Author comments explaining change-diffs in manuscript

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Dear Editor,

We are grateful to the two anonymous reviewers for useful suggestions and comments to improve the manuscript. We have addressed all the comments when revising the manuscript. The pdf of the differences generated with *latexdiff* has been attached and the changes are explained below.

Explanation of changes in *latexdiff* file

1. Author name addition: Dr. David Marsico, as mentioned in author comment.
2. P.1 L.3-4: Better rephrasing to make abstract clearer based on RC1.
3. P.1 L.19: Remove brackets for acronyms to improve readability.
4. P.2 L.19: Formatting change.
5. P.3 L.9: Remove YAC interpolator reference as suggested in RC1.
6. P.3 L.12-15: Provide context and add reference to the regridding analysis work by Sophie Valcke, as suggested in RC2.
7. P.3 L.35: Clarity (RC1).
8. P.5 L.12-13: Clarity (RC1).
9. P.7 L.4: As suggested in RC1.
10. P.9 L.25: To address question about patch remap in ESMF (RC1).

11. P.10 L.4: As suggested in RC1.

12. P.10 L.20: Addressing comment about better defining degree p (RC1).

13. P.10 L.22: As suggested in RC1.

14. P.11 L.2: References to further details about overlay based remap as requested in RC1.

15. P.11 L.3-5: Addressing comment in RC1 about potential functions in TempestRemap.

16. P.13 L.8: Addressing comment about better defining degree p (RC1).

17. P.14 L.31: As suggested in RC1.

18. P.15 L.3: As suggested in RC1. Removed ψ.

19. P.15 L.24-26: Clarifying question raised in RC1 about how norms help understand errors in large-scale and small-scale features.

20. P.16 L.2-9: Addressing comments from RC1 and RC2 to better explain the idea behind convergence order measurements and what is expected theoretically for a given degree p.

21. P.18 Equation (12): Addressing comment by RC1 about the Global minima metric, which was wrongly defined (sign changed). Text (P.18 L.5-8) has been added to clarify the changes further.

22. P.19 L.9-15: Addressing comment in RC2 about the validity of repeated remap study in production climate simulations.

23. P.24 L.7 - P.25 L.3: Addressing comments in RC1 and RC2 about more details on the meshes used along with information on the number of elements and nodes in each case. The newly added Table 1 also provides these details explicitly.

24. P.25 L.10-11: Correcting definition of N. We implicitly assumed that the combination of two meshes are needed for remap (one for source and one for target). This assumption is now explicitly shown as $N^{uni}_{type}C_2$ and $N^{rrm}_{type}C_2$ for uniform and regionally refined cases respectively.

25. P.26 L.11-14: More details added about how h and p are used in convergence study, as requested in RC1.

26. Formatting changes for 'conserve' to *conserve* and 'conserve2nd' to *conserve2nd* everywhere in the manuscript to make the text more readable.

27. P.27 L.1-2: Addressing comment in RC2 about what convergence rates of $1.00x$ and $0.99x$ imply. They both are considered $\mathcal{O}(h)$ asymptotically.

28. P.27 L.6: More description about figures added to text (RC2).

29. P.27 L.10-12: Addressing comments in RC1 and RC2.

30. P.28: Figure 6 caption improved with more details about the plot, as requested in RC1.

31. All figures have been regenerated with better fonts for axes and clearer background.

32. P.31 L.2-5: Clarifying the meaning of convergence rates, especially in relation to degree p and mesh size h as requested in RC1.

33. P.33 L.5-10: Addressing questions related to why TempestRemap accumulates errors more quickly than ESMF (RC2).

34. P.34 L.7: Including suggestion in RC1.

35. P.34 L.13: Replace L_{max} with G_{max} as correctly suggested in RC1.

36. P.34 L.14: Replace L_{min} with G_{min} as correctly suggested in RC1.

37. P.34 L.17: As suggested in RC1 to include the names of mesh-based schemes.

38. P.34 L.22-24: Addressing question in RC2 on details related to the dampening properties of ESMF maps. This cannot be fully understood without a full spectral analysis, and we do not currently have the time to pursue this.

39. P.34 L.30-31: Rephrase as requested in RC1.

40. P.35 L.3-5: Address comments about hidden traces in plots (RC1). This is now explained well in the text to avoid confusion.

41. P. 36, Figure (9): Fully regenerated as the *Gmin* metric computed for TempestRemap and ESMF were using an older definition. This is now fixed. All *Gmin* values should be zero or strictly negative (for deviation away from monotone solution).

42. P.37 L.4-5: Address more comments about hidden traces in plots (RC1).

43. P.39 L.8-33: Address multiple comments in RC1 and RC2 related to drawing better conclusions from the data presented in Table 7. Our changes should now explain more clearly the impact of using high-order vs low-order methods for both smooth and discontinuous field remaps.

44. P.40 L.2-11: Address comments in RC1 about replacing L_{max} with G_{max}, hidden traces in the plots, and better explanations about behavior of high-order TempestRemap maps for preserving global bounds.

45. P.41 Figures 12-14: Update caption to provide more context (RC1).

46. P.44 L.31-33: Include comment in RC1 about care needed for vector field remaps.

47. P.45 L.18-21: Add description of dynamic meshes and how performance complexity can be calculated for such cases (RC1).

48. P.47 L.9: Add reference to Valcke et al., (2022) as suggested in RC2.

49. P.48 L.16-23: Provide more context about h and p (RC1). Also more details about overall conclusions derived from the data presented in the manuscript (RC1, RC2).