

Seasonal weather variation and its impact on the energy industry *

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1. Introduction

The annual cycle of seasons produces variation in temperature and commercial activity that directly impact the US energy markets. Energy producers, businesses and even individual home owners learn through experience to expect a certain range of variation in energy consumption throughout the year. The weather usually falls within the expected range of variation, so business is conducted as usual. But when the weather approaches margins of "normal" and especially when the weather goes outside of and stays outside of "normal" ranges for days or weeks, the integrated effects on the energy markets can be very significant.

AER has been producing seasonal forecasts commercially for more than a decade. Drawn from our experience of producing operational forecasts, we will discuss the normal variation of seasonal weather and some of the Earth system components that are understood to drive seasonal weather and their impact on seasonal variations and weather extremes observed over the past decade. We will also show examples of seasons that are outside the range of expected weather, and discuss their potential impacts on the energy industry and on the US renewable energy portfolio in particular.

*Second Conference on Weather, Climate, and the New Energy Economy, January 2011

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2. Experimental Design

a. Selection of WRF configurations

(Chen et al. 2010).

b. Land-use datasets

3. Discussion and Conclusions

Our results, particularly the comparison of WRF vertical wind profiles to VTMX wind profiles, confirm the findings of (Zhong and Fast 2003) , that high-resolution mesoscale models are capable of reproducing local and mesoscale circulations.

Acknowledgement Funding was provided by Scitor Corporation, and supercomputing time was provided by NASA Ames.

References

Chen, F., H. Kusaka, R. Bornstein, J. Chire, C. S. B. Grimmond, S. Grossman-Clarke, T. Loridan, K. W. Manning, A. Martilli, S. Miao, D. Sailor, F. P. Salamanca, H. Taha, M. Tewari, X. Wang, A. A. Wyszogrodzki, and C. Zhang, 2010: The integrated WRF/urban modeling system: Development, evaluation, and applications to urban environmental problems. *Int. J. Climatol.*, early release, doi:10.1002/joc.2158.

Zhong, S. and J. Fast, 2003: An evaluation of the MM5, RAMS, and Meso-Eta models at subkilometer resolution using VTMX field campaign data in the Salt Lake Valley. *Mon. Wea. Rev.*, **131 (7)**, 1301–1322.

AER Snow Cover 2010

Snowcover 2010 Snow Cover Anomalies 2010

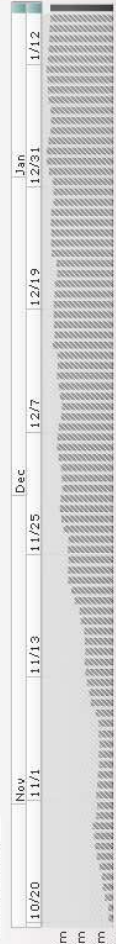
Minimized Pods



Total Snow Cover (sq. km)

27.50m

Sum Snowcovr



Net Snow Cover Anomaly (sq. km)

1.39m

Sum Snowanom



Daily Northern Hemispheres Snow Cover, last 90 days

Daily Northern Hemisphere Net Snow Cover, last 90 days

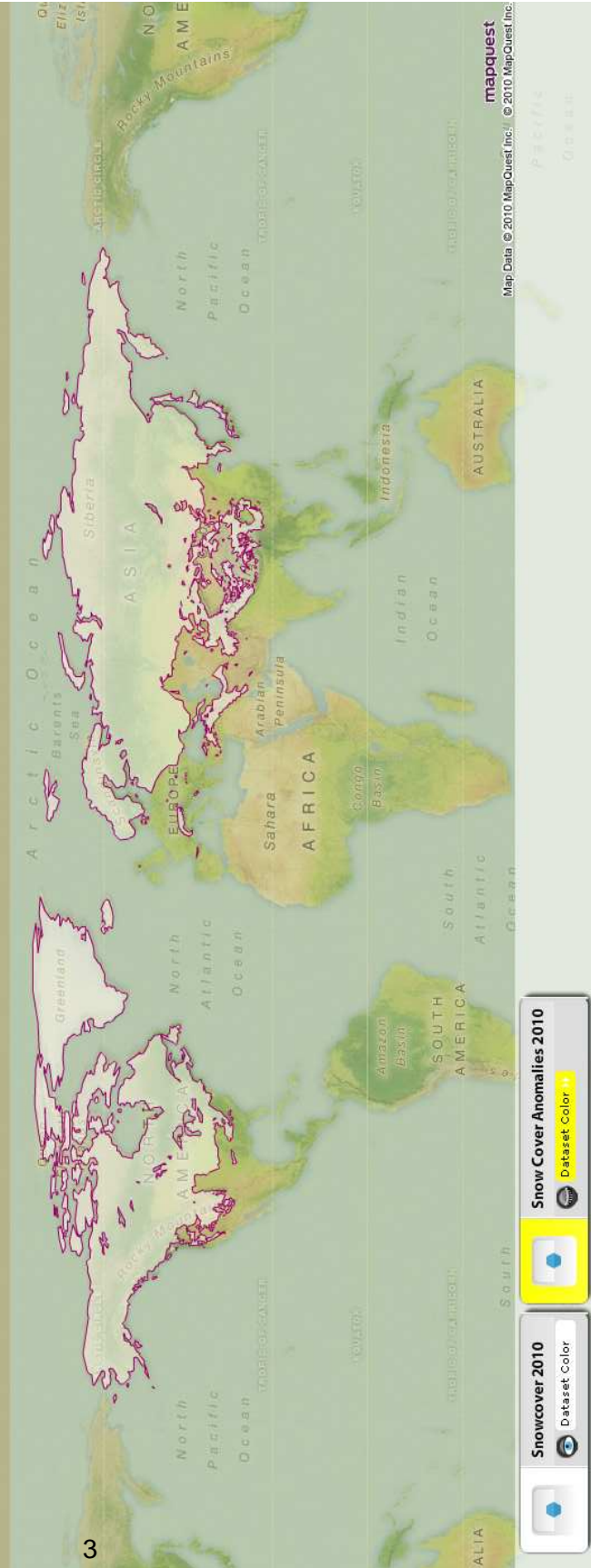


Figure 1: Cumulative 2010-11-snowcover.

Table 1: WRF configuration of the sensitivity runs. See text for details

Name	PBL	Sfc Layer	Version	Urban Land-Use	UCM
Eddy	Yongsei University (YSU)	Monin-Obukhov	3.2	1	No
Eddy-U	Yongsei University (YSU)	Monin-Obukhov	3.2.1	3	Yes
Turb	Mellor-Yamada-Janjic (MYJ)	Monin-Obukhov (Janjic)	3.2	1	No
Turb-U	Mellor-Yamada-Janjic (MYJ)	Monin-Obukhov (Janjic)	3.2.1	3	Yes