



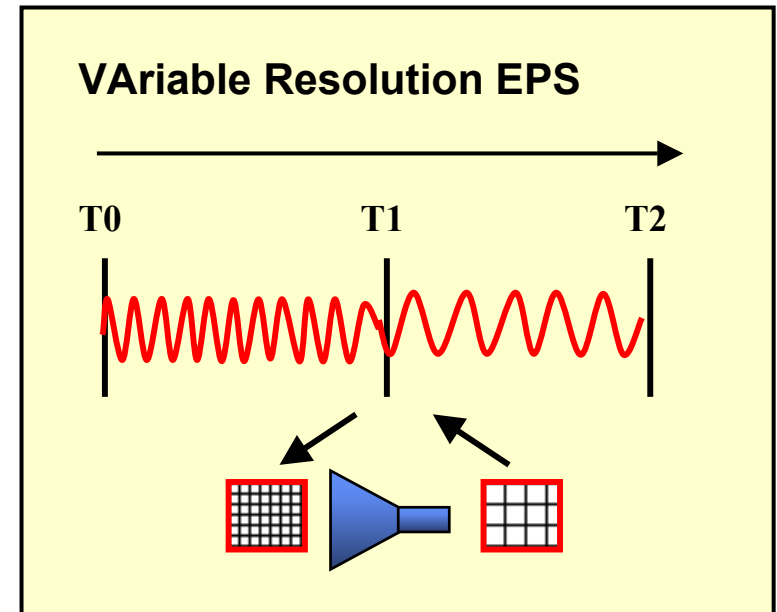
## VAREPS – D5 (16 May 2005)

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Three issues are discussed in this short communication\*:

1. Expected impact of EPS upgrade
2. CPU time requirements
3. Proposal for operational implementation

\* This material has been prepared with the help and comments from D Anderson, J Bidlot, H Boettger, P Bougeault, R Buizza, M Fuentes, M Hamrud, A Hofstadler, U Modigliani, T Palmer, D Salmon, A Simmons, F Vitart and N Wedi.





# Summary with key conclusions

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## 1. Expected impact of EPS upgrade

- Results based on the comparison of Z500 and precipitation predictions (30 cases, 51 members) indicate that the EPS upgrade will bring gains of up to 12 hours.

## 2. CPU time requirements

- The estimated increase for the following three VAREPS (with L62) options are:
  - $A \sim 5.2 \times \text{OPE}$ , where  $A = T399(d0-7) + T255(d6-14) + T255co(d13-32)$
  - $B \sim 6.3 \times \text{OPE}$ , where  $B = T399(d0-10) + T255(d9-14) + T255co(d13-32)$
  - $C \sim 7.6 \times \text{OPE}$ , where  $C = T399(d0-14) + T255co(d13-32)$

## 3. Proposal for operational implementation

- Options B and C should be considered, with the following time schedule:
  - 15 Sep: EPS d0-10 from T255L40 to T399L62 and monthly to L62
  - Early Dec: VAREPS extension to day 14
  - March '06: monthly to T255 and inclusion into VAREPS



# 1. EPS configurations tested with 51-members, CY28R3

Up to now VAREPS have been tested with a truncation at day 7.

The performance of ensembles run in the following four configurations have been compared for 30 cases (13 cases from a warm and 17 from a cold season).

Average results based on the comparison of 500 hPa geopotential height (Z500) and total precipitation (TP) forecasts are briefly reviewed hereafter.

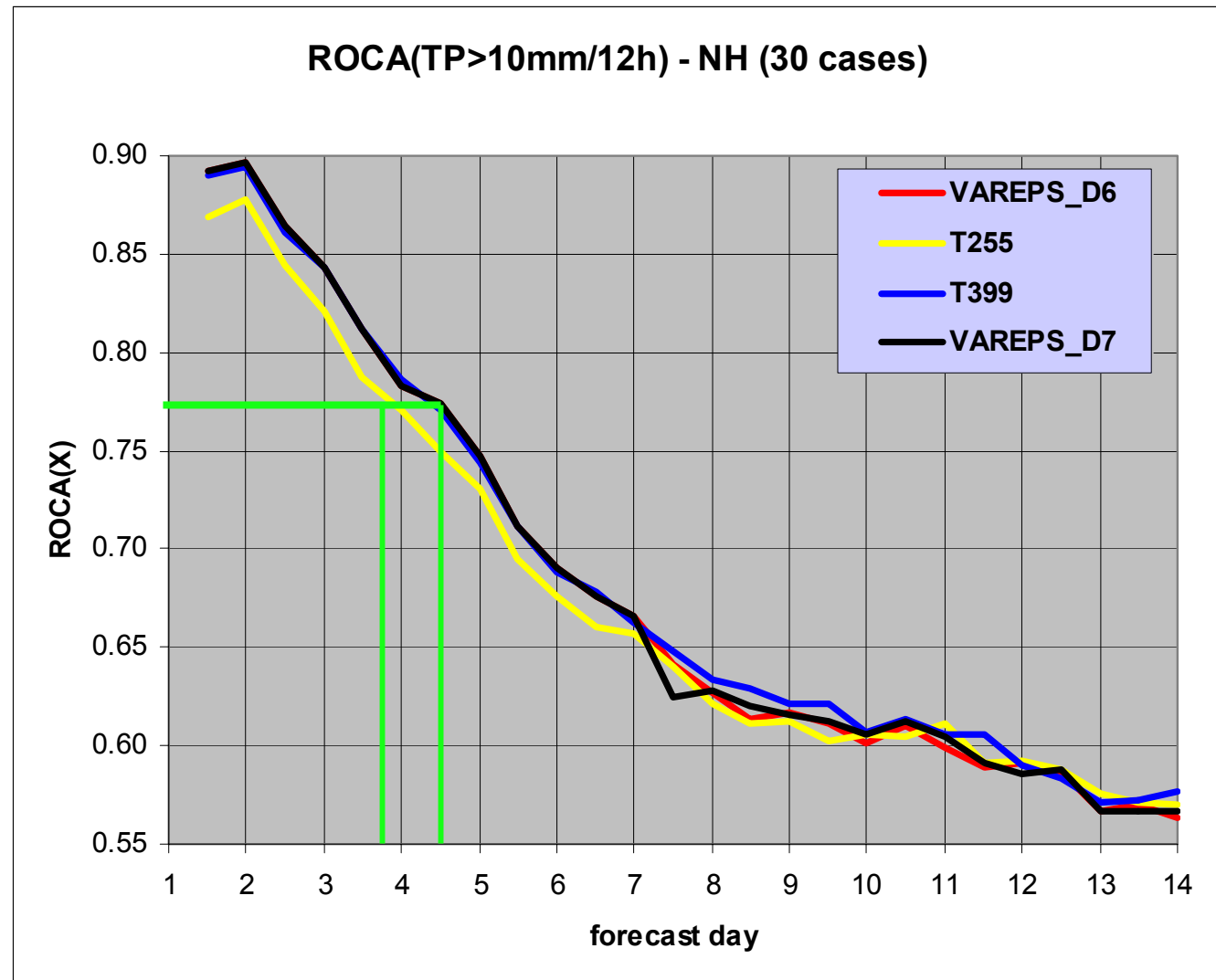
<i>fc-day</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
VAR7D6	TL399L40-1800s													
							TL255L40-2700s							
VAR7D7	TL399L40-1800s													
							TL255L40-2700s							
T399	TL399L40-1800s													
T255 (OPE)	TL255L40-2700s													



# 1. Expected impact of EPS upgrade: $\pi(\text{TP} \geq 10\text{mm}/12\text{h})$

Results based on 30 cases, 51-member ensembles (CY28R3) indicate a positive impact of EPS upgrade.

Considering ROCA as accuracy measure for probabilistic predictions of TP in excess of 10mm/12h over NH, results indicate a gain of ~12h during the first 7 forecast days.

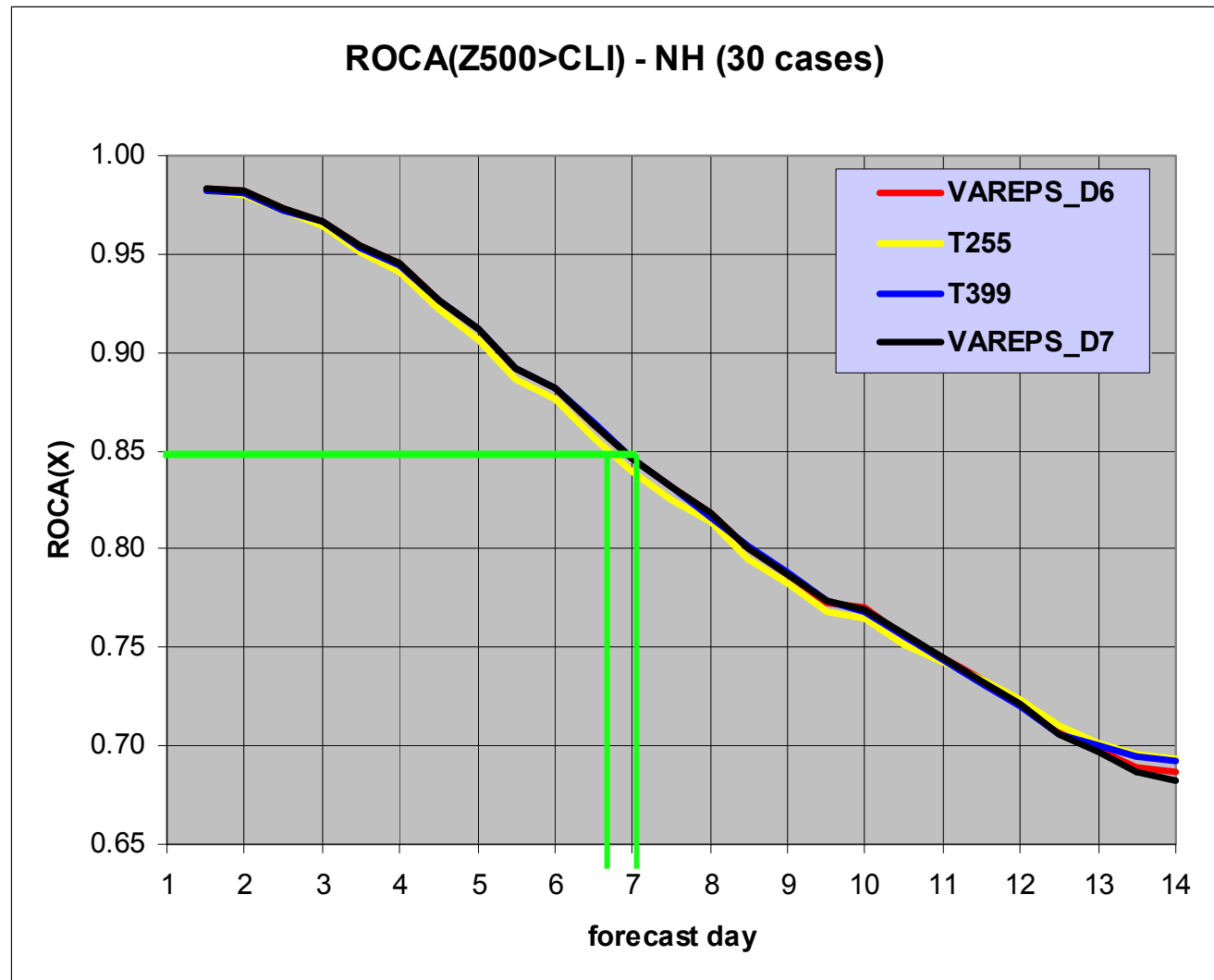




# 1. Expected impact of EPS upgrade: $\pi(\mathbf{Z500} \geq \mathbf{cli})$

Results based on 30 cases, 51-member ensembles (CY28R3) indicate a positive impact of EPS upgrade.

Considering ROCA as accuracy measure for probabilistic predictions of positive Z500 anomalies over NH, results indicate a small gain up to forecast day 11 (~6h at forecast day 7).



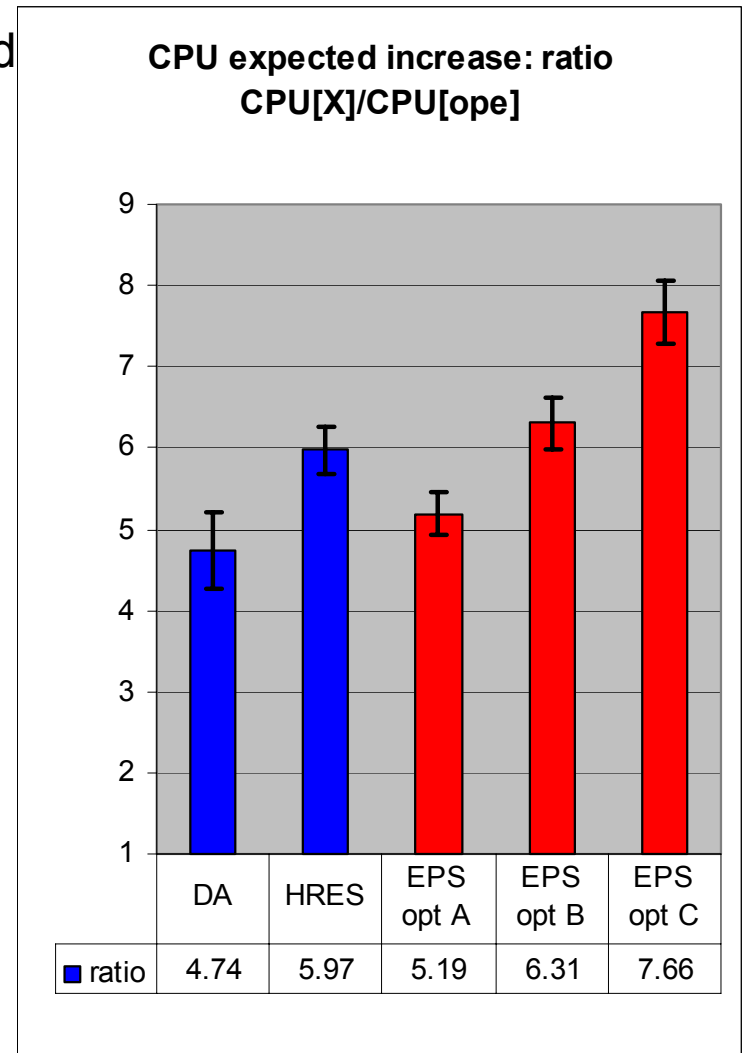


## 2. Weekly CPU expected increase (L62, including monthly)

The following chart compares weekly CPU expected increases of the assimilation (DA), high-resolution (HRES) and ensemble systems:

- ❖ DA: T799L91 / T511L60(CY28R4)
- ❖ HRES: T799L91(d0-14) / T511L60(d0-10)
- ❖ Opt A:  $\frac{[T399(d0-7)+T255(d6-14)+T255co(d13-32)]}{[T255L40(d0-10)+T159L40(d0-30)]}$
- ❖ Opt B:  $\frac{[T399(d0-10)+T255(d9-14)+T255co(d13-32)]}{[T255L40(d0-10)+T159L40(d0-30)]}$
- ❖ Opt C:  $\frac{[T399(d0-14)+T255co(d13-32)]}{[T255L40(d0-10) +T159L40(d0-30)]}$

Options A-B-C have d0-14 ensembles run 14 times a week, a T255co(d13-32) coupled monthly and a 60-member d0-32 hindcast system once a week.

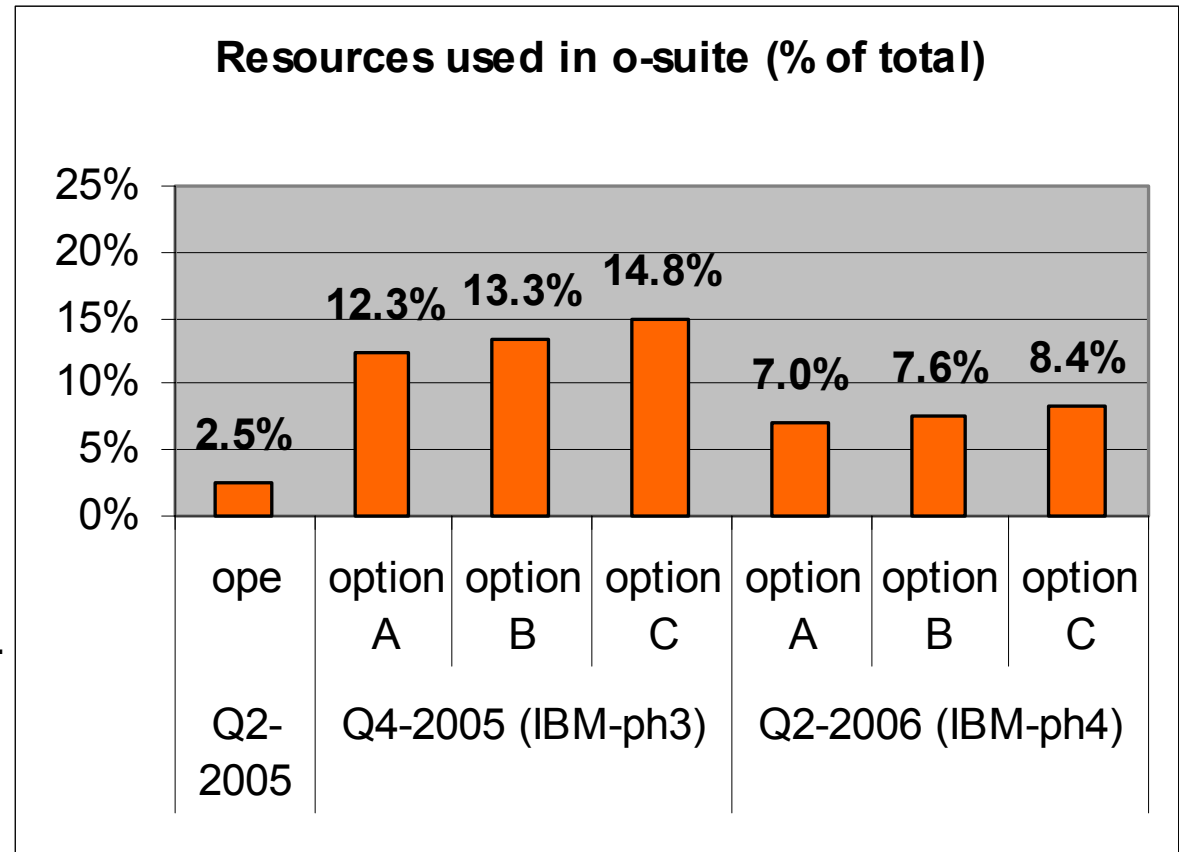




## 2. Expected change in o-suite use of total resources

The ensemble upgrade will change the amount of resources allocated to the o-suite.

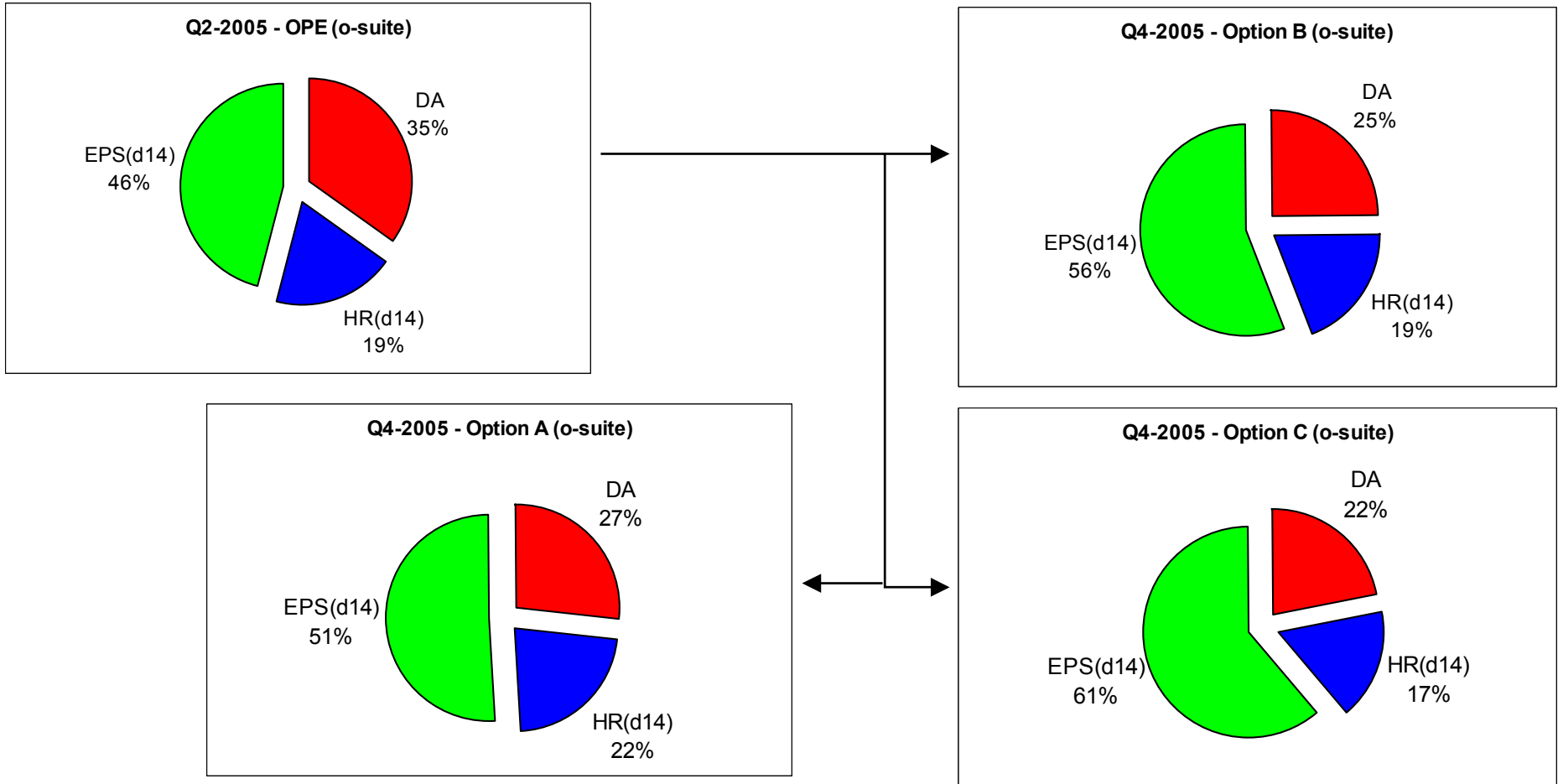
The following table chart shows how the the resources allocated to the DA, HRES(d0-14) and the EPS(d0-14) will change (source: Graham Holt memorandum dated 11 May). The monthly and hindcast systems are expected to increase these percentages by ~10% (e.g. 13.3% should become 14.6%).





## 2. Expected relative allocations in o-suite

The EPS upgrade will change the relative resources allocated to the o-suite.

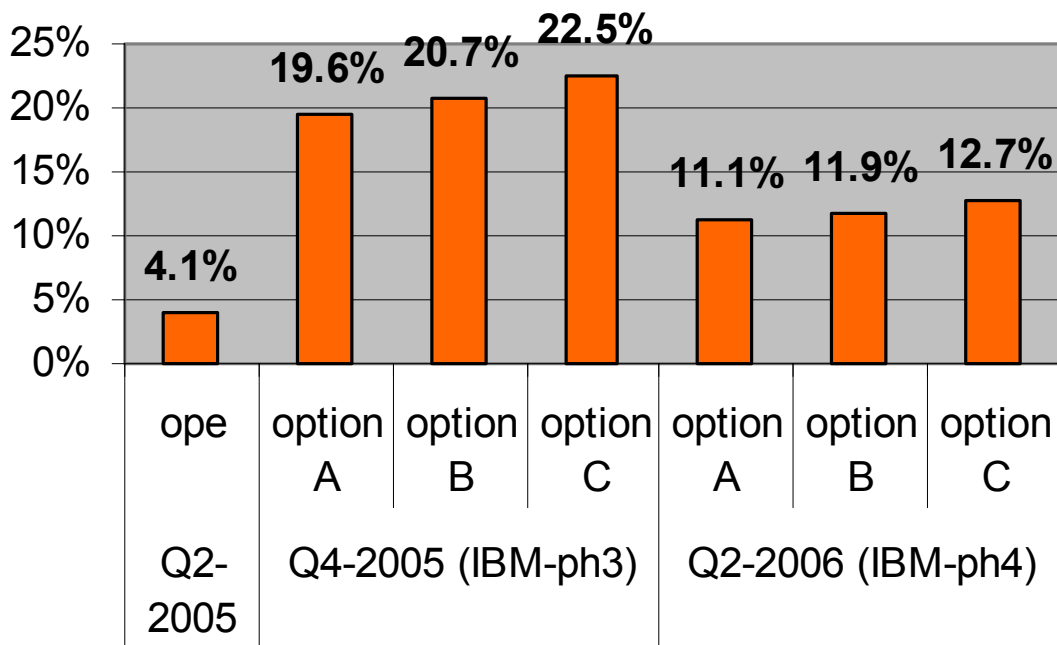




## 2. Expected change in o- & e-suite use of total resources

The following table chart shows how the the resources allocated in the o- & e-suites\* to the DA, HRES(d0-14) and the EPS(d0-14) will change (monthly system not included; sources Graham Holt memorandum dated 11 May).

Resources used in o- & e-suite (% of total)



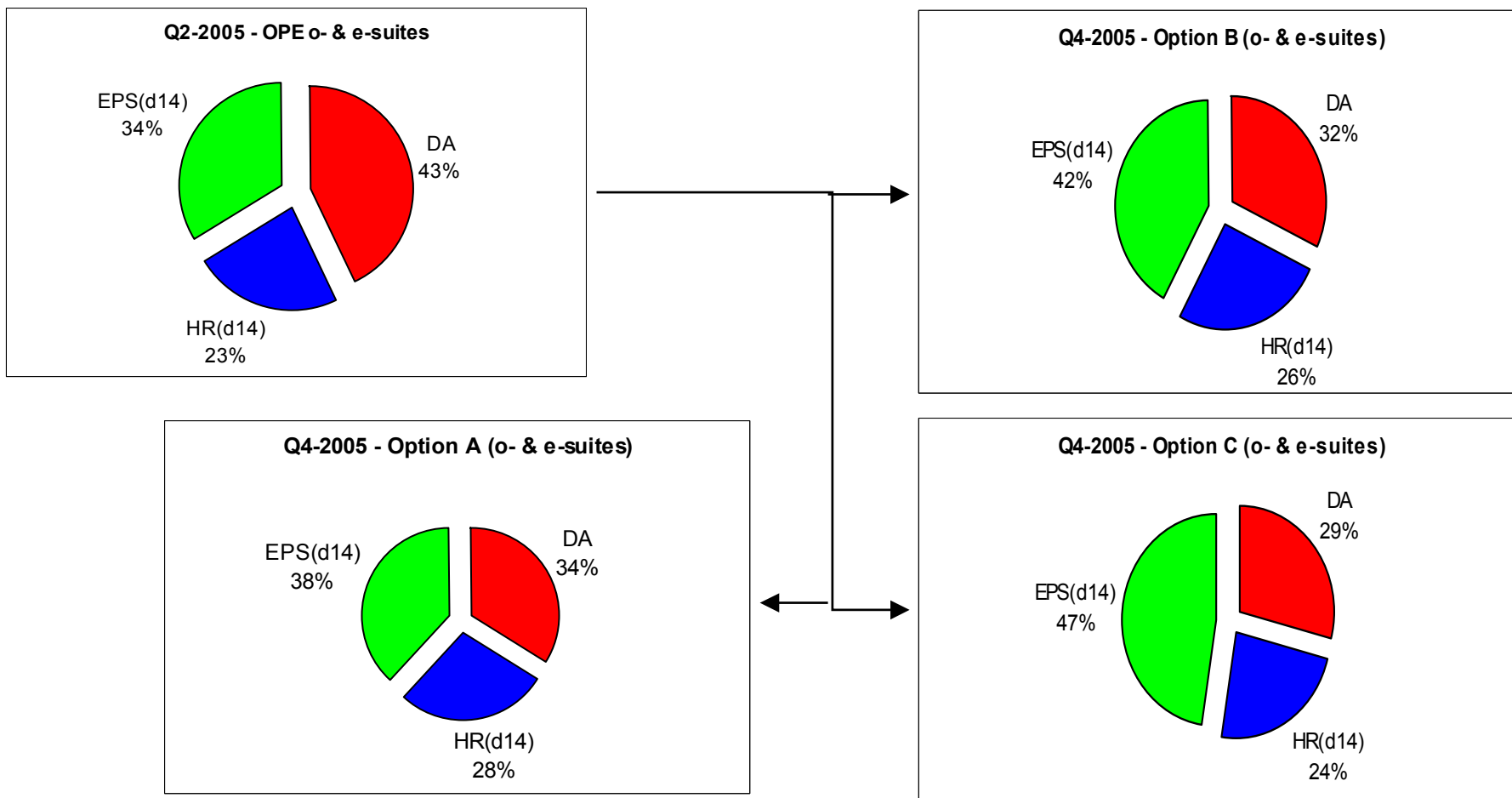
\* It has been assumed that in the e-suite the EPS is run only for 20% of the days:

- $[DA+HR](e-suite) = [DA+HR](o-suite) \text{ i.e. } 365d/y$
- $EPS(e-suite) = 0.20 * EPS(o-suite) \text{ i.e. } \sim 72d/y$



## 2. Expected relative allocations in o- & e-suites

The EPS upgrade will change the relative resources allocated to the o- & e-suites.





### 3. Impact of VAREPS implementation on users

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The **potential impact of truncation on the users' demand for EPS products** should be considered when deciding the future ensemble configuration.

- ❖ VAREPS will require users to revise product-generation software
  - If truncation is done before day 10, users will have to revise software to generate EPS products up to day 10.
  - If truncation is done after day 10, users will not need to revise software to generate EPS products up to day 10. Modifications will only be required to extend EPS products beyond day 10.
  
- ❖ There is a risk that if option A with a truncation at day 7 is adopted, users may decide to limit the demand for EPS products to the first 7 days.



### 3. Proposal for operational implementation

It is proposed that one of the following configurations is considered to upgrade the ensemble prediction system:

	<i>fc-day</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Option B	VAR10D9L62	TL399L62-1800s													
												TL255L62-2700s			
Option C	T399L62	TL399L62-1800s													

The following implementation time schedule is proposed:

- ❖ 15 Sep: EPS d0-10 from T255L40 to T399L62 and monthly to L62
- ❖ Early Dec: VAREPS extension to day 14, in either option B or C
- ❖ March '06: monthly to T255 (coupled) and inclusion into VAREPS