Mappers:

Following up on Brian Mapes' e-mail, attached are a couple of 3-D visualizations of the so-called bomb cyclone based on NAM analyses. I don't know if I've ever seen a better 3-D depiction of the inner structure of an intense extratropical marine cyclone so close to the east coast. This is a great case of sting-jet development, as defined by Schultz and Browning (2017, http://onlinelibrary.wiley.com/doi/10.1002/wea.2795/full), with the low-level wind maximum quite distinct (depicted in green is the 50 m/s isosurface showing both the upper-level jet and the distinct sting jet). The 925-mb temperature contours and frontogenesis (red positive, blue negative) and satellite imagery show the sting jet nicely located at the tip of the cloud head at the end of the bent-back front in a region of frontolysis and presumably descent from the mid troposphere.

Although not illustrated with this isosurface level, strong winds wrap encircle the low center and warm-core seclusion, giving it the warm-core appearance that Brian mentioned in his e-mail. Cross sections of this are really fantastic (not shown).

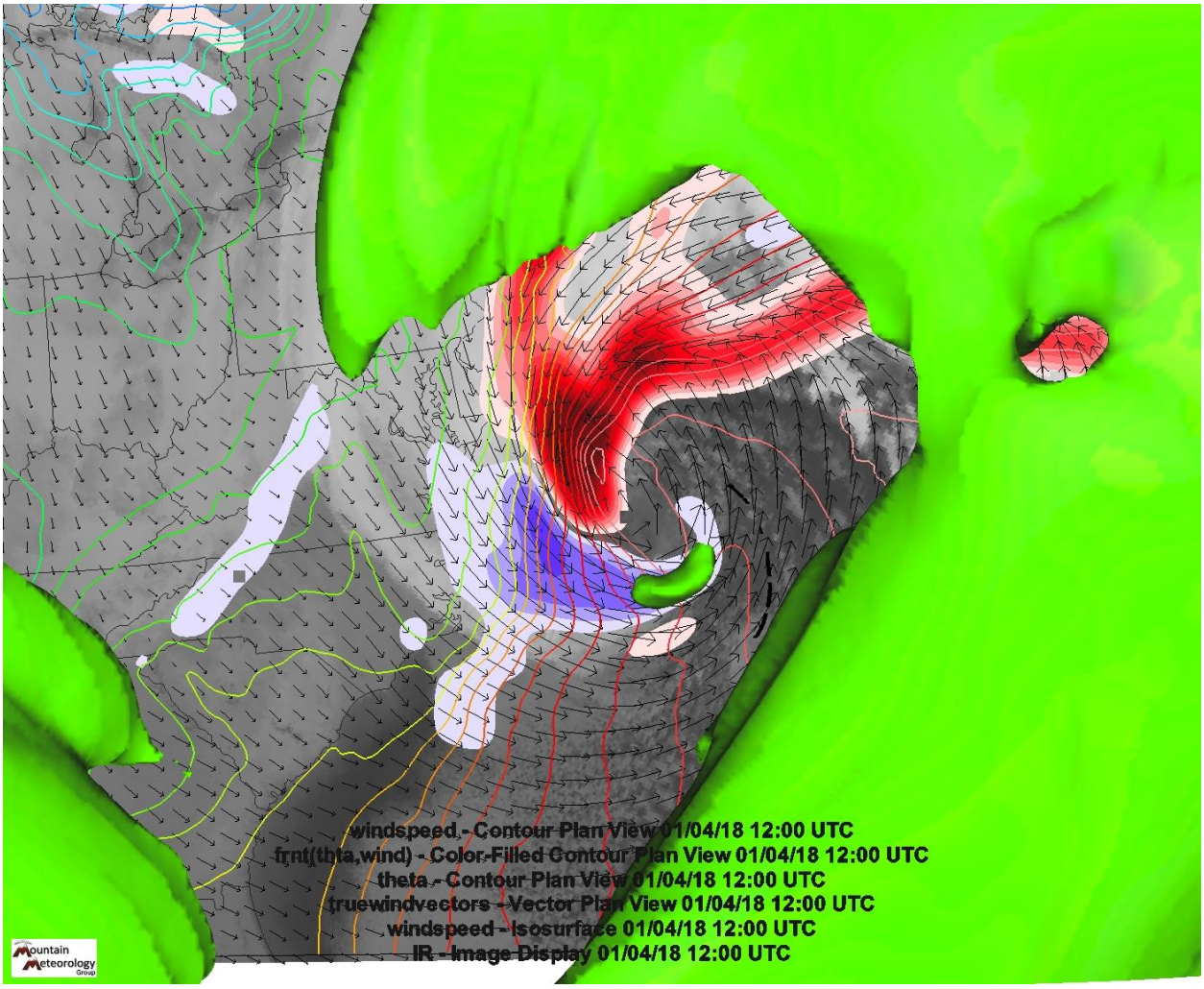
Some of you may have read about the Norwegian cruise ship that was battered in the storm (https://www.cbsnews.com/news/norwegian-cruise-line-passengers-recall-trip-atlantic-ocean-winter-storm-2018/). Perhaps they were stung by the "poisonous tail" of the bent-back occlusion. What an embarrassment for a Norwegian ship! Bergen School meteorologists, first described the seclusion and bent-back front (e.g., Bergeron 1937). As noted by Grønås (1995), and included in Schultz and Browning (2017):

"As a young forecaster in the late 1960s, I was informed that the strongest winds ever recorded in our region have been linked to back-bent occlusions. Such a structure has been called ‘the poisonous tail’ of the back-bent occlusion (after F. Spinnangr, who in 1939 succeeded S. Pettersen [sic.] as head of the Western Norway Forecasting Office)."

I don't know where that cruise line gets their forecasts from, but they need new meteorologists!

Looking forward to using case for class this semester. I've just revised all of my cyclone notes and activities to take advantage of this case.

Jim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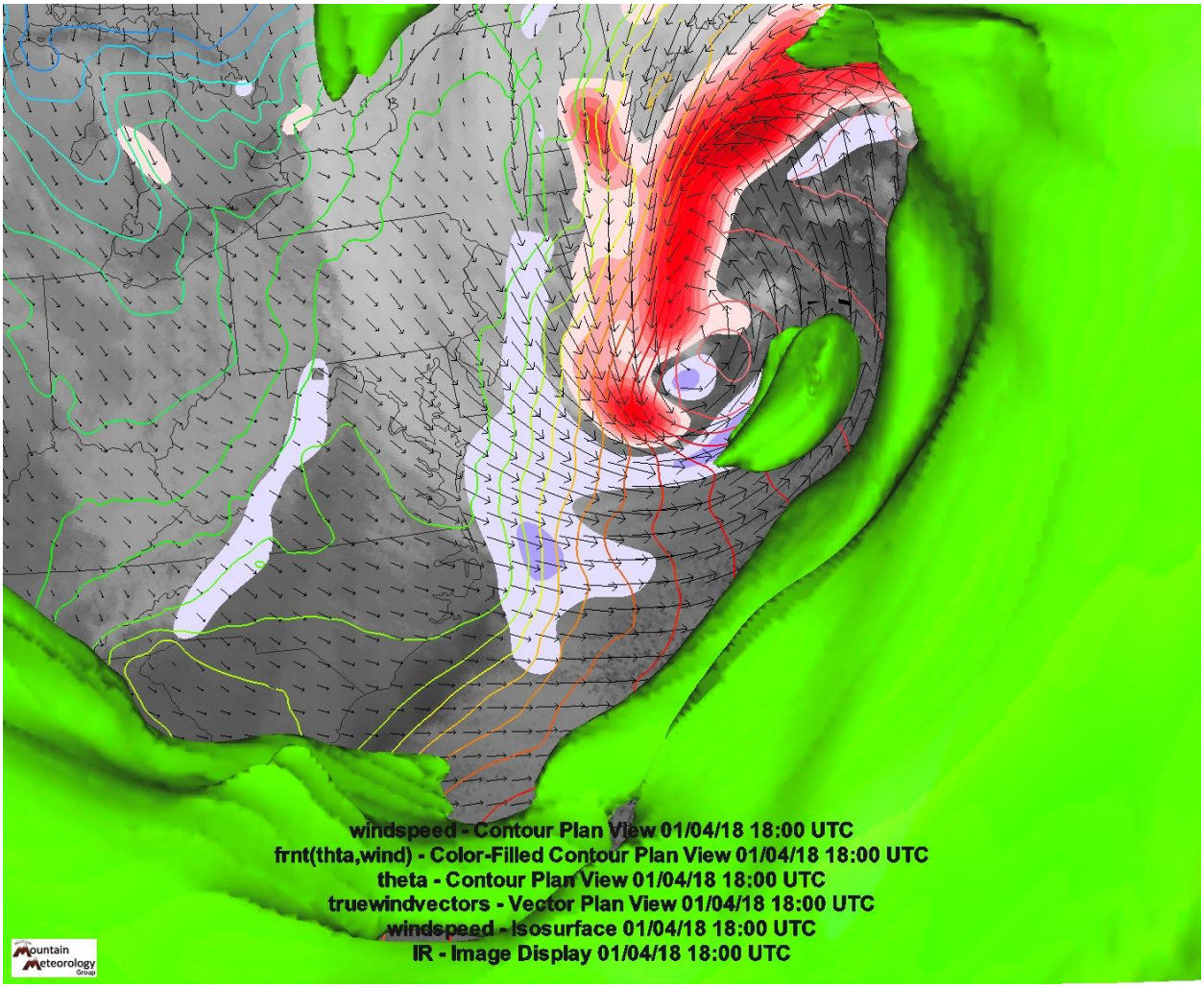
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