

5. listopada 2018. u 13:15 u predavaonici P2

## **Geofizički seminar 1\***

# **Precipitation in regional climate simulations: Influence of the size of domain, domain position and the use of the spectral nudging technique**

**Sarah Ivušić**

Državni hidrometeorološki zavod

### **Sadržaj**

High-resolution regional atmospheric models are nested into coarser resolution global circulation models (GCMs) to provide a more detailed representation of regional weather features. In the context of the climate simulations, when regional climate models (RCMs) are nested in GCMs, this technique is called dynamical downscaling. There are several dynamical downscaling methods and one-way nesting is the most often used one. It provides the large-scales, which are well-resolved by GCM, to RCM through lateral boundary conditions (LBC). This requires interpolation of coarse atmospheric fields to higher resolution spatial grid of the RCM domain. It has been shown that large scales of RCM can significantly deviate from those forced at lateral boundaries by GCM. Also, the RCM simulations are proved to be sensitive to the size of nested domain, its position and geometry. Problems may arise since LBC are not the exact solution of the nested model's partial differential equations. To answer this issue, LBC are provided over a so called sponge zone and/or the large-scales are relaxed within RCM to those of the GCM. The latter one is known as the spectral nudging (SN) technique, which forces the RCM to adopt large-scales of GCM over the entire domain and at the same time it allows the RCM to freely develop small-scale features. SN technique eliminates the effect of domain size and position and it is recommended to use with domains larger than few thousand kilometers. In the presentation the SN technique will be explained in more detail and several sensitivity studies regarding precipitation in RCMs will be presented.

### Članci na kojima se temelji seminar:

Colin, J., Déqué, M., Radu, R., and Somot, S. (2010). Sensitivity study of heavy precipitation in Limited Area Model climate simulations: influence of the size of the domain and the use of the spectral nudging technique, *Tellus A: Dynamic Meteorology and Oceanography*, 62:5, 591-604.

Radu, R., Déqué, M. and Somot, S. (2008). Spectral nudging in a spectral regional climate model, *Tellus A*, 60A, 2461-2481.

Waldron, K., Paegle, J. and Horel, J. (1996). Sensitivity of a spectrally filtered and nudged limited area model to outer model options, *Mon. Wea. Rev.*, 124, 529-547.

von Storch, H., Langenberg, H. and Feser, F. (2000). A spectral nudging technique for dynamical downscaling purposes, *Mon. Wea. Rev.* 128, 3664-3673.

Miguez-Macho, G., Stenchikov, G. L. and Robock, A. 2004. Spectral nudging to eliminate the effects of domain position and geometry in regional climate model simulations, *J. Geophys. Res.-Atmos.*, 109(D13104).

\* kolegij u okviru poslijediplomskog sveučilišnog doktorskog studija fizike, smjer geofizika