂ concentrations were higher than at any time in at least 2 million years (high confidence), and concentrations of CH ₄ and N ₂ O were higher than at any time in at least 800,000 years (very high confidence). Since 1750, increases in CO ₂ (47%) and CH ₄ (156%) concentrations far exceed, and increases in N ₂ O (23%) are similar to, the natural multi-millennial changes between glacial and interglacial periods over at least the past 800,000 years (very high confidence).
SPM A.2	1	Appendix A1	Add approved SPM statement to summary Appendix: The scale of recent changes across the climate system as a whole and the present state of many aspects of the climate system are unprecedented over many centuries to many thousands of years.
SPM A.2.2	1	Appendix A1	Add approved SPM statement to summary Appendix: Global surface temperature has increased faster since 1970 than in any other 50-year period over at least the last 2000 years (high confidence). Temperatures during the most recent decade (2011–2020) exceed those of the most recent multi-century warm period, around 6500 years ago [0.2°C to 1°C relative to 1850–1900] (medium confidence). Prior to that, the next most recent warm period was about 125,000 years ago when the multi-century temperature [0.5°C to 1.5°C relative to 1850–1900] overlaps the observations of the most recent decade (medium confidence).

P54/WGI-14 - Changes to the underlying scientific-technical assessment to ensure consistency with the approved SPM

SPM Page:Line	Chapter/Su pp. Material	Chapter Page:Line	Summary of edit to be made
SPM A.2.4	1	Appendix A1	Add approved SPM statement to summary Appendix: Global mean sea level has risen faster since 1900 than over any preceding century in at least the last 3000 years (high confidence). The global ocean has warmed faster over the past century than since the end of the last deglacial transition (around 11,000 years ago) (medium confidence). A long-term increase in surface open ocean pH occurred over the past 50 million years (high confidence), and surface open ocean pH as low as recent decades is unusual in the last 2 million years (medium confidence).
SPM A.1	1	Appendix A1	Add approved SPM statement to summary Appendix: It is unequivocal that human influence has warmed the atmosphere, ocean and land.
SPM A.1.3	1	Appendix A1	Add approved SPM statement to summary Appendix: The likely range of total human-caused global surface temperature increase from 1850–1900 to 2010–2019 is 0.8°C to 1.3°C, with a best estimate of 1.07°C. It is likely that well-mixed GHGs contributed a warming of 1.0°C to 2.0°C, other human drivers (principally aerosols) contributed a cooling of 0.0°C to 0.8°C, natural drivers changed global surface temperature by –0.1°C to 0.1°C, and internal variability changed it by –0.2°C to 0.2°C. It is very likely that well-mixed GHGs were the main driver of tropospheric warming since 1979, and extremely likely that human-caused stratospheric ozone depletion was the main driver of cooling of the lower stratosphere between 1979 and the mid-1990s.
SPM B.1.1	1	Appendix A1	Add approved SPM statement to summary Appendix: Compared to 1850–1900, global surface temperature averaged over 2081–2100 is very likely to be higher by 1.0°C to 1.8°C under the very low GHG emissions scenario considered (SSP1-1.9), by 2.1°C to 3.5°C in the intermediate scenario (SSP2-4.5) and by 3.3°C to 5.7°C under the very high GHG emissions scenario (SSP5-8.5).
Box SPM.1.1	1	Appendix A1	Add approved SPM statement to summary Appendix: This report assesses results from climate models participating in the Coupled Model Intercomparison Project Phase 6 (CMIP6) of the World Climate Research Programme. These models include new and better representation of physical, chemical and biological processes, as well as higher resolution, compared to climate models considered in previous IPCC assessment reports. This has improved the simulation of the recent mean state of most large-scale indicators of climate change and many other aspects across the climate system. Some differences from observations remain, for example in regional precipitation patterns.
SPM A.1.6	1	Appendix A1	Add approved SPM statement to summary Appendix: It is virtually certain that global mean sea level will continue to rise over the 21st century. Relative to 1995-2014, the likely global mean sea level rise by 2100 is 0.28-0.55 m under the very low GHG emissions scenario (SSP1-1.9), 0.32-0.62 m under the low GHG emissions scenario (SSP1-2.6), 0.44-0.76 m under the intermediate GHG emissions scenario (SSP2-4.5), and 0.63-1.01 m under the very high GHG emissions scenario (SSP5-8.5), and by 2150 is 0.37-0.86 m under the very low scenario (SSP1-1.9), 0.46-28 0.99 m under the low scenario (SSP1-2.6), 0.66-1.33 m under the intermediate scenario (SSP2-4.5), and 0.98-1.88 m under the very high scenario (SSP5-8.5) (medium confidence). Global mean sea level rise above the likely range – approaching 2 m by 2100 and 5 m by 2150 under a very high GHG emissions scenario (SSP5-8.5) (low confidence) – cannot be ruled out due to deep uncertainty in ice sheet processes.

P54/WGI-14 - Changes to the underlying scientific-technical assessment to ensure consistency with the approved SPM

SPM Page:Line	Chapter/Su pp. Material	Chapter Page:Line	Summary of edit to be made
SPM C.3.4	1	Appendix A1	Add approved SPM statement to summary Appendix: The Atlantic Meridional Overturning Circulation is very likely to weaken over the 21st century for all emission scenarios. While there is high confidence in the 21st century decline, there is only low confidence in the magnitude of the trend. There is medium confidence that there will not be an abrupt collapse before 2100. If such a collapse were to occur, it would very likely cause abrupt shifts in regional weather patterns and water cycle, such as a southward shift in the tropical rain belt, weakening of the African and Asian monsoons and strengthening of Southern Hemisphere monsoons, and drying in Europe.
SPM A.1.1	1	Appendix A1	Add approved SPM statement to summary Appendix: Observed increases in well-mixed greenhouse gas (GHG) concentrations since around 1750 are unequivocally caused by human activities. Since 2011 (measurements reported in AR5), concentrations have continued to increase in the atmosphere, reaching annual averages of 410 ppm for carbon dioxide (CO ₂), 1866 ppb for methane (CH ₄), and 332 ppb for nitrous oxide (N ₂ O) in 2019.
SPM D.1.1	1	Appendix A1	Add approved SPM D.1.1 statement to summary Appendix.
4:25-4:29	2	6:16	Immediately after bolded text add: GMST in the first two decades of the 21st century (2001-2020) was 0.99 [0.84-1.10] °C higher than 1850-1900. Each of the last 4 decades has successively been warmer than all preceding decades since 1850.
6:45-48	2	7:34	Add after '2-3 decades.' as follows: A long-term increase in surface open ocean pH occurred over the past 50 million years (high confidence), and surface ocean pH as low as recent times is uncommon in the last 2 million years (medium confidence)
4:25-4:29	2	39:26	To Cross-Chapter Box 2.3 Table 1 add the following values into a new row (to be positioned immediately before the existing row for 1850-1900 to 1995-2014): 1850-1900 to 2001-2020; 0.99 [0.84-1.10]; 0.99[0.81-1.14]; [empty]; Warming to first two decades of 21st century
12:23	2	40:35	Rephrase comparison to SR1.5 so as to connect more effectively to the SPM. Replace "about 10 years earlier than the midpoint" with "in the early part".
12:23	2	40:37	Rephrase comparison to SR1.5 so as to connect more effectively to the SPM. Replace "the ten-year" with "this".
12:27	2	40:40	Add sentence referring to another location in the SR1.5. After "(medium confidence)", add: "When considering scenarios similar to SSP1-1.9 instead of linear extrapolation, the SR1.5 estimate of when 1.5°C global warming is crossed is close to the central estimate reported here (SR1.5, Table 2.SM.12)"
4:25-4:29	2	46:1	Add column to Table as detailed in attached document (appendix 1). Change is to add a column of change to 2001-2020 to support its addition at SPM level.
4:25-4:29	2	47:1	before 'and to the most recent decade', add 'to the first two decades of the 21st century (2001-2020) by 0.99 [0.84-1.10] C'.
4:12	3	4:17	Replace "global climate system" with "atmosphere, ocean and land".
10:27	3	4:27	Add before "High-resolution models", and not in bold: "Some differences from observations remain, for example in regional precipitation patterns."
10:28	3	5:3	Replace the sentence on lines 3 to 5: "The CMIP6 multi-model mean GSAT anomaly between 1850–1900 and 2010–2019 is close to the best estimate of observed warming, but some CMIP6 models simulate a warming that is outside the assessed 5–95% range of observed warming." with "The CMIP6 historical simulations assessed in this report have an ensemble mean global surface temperature change within 0.2°C of the observations over most of the historical period, and observed warming is within the 5-95% range of the CMIP6 ensemble. However, some CMIP6 models simulate a warming that is either above or below the assessed 5-95% range of observed warming."
9:2	3	6:50	Change 1970 to 1971
5:17	3	7:22	Change "global ocean" to "global surface open ocean"

P54/WGI-14 - Changes to the underlying scientific-technical assessment to ensure consistency with the approved SPM

SPM Page:Line	Chapter/Su pp. Material	Chapter Page:Line	Summary of edit to be made
19:23	3	28:5	Add two references in addition to (Seneviratne et al. 2014), so that references become (Seneviratne et al. 2014, Kamae et al. 2014, Imada et al. 2017). The two extra references are "Kamae, Y., Shiogama, H., Watanabe, M., and Kimoto, M. (2014). Attributing the increase in Northern Hemisphere hot summers since the late 20th century. <i>Geophys. Res. Lett.</i> 41, 5192–5199. doi:10.1002/2014GL06106"; "Imada, Y., Maeda, S., Watanabe, M., Shiogama, H., Mizuta, R., Ishii, M., et al. (2017). Recent enhanced seasonal temperature contrast in Japan from large ensemble high-resolution climate simulations. <i>Atmosphere</i> . 8, 57, doi:10.3390/atmos8030057.
19:23	3	28:53	Replace "Global ocean.... (Very high confidence)." with "Nonetheless, the heating of the climate system continued during this period, as reflected in the continued warming of the global ocean (<i>very high confidence</i>) and in the continued rise of hot extremes over land (<i>medium confidence</i>)."
9:2	3	65:16	Change 1970 to 1971
9:2	3	65:16	Add new sentence after full stop: "The assessed period starts in 1971 for consistency with observations assessed in Cross-Chapter Box 9.1."
5:17	3	73:19	Change "global ocean" to "global surface open ocean"
5:17	3	73:20	Delete "at the surface"
5:17	3	73:30	Change "global ocean" to "global surface open ocean"
4:12	3	91:34	Add new sentence after "(Section 3.3.1.1)": "It is <i>very likely</i> that human influence is the main driver of warming over land (Section 3.3.1.1)."
4:12	3	91:34	Replace sentence on lines 34-37, from "Moreover" to "(Cross-Chapter Box 3.2)", with: "Moreover, the atmosphere as a whole has warmed (Table 7.1), and it is <i>very likely</i> that human-induced greenhouse gas increases were the main driver of tropospheric warming since 1979 (Section 3.3.1.2). It is <i>virtually certain</i> that greenhouse gas forcing was the main driver of the observed changes in hot and cold extremes on the global scale (Cross-Chapter Box 3.2)."
4:12	3	91:37	Add "over land" before "at the global scale".
4:12	3	92:4	Replace "global climate system" with "atmosphere, ocean and land components of the global climate system, taken together".
12:23	4	4::33	Rephrase comparison to SR1.5 so as to connect more effectively to the SPM. Replace "about 10 years earlier than the midpoint" with "in the early part".
12:23	4	4::35	Rephrase comparison to SR1.5 so as to connect more effectively to the SPM. Replace "the ten-year" with "this".
12:27	4	4:38	Add sentence referring to another location in the SR1.5. After "(medium confidence)", add sentence referring to another location in the SR1.5: "When considering scenarios similar to SSP1-1.9 instead of linear extrapolation, the SR1.5 estimate of when 1.5°C global warming is crossed is close to the central estimate reported here."
12:23	4	37:10	Rephrase comparison to SR1.5 so as to connect more effectively to the SPM. Replace "about 10 years earlier than the midpoint" with "in the early part".
12:23	4	37:12	Rephrase comparison to SR1.5 so as to connect more effectively to the SPM. Replace "the ten-year" with "this".
12:27	4	37:15	Add sentence referring to another location in the SR1.5. After "(Section 3.3.1)", add "When considering scenarios similar to SSP1-1.9 instead of linear extrapolation, the SR1.5 estimate of when 1.5°C global warming is crossed is close to the central estimate reported here (SR1.5, Table 2.SM.12)"
D2.2, 26, 8	6	8:6	to reflect the above change in the text, please add "(high confidence)" between "mitigation" and ","
D2.2, 26, 8	6	8:8	to reflect the above change in the text, please add "(high confidence)" at the end of the sentence "...exceeding the WHO guidelines."
D.2.1, 26, 5	6	75:12	to support the sentence added to SPM.D.2 on non-detection of CO2 growth rate changes, please add "(medium confidence)" to the end of the sentence in chapter 6 CCB, page 75, line 12.

P54/WGI-14 - Changes to the underlying scientific-technical assessment to ensure consistency with the approved SPM

SPM Page:Line	Chapter/Su pp. Material	Chapter Page:Line	Summary of edit to be made																																													
D2.2, 26, 8	6	89:9	to support the high confidence for the new approved sentence in CRP56 - "Scenarios with targeted reductions of air pollutant emissions....GHG emissions with the magnitude of the benefit varying 21 between regions (high confidence).", please add "(high confidence)" to the end of the sentence "...air pollution exceeding the WHO guidelines"																																													
8: 48-51	7	6:36	Replace "435 [325 to 545]" with "282 [177 to 387]" .																																													
8: 48-51	7	6:36	Replace "1971-2018" with "1971-2006" .																																													
8: 48-51	7	6:37-38	Replace "0.57 [0.43 to 0.72]" with "0.50 [0.32 to 0.69]" .																																													
8: 48-51	7	6:38	Replace "1971-2018" with "1971-2006" .																																													
8: 48-51	7	19:21	After the sentence that ends "... radiative forcing from greenhouse gases (<i>high confidence</i>)." insert "For the period 1971-2006 the total energy gain was 282 [177 to 387] ZJ, with an equivalent Earth energy imbalance of 0.50 [0.32 to 0.69] W m ⁻² ."																																													
4:17-22 footnote	7	32:40	<p>Replace second last row of Table 7.5 by</p> <table border="1"> <tbody> <tr> <td>Sum of HFCs (HFC-134a equivalent)</td> <td>237.1</td> <td>128.6</td> <td>0.</td> <td>0.</td> <td>0.040</td> <td>0.022</td> <td>0.040</td> <td>0.022</td> </tr> <tr> <td>Sum of CFCs+HCFCs+other ozone depleting gases covered by the Montreal Protocol (CFC-12 equivalent)</td> <td>1031.9</td> <td>1050.1</td> <td>0.</td> <td>0.</td> <td>0.354</td> <td>0.362</td> <td>0.354</td> <td>0.362</td> </tr> <tr> <td>Sum of PFCs (CF₄ equivalent)</td> <td>109.4</td> <td>98.9</td> <td>34.0</td> <td>34.0</td> <td>0.007</td> <td>0.006</td> <td>0.007</td> <td>0.006</td> </tr> <tr> <td>Sum of HFCs (HFC-134a equivalent)</td> <td>237.1</td> <td>128.6</td> <td>0.</td> <td>0.</td> <td>0.040</td> <td>0.022</td> <td>0.040</td> <td>0.022</td> </tr> <tr> <td>Sum of Halogenated species</td> <td></td> <td></td> <td></td> <td></td> <td>0.408±0.078</td> <td>0.394</td> <td>0.408±0.078</td> <td>0.394</td> </tr> </tbody> </table>	Sum of HFCs (HFC-134a equivalent)	237.1	128.6	0.	0.	0.040	0.022	0.040	0.022	Sum of CFCs+HCFCs+other ozone depleting gases covered by the Montreal Protocol (CFC-12 equivalent)	1031.9	1050.1	0.	0.	0.354	0.362	0.354	0.362	Sum of PFCs (CF ₄ equivalent)	109.4	98.9	34.0	34.0	0.007	0.006	0.007	0.006	Sum of HFCs (HFC-134a equivalent)	237.1	128.6	0.	0.	0.040	0.022	0.040	0.022	Sum of Halogenated species					0.408±0.078	0.394	0.408±0.078	0.394
Sum of HFCs (HFC-134a equivalent)	237.1	128.6	0.	0.	0.040	0.022	0.040	0.022																																								
Sum of CFCs+HCFCs+other ozone depleting gases covered by the Montreal Protocol (CFC-12 equivalent)	1031.9	1050.1	0.	0.	0.354	0.362	0.354	0.362																																								
Sum of PFCs (CF ₄ equivalent)	109.4	98.9	34.0	34.0	0.007	0.006	0.007	0.006																																								
Sum of HFCs (HFC-134a equivalent)	237.1	128.6	0.	0.	0.040	0.022	0.040	0.022																																								
Sum of Halogenated species					0.408±0.078	0.394	0.408±0.078	0.394																																								
15:33	8	7:36	change "very likely" to "likely" (addition of text on projected land precipitation change to ensure consistent assessment between Ch4 and Ch8)																																													
22:33	8	9:19	add "and drying in Europe" at the end of the sentence																																													
15:33	8	64:50	change "very likely" to "likely" (addition of text on projected land precipitation change to ensure consistent assessment between Ch4 and Ch8)																																													
15:33	8	65:16	change "very likely" to "likely" (addition of text on projected land precipitation change to ensure consistent assessment between Ch4 and Ch8)																																													
SPM14:4	9	7:4	Please change "There is low confidence in model simulations of past and future Antarctic sea ice evolution due to deficiencies..." to " There is low confidence in model simulations of future Antarctic sea ice decrease, and lack of decrease, due to deficiencies... "																																													
SPM-9:4	9	8:40	Please add the sentence in bold after the existing sentence: "While ocean thermal expansion (38%) and mass loss from glaciers (41%) dominate the total change from 1901 to 2018, ice sheet mass loss has increased and accounts for about 35% of the sea level increase during the period 2006–2018 (<i>high confidence</i>). Because of the increased ice-sheet mass loss, the total loss of land ice (glaciers and ice sheets) was the largest contributor to global mean sea-level rise over the period 2006-2018 (<i>high confidence</i>). "																																													
SPM14:4	9	51:1-2	Please change "there remains low confidence in existing future projections of Antarctic sea-ice evolution." to " there remains low confidence in existing future projections of Antarctic sea-ice decrease and lack of decrease. "																																													
SPM-9:4	9	96:4	Please add the sentence in bold after the existing sentence: "However, all contributions to GMSL rise show their largest rate during 2006 to 2018, with the ice sheets accounting for about 35% of the total change during this period. Because of the increased ice-sheet mass loss, the total loss of land ice (glaciers and ice sheets) was the largest contributor to GMSL rise over the period 2006-2018 (<i>high confidence</i>). "																																													
C1.1	11	40:47	Add after "; Imada et al. 2017)": ", suggesting a continued heating during this time period (<i>medium confidence</i>)." .																																													

P54/WGI-14 - Changes to the underlying scientific-technical assessment to ensure consistency with the approved SPM

SPM Page:Line	Chapter/Su pp. Material	Chapter Page:Line	Summary of edit to be made
C1.1	11	43:11	Add after "Europe, Australasia, Asia and North America.": "A continued warming of hot extremes was also observed during the "slower surface global warming" period from the late 1990s to early 2010s (<i>medium confidence</i>)."
A3.5 & footnote 12, "compound extreme events"	11	106:22	Please add between "... from dependent drivers." and "Compound events ..." the sentence: "The term 'compound event' is used interchangeably with 'compound extremes' and 'compound extreme events' in other parts of the assessment.
30:20 ("Agricultural and ecological droughts are assessed based on observed and simulated changes in total column soil moisture, complemented by...")	11, Section 11.9	115:42	Replace "11.SM" with "Figure 11.SM.1"
Figure SPM.6	11		Update of Figures 11.6, 11.7, 11.12, and 11.15 to the updated reference period used in Figure SPM.6. The mentioned figures in the chapter need to be replaced (new versions already on the figure manager). In all figure captions "1851" needs to be replaced with "1850". There are also two typos: in the caption of Figure 11.7 "1951-1990" needs to be "1850-1900", and in the caption of Figure 11.15 "daily percipitation" needs to be "maximum daily precipitation". The exact changes are given below.
Figure SPM.3 Panel b	11	194	Table 11.15 Entry for heavy rain CAR change "Insufficient data and a lack of agreement on the evidence of trends" to "Lack of agreement on the evidence of trends" in first column - observations.
Figure SPM.3 Panel b	11 Figure 11.4	319	direction of change data in panel B for NWN region has changed from insufficient to mixed
Figure SPM.3	11 Figure 11.4	319	rename region NEC - NEN
Figure SPM.3 Panel b	11 fig 11.4	319	direction of change data in panel B for CAR region has changed from insufficient to mixed
Figure SPM.3 Panel b	11 Figure 11.4	319	remove "in winter" for region NEU precipitation
Figure SPM.3 Panel b	11 Figure 11.4	319	direction of change data in panel B for WCE region has changed from mixed to increase (colour red)
Figure SPM.3 Panel b	11 Figure 11.4	319	direction of change data in panel B for MED region has changed from insufficient to mixed
Figure SPM.3 Panel b	11 Figure 11.4	319	direction of change data in panel B for EAU region has changed from insufficient to mixed
Figure SPM.3 Panel b	11 Figure 11.4	319	direction of change data in panel B for NZ region has changed from insufficient to mixed
Figure SPM.6	11	322:7	Replace "1851" with "1850"
Figure SPM.6	11	322:9	Replace "1851" with "1850"
Figure SPM.6	11	323:5	Replace "1951-1990" with "1850-1900"
Figure SPM.6	11	323:7	Replace "1851" with "1850"
Figure SPM.6	11	331:5	Replace "1851" with "1850"

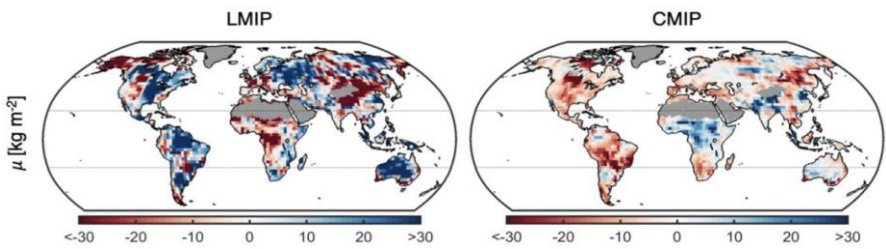
P54/WGI-14 - Changes to the underlying scientific-technical assessment to ensure consistency with the approved SPM

SPM Page:Line	Chapter/Su pp. Material	Chapter Page:Line	Summary of edit to be made
Figure SPM.6	11	331:7	Replace "1851" with "1850"
Figure SPM.6	11	334:4	Replace "1851" with "1850"
Figure SPM.6	11	334:5	Replace "daily precipitation" with "maximum daily precipitation"
Figure SPM.6	11	334:6	Replace "1851" with "1850"
30:20 ("Agricultural and ecological droughts are assessed based on observed and simulated changes in total column soil moisture, complemented by...")	Table 11.4-11.21	Entries for AGR/ECO, obs	Add references to Figure 11.SM.1 and to Gu et al. 2019, GRL; Gu, X., Zhang, Q., Li, J., Singh, V. P., Liu, J., Sun, P., & Cheng, C. (2019). Attribution of global soil moisture drying to human activities: A quantitative viewpoint. Geophysical Research Letters, 46, 2573–2582. https://doi.org/10.1029/2018GL080768
Figure SPM6	11	Figure 11.18	Add statistics for non-drying regions in respective figure
Figure SPM9	12	2:37	In the title of Section 12.3.6 within the Table of Contents, please replace "Oceanic" with "Open ocean"
Figure SPM9	12	15:19	In Table 12.2, please replace set of columns label "Oceanic" with "Open ocean" (second row; purple set). Please also note that the format of the "Heat and Cold" label in the same row seems to have strange vertical lines near top that may be due to internal columns interfering.
Figure SPM9	12	26:19	In the title of Section 12.3.6, please replace "Oceanic" with "Open ocean"
Figure SPM9	12	113:1	In Table 12.12, please replace set of rows label "Oceanic" with "Open ocean" (purple set of rows)
B5.2 Footnote 22	TS	7:4	In the definition of Low likelihood, high impact outcomes, the beginning of the sentence now starting with "Events..." should be changed to "Outcomes/events whose probability..."
10:27	TS	16:7	Replace sentence starting on line 7 with "Developments in the latest generation" and ending on line 10 with "and many other aspects across the Earth system" with: "This report assesses results from climate models participating in the Coupled Model Intercomparison Project Phase 6 (CMIP6) of the World Climate Research Programme. These models include new and better representation of physical, chemical and biological processes, as well as higher resolution, compared to climate models considered in previous IPCC assessment reports. This has improved the simulation of the recent mean state of most large-scale indicators of climate change and many other aspects across the climate system. Some differences from observations remain, for example in regional precipitation patterns."
10:28	TS	16:14	Replace sentence on lines 14-15 "While past warming is well simulated by the new generation of models, some individual models simulate past surface warming that is either below or above that observed." with "The CMIP6 historical simulations assessed in this report have an ensemble mean global surface temperature change within 0.2°C of the observations over most of the historical period, and observed warming is within the <i>very likely</i> range of the CMIP6 ensemble. However, some CMIP6 models simulate a warming that is either above or below the assessed <i>very likely</i> range of observed warming"
4:12	TS	20:7	Replace "climate system" with "atmosphere, ocean, and land components of the climate system."
Box SPM.1.1	TS	21:9	Add "illustrative" before "scenarios", to read "A core set of five illustrative scenarios ..."
Box SPM.1.1	TS	22:11	Add "illustrative" before "scenarios", to read "A core set of five illustrative scenarios ..."

P54/WGI-14 - Changes to the underlying scientific-technical assessment to ensure consistency with the approved SPM

SPM Page:Line	Chapter/Su pp. Material	Chapter Page:Line	Summary of edit to be made
Box SPM.1.1	TS	22:11-15	<p>Replace text from line 11-15</p> <p>"In this report, a core set of five scenarios is used to explore climate change over the 21st century and beyond (Section TS.2). They are labelled SSP1-1.9, SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5.14, and span a wide range of radiative forcing levels in 2100. Scenarios in AR6 cover a broader range of emissions futures than considered in AR5, including high CO2 emissions scenarios without climate change mitigation as well as a low CO2 emissions scenario reaching net zero CO2 emissions (see Core Concepts Box) around mid-century."</p> <p>with the following text:</p> <p>"Scenarios in AR6 cover a broader range of emissions futures than considered in AR5, including high CO2 emissions scenarios without climate change mitigation as well as a low CO2 emissions scenario reaching net zero CO2 emissions (see Core Concepts Box) around mid-century. In this report, a core set of five illustrative scenarios is used to explore climate change over the 21st century and beyond (Section TS.2). They are labelled SSP1-1.9, SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5, and span a wide range of radiative forcing levels in 2100. They start in 2015, and include scenarios with high and very high GHG emissions (SSP3-7.0 and SSP5-8.5) and CO2 emissions that roughly double from current levels by 2100 and 2050, respectively, scenarios with intermediate GHG emissions (SSP2-4.5) and CO2 emissions remaining around current levels until the middle of the century, and scenarios with very low and low GHG emissions and CO2 emissions declining to net zero around or after 2050, followed by varying levels of net negative CO2 emissions (SSP1-1.9 and SSP1-2.6)."</p>
4:25-4:29	TS	27:52	after the first 'increased by', add the words '0.99 [0.84-1.10] C from 1850-1900 to the first two decades of the 21st century (2001-2020), and' (then continue with the existing sentence).
4:25-4:29	TS	28:24	Add after first comma (between 1850-1900 to 1995-2014 and 1850-1900 to 2011-2020): between 1850-1900 and the first two decades of the 21st century by 0.99 [0.84-1.20]C,
19:23	TS	30:4	Add following sentence after "very likely range of CMIP6 trends.": "Furthermore, the heating of the climate system continued during this period, as reflected in the continued warming of the global ocean (<i>very high confidence</i>) and in the continued rise of hot extremes over land (<i>medium confidence</i>)".
12:23	TS	30:22	Rephrase comparison to SR1.5 so as to connect more effectively to the SPM. Replace "about 10 years earlier than the midpoint" with "in the early part".
12:23	TS	30:24	Rephrase comparison to SR1.5 so as to connect more effectively to the SPM. Replace "the ten-year" with "this".
12:27	TS	30:26	Add sentence referring to another location in the SR1.5. After "(medium confidence)", add: "When considering scenarios similar to SSP1-1.9 instead of linear extrapolation, the SR1.5 estimate of when 1.5°C global warming is crossed is close to the central estimate reported here."
5:17	TS	32:Table	Last row of Table TS.1: Change 1970 to 1971
4:12	TS	32:2	Replace "climate system as a whole" with "atmosphere, ocean, and land components of the climate system, taken together, "
4:12	TS	32:13	Replace "climate system" with "atmosphere, ocean, and land".
22:33	TS	39:52-54	Before "weather patterns and water patterns", add "regional" ; at the end of end of the sentence, before the full stop and LOS, add ", and drying in Europe". So the full sentence should read: "If an AMOC collapse were to occur, it would very likely cause abrupt shifts in the regional weather patterns and water cycle, such as a southward shift in the tropical rain belt, and could result in weakening of the African and Asian monsoons and strengthening of Southern Hemisphere monsoons, and drying in Europe."
5:17	TS	40:38	Change "ocean acidification" to "surface open ocean acidification"
6:45-48	TS	40:38	Add after '(virtually certain).' as follows: A long-term increase in surface open ocean pH occurred over the past 50 million years (high confidence), and surface ocean pH as low as recent times is uncommon in the last 2 million years (medium confidence)

P54/WGI-14 - Changes to the underlying scientific-technical assessment to ensure consistency with the approved SPM

SPM Page:Line	Chapter/Su pp. Material	Chapter Page:Line	Summary of edit to be made
6:45-48	TS	41:51-53	Replace sentence starting 'There is very high confidence that present-day surface pH' with: A long-term increase in surface open ocean pH occurred over the past 50 million years (high confidence), and surface ocean pH as low as recent times is uncommon in the last 2 million years (medium confidence)
5:17	TS	44:26	Change 1970 to 1971
B.4.2, 24, 16	TS	47:35	to support confidence statement added to SPM, please add the following sentence after the one which finishes ...declining atmospheric CO2 concentrations. "Under SSP1-1.9 models project combined land and ocean sinks turn into a weak source by 2100 (medium confidence)."
8: 48-51	TS	55:19	Replace "435 [325 to 545]" with "282 [177 to 387]".
8: 48-51	TS	55:20	Replace "1971-2018" with "1971-2006".
8: 48-51	TS	56:1	Replace "1971-2018" with "1971-2006".
8: 48-51	TS	56:2	Replace "0.57 [0.43 to 0.72]" with "0.50 [0.32 to 0.69]".
Figure SPM.3	TS Box TS.10, fig 1	137	this figure should be replaced with the accepted figure SPM3
30:20 ("Agricultural and ecological droughts are assessed based on observed and simulated changes in total column soil moisture, complemented by...")	11SM	18, Figure 11.SM.1	<p>Replace figure with figure below (referred to in Section 11.9, page 115, line 42). Caption: "Analysis similar to Padron et al. (2020) Figs 1b,c for simulated total soil moisture (instead of P-E) based on multi-model offline simulations of Land surface, Snow, and Soil Moisture Model Intercomparison Project within CMIP6 (left) and coupled CMIP6 simulations (right), for differences between 1985-2014 vs 1000-1050 "</p> 
Figure SPM9	Annex VI	6:14	Please replace "oceanic" with "open ocean"
A3.5 & footnote 12, "compound extreme events"	Annex VII: Glossary	16:17-18	Please add: "The terms 'compound events', 'compound extremes' and 'compound extreme events' are used interchangeably in the literature and this report and refer to.... "
17:Footnote 22	Annex VII: Glossary	32:50	To be consistent with the wording in CCBox 1.3 and the LLHI outcome definition in SPM Footnote, the words in the parenthesis need to be deleted behind the Glossary term "Impacts", which should then only be " Impacts : The consequences of realised risks on natural and human systems, " Note that this doesn't change the definition as agreed with WGII.
17:Footnote 22	Annex VII: Glossary	37:14	The wording in the term and definition of Low-likelihood, high impact events needs to be change to read "Low-likelihood, high impact outcomes: Outcomes/events whose probability..."
18:2	Annex VII: Glossary	62:13	<p>Add the following definition for 'Urbanization' to the glossary: In the WGI report, urbanization is used to mean the process of soil sealing with the change of natural land cover to built environment and urban areas, together with its associated <i>albedo</i> changes, and increased surface <i>runoff</i> and elevated warming. See also <i>Urban heat island (UHI)</i> .</p> <p>Revise the glossary definition for 'Urban heat island' to the following: The relative warmth of a city compared with surrounding rural areas, associated with heat trapping due to the close proximity of tall buildings, the heat-absorbing properties of urban building materials, reduced ventilation, and heat generated directly from human activities. See also <i>Urbanization</i> .</p>