



HRVATSKA KONTROLA
ZRAČNE PLOVIDBE

Workshop on advances in meso- and micro-meteorology
03-04 November 2014, Jezerčica Thermae, Donja Stubica

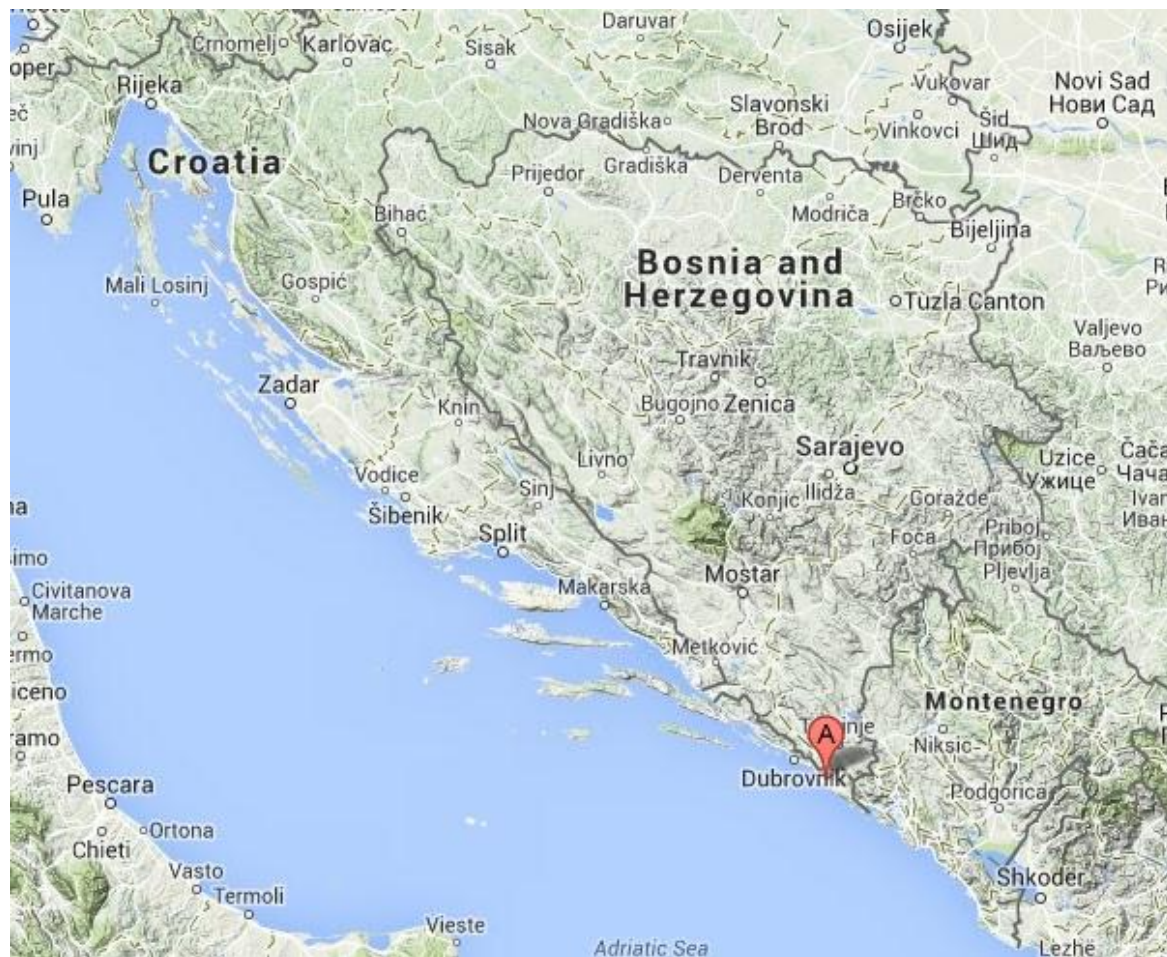
MET service provision challenges related to bora wind at Dubrovnik airport

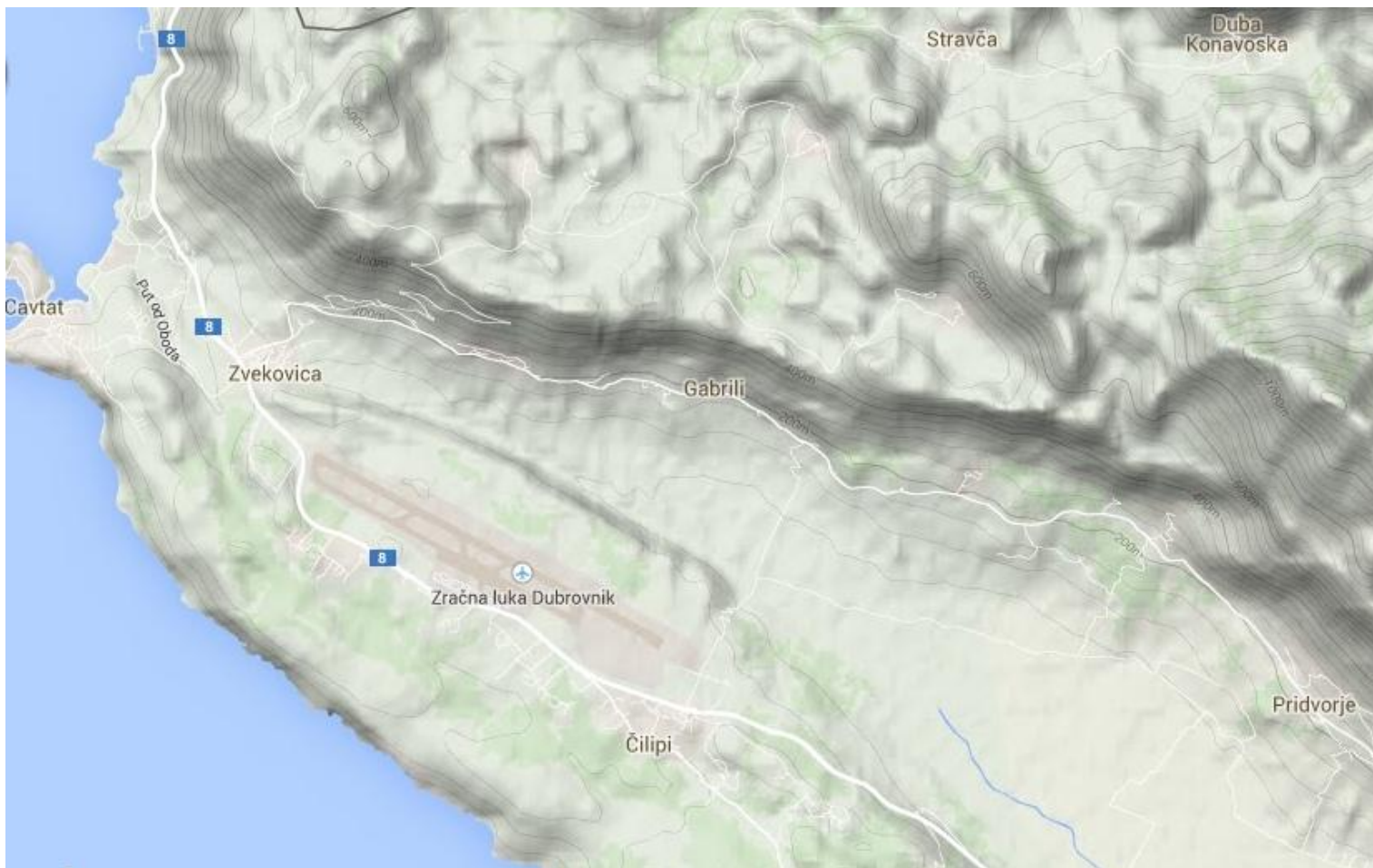
Igor Kos and Jadran Jurković

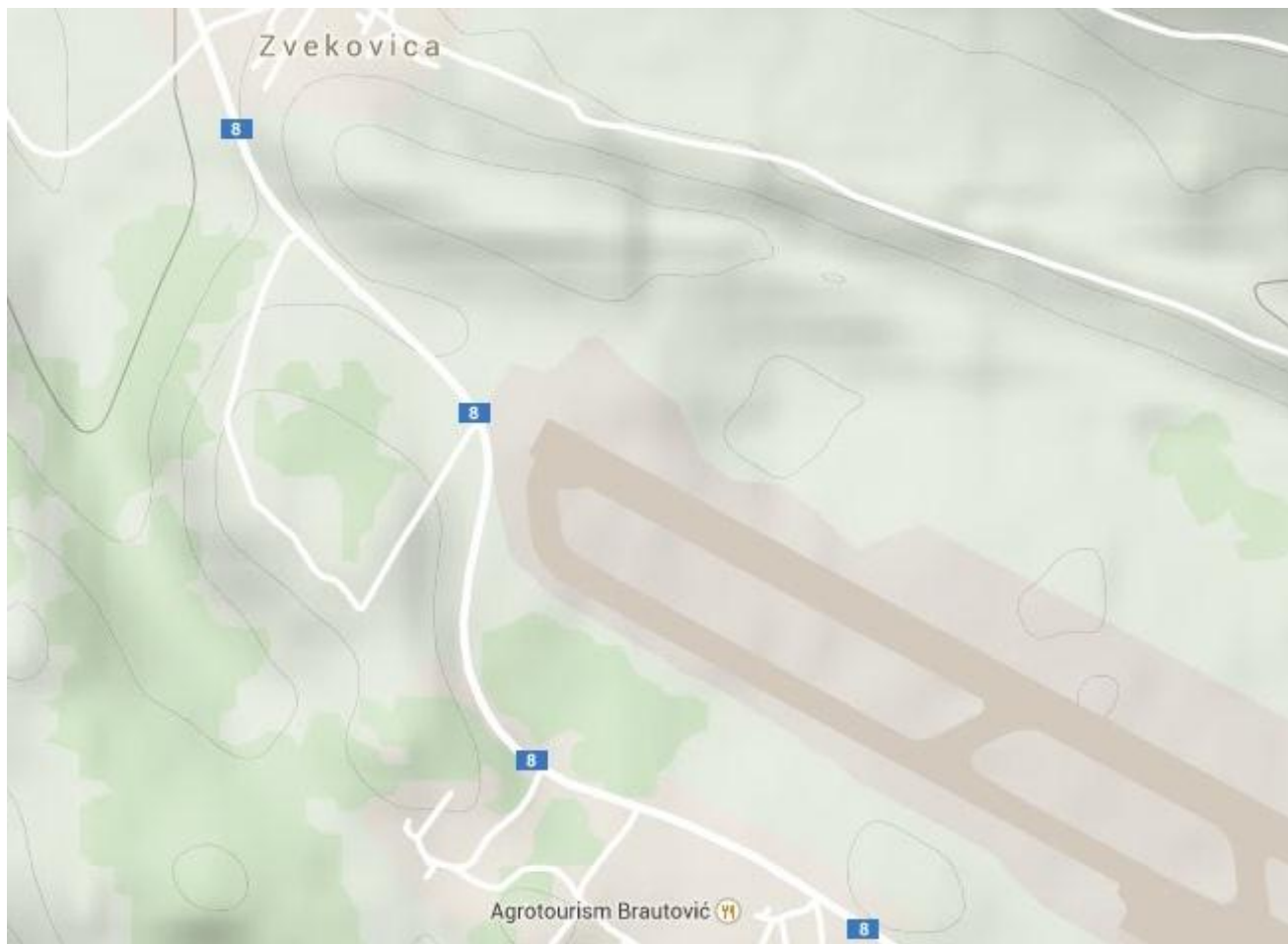
■ Outline

- LDDU description
- Wind measurements
- Wind forecasts
- Observed bora characteristics
- LDDU bora project

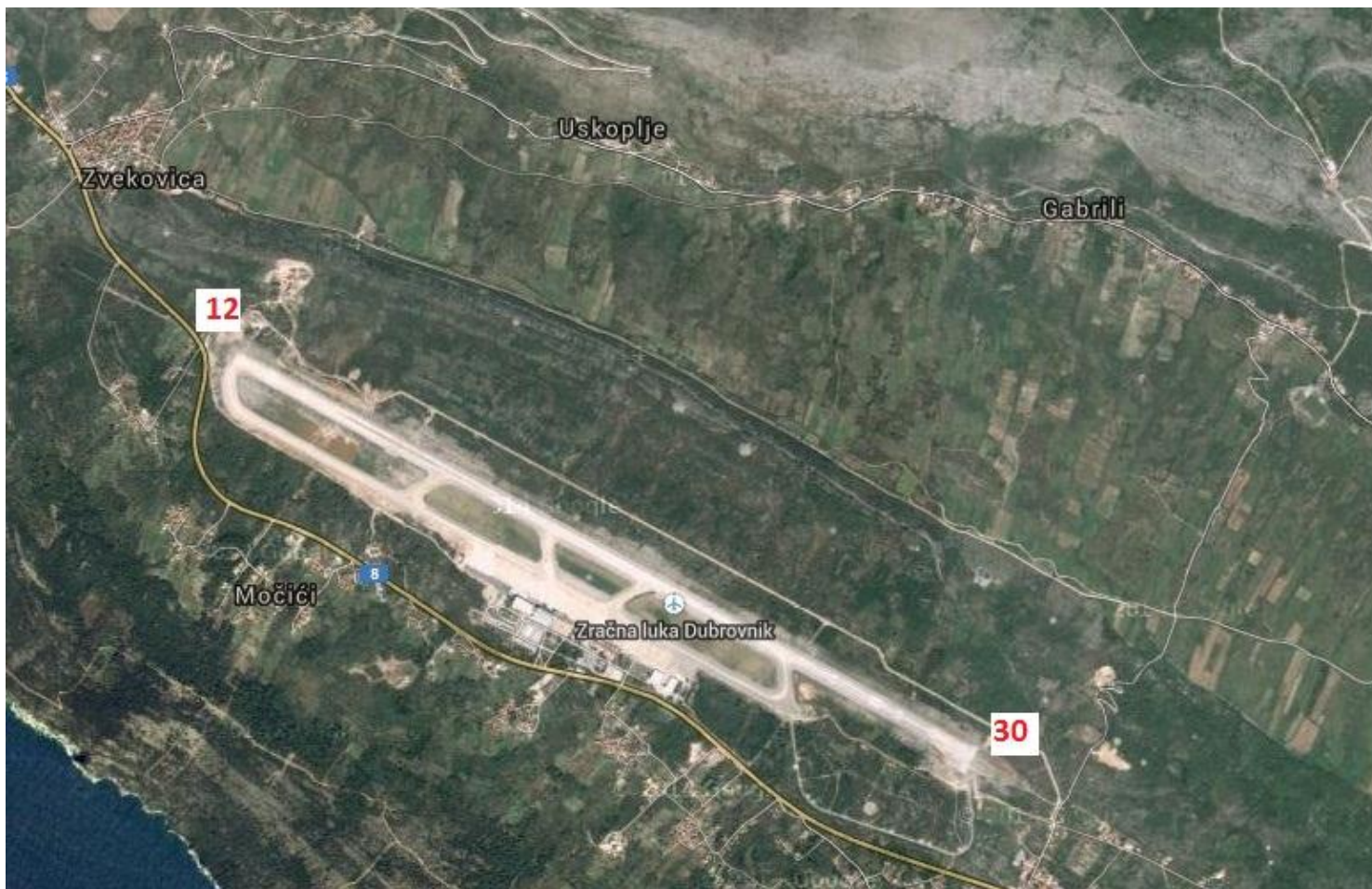
■ LDDU description











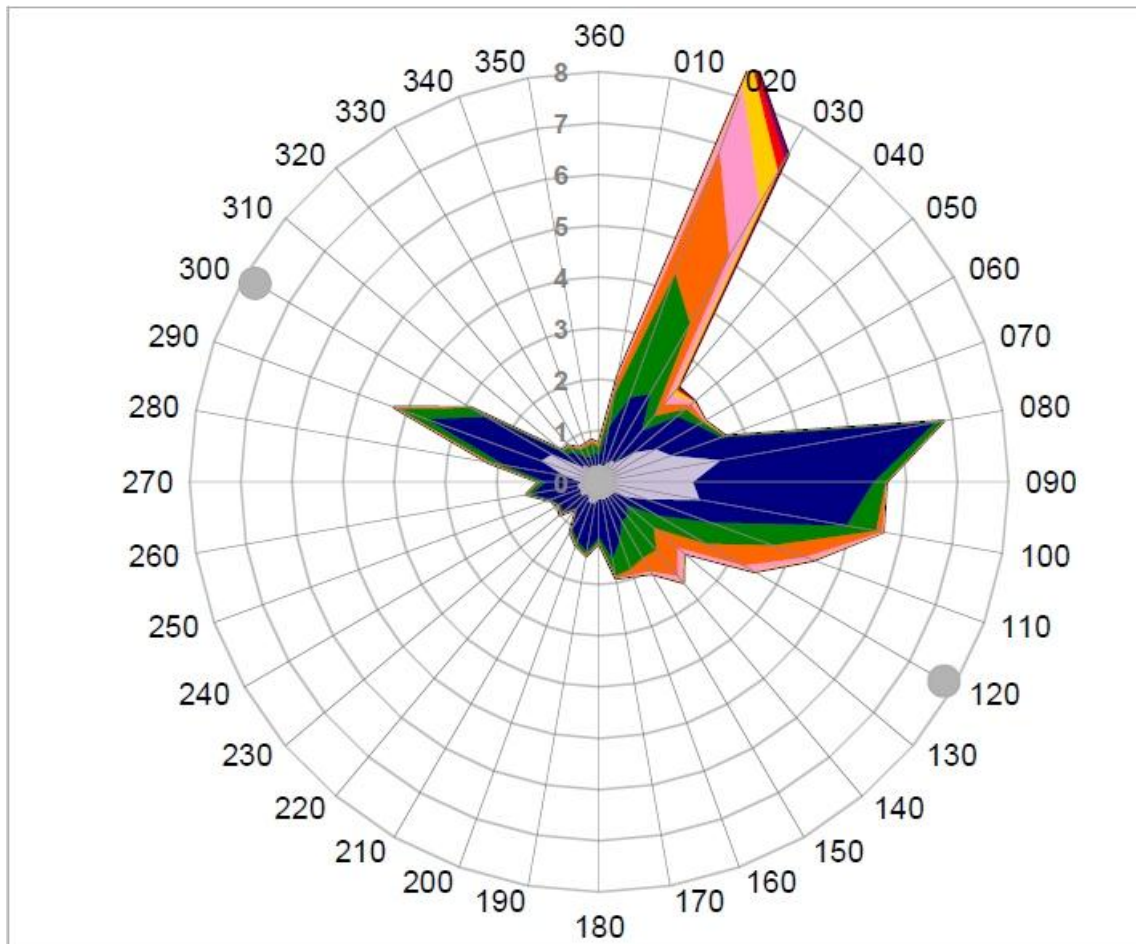
■ METAR reports

- METAR LDDU 221700Z **02032G44KT** 350V060
CAVOK 12/03 Q1001 NOSIG=
- every 30 minutes
- 2000- ...

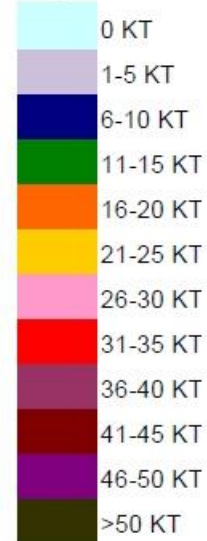
■ „raw data”

- 3 sec average, 4 Hz sampling
- 2013- ...
- 2 anemometers: 12 & 30

Wind rose



Legenda:



Ruža vje
po smjeri
Sivim tori

■ TAF

TAF LDDU 221125Z

2212/2312 19012KT 9999 FEW017 BKN030 TX18/2212Z TN09/2306Z

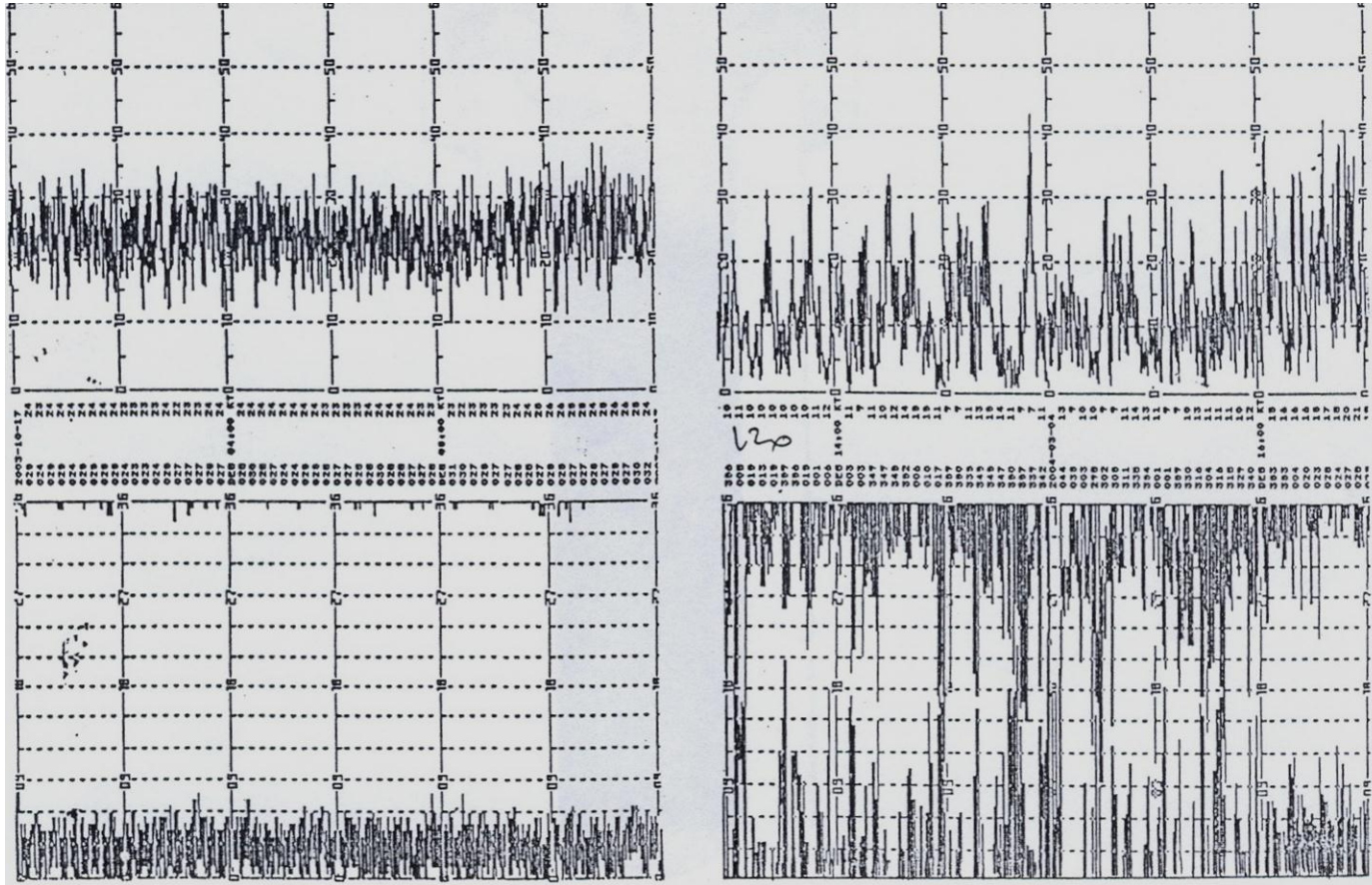
BECMG 2212/2214 29012KT

TEMPO 2212/2218 4000 SHRA FEW020TCU BKN027

BECMG 2215/2218 03020G35KT

TEMPO 2218/2222 03030G40KT=

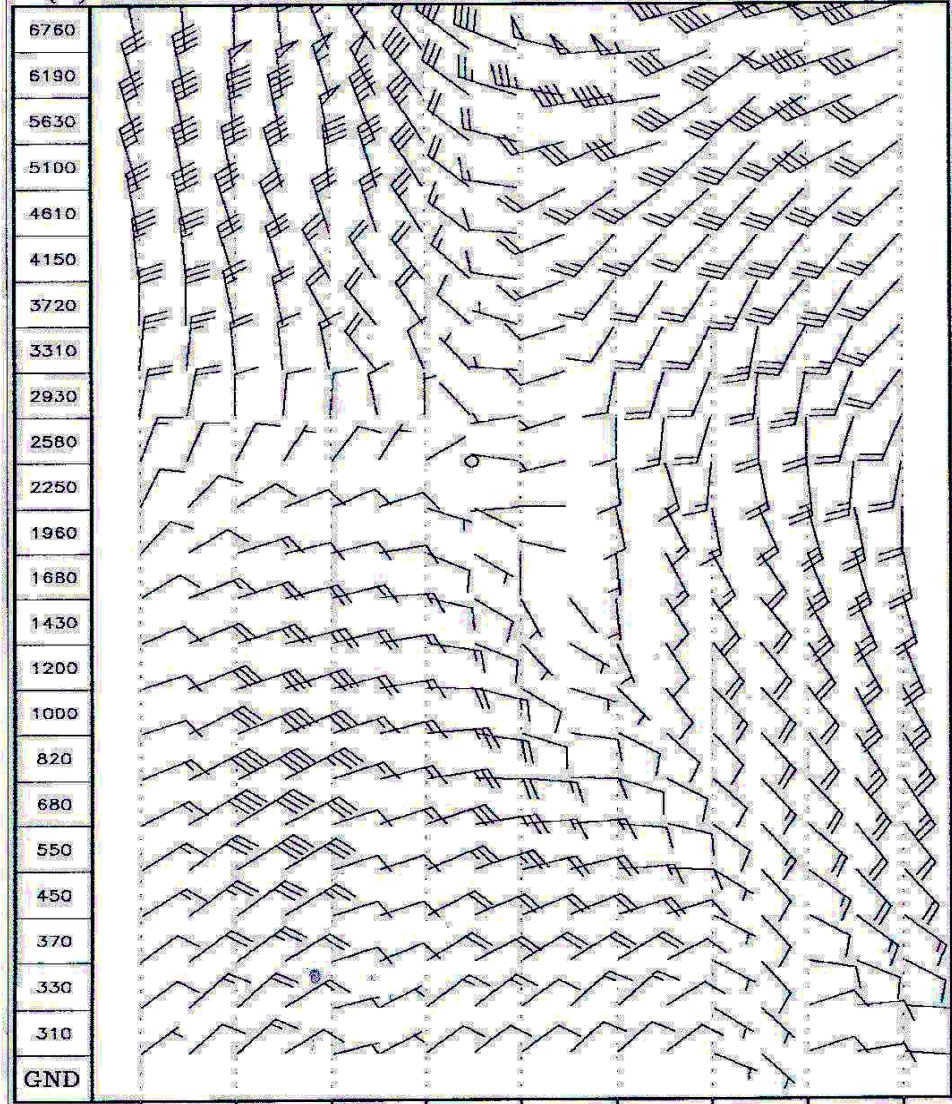
■ Bora characteristics



ALADIN-Vertikalni vremenski presjeci

Dubrovnik

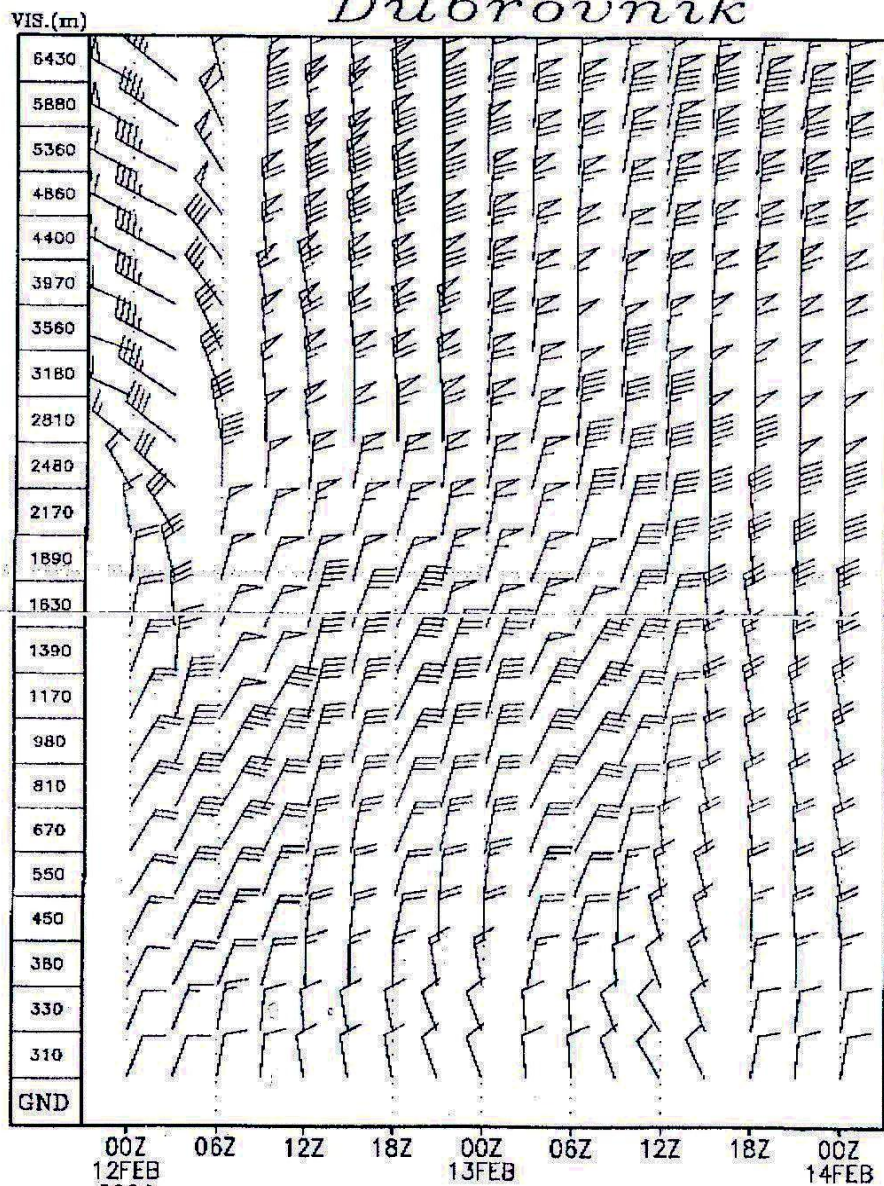
VIS. (m)



00Z 6NOV 2003 06Z 12Z 18Z 00Z 7NOV 06Z 12Z 18Z 00Z 8NOV
GrADS: COLA/IGES

		Vs (kt)	Vmax (kt)
	00Z	23	32
6NOV	03Z	28	42
2003.	06Z	31	50
	09Z	31	47
	12Z	30	39
	15Z	22	35
	18Z	22	32
	21Z	19	30
	00Z	20	29
7NOV	03Z	15	22
2003.	06Z	15	21
	09Z	13	18
	12Z	/	/

ALADIN – Vertikalni vremenski presjeci Dubrovnik



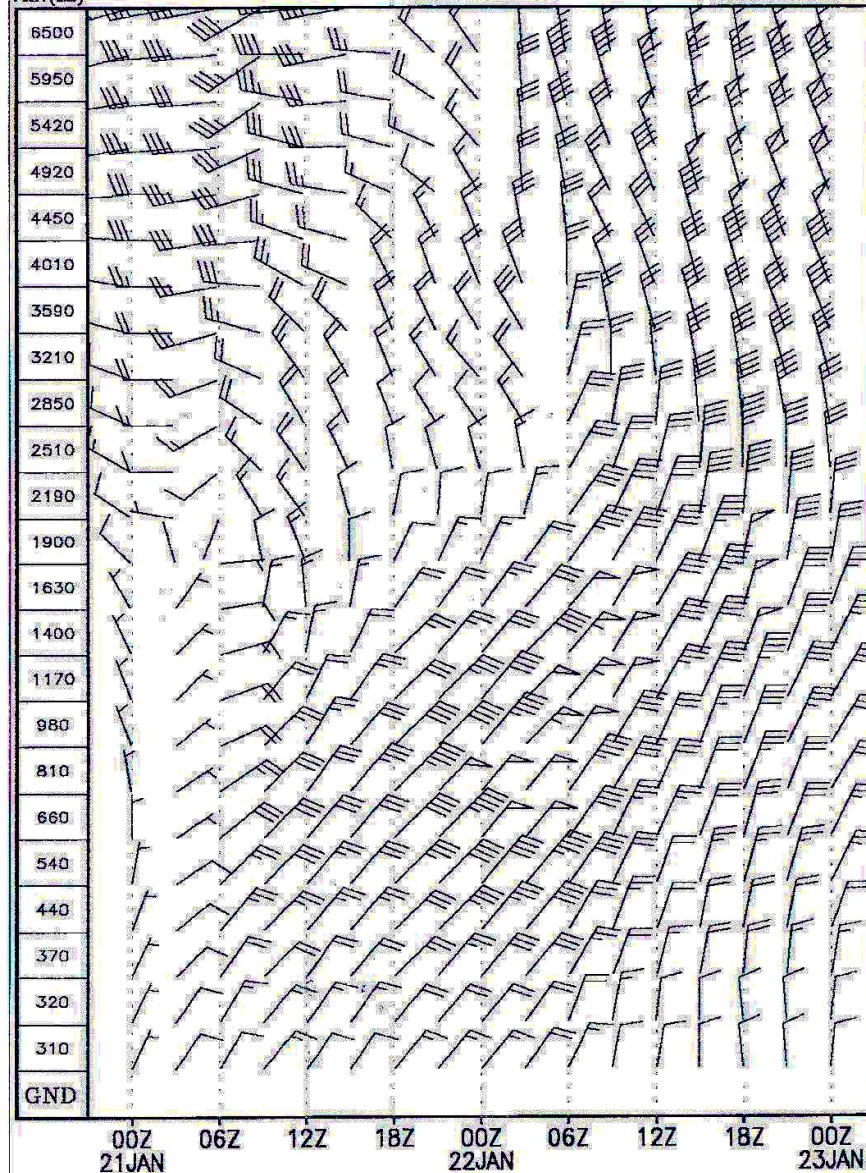
GrADS: COLA/IGES

		Vs(kt)	Vmax(kt)
11FEB	21Z	/	<20
2004.	00Z	22	38
12FEB	03Z	22	47
	06Z	30	58
	09Z	17	43
	12Z	20	37
	15Z	21	41
	18Z	19	39
	21Z	16	30
	00Z	18	35
13FEB	03Z	19	36
2004.	06Z	16	35
	09Z	14	28
	12Z	13	27
	15Z	/	<20

ALADIN – Vertikalni vremenski presjeci

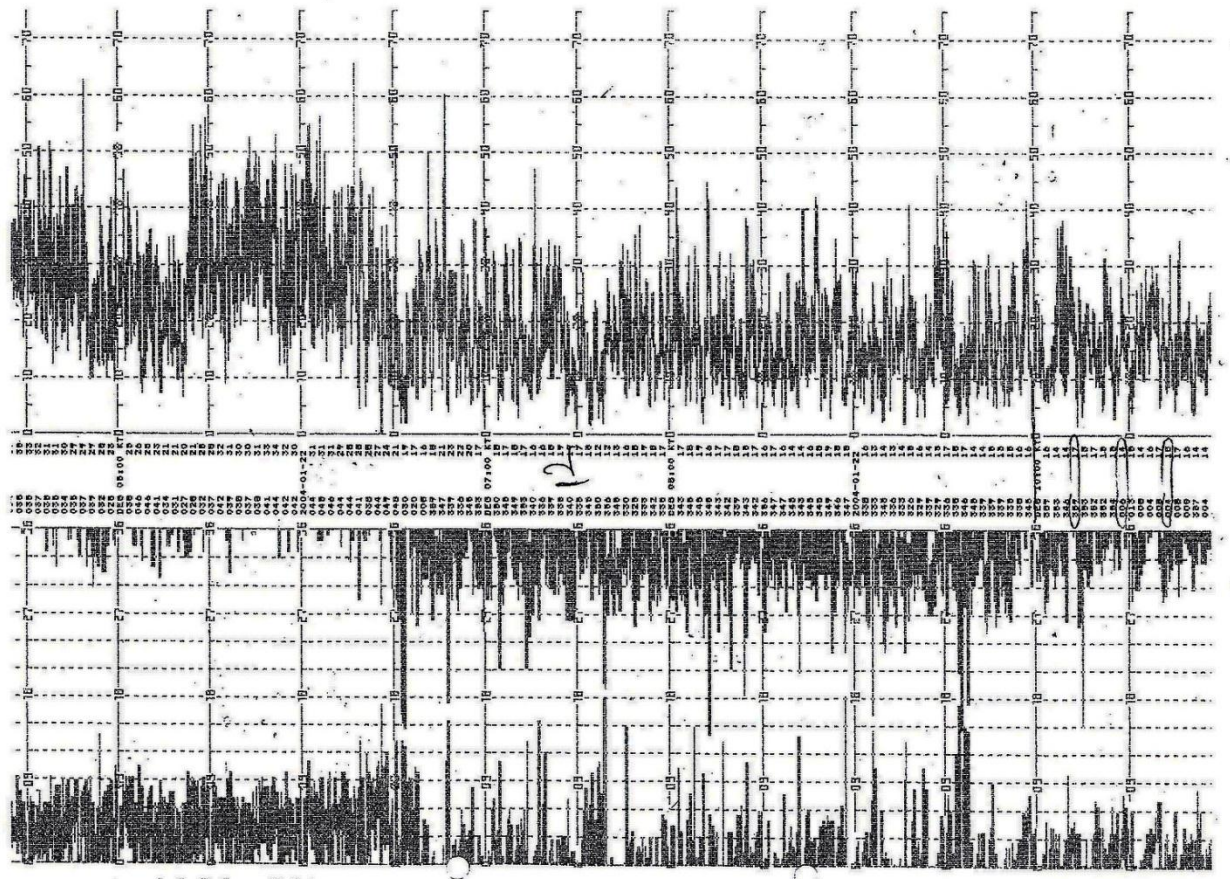
Dubrovnik

VIS. (m)



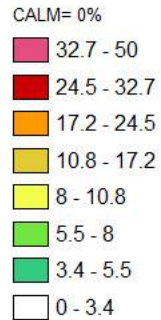
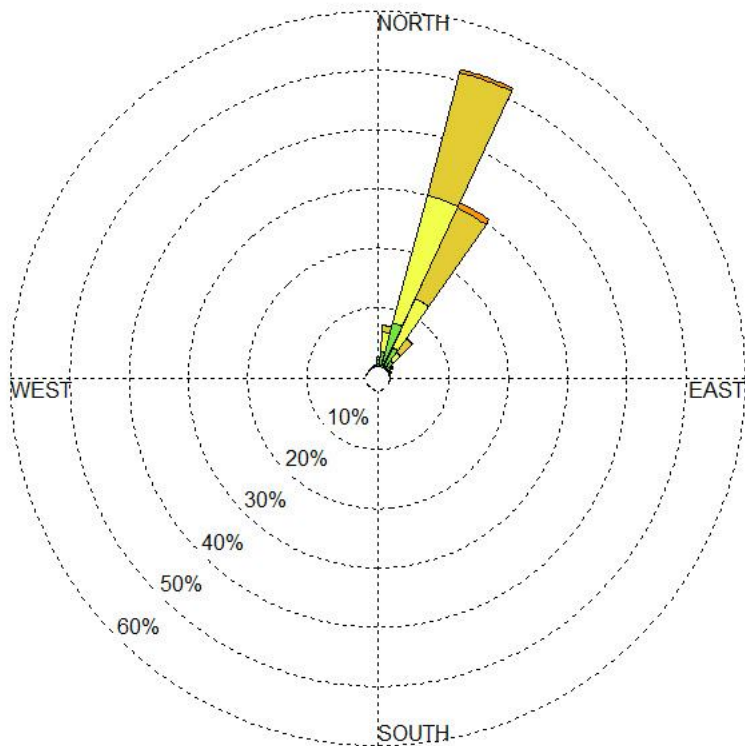
GrADS: COLA/IGES

		Vs	Vmax
		00Z	
21JAN		03Z	/ <20
2004.		06Z	26 36
		09Z	31 43
		12Z	31 42
		15Z	27 38
		18Z	32 46
		21Z	39 53
		00Z	45 55
22JAN		03Z	43 57
2004.		06Z	42 52
		09Z	28 66
		12Z	19 46
		15Z	17 38
		18Z	17 37
		21Z	18 37
		00Z	13 31
23JAN		03Z	15 27
2004.		06Z	15 26
		09Z	10 27
		12Z	15 38
		15Z	12 34
		18Z	10 22
		21Z	13 28
		00Z	27 36
24JAN		03Z	27 38
2004.		06Z	20 29
		09Z	/ <20

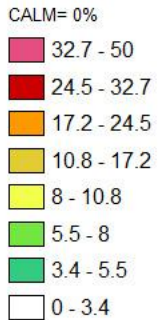
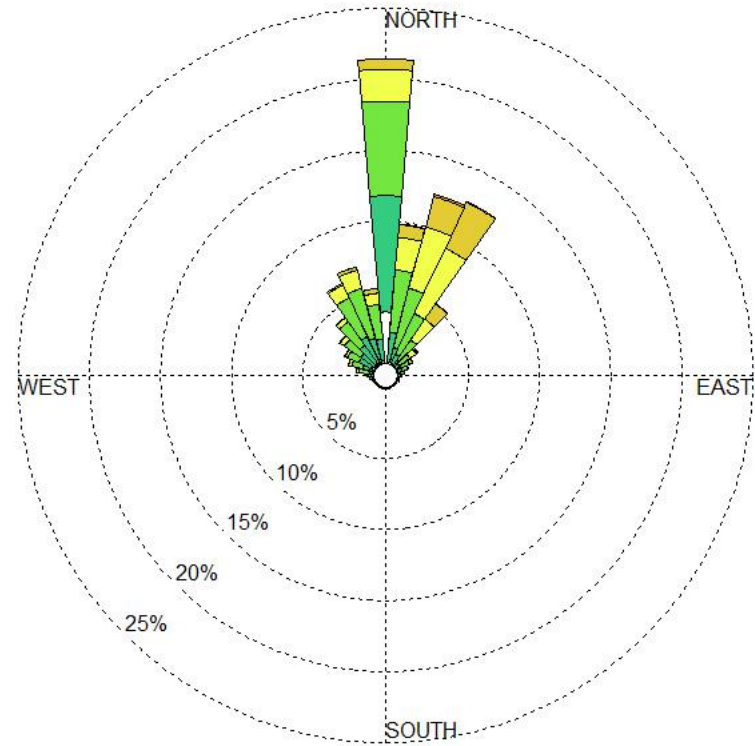


■ Shallow and deep bora

shallow



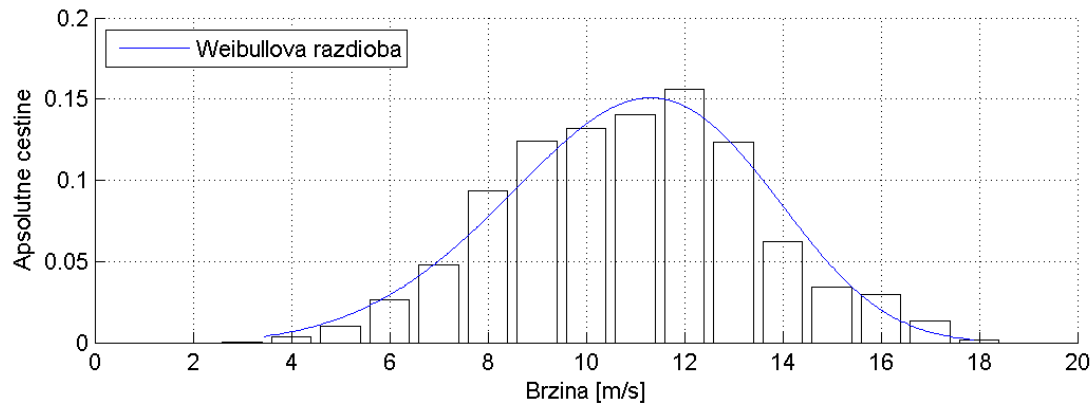
deep



Keresturi, 2014.

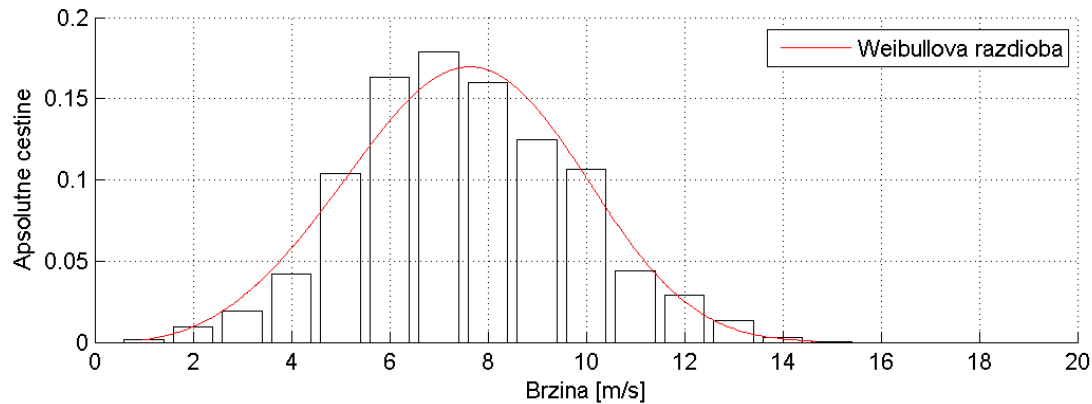
■ shallow bora (SM)

12



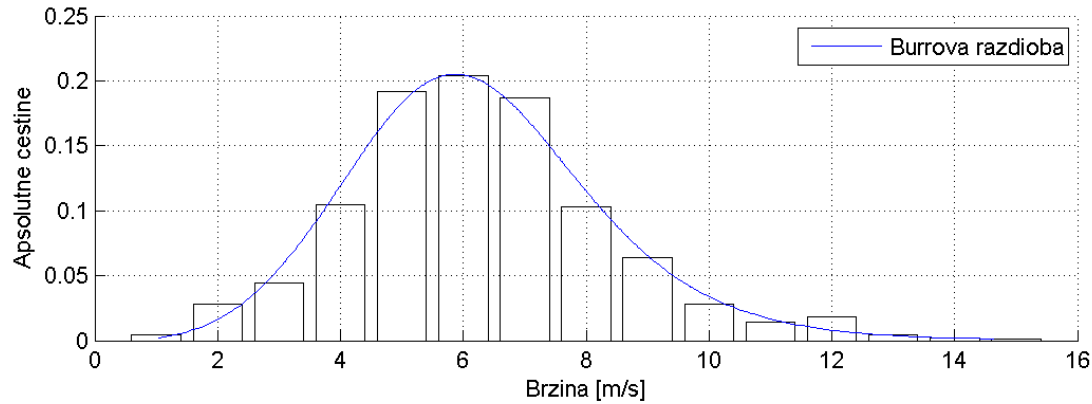
Pogačić 2014.

30



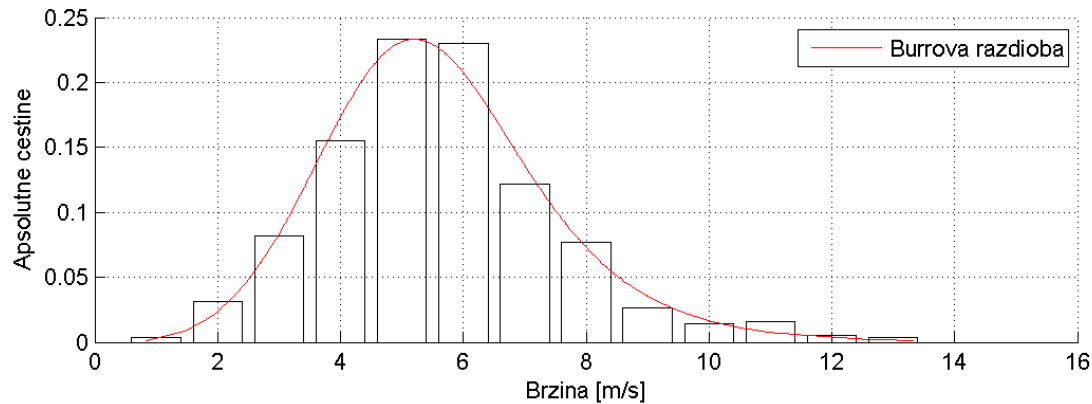
■ deep bora (N)

12



Pogačić 2014.

30



■ LDDU Bora Project

- CCL, AMGI, DHMZ, FPZ, Dubrovnik Airport, Croatia Airlines, county, city...
- Goals:
 - Bora measurements – more details, 3D
 - Designing new approach procedures to reduce flight cancellations and diverts
 - Create a decision-making (nowcasting and very short range forecasting) system for aeronautical forecasters
 - Adapt the decision-making system for users' systems – ATC, airport operators, airliners and pilots
 - Apply the procedure to other similar airports?



THANK YOU!