KTU-GEOD IVS Analysis Center Annual Report 2010

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Abstract

This report summarizes the activities of the KTU-GEOD IVS Analysis Center (AC) in 2010 and outlines the planned activities for the year 2011. Analysis of the IVS EUROPE sessions is one of our specific interests.

1. General Information

KTU-GEOD IVS Analysis Center (AC) is located at the Department of Geomatics Engineering, Karadeniz Technical Univesity, Trabzon, Turkey.

2. Staff

Members who have contributed to the research work at the KTU-GEOD IVS Analysis Center (AC) from the establishment of the AC up to the present are listed in Table 1.

Figure 1. Members of the KTU-GEOD IVS Analysis Center (AC) at the 15^{th} General Assembly of WEGENER, which was held in Istanbul. From right: Emine Tanır and Kamil Teke.

3. Current Status and Activities

Since 23^{rd} of June 1989 every year several (6-12) IVS EUROPE sessions have been carried out. The last complete solution of IVS EUROPE sessions was done about 10 years ago [1]. In 2010 we analyzed the IVS EUROPE sessions from 1990 to 2010. We determined horizontal and vertical crustal motion in Europe. We compared our results with the previous findings derived from VLBI and GNSS data analyses. We considered six VLBI stations: Matera and Medicina

Table 1. Staff of the KTU-GEOD Analysis Center.

Name	**Working Location**	**Main Focus of Research**
Emine Tanır	Karadeniz Technical University, Department of Geomatics Engineering, Trabzon, Turkey.	Responsible for KTU-GEOD IVS AC and data processing.
Kamil Teke	[1] Vienna University of Technology, Institute of Geodesy and Geophysics, Vienna, Austria.	Least-squares adjustment.
	[2] Hacettepe University, Department of Geodesy and Photogrammetry Engineering, Ankara, Turkey.	Data processing.

in Italy; Wettzell in Germany; Svetloe in Russia; Onsala in Sweden; and Ny-Ålesund in Norway. We analyzed the IVS EUROPE sessions with VieVS (Vienna VLBI Software) developed at the Institute of Geodesy and Geophysics (IGG), Vienna University of Technology (TU Wien). We estimated horizontal and vertical velocities for each VLBI station by fitting a linear function to the coordinate time series. We compared these velocities with those of ITRF2005, VTRF2008, and a EUREF GNSS solution (see Table 2). According to our results, the VLBI sites of Onsala and Ny-Ålesund are rising at rates of 4 mm/year and 8 mm/year, respectively (see Table 2).

Table 2. Velocity vectors (cm/year) in north, east, and radial directions from the analysis of IVS EUROPE sessions, from ITRF2005 and VTRF2008 TRF solutions, and from the analysis of EUREF GNSS sessions (all velocities are at epoch 2000.0).

Stations	IVS EUROPE			ITRF 2005			VTRF 2008			EUREF GNSS		
	v_n	v_e	v_r	v_n	v_e	v_r	v_n	v_e	v_r	v_n	v_e	v_r
MATERA (MATE)	1.9	2.4	0.0	1.9	2.4	0.0	1.9	2.3	0.1	2.0	2.3	0.2
MEDICINA (MEDI)	1.8	2.2	-0.2	1.8	2.2	-0.2	1.8	2.2	-0.2	2.1	2.2	-0.1
WETTZELL (WTZR)	1.5	2.0	0.0	1.6	2.0	0.0	1.6	2.0	0.0	1.7	2.0	0.1
ONSALA60 (ONSA)	1.5	1.7	0.4	1.5	1.7	0.3	1.5	1.7	0.4	1.6	1.7	0.3
SVETLOE	1.3	2.1	0.0	1.6	1.9	0.2	1.1	2.1	0.4	-	-	-
NYALES20	1.4	1.0	0.8	1.4	1.1	0.8	1.4	1.0	0.8	-	-	-

Figure 2 shows the radial velocities of the GNSS sites of which coordinate time series are available approximately longer than four years without any gap. Although the other European VLBI sites show uplift, the Medicina VLBI site is subsiding about 2 mm/year. The IVS EUROPE radial velocities estimated by VieVS are in good agreement with the EUREF GNSS solution at co-located sites in direction and in reasonable agreement in magnitude [2, 3]. The horizontal and radial velocity estimates of IVS and EUREF solutions agree at co-located sites within a few mm/year. In general the radial components of the antenna positions do not agree as well as the horizontal components. For the case of our study, i.e. analyzing IVS EUROPE VLBI data, estimating EOP or fixing to a priori models did not cause significant differences in the horizontal

velocity estimates, contrary to radial velocities. After de-trending the coordinate time series, at some VLBI sites (e.g., Wettzell) clear annual spectra were detected [3].

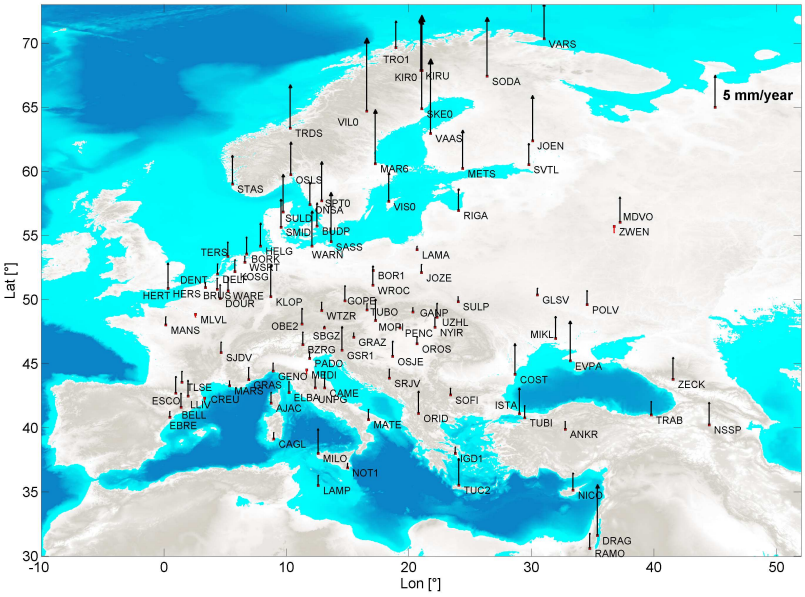

Figure 2. Radial velocity vectors from the EUREF GNSS solution.

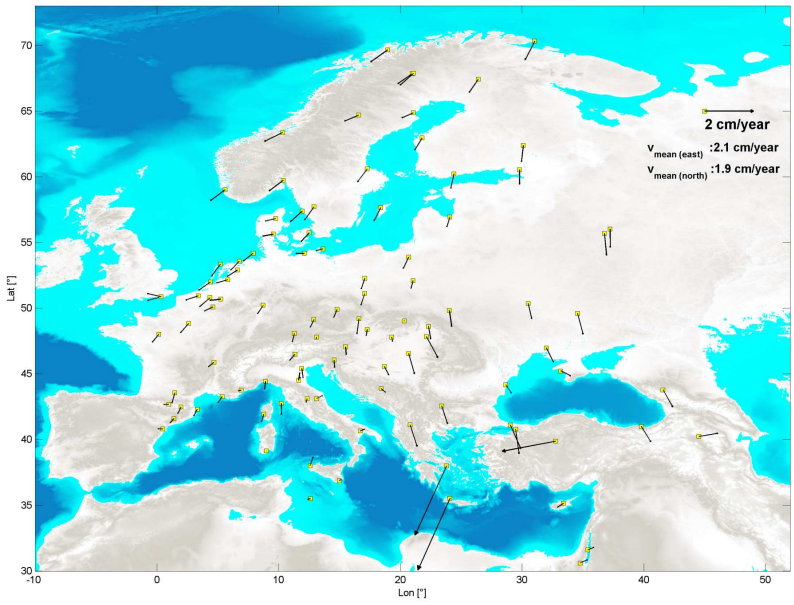

Figure 3. Relative horizontal velocity vectors from the EUREF GNSS solution when the European plate is fixed (Europe intra-plate motions).

4. Future Plans

We will continue to analyze VLBI sessions with different parameterizations, focusing on the IVS EUROPE series by using VieVS. In 2011, we plan to study different stochastic models in the analysis of VLBI sessions.

Acknowledgements

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References

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