

# **SNR OF EGNOS SATELLITES IN SOUTHERN BALTIC AREA**

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## **ABSTRACT**

**Introduction to using EGNOS system made possible determining of position in navigation and measurement applications. High accuracy of determined position, at precision of system DGPS level, allowed for taking advantage of that system in hydrographic measurements.**

**In article are presented observations from signals transmitted by EGNOS system satellites in 2005, in the middle of operation activating, to protecting of hydrographic measurements at sea and inland areas.**

## **INTRODUCTION**

**Currently used receivers of radionavigation positioning systems made possible using them to protect hydrographic measurements. Precision of determined position, limits possibility of using them in individual categories of measurements. For Special Category, for which required precision of determining position amount  $\pm 2$  m, possible is using receivers of systems GPS and EGNOS. In order to get very high precision of position in special areas of performed measurements, in harbours and near coasts, recommended is practical (not formal) taking advantage of others, more accurate measurement tools, to which could be rated GPS-RTK. Using of that system is also possible thanks to executing measurements in not big distance from land – base station.**

**New possibilities of protecting hydrographic works gave activating of system EGNOS as alternative to system DGPS in inland areas, where aren't possibilities of receiving differential corrections from reference station. On sea areas (area of Southern Baltic) location of reference stations enables receiving corrections from at least one reference station, so main direction of executing system EGNOS in hydrography searched in inland areas.**

## **SPACE SEGMENT ARCHITECTURE OF EGNOS SYSTEM**

**Space segment of EGNOS system consists of three following geostationary satellites: Inmarsat III AOR-E (Atlantic Ocean Region – East - 15,5°W) (PRN 120), Inmarsat III IOR-W (Indian Ocean Region – West -25°E) (PRN 126) and ESA Artemis (Advanced Relay Technology Mission - 21,5°E) (PRN 124), which is telecommunication one which belong to European Space Agency (European Space Agency). Satellites transmits corrections, enabling getting high precision of determined position in zone of systems working.**

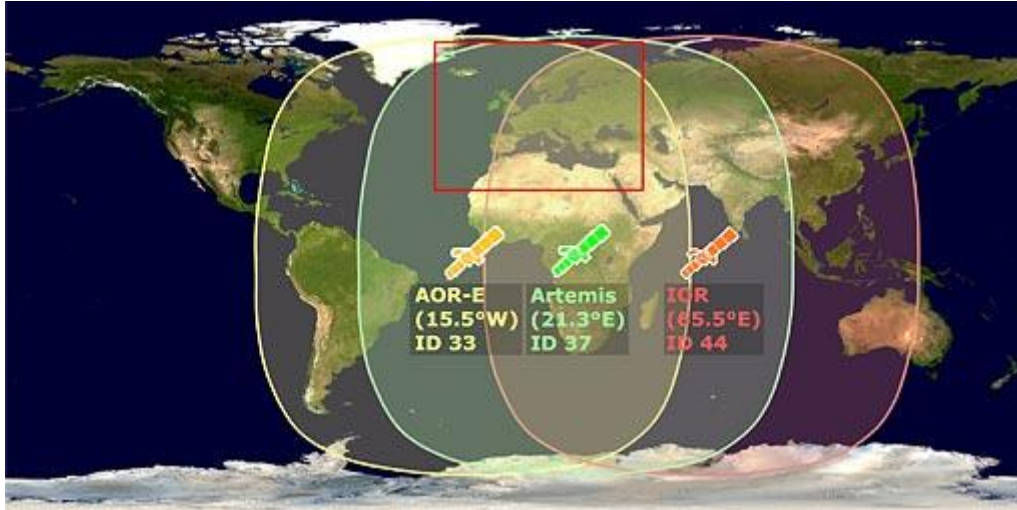


Fig. 1. Operating zone of Inmarsat satellites

Table 1. Space Based Augmentation System (SBAS) RANGING C/A CODES

PRN	G2 Delay (Chips)	Initial G2 Setting (Octal)	First 10 SBAS Chips (Octal)	Geostationary Satellite PRN Allocations	Orbital Slot
120	145	1106	0671	INMARSAT 3F2, AOR-E	15.5 W
121	175	1241	0536	INMARSAT 4F2	53 W
122	52	0267	1510	INMARSAT 3F4, AOR-W	54 W
123	21	0232	1545	Unallocated	
124	237	1617	0160	ARTEMIS	21.5 E
125	235	1076	0701	Unallocated	
126	886	1764	0013	INMARSAT 3F5, IND-W	25 E
127	657	0717	1060	INSATNAV	TBD
128	634	1532	0245	INSATNAV	TBD
129	762	1250	0527	MTSAT-1R (or MTSAT-2, note 2)	TBD
130	355	0341	1436	INMARSAT 4F1	63 E
131	1012	0551	1226	INMARSAT 3F1, IOR	64 E
132	176	0520	1257	Unallocated	
133	603	1731	0046	INMARSAT 4F3	N/A
134	130	0706	1071	INMARSAT 3F3, POR	178 E
135	359	1216	0561	Unallocated	
136	595	0740	1037	INMARSAT Reserved	8 E
137	68	1007	0770	MTSAT-2 (or MTSAT-1R, note 2)	TBD

**Table 2. PRN/Satellite ID information**

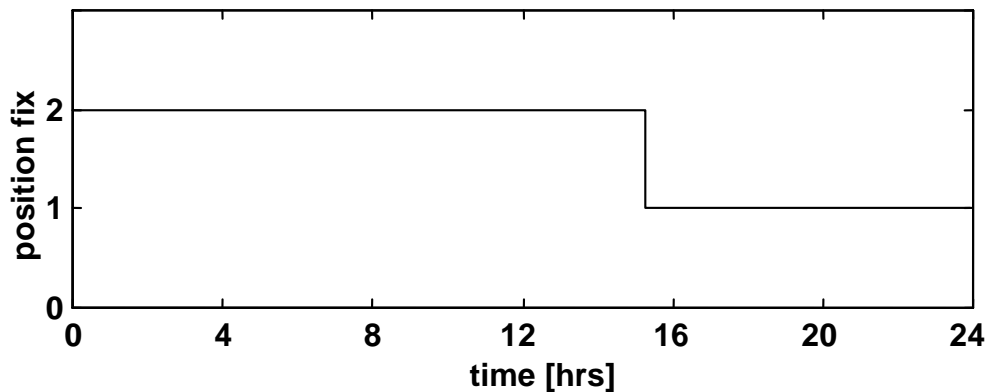
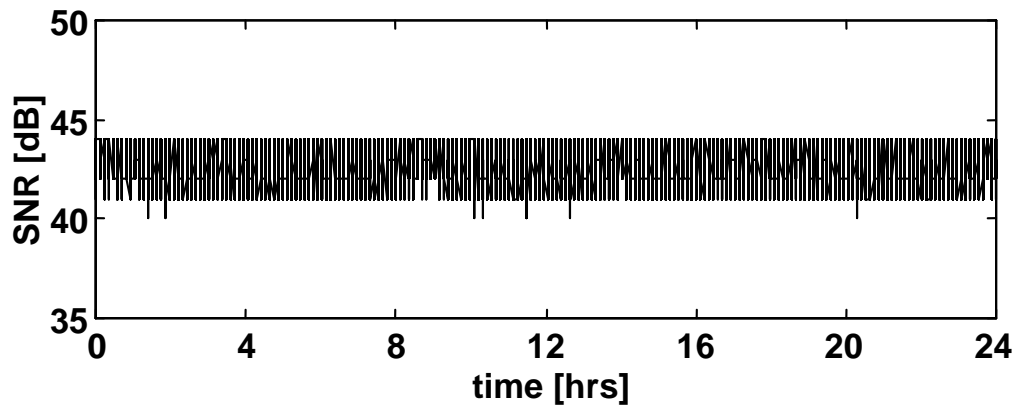
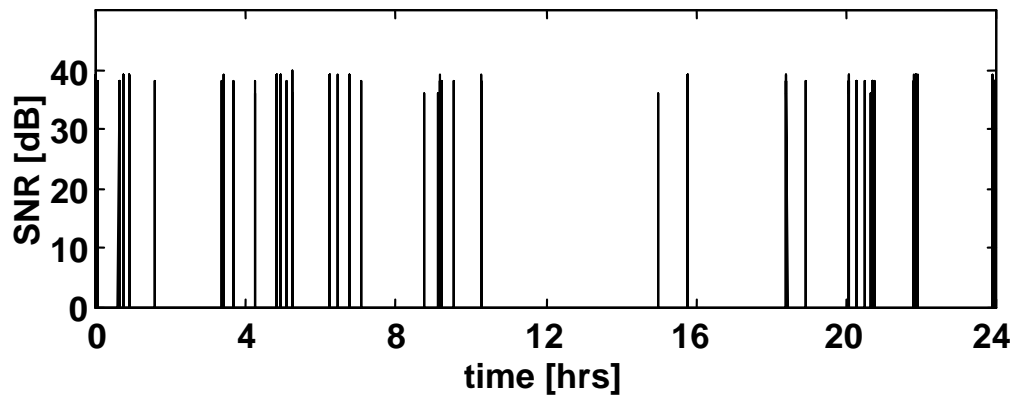
	<b>Inmarsat</b>	<b>PRN</b>	<b>Garmin Satellite ID</b>
<b>WAAS</b>	<b>AOR-W</b>	<b>122</b>	<b>35</b>
	<b>POR</b>	<b>134</b>	<b>47</b>
<b>EGNOS</b>	<b>AOR-E</b>	<b>120</b>	<b>33</b>
	<b>Artemis</b>	<b>124</b>	<b>37</b>
	<b>IOR-W</b>	<b>126</b>	<b>39</b>
<b>MSAS</b>	<b>MTSAT-1</b>	<b>129</b>	<b>42</b>
	<b>MTSAT-2</b>	<b>137</b>	<b>50</b>



**Fig. 2. Inmarsat 3 satellite**

## **TEST RESULTS**

**For measurements of SNR received from Inmarsat 3F2 (PRN 120) satellite, observed in Southern Baltic area, receiver Magellan FX 324 Map has been used. Executed 24-hours recording of GSV sentences, including among other things, parameters of EGNOS system satellites. One from another three sentences concerned visible satellites (PRN, elevation, azimuth and SNR value), includes information about two visible EGNOS satellites, decreasing transmitted information about satellites GPS to 10 (are transmitted max. three sentences including information about four satellites, among other things about satellites of EGNOS system). Below SNR record of EGNOS system satellites (PRN 120 and 131) and receiver status for twenty four hours observation made in February 2006, during full operating functioning of system, have been shown.**



## CONCLUSIONS

Within the space of next dozen or so years, EGNOS system will contribute to decisive technological and economical development not only European economy, but also world-wide. Thanks to improvement efficiency of working and credibility of functioning will be able in moment of full operational achievement (according to assurances of European Space Agency representatives it should took place at the beginning of 2006) be successfully used in applications bounded with safety of life, increasing thereby assortment of his services. In the event of EGNOS system, operators of system takes whole responsibility for quality of his working. After

getting adequate certificates will be able to be applied in so-called critical applications, in which dependability of getting information is the most important. Is expected that EGNOS will bring significant progress in quality, efficiency and safety of services. Will also offer a lot of new applications, developing potential market of satellite navigation. European Commission took a final decision about including EGNOS system to structures of arising global navigation satellite system Galileo.

## **BIBLIOGRAPHY**

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