The “Advanced Techniques” of MIMIC-TPW2

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With contributions from Chris Velden, Jordan Gerth and Scott Bachmeier

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University of Wisconsin - Madison

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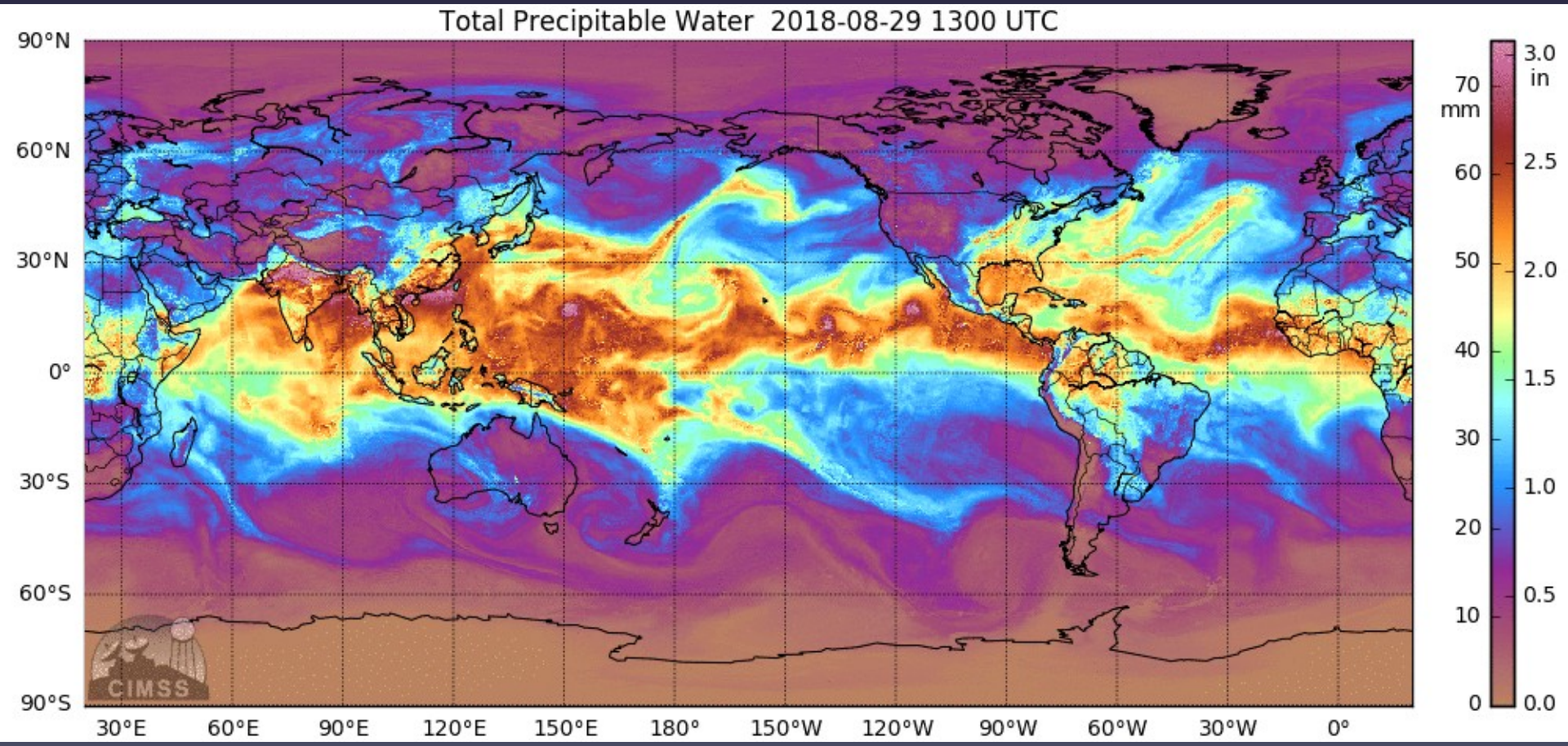
Total Precipitable Water 2018-08-29 1300 UTC
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CIMSS

The Uniqueness of TPW & LPW

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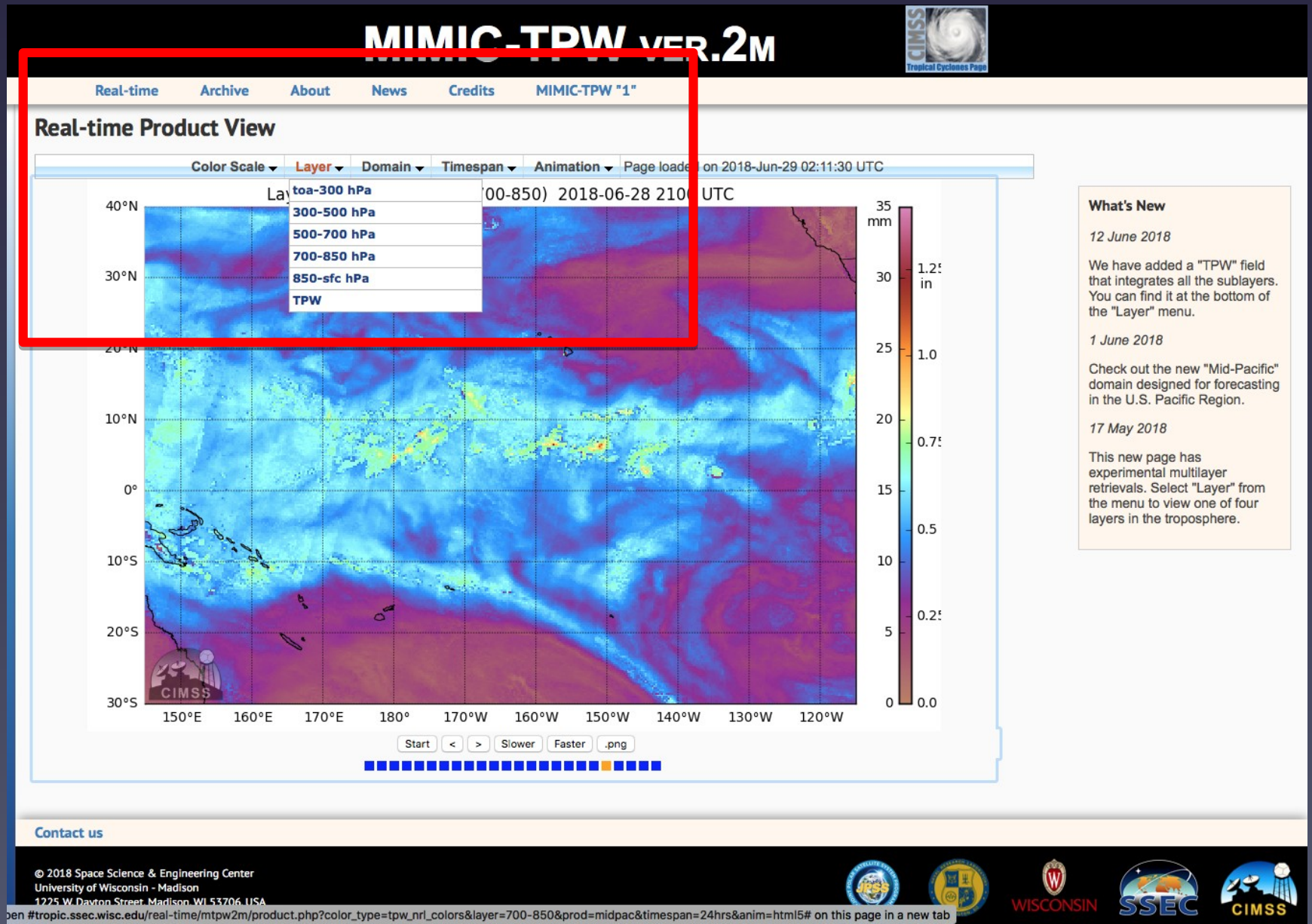

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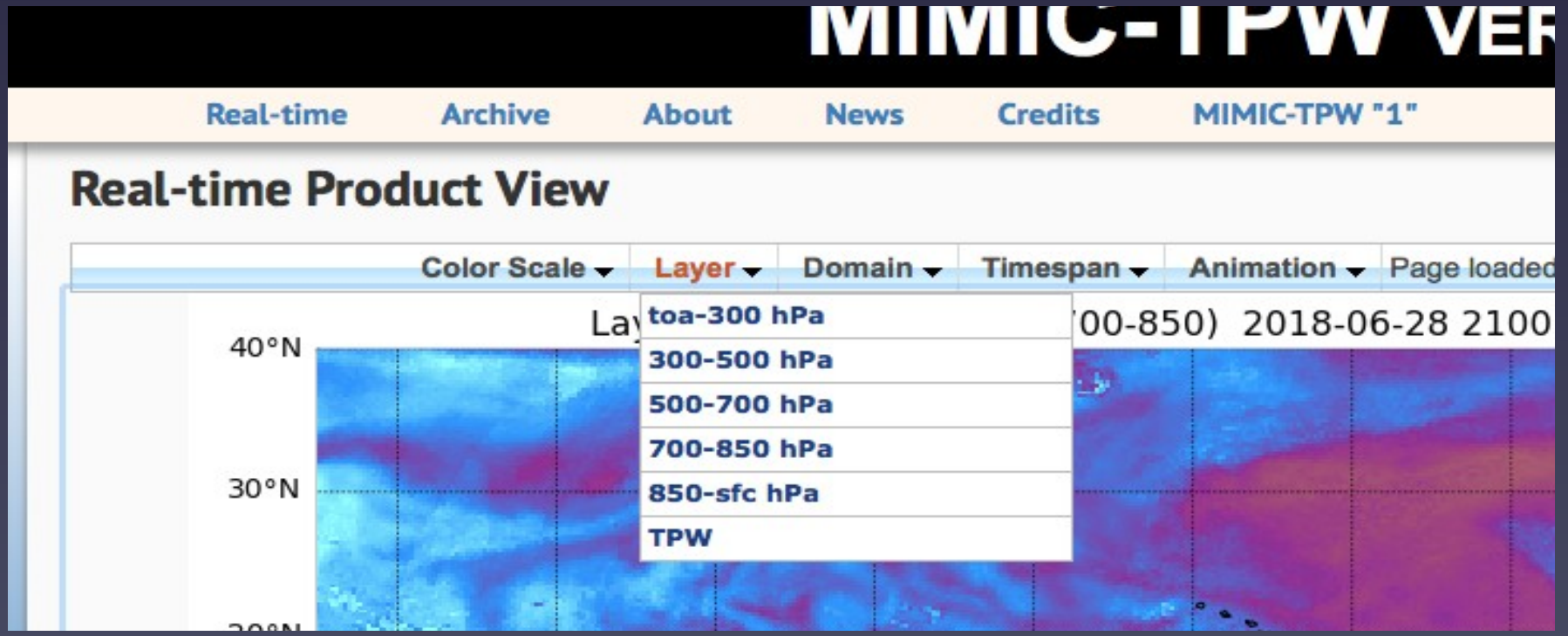

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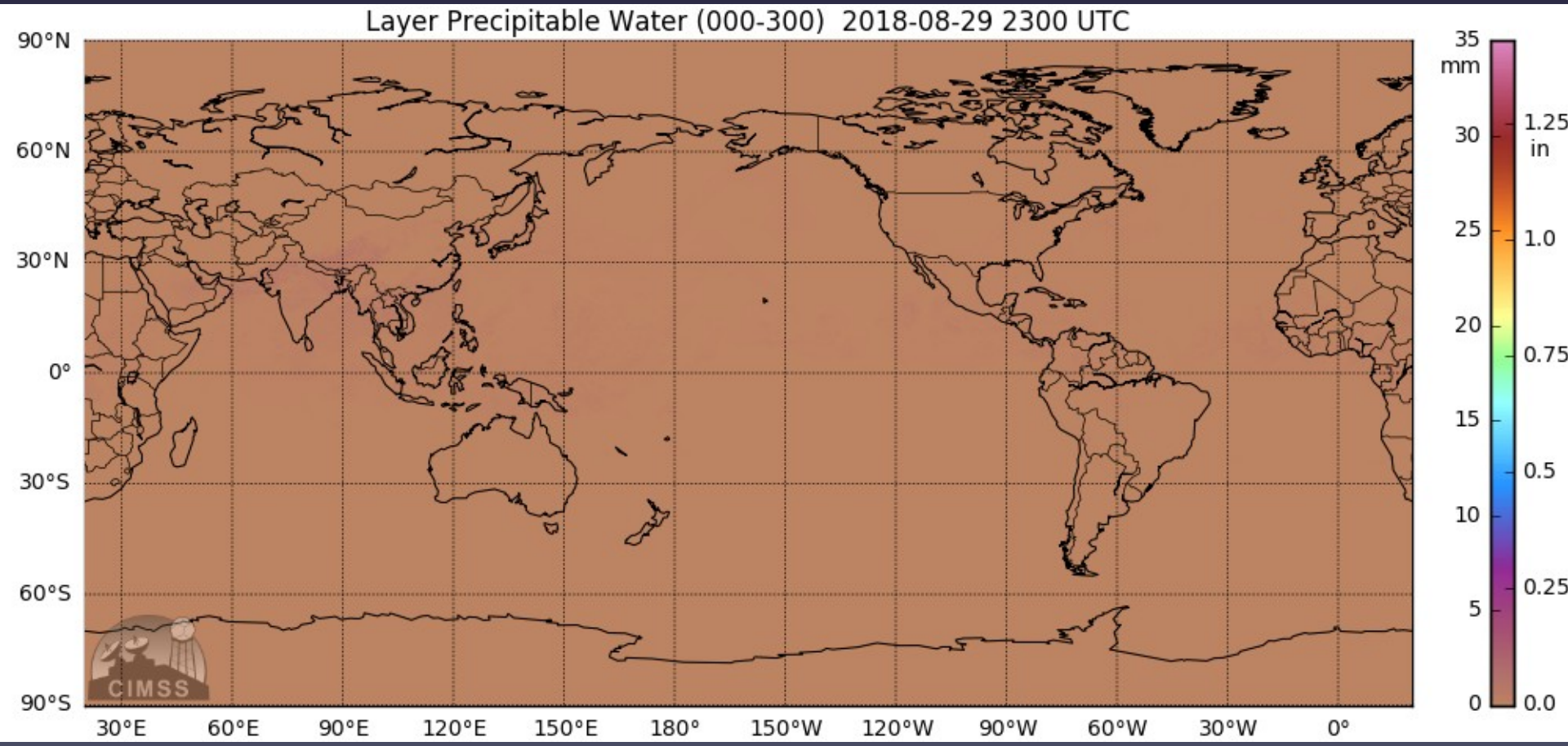


The Uniqueness of TPW & LPW

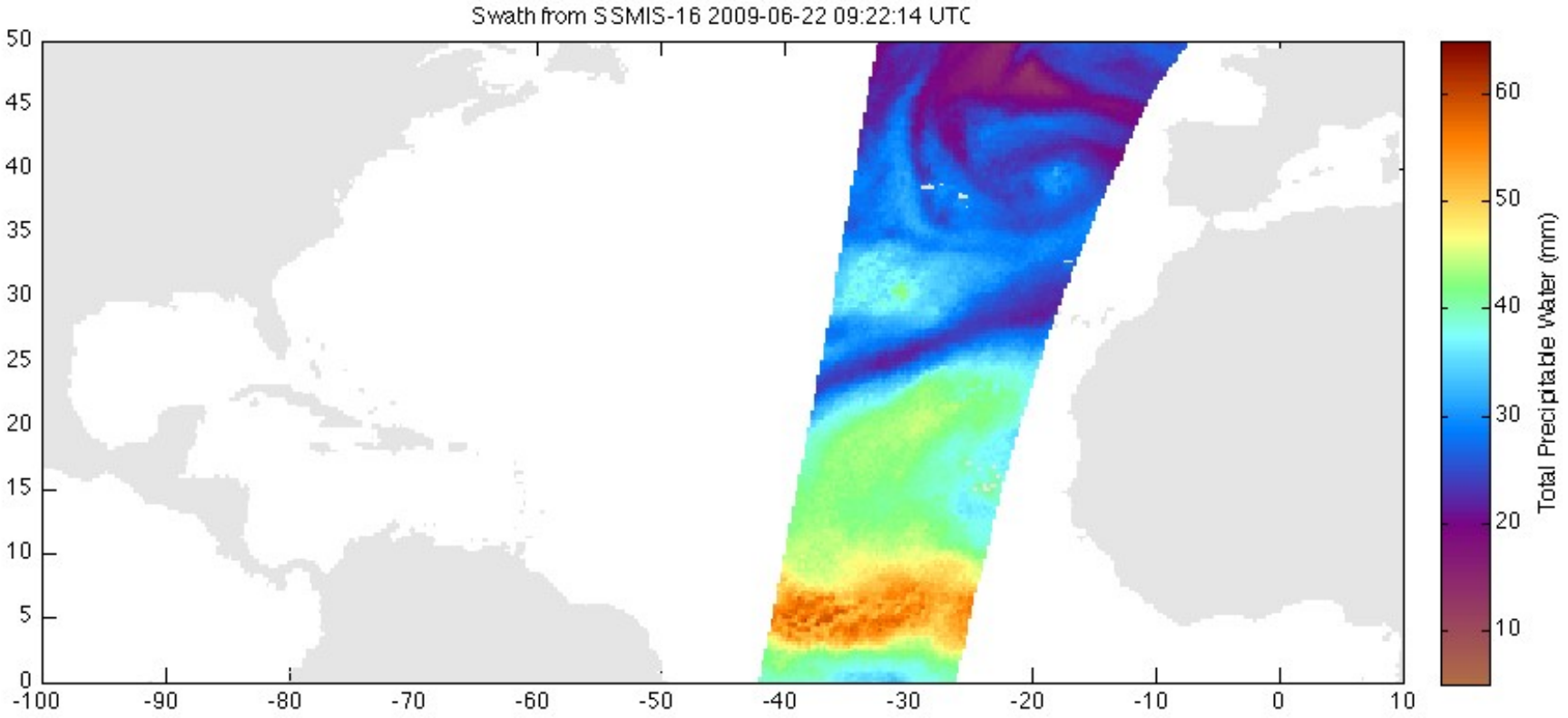
- Sampled by MiRS at ~4-6 hours
- Long-lived: Normally ~9-18 hours duration with advection
- Globally observed (over water, land, ice) with almost no gaps
- Highly consequential atmospheric quantity
- Clean, detailed retrieval with no significant noise
- How many products can you name that have all these qualities?
  - Temperature? (no major surprises)
  - Trace gases? (noisy, obscured by cloud)

The “Advanced Method” of advective blending

- The retrieval is pushed and pulled with a weighted average of wind
  - Weighting function comes from a climatology of specific humidity

Data advected from 09:22 UTC

2009 / 06 / 22



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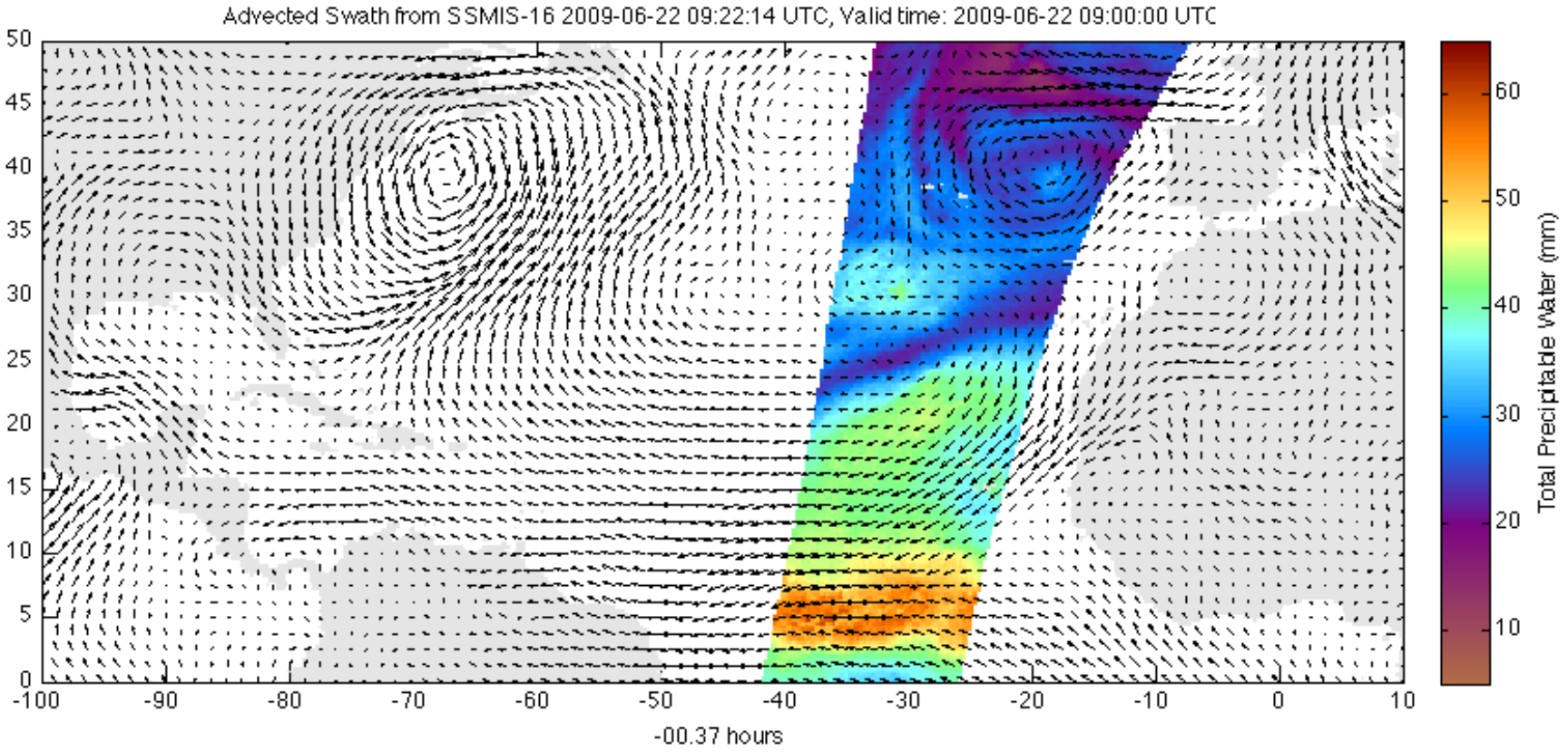

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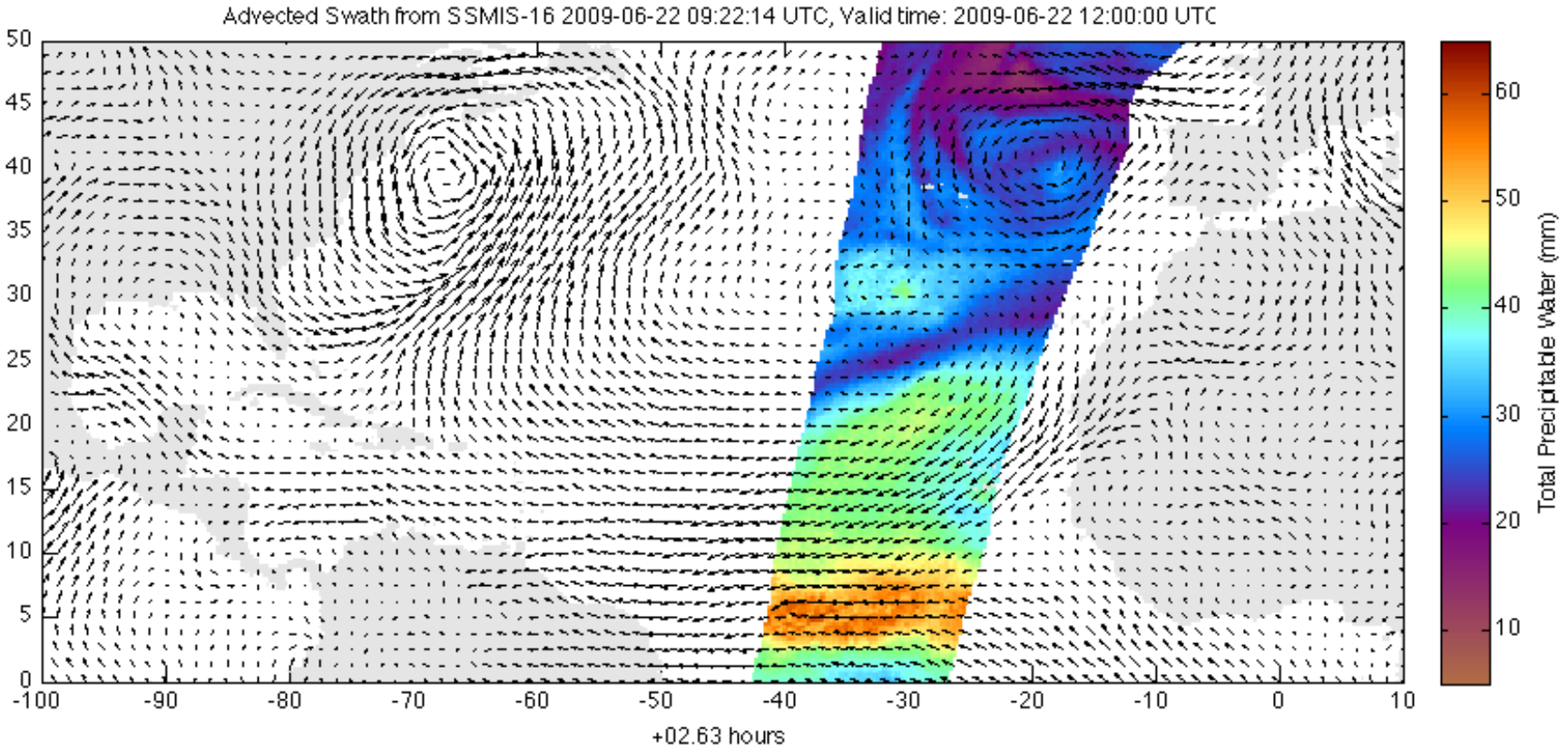

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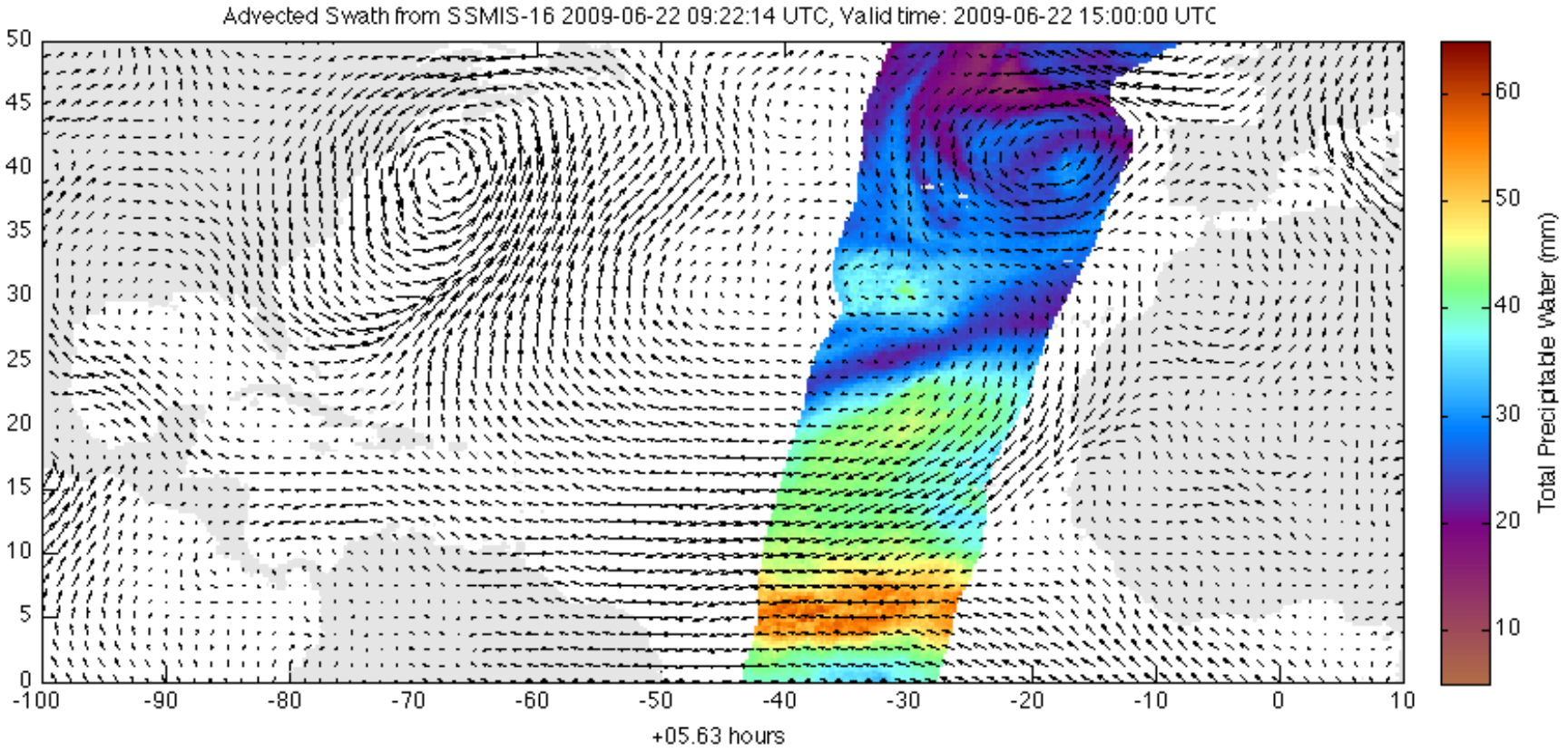

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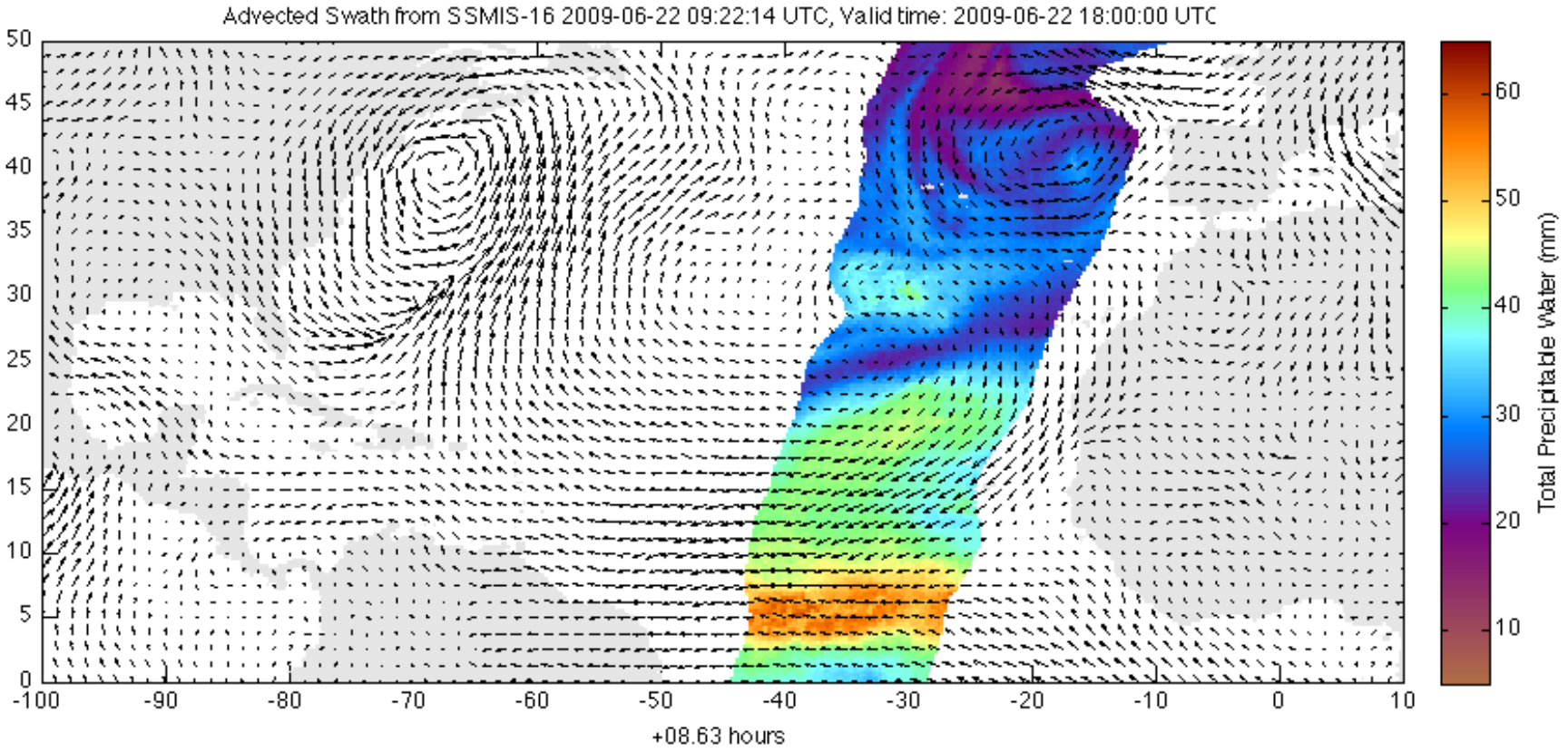

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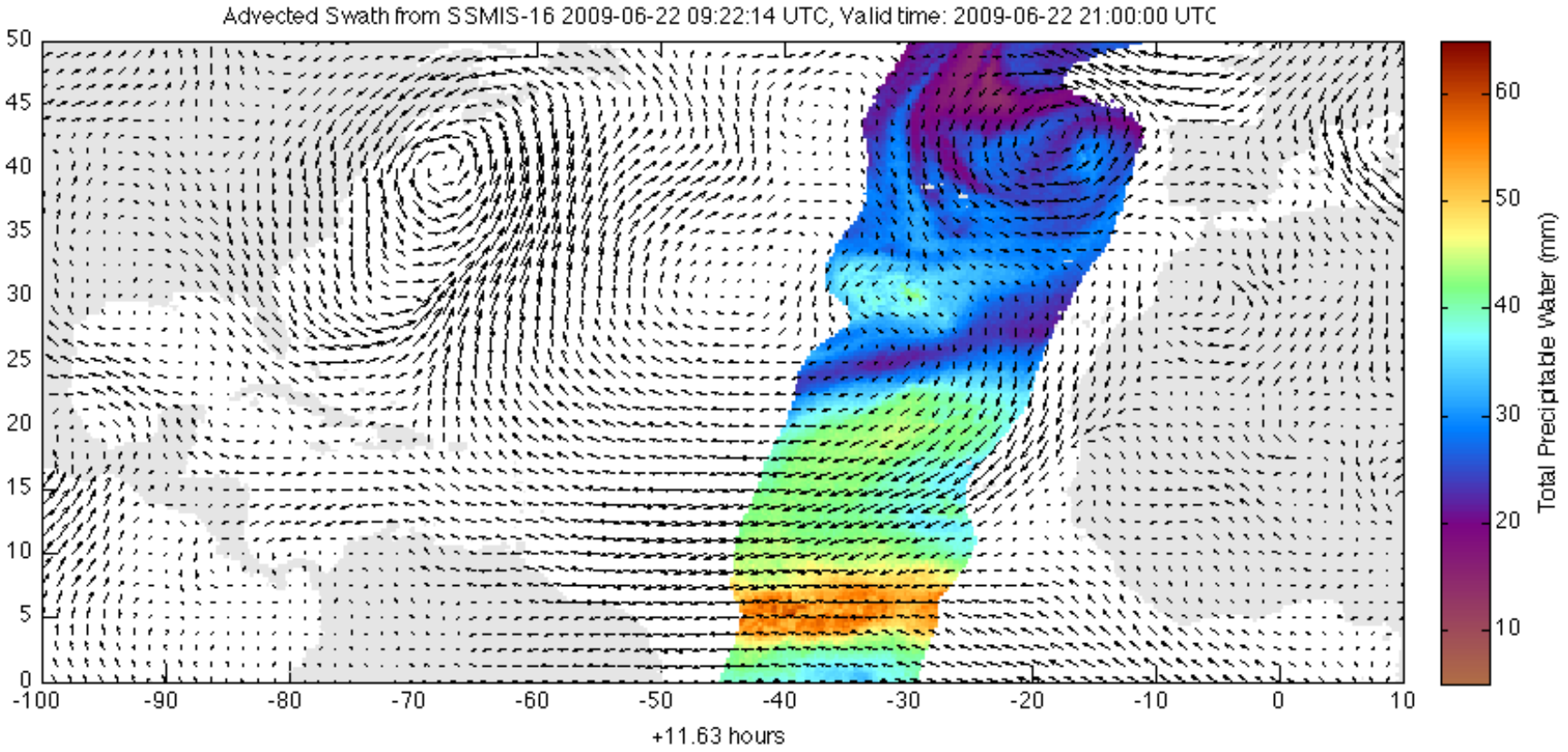

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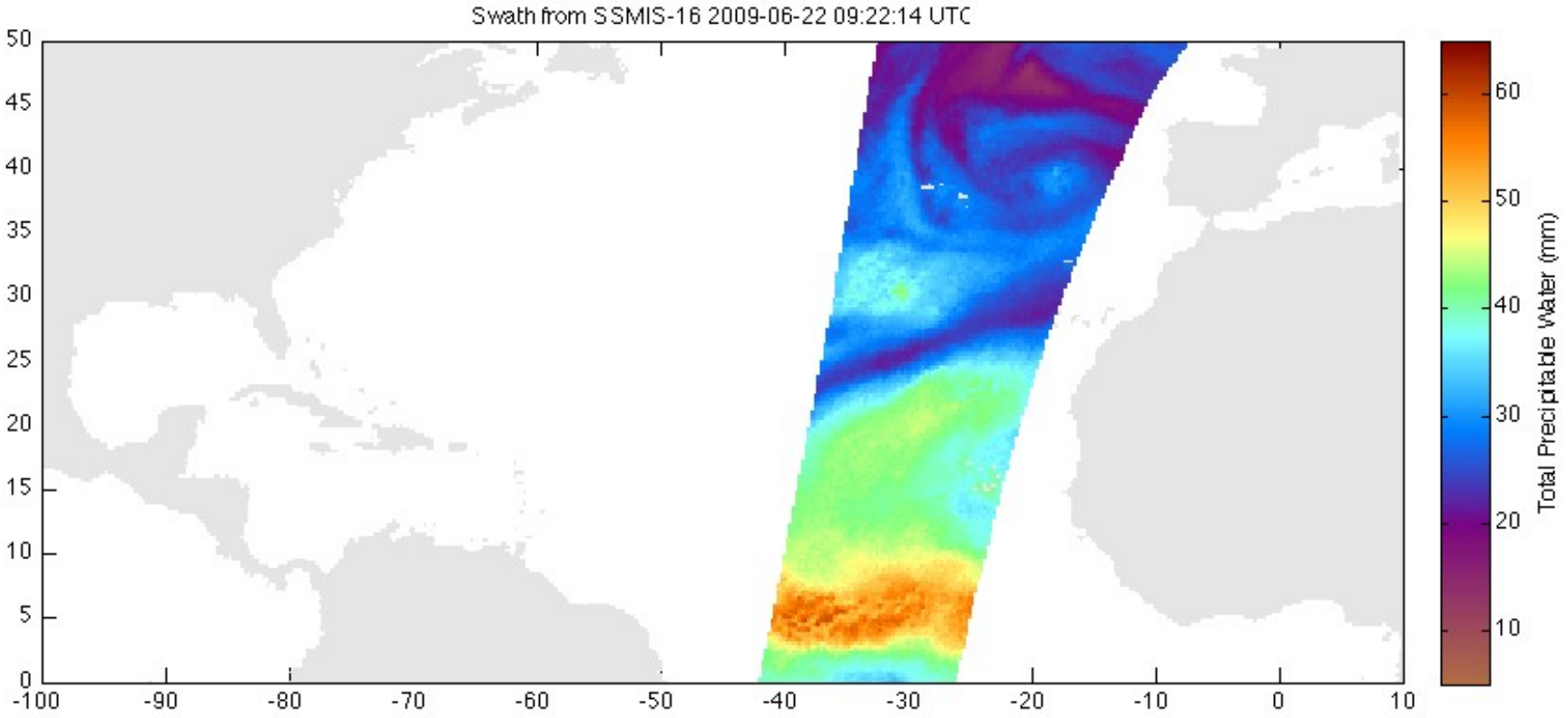

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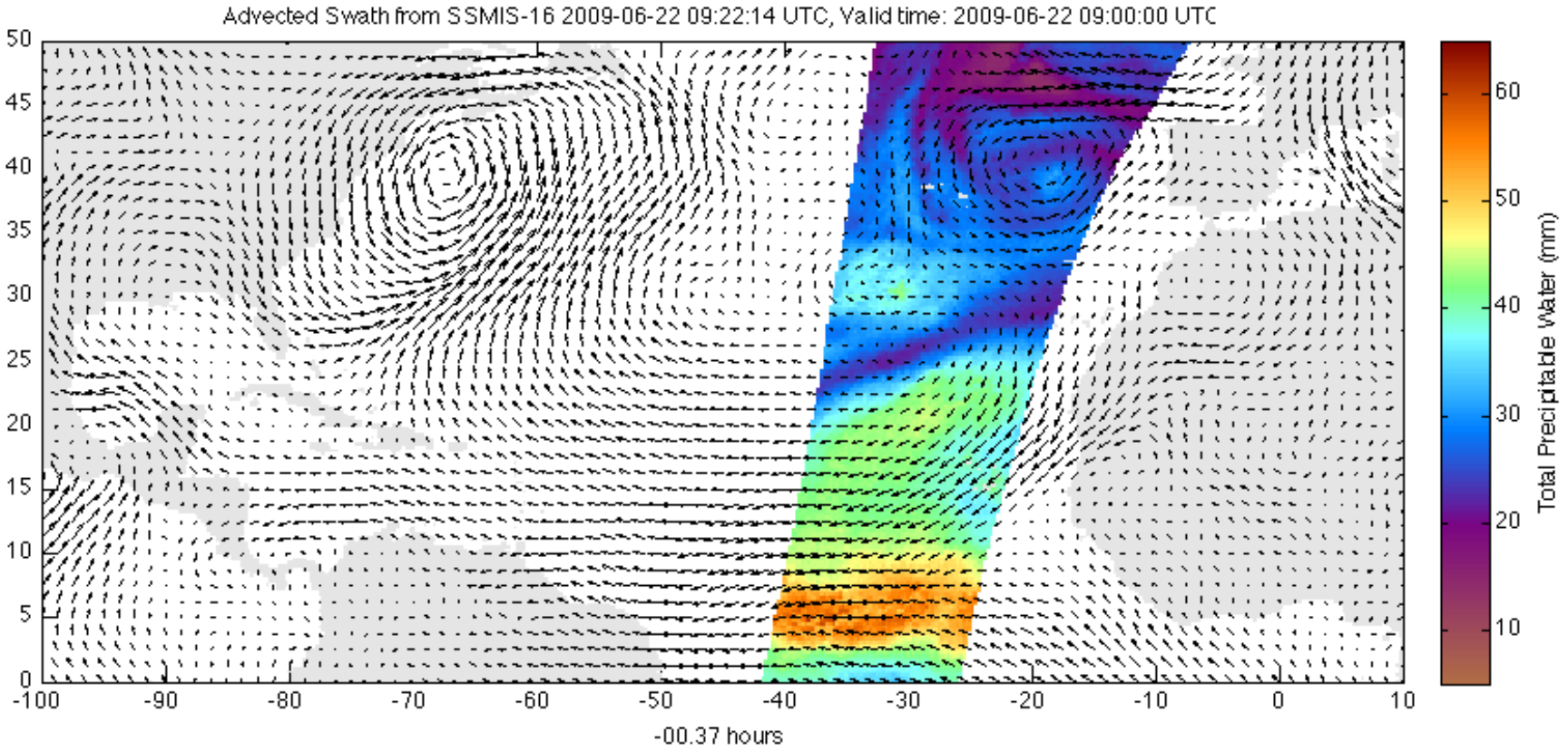

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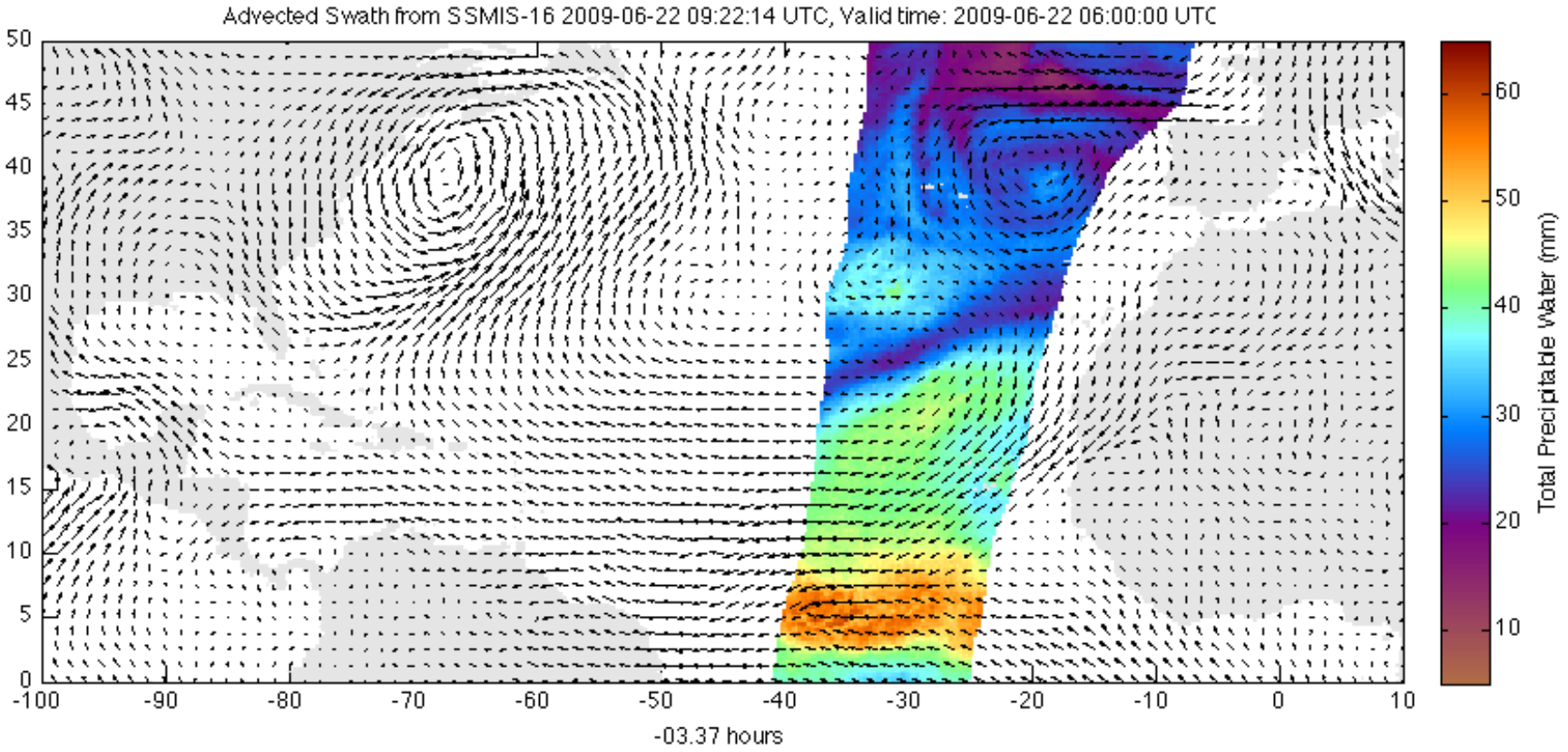

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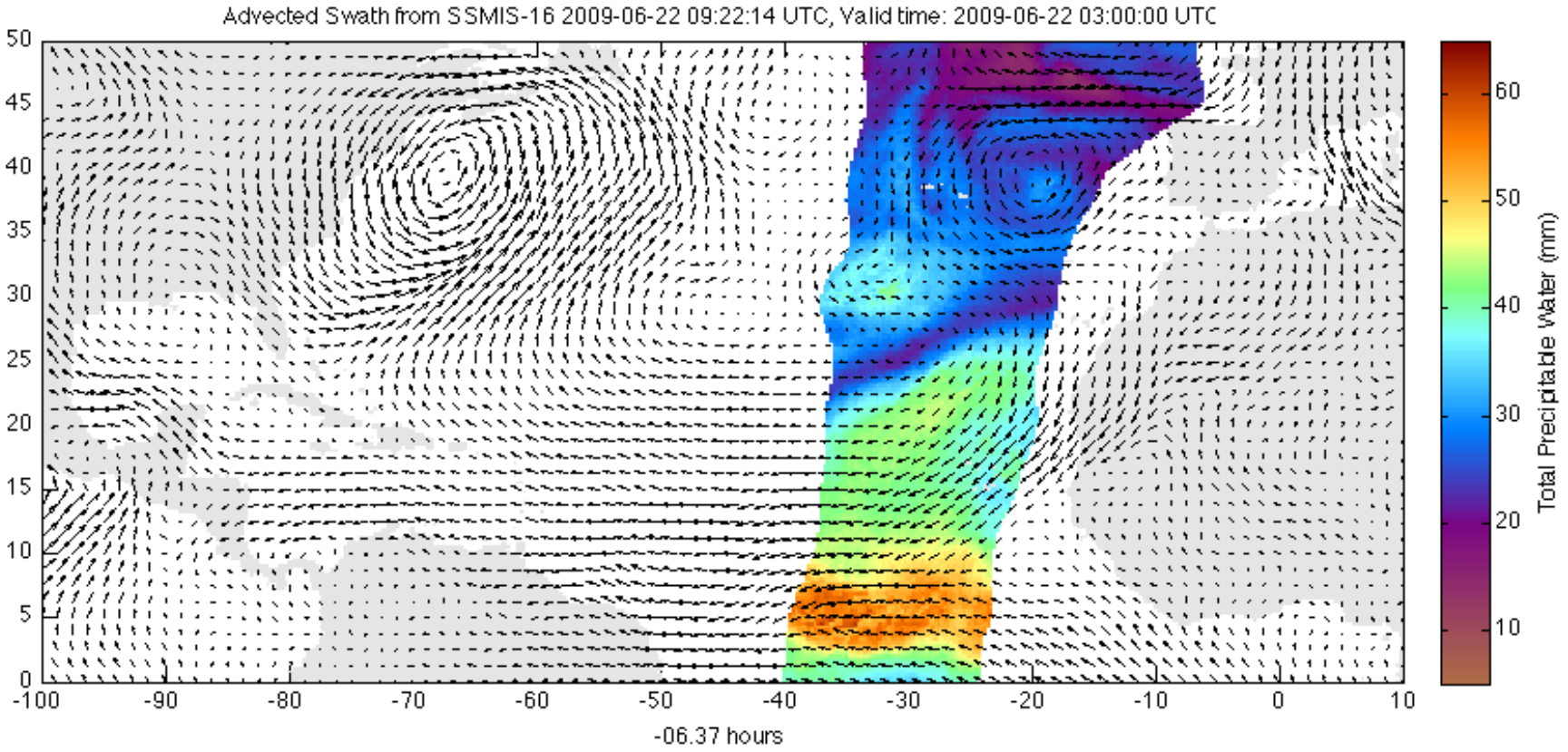

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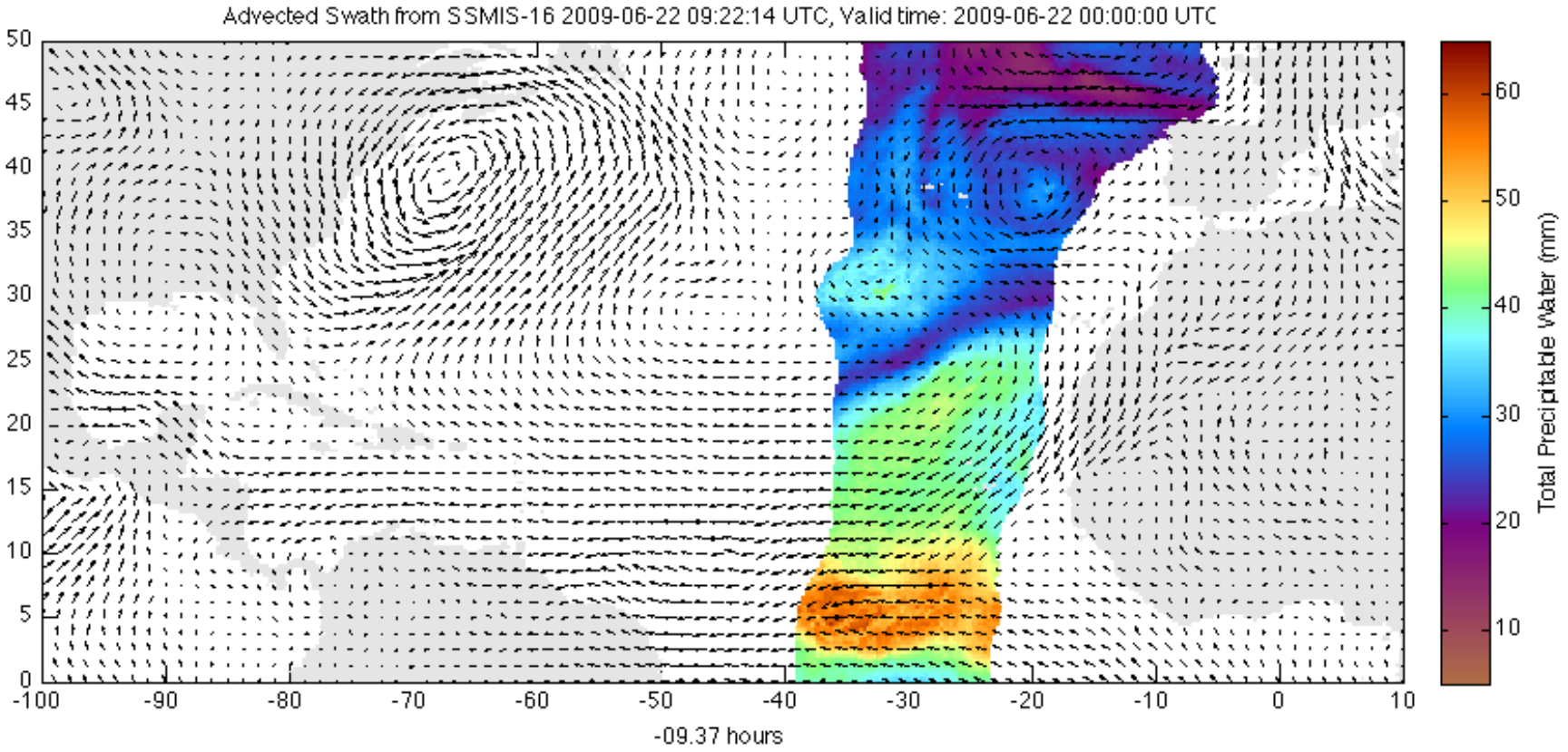

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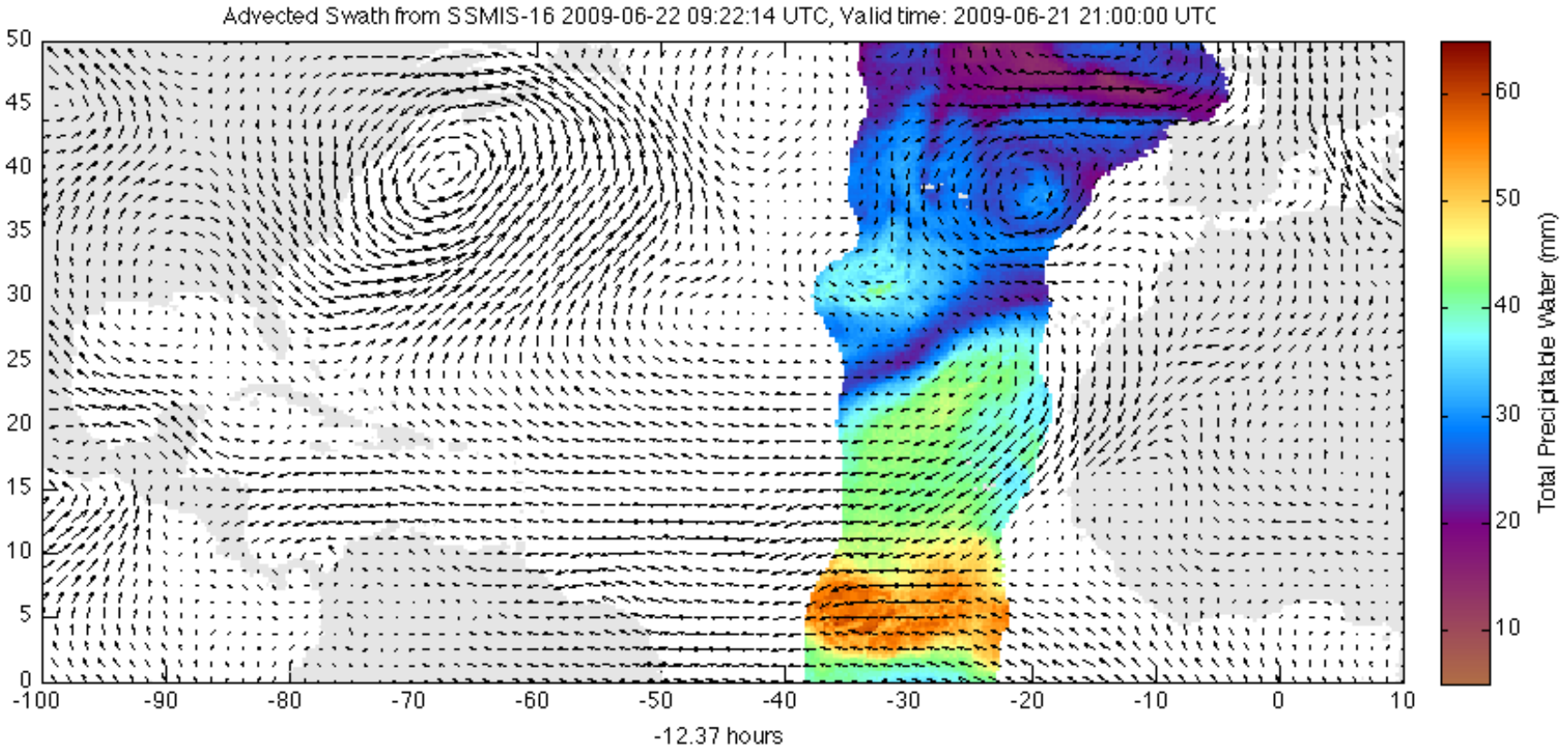

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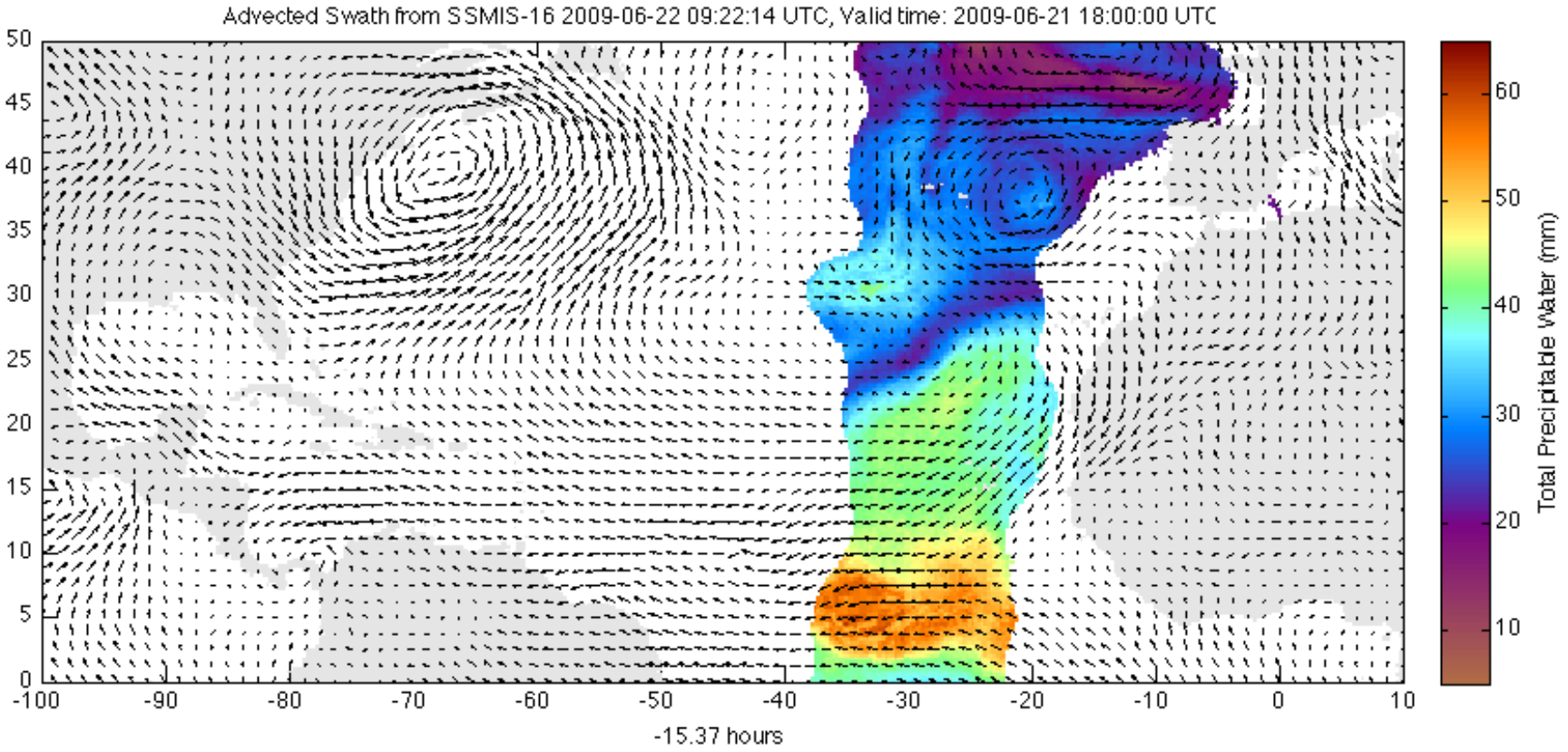

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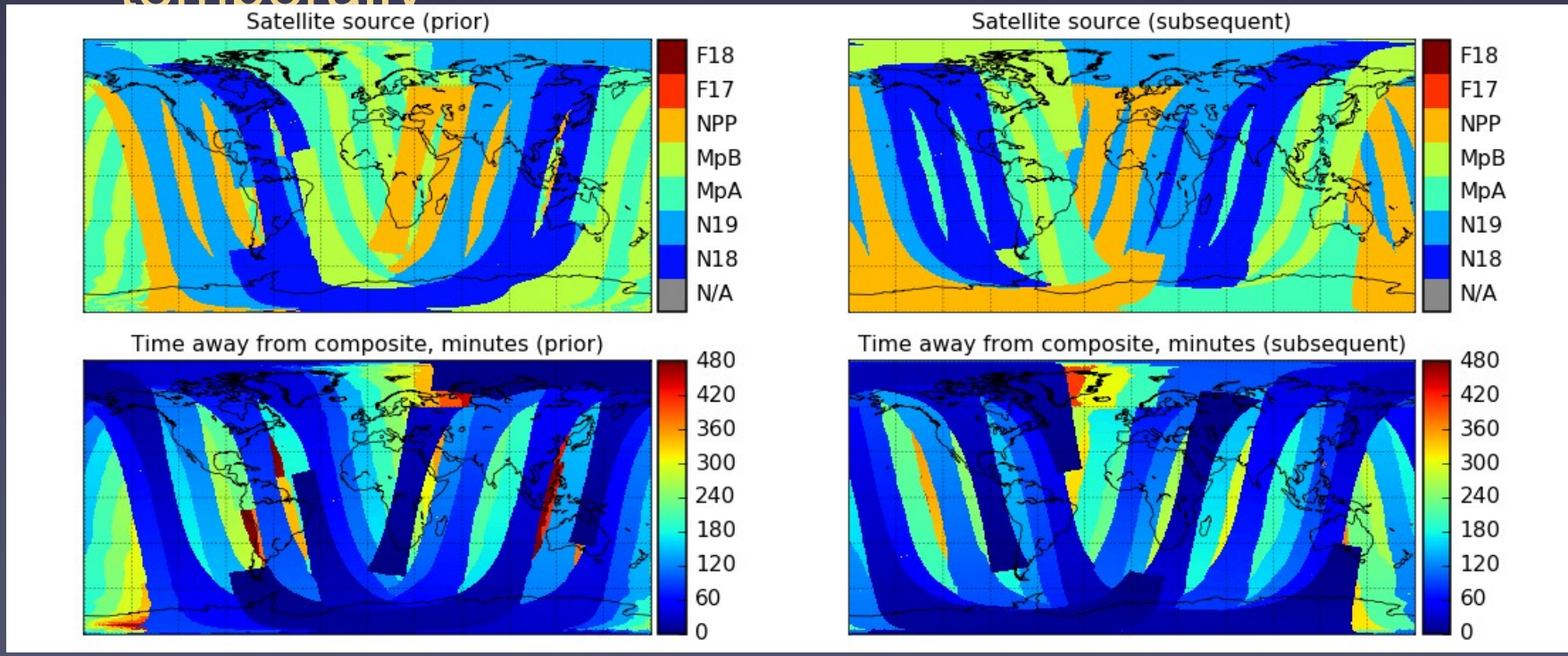
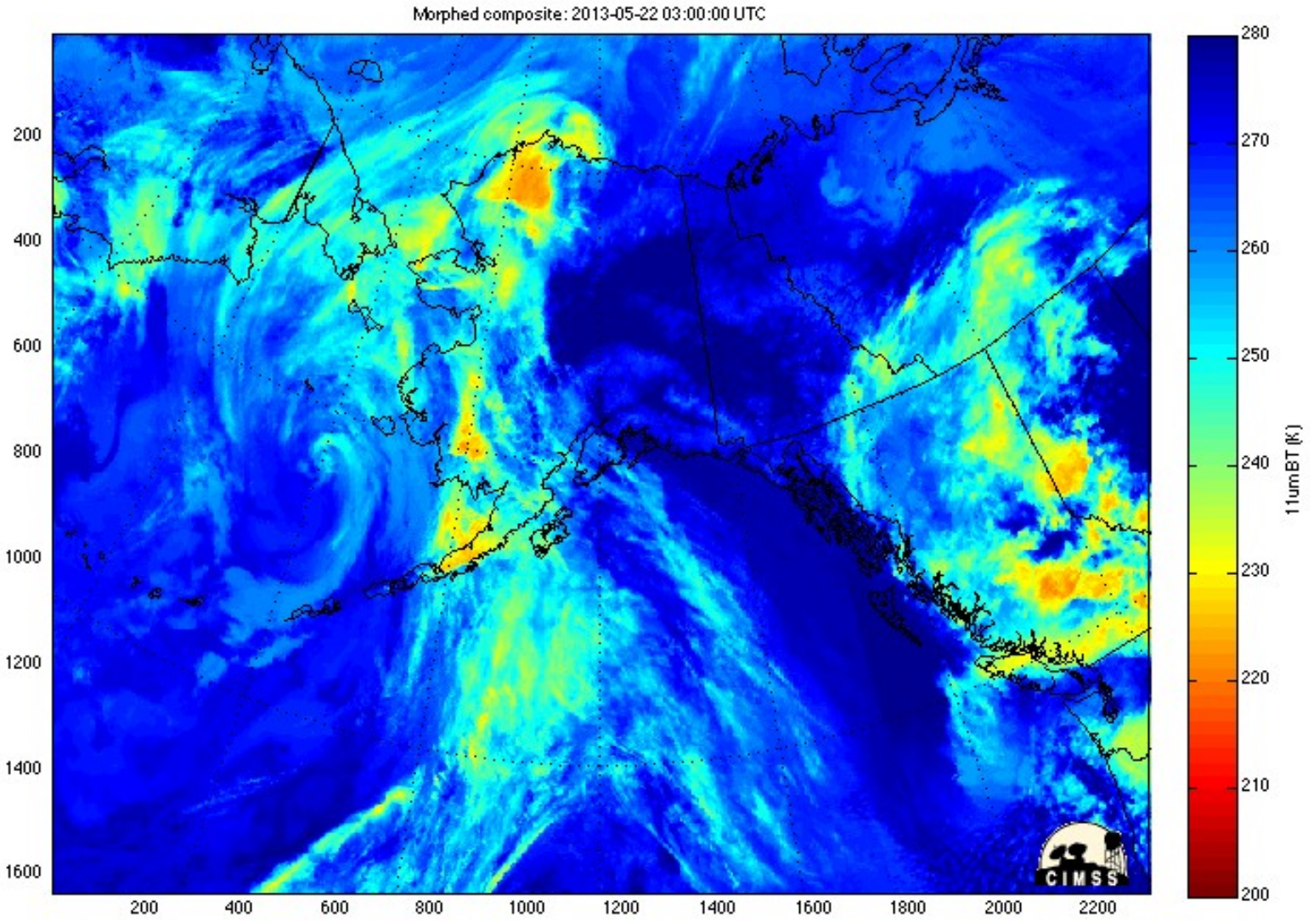
The “Advanced Method” of advective blending

- The retrieval is pushed and pulled with a weighted average of wind
  - Weighting function comes from a climatology of specific humidity
- *After that,* the TPW/LPW values are averaged temporally

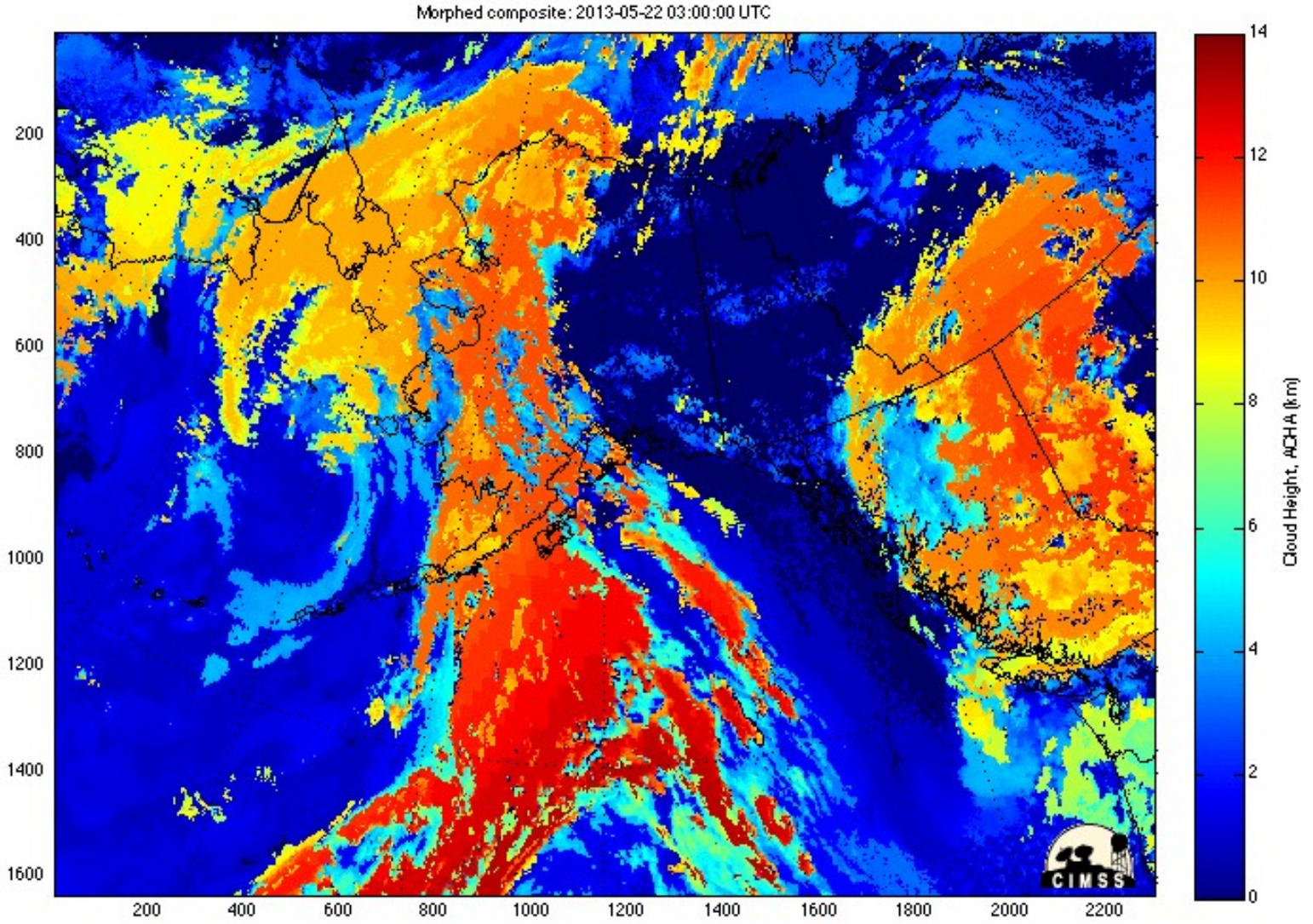


Temporal continuity

Temporal continuity



Temporal continuity

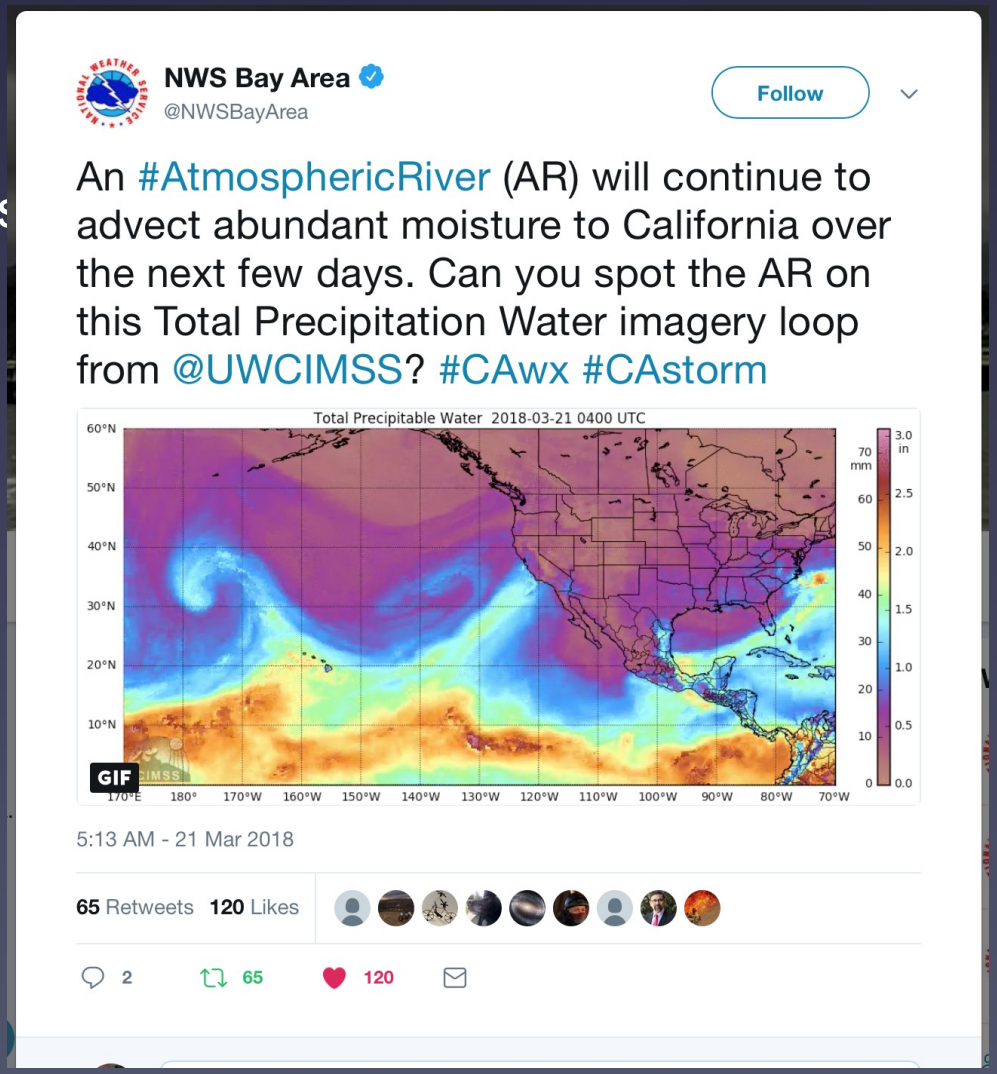


Temporal continuity

- *Temporal continuity* is usually not driven by developers
  - Notice “temporal continuity” is not in any product requirements
  - Is it implied in the “accuracy” requirement maybe?
  - It is generally not pushed by end-users either. (MIMIC-TPW was not requested by the forecasters. But they sure want morphed TPW products now.)

User response

- Good blended advection will increase your user base significantly
- Social media
  - Social media platforms



User response

- Good blended advection will increase your user base significantly
- Social media
  - Trades in animated gifs
- News/documentaries
- Attention from crazy people

Infowars host: Hurricane threatening Hawaii has been split in two by energy beam shot from Antarctica, possibly by John Kerry

Owen Shroyer: "Why is John Kerry going down to Antarctica just a week after the election to discuss climate change and then you have energy beams coming out of Antarctica splitting hurricanes?"

Video ››› August 24, 2018 10:25 AM EDT ››› MEDIA MATTERS STAFF

Like 4.6K Share Tweet G+ 234

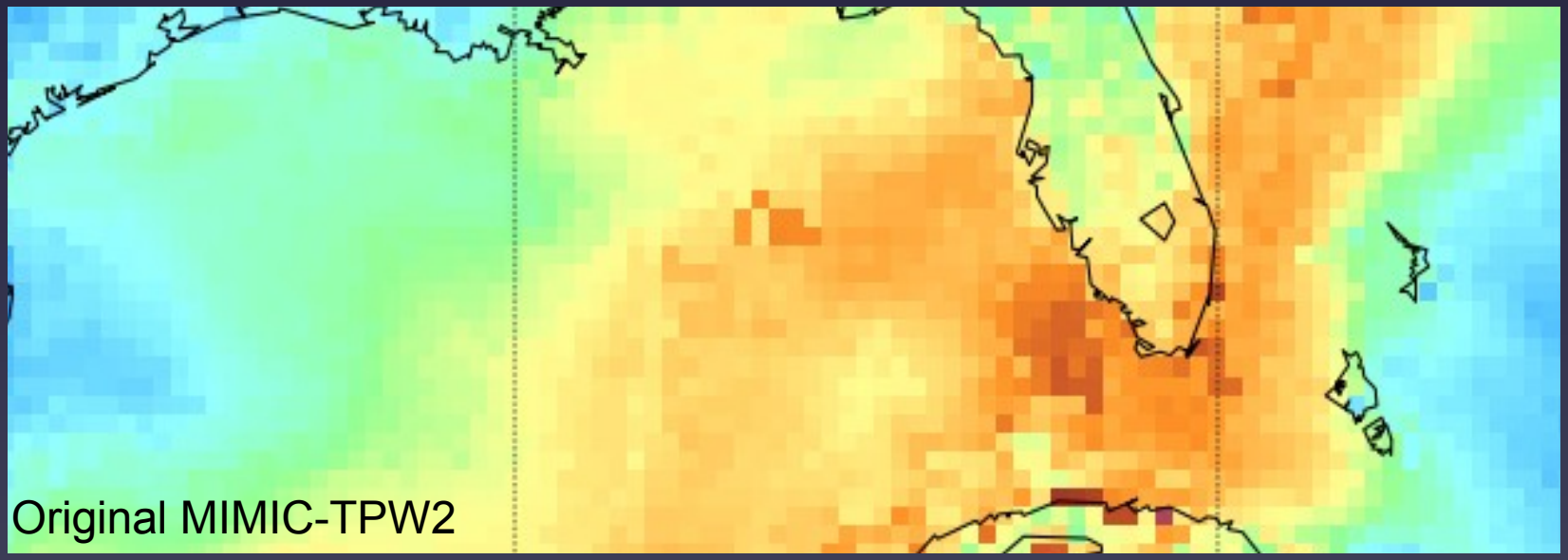
From the August 23 edition of Infowars' *War Room*:

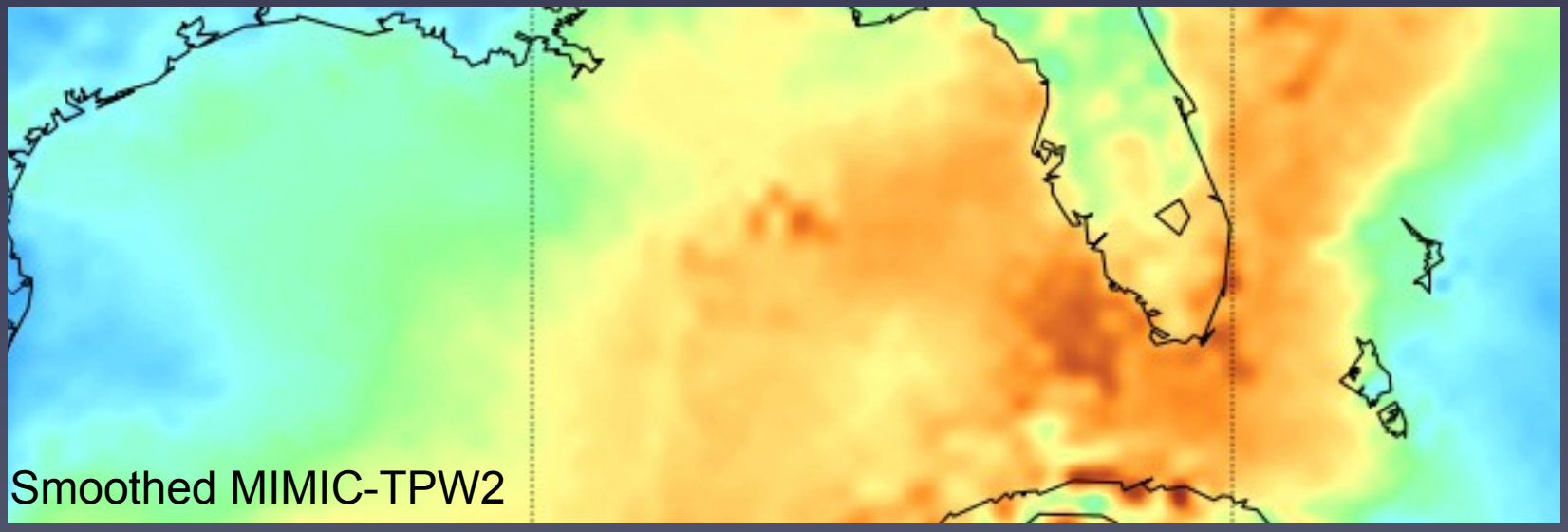
User response

Nominal resolution vs. display resolution

- MIMIC-TPW is 25 km resolution
- But forecasters on TV do not want pixelated imagery

Nominal resolution vs. display resolution





Nominal resolution vs. display resolution

- MIMIC-TPW is 25 km resolution
- But forecasters on TV do not want pixelated imagery
- They actually don’t mind interpolation and smoothing. In fact, they seem to prefer it
- This is a >100-fold increase in file size
  - Too large to render on the MIMIC-TPW2 website, but just fine for SSEC RealEarth

Key takeaways

- TPW, LPW is uniquely suited for blended advection, making it the best source to learn from.
- The “advanced method” of morphing (blended advection) is not too advanced to apply to other products.
- The key advantage of morphed products is temporal consistency.
- Showing your product with good temporal consistency will greatly increase its profile.
- A little smoothing and interpolation for HD-level resolution will be embraced by the public.