SPECIAL PROJECT INTERIM REPORT

Interim Reports should be 2 to 10 pages in length, depending on importance of the project. All the following mandatory information needs to be provided.

Reporting year	2006
Project Title:	**Downscaling of ECMWF seasonal forecast in the tropical region Central Sulawesi, Indonesia using the climate limited area model, CLM**
Computer Project Account:	spdeibk
Principal Investigator(s):	Prof. Dr. Gode Gravenhorst
Affiliation:	Institute of Bioclimatology, Universität Göttingen
Name of ECMWF scientist(s) collaborating to the project (if applicable)	……………………………………………………….…… ……………………………………………………….……
Start date of the project:	4/2005
Expected end date:	12/2007

Computer resources allocated/used for the current year and the previous one

(if applicable)
Please answer for all project resources

		Previous year		Current year	
		Allocated	Used	Allocated	Used
High Performance Computing Facility	(units)	100 000		100 000	
Data storage capacity	(Gbytes)	200		200	

Summary of project objectives

(10 lines max)

The main goal of this study is to predict local scale effects of large scale ENSO events. Therefore, the CLM model will be applied to predict ENSO effects using initial conditions from ERA as well as from the Ensemble Prediction System (EPS) of ECMWF output. The study area is a tropical regional Central Sulawesi, Indonesia. We applied the CLM to simulate precipitation with a horizontal resolution of 4 – 7 km.

Summary of problems encountered (if any)

(20 lines max)

We have still in progress set up the CLM model and we will have a computing time for testing the model at DKRZ Hamburg in September 2006. At the moment we are working with the interpolation program era2lm for nested long-term model simulations.

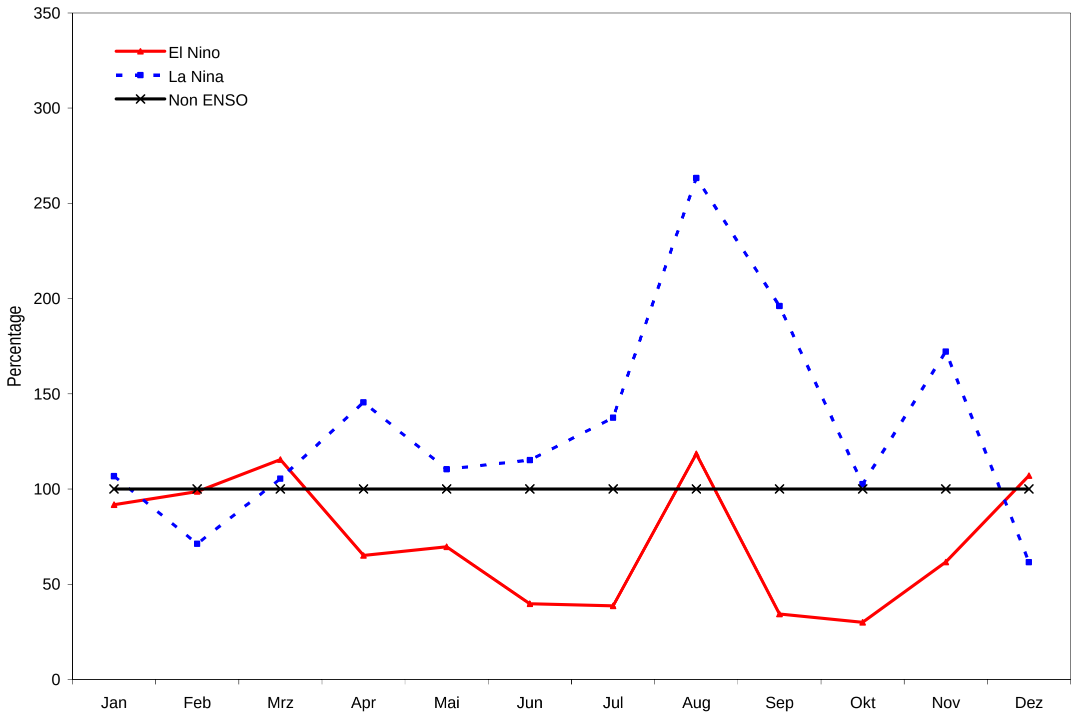
Summary of results of the current year (from July of previous year to June of current year)

This section should comprise 1 to 8 pages and can be replaced by a short summary plus an existing scientific report on the project

In our previous study using REMO model driven by ERA-15 data with a horizontal resolution of 0.167° (or about 18 km), the ENSO-related precipitation variability in our study area are well simulated as it shown in Fig. 1.

These two graphs indicate the similarity of the modeled and measured rainfall pattern: low rainfall during dry season at El Niño years and high rainfall during dry season at La Niña years. The months that are affected by ENSO events fall in the period of a dry season. In South Sulawesi the lower rainfall periods as an impact of El Niño simulated by REMO (Fig.1a) occurred from April to November, while observational data (Fig.1b) show that low rainfall occurs from May to November. The high rainfall as an impact of La Niña is simulated between May to November and observed between May to October. In La Niña years, the high precipitation occurs in the period May to October as simulated and in the period of July to November as obtained from rain gauge measurements. In general, ENSO is only causing precipitation variability during the dry and the transitional period, and does not alter the precipitation during wet season. For the entire Indonesia region, Haylock and McBride (2001) have shown that in some part of Indonesia rainfall is coherent with ENSO forcing during the dry-transitional seasons [June-July-August to September-October-November (JJA-SON)]. During the wet season [December-January-February (DJF)], there is no significant correlation with ENSO. Similar results are reported by Kirono and Tapper (1996); McBride et al. (1998); Aldrian et al. (2004); Chang et al. (2004); Gunawan and Gravenhorst (2005); Juneng and Tangang (2005).

a).



b).

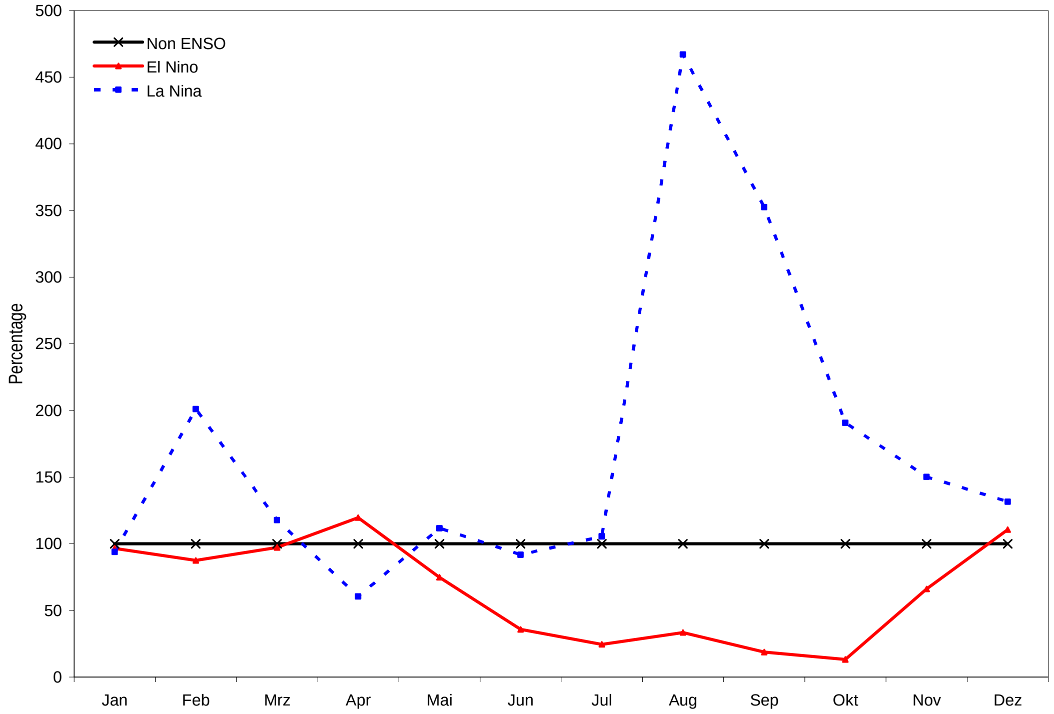


Figure 1: Monthly averaged precipitation rates in South Sulawesi (1979-1993) during El Niño, La Niña, and Non ENSO years in % of Non-ENSO year rates. a). REMO model, b) measured.

List of publications/reports from the project with complete references

Aldrian, E., L.Dümenis-Gates, D.Jacob, R.Podzum and D.Gunawan, 2004: Long-term simulation of Indonesian rainfall with the MPI regional model. *Climate Dynamic. 22: 975-814.*

Gunawan,D., and G.Gravenhorst, 2005: Die Auswirkung von ENSO auf Niederschläge in Zentral-Sulawesi,Indonesien. German Climate Research Program, Final Symposium.

Haylock,M., and J.McBride, 2001: Spatial coherence and predictability of Indonesian wet season rainfall, *J. Clim*.,14,3882–3887.

Kirono, D.G.C., and N.J. Tapper, 1999: ENSO rainfall variability and impacts on crop production in Indonesia, Physical Geography, 20(6): 508-519.

Juneng,L., and F. T. Tangang, 2005: Evolution of ENSO-related rainfall anomalies in Southeast Asia region and its relationship with atmosphere–ocean variations in Indo-Pacific sector, *Climate Dynamics*, 25: 337–350.

McBride,J., W. Drosdowsky, D.G.C.Kirono, D.Gunawan, Soetamto, and P.A.Winarso, 1998. Interannual Variability of the Indonesia Monsoon. Extended Abstracts of the International Conference on Monsoon and Hydrologic Cycle. Kyongju, Korea: *Korean Meteorological Society*.

Summary of plans for the continuation of the project

(10 lines max)

- Implementing the CLM model in ECMWF computing facility.
- Running CLM model use ERA-40 datasets to get model climatology.
- Test running 6 months EPS operational seasonal predictions.
- Comparison of seasonal prediction with model climatology and observation.

Interim Report

July 10, 2006

Special Project

Downscaling of ECMWF seasonal forecast in the tropical region Central Sulawesi, Indonesia using the climate limited area model, CLM

Gode Gravenhorst and Dodo Gunawan

Institute of Bioclimatology, Universität Göttingen

The main goal of this study is to predict local scale effects of large scale ENSO events. Therefore, the CLM model will be applied to predict ENSO effects using initial conditions from ERA as well as from the Ensemble Prediction System (EPS) of ECMWF output. The study area is a tropical regional Central Sulawesi, Indonesia. We applied the CLM to simulate precipitation with a horizontal resolution of 4 – 7 km.

We have still in progress set up the CLM model and we will have a computing time for testing the model at DKRZ Hamburg in September 2006. At the moment we are working with the interpolation program era2lm for nested long-term model simulations. Accessing data from MARS have been done to ensure that we can retrieve the ERA data.

In our previous study using REMO model driven by ERA-15 data with a horizontal resolution of 0.167° (or about 18 km), the ENSO-related precipitation variability in our study area are well simulated as it shown in Fig. 1.

These two graphs indicate the similarity of the modeled and measured rainfall pattern: low rainfall during dry season at El Niño years and high rainfall during dry season at La Niña years. The months that are affected by ENSO events fall in the period of a dry season. In South Sulawesi the lower rainfall periods as an impact of El Niño simulated by REMO (Fig.1a) occurred from April to November, while observational data (Fig.1b) show that low rainfall occurs from May to November. The high rainfall as an impact of La Niña is simulated between May to November and observed between May to October. In La Niña years, the high precipitation occurs in the period May to October as simulated and in the period of July to November as obtained from rain gauge measurements. In general, ENSO is only causing precipitation variability during the dry and the transitional period, and does not alter the precipitation during wet season. For the entire Indonesia region, Haylock and McBride (2001) have shown that in some part of Indonesia rainfall is coherent with ENSO forcing during the dry-transitional seasons [June-July-August to September-October-November (JJA-SON)]. During the wet season [December-January-February (DJF)], there is no significant correlation with ENSO. Similar results are reported by Kirono and Tapper (1996); McBride et al. (1998); Aldrian et al. (2004); Chang et al. (2004); Gunawan and Gravenhorst (2005); Juneng and Tangang (2005).

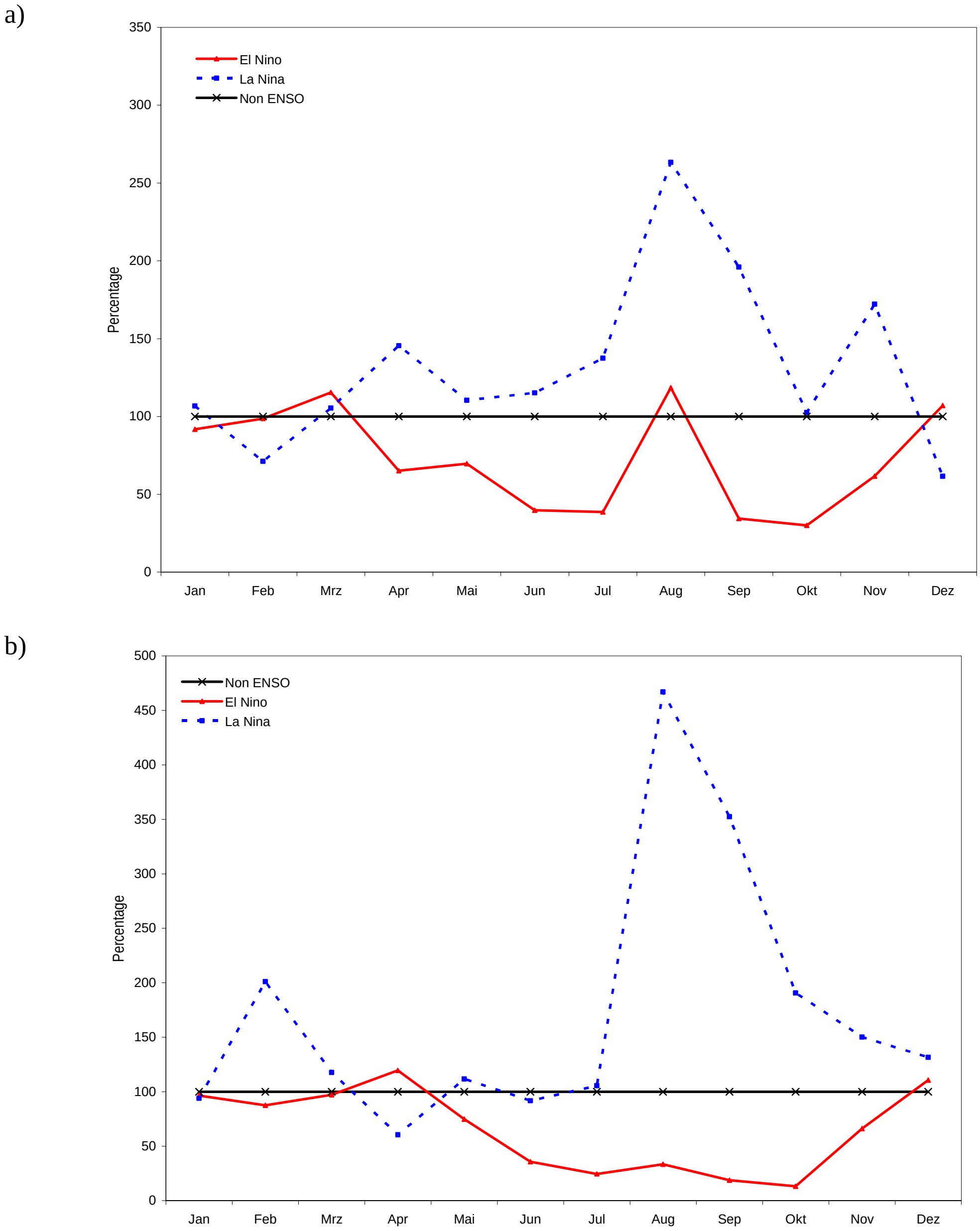


Figure 1 Monthly averaged precipitation rates in South Sulawesi (1979-1993) during El Niño, La Niña, and Non ENSO years in % of Non-ENSO year rates. a). REMO model, b) measured.

References:

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