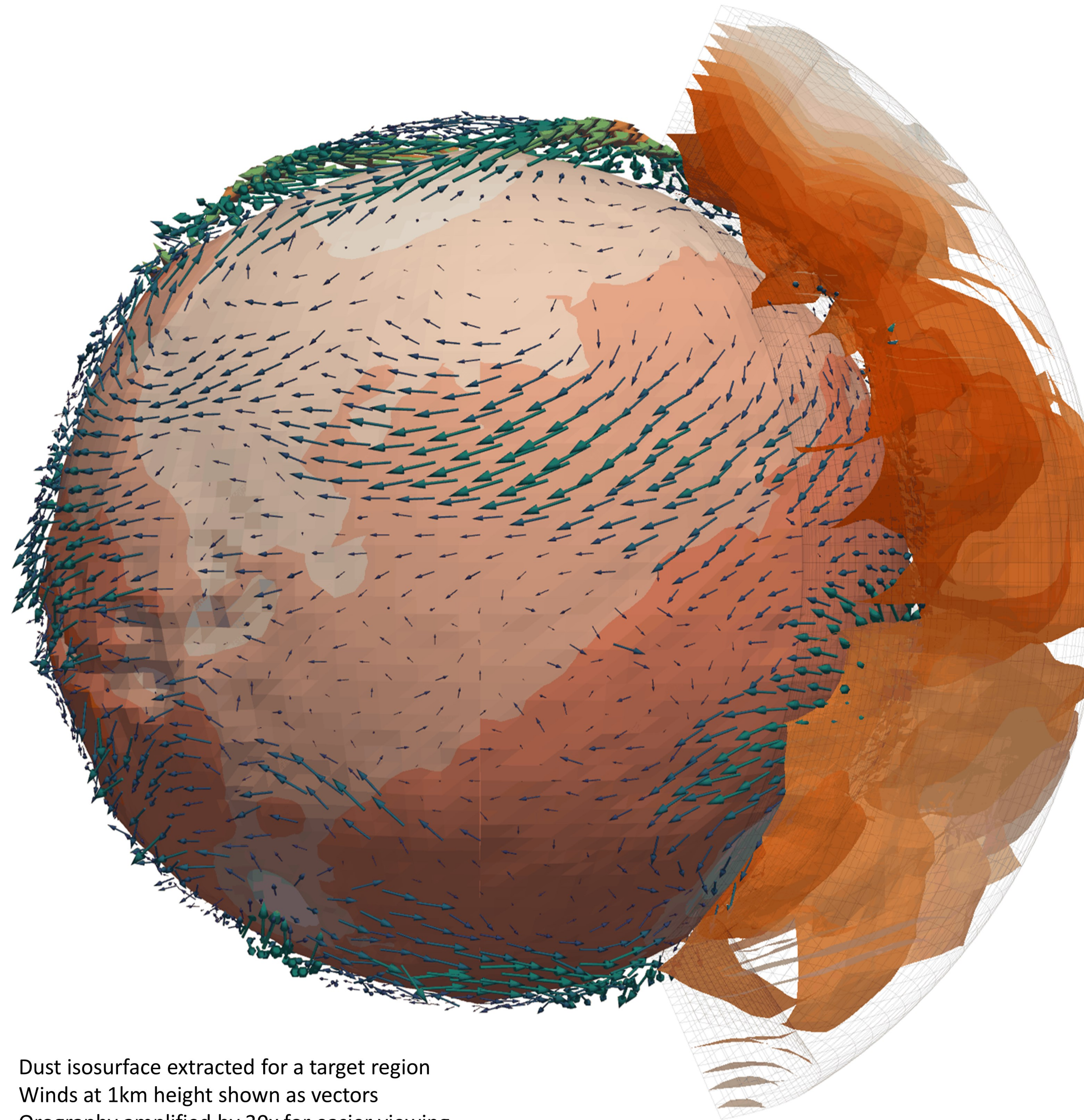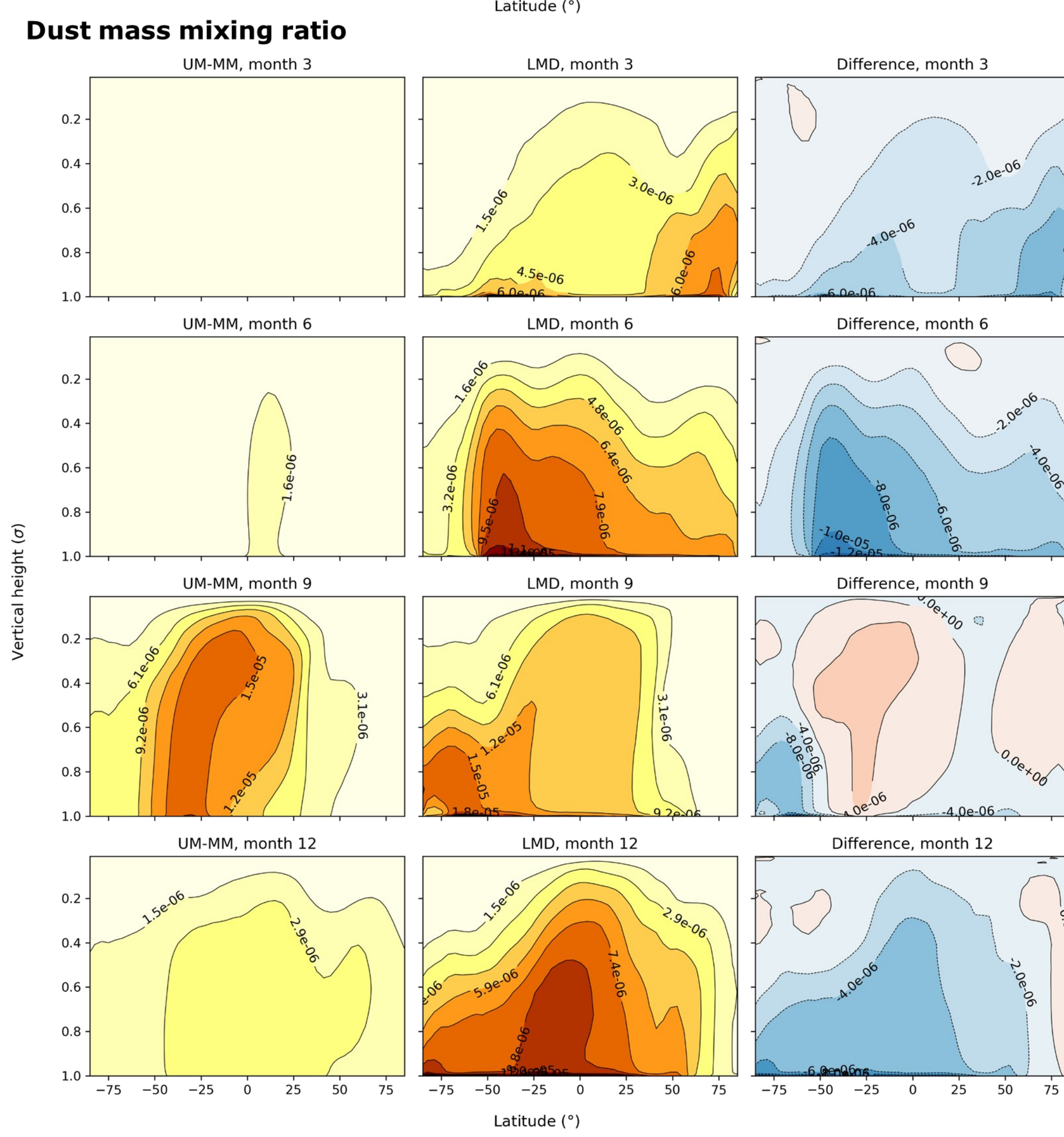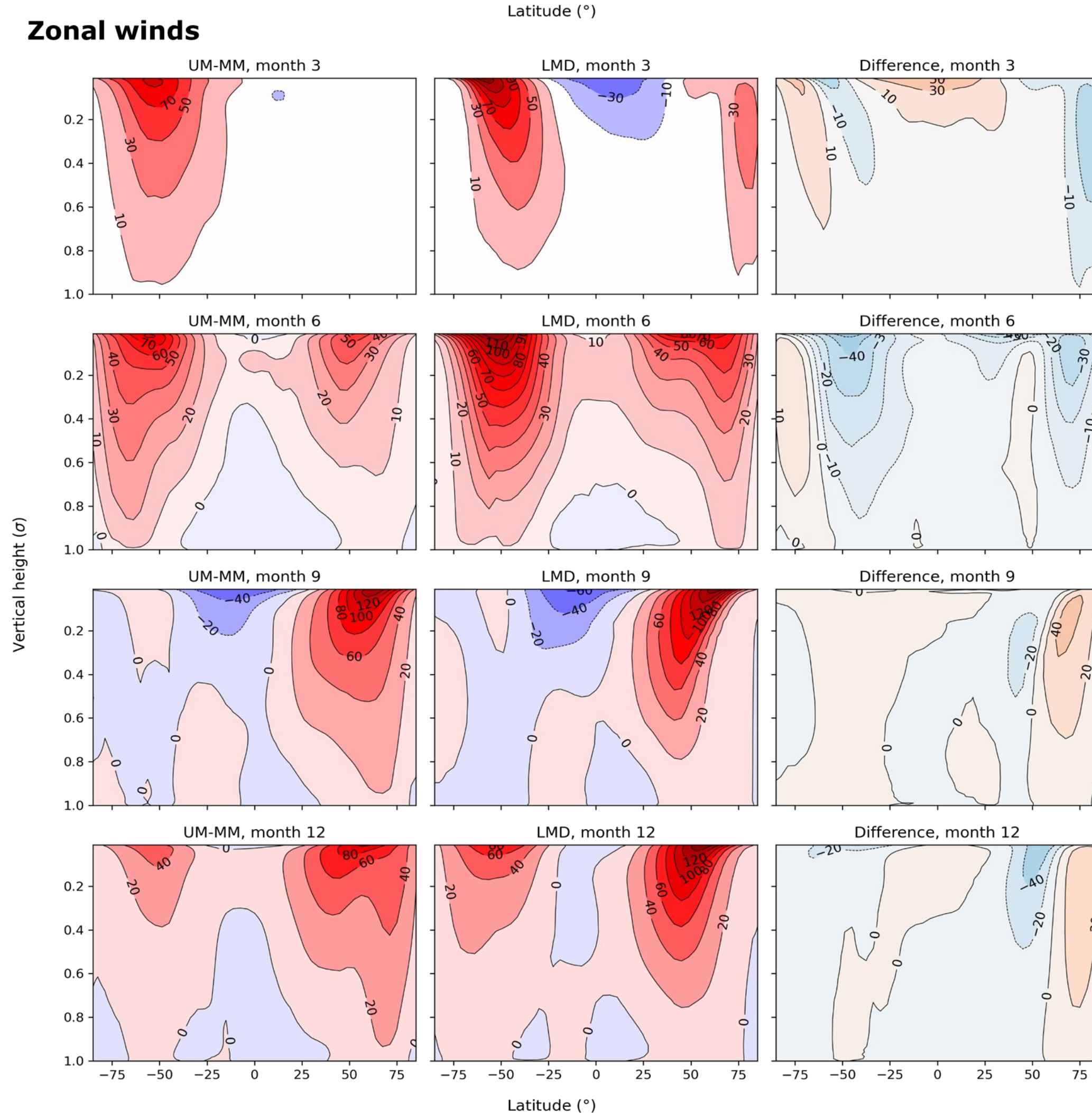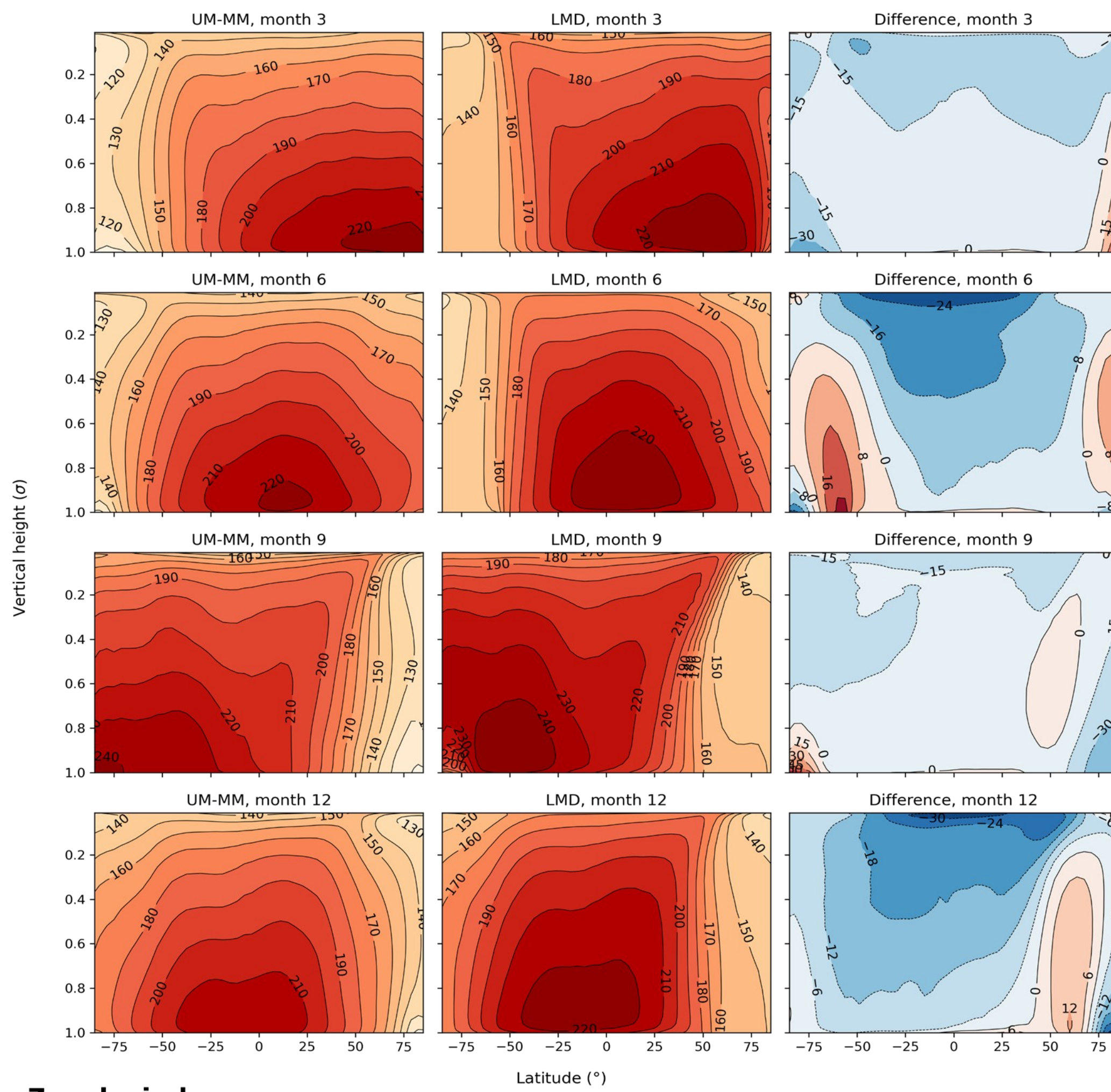# A modern-day Mars climate model using the Met Office Unified Model: dry simulations

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Air temperature

Zonal winds

Dust mass mixing ratio

Dust isosurface extracted for a target region
Winds at 1km height shown as vectors
Orography amplified by 30x for easier viewing

Key points

- We have adapted the Met Office Unified Model to a modern-day Martian climate
- Results show matching seasonal patterns with some small differences in severity
- Annual dust season is simulated in the UM
- UM will eventually include more processes present on Mars to further improve accuracy

Introduction

- Modelling Mars with Global Climate Models (GCMs) is essential for understanding Mars' climate
- GCMs allow us to predict what conditions are like in places where in-situ data isn't available
- Different GCMs handle different variables in **different** ways, potentially leading to misrepresentation of variables
- Inter-GCM comparison **vital** to validate parameterisation

Methods

- We use the Met Office Unified Model with a General Atmosphere 8.0 configuration
- So far, we have implemented:
  1. Full (regridded) MOLA Orography
  2. Martian dust quantities
  3. Martian orbital parameters
  4. Average atmosphere of 610 Pa
  5. 95% CO_2 5% N_2 atmosphere
- Averages are taken across designated months, where months corresponds to 30° solar longitude (e.g. month 1 = 0°->30°), similar to other GCMs
- Plots are zonally meaned to observe general trends

Results and conclusions

Compared to the LMD-Mars:

- Similar surface temperatures, but UM gets **colder quicker** with height (up to 20 K at ~80km)
- Winds **are similar** during the dust seasons, but are **slower** during northern autumn equinox (month 6)
- Dust is the variable with the largest differences, the UM features **less** dust during the aphelion (month 3), but **similar amounts** during the dust season

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This poster and supplementary information can be viewed using the QR code to the right

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