

Time Series Meeting

6th & 7th March 2017

Day 1

1 Invitees

Attendees

James Livesy (*Census Bureau (US)*), Brian Monsell (*Census Bureau (US)*), Dario Buono (*Eurostat*), Dominique Ladiray (*INSEE (France)*), Giancarlo Bruno (*ISTAT (Italy)*), Jean Palate (*National Bank of Belgium*), Tariq Aziz (*ONS*), Jennie Davies (*ONS*), Duncan Elliott (*ONS*), Charlotte Gaughan (*ONS*), James Macey (*ONS*), Atanaska Nikolova (*ONS*), Jeff Ralph (*ONS*), Bethan Russ (*ONS*), Ping Zong (*ONS*), Steve Matthews (*Stat Can*), Kathryn Leeming (*University of Bristol*), Guy Nason (*University of Bristol*), Ben Powell (*University of Bristol*), Rebecca Killick (*University of Lancaster*), Ben Norwood (*University of Lancaster*),

2 Introduction

Duncan welcomed everyone to the meeting with a summary of the previous meeting, held on the 19th and 20th November 2015. The main outcome from the previous meeting was the need to have a more focused meeting the second time around, hence the theme of *Prior Adjustment*.

See *Welcome and Introductions* → *Introductions* for introductory slides.

3 Lightning Introductions

Giancarlo Bruno (*ISTAT*)

The main issues facing ISTAT are the same as those dealt with by other NSIs. These are seasonal adjustment, benchmarking and reconciliation. Other important areas of interest are nowcasting in national accounts and economic forecasts, run by the forecast division. Some emerging themes at ISTAT are trend estimation, data validation and microdata editing for longitudinal surveys.

See *Lightning Intros* → *ISTAT* for presentation slides.

Rebecca Killick (*University of Lancaster*)

The main work, of interest to NSIs, being undertaken by the University of Lancaster is changepoint analysis, multi-skill methods, analysis of locally stationary processes and network analysis between companies. They are also researching long memory models and cluster analysis of time series and business sectors. They are currently working with ONS on automatic detection of seasonality and change, as well as with Eurostat on the Principal European Economic Indicators (PEEI) project.

See *Lightning Intros* → *Lancaster* for presentation slides.

Jennie Davies (*ONS*)

The main work undertaken by the ONS is seasonal adjustment reviews (of economic and labour market series), benchmarking national account series, nowcasting, research and training (of seasonal adjustment and software). The main issues facing them at the moment are the seasonal adjustment of long series, calendarisation (or 4-4-5 datasets and datasets collected on different frequencies) and adjustment and forecasting of Brexit. Current research is focusing on state space modelling, moving holidays, excess winter mortality, outlier detection and volatility models.

See *Lightning Intros* → *ONS* for presentation slides.

Jean Palate (*National Bank of Belgium*)

The next phase of JDemetra+ testing is underway, looking into high frequencies, robust modelling and multivariate approaches. New technology features are being added to allow interaction with various systems and build an R interface. Work is also being undertaken into nowcasting, temporal disaggregation, benchmarking and the use of multivariate approaches (particularly in JD+). Pressures are building in reducing revisions, and so work is under way on this.

See *Lightning Intros* → *NationalBank* for presentation slides.

Steve Matthews (*Stat Can*)

The main work undertaken by Stat Can are seasonal adjustment, benchmarking and reconciliation. There has recently been an increased focus on forecasting. Current research is looking at variance estimates of seasonally adjusted data, modelling of weather effects, a seasonal adjustment dashboard and a formal quality assurance approach to seasonal adjustment (in particular automation when a large volume of datasets is being analysed).

See *Lightning Intros* → *Statistics Canada* for presentation slides.

James Livesy (*USCB*)

There are two main sides to the Census Bureau work - software development & research. Software development work on the X13 API interface and use of X13 with R is being done, as well as multivariate signal extraction and the replacement of Fortran with C/C+/C++. Research work is ongoing in multivariate analysis, inclusion of LASSO in VARMA, collinearity, direct/indirect seasonal adjustment for GDP, weather analysis and state space modelling.

See *Lightning Intros* → *US Census Bureau* for presentation slides.

Dominique Ladiray (*INSEE / SACE*)

The main time series analysis at INSEE is in three departments. National accounts are working on rapid estimation and nowcasting. The short-term department are working on rapid estimates and forecasting for short-term evolution. The methodology department is working on benchmarking and seasonal adjustment, generally in the SACE framework. SACE are working with NSIs, national banks and other partners to support and provide documentation, a helpdesk and training across nations. They are running testing for the evaluation of JD+ and testing new plug-ins, as well as undertaking other research.

See *Lightning Intros* → *INSEE* for presentation slides.

Dario Buono (*Eurostat*)

Work is ongoing with the universities since the last meeting. Methodology work is going on in time series, econometrics, statistical disclosure control, research and enterprise architecture. Time series research into seasonal and calendar adjustment is ongoing, as is the ESS guideline to temporal disaggregation, nowcasting, big data econometrics, revision analysis, composite indicators and data analytics. Big data econometrics work is continuing to look at real time evaluations, nowcasting and a handling tool in R. Finally they are working on statistical methods for correlation analysis, country-cluster mapping, principal component analysis and statistical indicator clustering.

See *Lightning Intros* → *Eurostat* for presentation slides.

Ben Powell (*University of Bristol*)

The work being undertaken is into sequential Monte Carlo and Bayesian methods for big data. There is also work going on looking at local stationarity in time series, multi-scale modelling and changepoint detection. Optimal sampling strategies, webscraping models, data fusions, variable stabilisation and network analysis are also being undertaken.

See *Lightning Intros* → *Bristol* for presentation slides.

4 Pre Treatment Presentations

4.1 Brian Monsell (*USCB*)

4.1.1 Presentation Summary

The four main prior adjustments discussed were user-generated adjustments, holiday adjustments, trading day adjustments and outliers.

The main user-defined adjustment was built to account for values that were boosted for homes without a permit in *Housing Starts and Sales* series.

Various holiday adjustments were discussed. USCB are using holiday adjustments for Easter[8], Labor[9] and Thanksgiving[-1] on *Retail and Wholesale* series. They also publish selected series by country groupings, where additional moving holidays are tested. Certain series are adjusted for Chinese New Year or a Customized Easter. Research is continuing for the effects of *Super Bowl Sunday* holiday, *Black Friday* and *Cyber Monday* on different series - with the aim of using daily data to aid analysis.

Trading day analysis is looking into one coefficient trading day, ie weekdays versus weekends. Other adjustments to account for the 4-4-5 reporting period is ongoing - currently a regression method is used to impose a calendar structure however work into evaluating this with daily data is under way.

Adjustments for outliers is currently done during regARIMA modelling at annual reviews. There are two strategies for including outliers at the end of the series - hard coding them or raising limit for automatic detection.

Three main streams of future work are: examining using daily data in moving holiday and calendar adjustments, examining weather effects in adjusting *Construction* and Bayesian outlier identification and adjustment.

See *Prior Adjustment* → *US Census Bureau*' for presentation slides.

4.1.2 Post-presentation Discussion

- Dominique and Dario commented as to whether weather effects should be prior-adjusted for. A discussion was then had as to whether these effects should be included in the prior-adjustment or seasonal adjustment, or just used as an interpretation tool.
- Clarification about the difference between seasonal factors and calendar effects and combined seasonal factors and calendar effects. This was clarified and noted that the decision to use either is made on a series-by-series basis.
- Comment on whether TD1 coefficient was more efficient, as it only looks at weekday versus weekend. During discussion Brian mentioned that prior adjustment modelling was before seasonal adjustment, but that adjustments for trading day/Easter (or other holidays) are done simultaneously and not removed separately.
- Dominique inquired about the time-varying regressor and how a decision is made of when effect starts and why the windows are so long. Brian commented that work is ongoing to use daily data to look at this, because of the non-constant patterns before and after the holiday/event.

4.2 Jean Palate (*National Bank of Belgium*)

4.2.1 Presentation Summary

The overall goal is to find a common, unique module for regARIMA modelling.

Outlier detection issues is the main difference between X13 and TRAMO, in terms of both robustness and speed. TRAMO is fast and generally has small differences, but is in need of some improvements. Possibility for trying a Bayesian approach.

Calendar effects are also an issue. Work is ongoing to look at a more general specification and automatic selection of variables. An alternative solution is time-varying coefficients using state space modelling moving windows, however the results are not very convincing.

Final reflections concerned the comparison of different models between SEATS and X11 and the comparison of criteria used. Therefore the main issues going forward is the robustness and the trade off between performance and accuracy.

See *Prior Adjustment* → *NationalBank* for presentation slides.

4.2.2 Post-presentation Discussion

- Dominique commented than Brian had done similar research and that it would be useful to share information and documentation. Brian agreed to this, but not all work is documented and there were problems with the end testing.
- Jim and Tucker from USCB have a paper on maximum entropy to compare models that are not nested.
- Dario asked for clarification on the TD3 regressor. Jean clarified that it provided a contrast between Sunday and Saturday + Friday versus weekdays - although a contrast between any other day combinations is possible (ie more generic and flexible).
- Ping asked about the frequency of test series used and what software was used for the state space modelling/time-varying coefficients. Jean confirmed that it was monthly series and that this work was done in a new, unreleased, version of JD+.
- Dominique commented about the danger in allowing so many “push-button” options for users, including Brian’s *genhol* program.

4.3 Steve Matthews (*Stat Can*)

4.3.1 Presentation Summary

A current issue is the reference week effect in the Labor Force Survey, which is collected on the 15th of each month. Prior adjustment is included, and so the series is very short. Concurrent factors are currently being used, but thinking of moving to fixed effects while series are short.

Research showed that automatic outlier detection is good for on-off effects, but not so good in 2008/2009 and found that putting in ramps and level shifts as they happened worked better than waiting (ie real-time detection).

Research is ongoing on interaction of trading days with holidays, for example day of the week of New Year’s Eve - this is difficult with lack of data (ie how many times does NYE fall on a Friday in a series?). Moving holiday work is also ongoing, looking at Chinese New Year in travel series, Black Friday and Cyber Monday and the lengths of windows around these.

Weather analysis is also being done. Effects are currently assigned to the irregular, but they are planning to explain as much of the irregular as possible and how it may contribute to the seasonality.

See *Prior Adjustment* → *Statistics Canada* for presentation slides.

4.3.2 Post-presentation Discussion

- Ping asked for more detail on the TD/holiday combination regressor. Steve explained they are looking into what day NYE falls on, as this could have a different TD impact to other months. They are looking to design a separate TD regressor for December and rest of year. Jennie explained

she is working on a similar issue, where Christmas was on a Sunday and so an extra bank holiday fell on the Tuesday.

- Brian suggested that in X13 the TD regressors could be defined as holidays and using a Chi-square test for December vs rest of year.
- Dominique commented that introducing such effects, including Black Friday, may not be suitable in official statistics as it may interfere with stability. Brian commented that the history spec coefficient changes may be used as a stability indicator.

4.4 Rebecca Killick (*University of Lancaster*)

4.4.1 Presentation Summary

A lot of the work is not relevant to official statistics, and so only a few pieces of research will be discussed.

Working on computationally efficient algorithm (both univariate and multivariate) for analysing 1000s of series. Also working on multivariate methods for model selection with changepoints, used to detect small changes unseen in a univariate context.

Work into complex exponential smoothing is ongoing. The smoothR package is being used to make the choice between additive and multiplicative smoothing.

Finally the main work stream of interest is periodicity detection methods for high-frequency data. Dan, a PhD student is looking into detecting which observations share periodic parameters and how many.

See *Prior Adjustment* → *Lancaster* for presentation slides.

4.4.2 Post-presentation Discussion

- Ping asked whether changepoints are identified before or after seasonal adjustment. Rebecca answered the question, saying the algorithms are designed for generic time series and can be applied to either, although a good model selection beforehand is very important.
- A further question was asked about the difference between univariate and multivariate changepoint models. The answer is that a parameter can be adjusted to determine whether changepoints should snap at the same time, ie to define the distance between changepoints before considering them the same event.

4.5 Charlotte Gaughan (*ONS*)

4.5.1 Presentation Summary

Working on 6 methods of automatic identification and intervention of outliers when entering periods of uncertainty, using the 2008 recession to predict what methods to use during Brexit.

See *Prior Adjustment* → *ONS (1)* for presentation slides.

4.5.2 Post-presentation Discussion

- Dominique commented that using indicator series and partial concurrent adjustments may be useful. He also noted that anticipation effects and forecasts may be more important than seasonal adjustment.
- Dario suggested focusing before a crisis, not just during it. He also noted that the anticipated effect is limited to a downturn, which is most likely but not the only outcome.
- Giancarlo commented that the results, doing nothing was preferred, are not unsurprising since seasonality is unlikely to change immediately and current methods can deal with smooth changes.

4.6 Tariq Aziz (*ONS*)

4.6.1 Presentation Summary

Another research project at ONS is automatic outlier detection, where the team is looking into X13 versus Indicator Saturation (IS). Results showed IS detected more true outliers, but X13 had a lower proportion of wrongly identified outliers and lower revisions.

See *Prior Adjustment* → *ONS (2)* for presentation slides.

4.6.2 Post-presentation Discussion

- Jean commented that the results are not contradictory and the dependence is on the t-values.
- Dario questioned why transitory changes are excluded, with the answer being that AOs and LSs are easier to identify and this could be a next step.
- Dominique commented that for seasonal adjustment outlier detection is for stabilising series and isn't overly important.

4.7 Bethan Russ (*ONS*)

4.7.1 Presentation Summary

Final research project is moving holidays - looking into alternative windows for Easter and holidays in the Islamic and Chinese lunar calendars.

See *Prior Adjustment* → *ONS (3)* for presentation slides.

4.7.2 Post-presentation Discussion

- Dominique commented on the difficulty working with the Islamic calendar, with overlapping holidays, and the need for future dates to construct regressors for the future. Tariq answered that overlapping holidays was future work.
- Dominique also commented that bank holidays should be removed from trading day regressors.
- Dario asked for Chinese New Year regressors to be shared for similar research. It was noted that they would be identical for constructing astronomic-based regressors with dates known in advance.
- It was noted that Lancaster had worked on holiday effects detected with Tesco daily sales data.

4.8 Dominique Ladiray (*INSEE / SACE*)

4.8.1 Presentation Summary

Working to introduce more options in JD+: this includes pre-adjustments and more on calendar effects (which includes national calendars and various religious festivals). Work is also ongoing for new trading day regressors, moving trading day regressors and automatic selection of the best to use.

See *Prior Adjustment* → *INSEE* for presentation slides.

4.8.2 Post-presentation Discussion

- Discussion was had about clustering the trading day coefficients for series within sectors - which uses a distance hierarchical analysis of the days and decide which is best.
- It was commented that the automatic selection of these regressors was still in project phase and should be implemented as a plug-in for JD+. The importance of human interpretation was stressed, not just automatic selection.

4.9 Giancarlo Bruno (*ISTAT*)

4.9.1 Presentation Summary

A common issue is dealing with large volumes of series and the automatic choices associated with this, especially for borderline cases.

National holidays are often considered with trading days. In many cases, for example production but not retail, bank holidays are treated as Sundays in regressors, which works well.

Investigated changing critical values in SEATS, which gives different models and large differences in the seasonally adjusted series.

See *Prior Adjustment* → *ISTAT* for presentation slides.

4.9.2 Post-presentation Discussion

- Jean commented on how the log/level decision relied heavily on outliers and how X13 has a good solution for leap years.
- Brian added that the robustness of the standard error in automatic detection drops significantly after 3 or 4 iterations, inflating the t-statistics and increasing the detection of false outliers.
- Dominique commented the importance of detecting AOs depends on the aim - seasonal adjustment or forecasting. This was followed by the question on the need for trading day adjustments, as Eurostat requires they should be tested and adjusted since they are easily understood by users, but may not be that important in reality.
- Dario added that Eurostat does not have a formal requirement on trading day adjustments and agreed that it may not be worth adjusting for very small effects.

4.10 Kathryn Leeming (*University of Bristol*)

4.10.1 Presentation Summary

Working on test for capturing local white noise, looking for correlation structures that may *cancel out* globally. A wavelet periodogram was computed with test statistics and compared to the distribution.

See *Prior Adjustment* → *Bristol* for presentation slides.

4.10.2 Post-presentation Discussion

- Dominique asked why a wavelet periodogram was used rather than a standard one, with the answer being that it is more suitable for local effects.
- A query on the model was asked, with the answer being that a GARCH (1,1) was used and that work was still in testing. At present the centre window was used and compared to a full smoothed window - work to use random start points and lengths is in the future.

5 Proposals for Day 2

Duncan proposed four broad themes, based on the presentations. There were;

1. Outliers
2. Calendar Adjustments
3. Beyond univariate
4. Robustness

Everyone was in agreement and the meeting was closed for Day 1.

Day 2

6 Group Discussion

6.1 Rules

1. Withhold judgment on ideas
2. Encourage bold and exaggerated ideas
3. Quantity not quality
4. Build on other ideas
5. Every idea is of equal worth

6.2 Feedback

6.2.1 Calendar Adjustments

One common theme was moving holiday windows. There was discussion around both the placement (before, during, after or mixture), length and shape (constant, linear, quadratic or mixture) of the window. Adding to this discussion was the problem of overlapping holidays.

A common solution, suggested for many calendar effects, was the use of high frequency data to identify effects. This could be used for holidays (moving or otherwise), trading days and converting 4-4-5 data to monthly effects. Daily and weekly data was discussed, with daily data highlighted as the most preferable. A further solution to the optimal holiday windows is a step-wise method - increasing the length of the window by a day until the optimal window is found.

Further discussion was on new and emerging holidays, for example Black Friday, and whether or not they were established and stable enough to detect and estimate for. This work should continue and possibly identified through daily data.

How to choose between different regressors was discussed. The growing need for a parsimonious and stable method was highlighted (AICC test, Chi-square test on likelihoods or something else). One solution was to use prior knowledge to narrow down the options and test fewer of them.

Evolving effects issues was then discussed, with daily data and multivariate estimation mentioned as solutions. Multivariate raises issues of volume of covariates to estimates, whilst collinearity of regressors also becomes a potential problem.

Next to be discussed was the inclusion of national holidays in trading day regressors, in particular whether or not they fall on a Sunday. An added complication is the difference in dates for certain holidays across regions.

After discussion Dominique discussed the ESS guideline of not estimating unless we are very sure. It was then discussed whether or not trading day effects should be used in quarterly data, even if they are identified. It was decided that they should not be added in automatically, and as with all adjustments common sense and prior knowledge should be applied.

6.2.2 Outliers and Robustness

The group started by discussing the types of outliers worth adjusting for. The list is as follows:

- Additive outlier
- Level shift
- Ramp
- Transitory change (although there was some discussion on whether it should be considered an outlier)

- Seasonal outlier
- Innovation outlier
- Switching effect

The group then discussed which component each effect - the trend, seasonal or irregular.

Issues were discussed next. The first issue was the weighting of outlier, which is typically binary, and whether other weighting strategies should be considered. The number of outliers and model selections were also discussed and it was noted that sensitivity analysis is uncommon. Other common issues are changes in variance, seasonal outliers and the length of series. It was also queried as to when the frequency of outliers just becomes seasonality and how to treat outliers at the end of the series (which does not impact seasonal adjustment but will impact forecasting).

Various solutions were proposed. Split modelling, before and after variance change, is one solution. For most issues prior knowledge and identification of outliers prior to analysis was suggested, as opposed to always relying on automatic selection. Another solution was using time-varying models and identifying if outliers are common across spans. Work on using neuro networks to give weights to observations and outliers was discussed, along with the potential to use indicator saturation to give a more robust estimate of true outliers.

6.2.3 Beyond Univariate

The discussion opened with the motivation for multivariate methods. The following were discussed;

- Harness multivariate power
- Answer questions unanswered by univariate
- Analyse 1000s of series quickly and automatically
- Flag specific series to focus on.

The group decided upon two main aspects of multivariate adjustment - seasonal multivariate adjustment and disaggregation of data (ie seasonally adjusting consistently over different frequencies).

Issue around big data were discussed and the complications associated with lot of covariates. The missingness of data at different levels was also considered.

Much of the discussion was around doing univariate analysis but having multivariate diagnostic tools and tests. This should identify additional seasonal component and pick up things missed at the univariate level. Discussed here was spacial distancing and the clustering of time series (not only geographically).

The discussants also noted how national holidays, and other effects, may not be obvious at a global level but may be identified by bringing together information across multiple series.

7 Presentations on Other Time Series Issues

7.1 Ben Powell (*University of Bristol*)

Modelling High Frequency On-line Data

7.1.1 Presentation Summary

Work follows on from paper analysing ONS web-scraped price data. The main finding were that price data is sticky (remains constant) and bursty (if one shop changes the other follow). This resulted in forecasting becoming more difficult as data is disaggregated. It was also found that simpler models performed equally as well as more sophisticated ones. At item level the one month ahead forecast variance could be reduced by approximately 10%.

The presentation was completed by putting questions to the audience about the work. These can be

seen in the slides.

See *Other presentations* → *Bristol* for presentation slides.

7.1.2 Post-presentation Discussion

- Dominique commented that it was difficult to understand the model without seeing the data and suggested a proxy benchmark model to mimic CPI data. Ben mentioned that at the smallest aggregation was easiest, replicating the geometric mean, but without quantity information constructing weights was difficult.
- Jim (Macey) commented that prices will often be set around the same amount (rounded to the nearest pound or 99p) and wondered if this could be incorporated into the model.
- Steve added that this data would be useful when products are discontinued to know how they behaved in the past.
- A general comment was made that web scraped data would probably never replace surveys.

7.2 James Livesy (*USCB*)

Challenges with Seasonal Adjustment of GDP

7.2.1 Presentation Summary

At the USCB there has been a longstanding practice of indirectly seasonally adjusting GDP. It was noted that Q1 generally grows slower than other quarters, which some users have attributed to residual seasonality.

The challenges to overcome this is nonseasonal monthly series becoming seasonal when aggregated to quarterly, or across cross-sections, and seasonal series deemed nonseasonal by diagnostics.

A series of simulations were then generated before the audience was asked about the harm of adjusting nonseasonal data and whether it is possible to detect signal in monthly data before aggregation.

See *Other presentations* → *US Census Bureau (1)* for presentation slides.

7.2.2 Post-presentation Discussion

- Brian mentioned that industries often use an F-statistic alone to test for seasonality in aggregated series, and this may not be appropriate.
- Dario mentioned similar issues at Eurostat, emerging when aggregating EU countries. It is recommended to check for residual seasonality, but maybe there is a need for a different method to check.
- Giancarlo added that ISTAT adjusts the monthly and quarterly series separately, which causes its own problem in the different stories they can tell.
- Steve mentioned that loosening outlier tolerances helped temporarily, but that it did lead to more revisions.

7.3 Dominique Ladiray (*INSEE / SACE*)

High Frequency Data

7.3.1 Presentation Summary

One of the main objectives of SACE are a complete plug-in for JD+ to adjust weekly and daily data - to be released in the next 2-3 years. The other is to stick to the regARIMA and moving averages philosophy, as per X12, but adapt to higher frequency data. Other methods considered are SSM and STL (loess).

Other points raised the difficulty of issues removing seasonality without removing the trend. Jean

also mentioned that holidays and special events were very disruptive to the daily series. See *Other presentations* → *INSEE* for presentation slides.

7.4 Brian Monsell (*Census Bureau*)

Using Daily Data to Identify New Holiday Effects (Easter[0])

7.4.1 Presentation Summary

After an introduction to the Easter problem it was discussed that daily retail data provided a rare opportunity not only to investigate Easter but other holidays - this includes Super Bowl Sunday, Ramadan, Chinese New Year and Cyber Monday. It allowed analysis of when sales increase or decrease around the holidays - giving clarity on the size and window of the effect.

The risks associated with the data (capture of only small proportion of transactions and companies) were discussed, along with the analysis of an Easter[0] regressor. The results were promising and the regressor will be included in future version of X13.

See *Other presentations* → *US Census Bureau (2)* for presentation slides.

- Dario inquired about the need for Easter[0] if it could be used in Genhol. Brian answered that it's easier for production if it is built into the software.
- Dominique commented that the trading day regressors account for Sunday and wondered if Easter[0] was considered a separate effect.

8 Future Meeting Plans

Duncan invited comments from the attendees on the duration, size, format and timing on the meeting.

Dario enjoyed the flexibility in the agenda, but would encourage newer analysts to present and get involved in future meetings.

No ideal date for the next meeting was agreed, however all institutions were in agreement that agreeing the date in/before October was preferable for financial planning.

Possible topics were discussed. Dario suggested Time Series Econometrics or Data Analytics and Duncan suggested High Frequency. It was decided that when this summary was circulated that a call for ideas would be included.

Dario also took the opportunity to encourage academics to work with JD+ and to pass the software on to students for use.

Finally, Duncan inquired if attendees were happy for their presentations to be put on the GSS website. Everyone was in agreement with this.