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Interactive comment on "Influence of ENSO on North American subseasonal surface air temperature variability" *by* Patrick Martineau et al.

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I can't add much to the text as I have no doubt that the influence of ENSO on NA temperature variability is strong, and that the qualitative mechanisms that are described apply. But since I have an interest in the underlying fundamental mechanism in the cause of the climate dipoles, there is a different approach that can be applied.

In Chapter 11 of Mathematical Geoenergy, we developed a general formulation based on Laplace's Tidal Equations (LTE) to aid in the analysis of standing wave climate models, focusing on the ENSO and QBO behaviors in the book. As a means of cross-validating this formulation, it makes sense to test the LTE model against other climate indices, such as the northern latitude indices comprised of the Arctic Oscilla-

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tion/Northern Annular Mode (AO/NAM) and the Pacific North America (PNA) pattern.

Both the PNA and the Arctic Oscillation can be easily fit from a perturbation of the NAO model, which can be deduced from the known similarity between the AO and NAO âĂŤ ("The North Atlantic oscillation (NAO) is a close relative of the AO").

Fig 1 shows the common tidal forcing for each of these models, with the LTE modulation in the lower panel. The tidal forcing has a strong semi-annual factor, as does the QBO (see Chapter 11).

The LTE modulation differs subtly between the three, as the multipliers are slightly different for NAO and AO and within $\sim$15% for PNA. They are in sync at the yellow arrows shown in the lower panel of Fig 1. The LTE modulation is dependent on the fundamental spatial wavenumber defining the dipole, which should be different for each of the regions.

Fig 2 shows the fits for each of the time-series.

You can see how the NAO and AO are vaguely similar and the the PNA is similar but flipped in polarity. It is known that the QBO has a connection to the polar vortex, so the semi-annual commonality between QBO and AO makes some sense.

Figure 1 : Tidal forcing and LTE modulation for the AO and PNA models, alongside the NAO.

Figure 2 : Model fit for NAO, AO and PNA.

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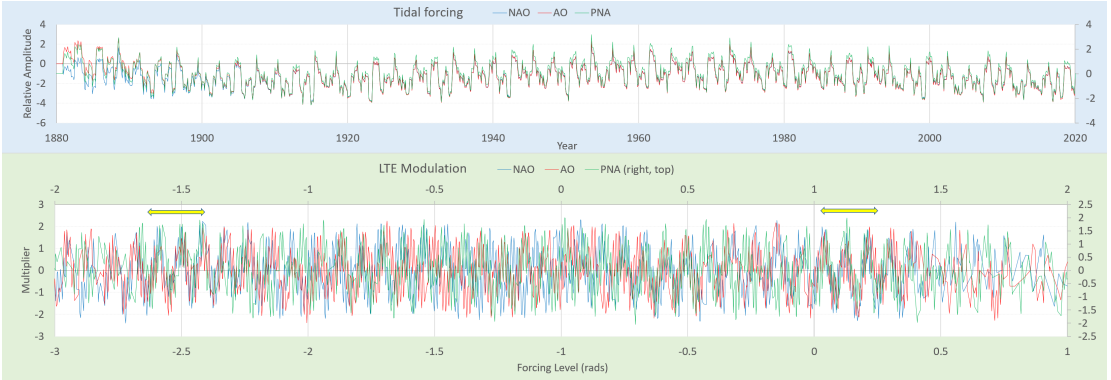

Fig. 1.

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Fig. 2.

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