SPECIAL PROJECT PROGRESS REPORT

Progress 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 2015

Project Title: Attributing predictable signals at subseasonal timescales to tropical forcing and surface boundary conditions

Computer Project Account: spgbnort

Principal Investigator(s): Warwick Norton

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Affiliation: CFIC

Name of ECMWF scientist(s) collaborating to the project (if applicable)

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Start date of the project: 1 January 2015

Expected end date: 31 December 2017

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)			10000000	20000
Data storage capacity	(Gbytes)				

Summary of project objectives
(10 lines max)

Primary Project Objective

- Routine attribution of potentially predictable signals on subseasonal timescales (weeks 3-6).

Secondary Project Objectives

- Establishing case studies that could be used for testing model improvements.
- Suggesting areas where model improvements might increase predictive skill.

Summary of problems encountered (if any)
(20 lines max)

Progress has not been as fast on the testing stages of this project as we envisaged for two reasons.

1) We have been unable to discover how to vertically interpolate the inputs to the model (in particular from ERA-interim L60 -> L91) both for the initial conditions and the relaxation fields. We probably need some extra help from user support in this area.
2) For most of April & May we were distracted by the upgrade of the operational model cycle. In particular we found the test data delivered through dissemination to be often missing and it took several weeks for the new monthly hindcast dissemination to be correctly delivered. Both these problems took significant time from our end to manage.

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

Even though the project has not yielded any results yet – this year has offered another interesting example of strong subseasonal/seasonal signals that will provide a nice case study. Figure 1 shows the monthly 500 hPa height anomalies for January, March & May and the monthly forecast for July. All four figures show ridging in the western US, a trough near Hudson Bay that for the first three figures extends to Greenland and (in the case of January & May) across into Europe (February was also similar and here the trough in the eastern US extended right down to Florida resulting in an extremely cold month in the eastern US). However the 4th figure has a very different pattern across the Atlantic which (if the monthly forecast proves correct) indicates a very hot month for Europe. So questions our project could address include:

1) What is maintaining the western ridge over the US?
2) Why is there westerly flow across the Atlantic January-May?
3) What is driving the strong pattern change across the Atlantic in July and how predictable was it?
4) There were also some subtle changes across the US – the trough in southeast in January-February was replaced by a ridge for March-May, and this looks to disappear in July – what is driving these changes?

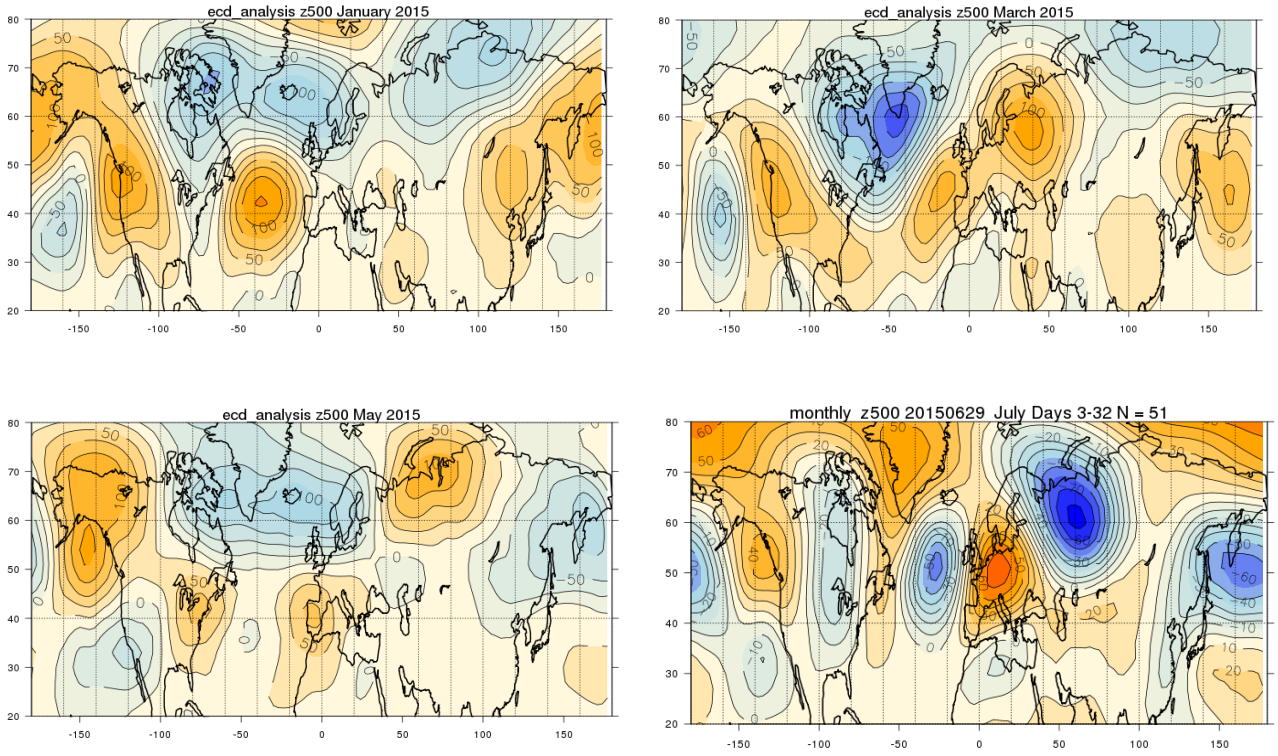

Figure 1. Analysed 500 hPa height anomalies for January, March and May 2015 and monthly forecast for July 2015

There is some indication that at least some of these patterns are predictable e.g. compare figure 1 with figure 2 which shows composites for March and July from years with extreme north Atlantic SSTs similar to this year (the SSTs are taken from the month before i.e. February and June respectively). We need to perform model experiments to confirm (or not) if the north Atlantic SSTs are key in forcing these patterns.

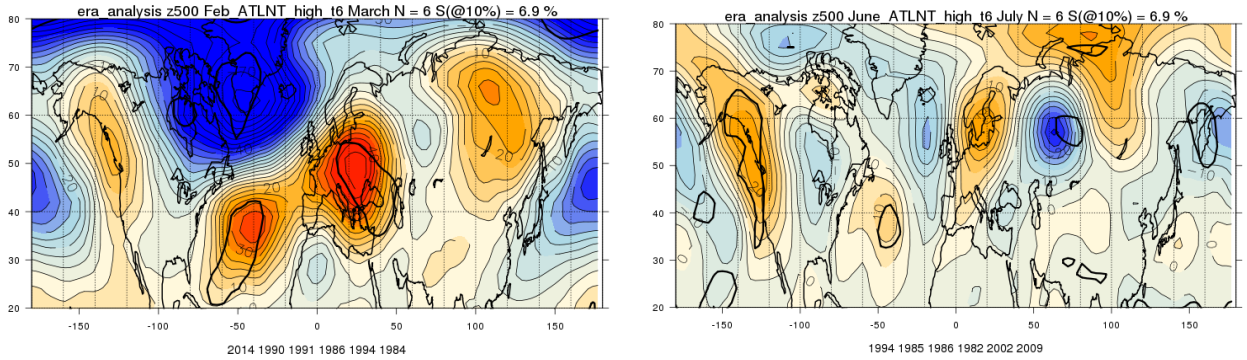

Figure 2. Composites of 500 hPa height fields for March and July taken from years with extreme north Atlantic SSTs in the preceding month.

Furthermore at least for the late spring period, the observed pattern was significantly under forecast by the EPS, e.g. compare the two panels in figure 3 which show the full anomaly and the bias in the day 13-15 forecast during May. Particularly having heights too high to the north of the UK in the forecast lead to over estimating the chances of blocking (and subsequent misinterpretation of the impacts – we have heard of other users also unhappy with this feature of the forecast).

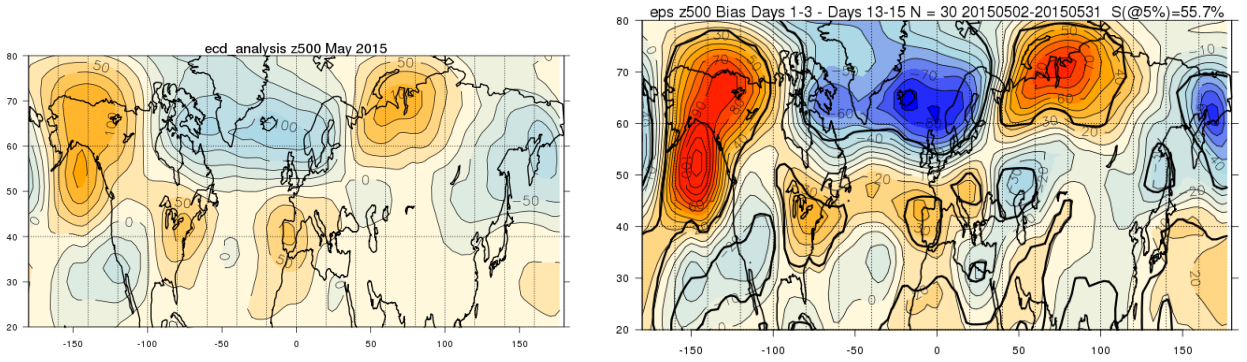

Figure 3. Analysed 500 hPa height anomaly for May 2015 (left, contour interval 25m), day 13-15 EPS forecast bias (right, contour interval 10m) – this is calculated as day 1-3 forecast minus day 13-15.

List of publications/reports from the project with complete references

None.

Summary of plans for the continuation of the project

(10 lines max)

We have hired extra people into our weather group which will give more resources to this project. We have contacted ECMWF over the problem of vertical interpolation. Hopefully we can resolve the issue with the model set up soon and make rapid progress on running test cases and then move to a weekly schedule of standard experiments.