The "Sonate" Campaign

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"Sonate" (Sondages acoustiques pour l'évaluation de la qualité d'images des télescopes) – Acoustic sounding to estimate the quality of telescope images – is a prime example of professional/amateur collaboration as it involved 3 professionals and 22 amateurs, who, in order to collect the maximum amount of data, relayed one another in 10-day shifts over a period of 4 months in 1984, using the 1-m telescope at the Pic du Midi. A preliminary campaign with the 2-m telescope in 1982 had shown that the profile of sound waves reflected from the layers above a site could be correlated with the quality of telescopic images at the same site.

Each team collected two series of data:

1) Beginning two hours before nightfall, after reading temperature, atmosphere pressure and humidity, a series of SODAR measurements was taken. SODAR, mounted on a building near the 1-m, uses a parabolic dish pointing to the zenith to emits a series of 2000–Hz blips. The echoes from heights of 800 m above the site are received by the same dish. This layer of the atmosphere contains about 80% of the sources of turbulence affecting the site, so the information is capable of providing an adequate model of the atmospheric structure through which the telescopes will have to work. Integration of profiles obtained at 5-second intervals allows an average value of R_o, a parameter expressing the variations in the refractive index of the air, to be calculated.

2) After nightfall, objective measurements of R_o were made by the SYLVAIN equipment (a camera giving a real-time stellar image, digitized and integrated to calculate R_o. The measuring procedure could take 20–30 minutes, but was helped by a detailed check-list. The objective value of R_o obtained by SYLVAIN was obviously compared immediately with the SODAR value.

Of the 108 days of the campaign, 60 nights' values could be used. The correlation between the SODAR and SYLVAIN values was 0.895. The rare disagreements could explained. In general a SODAR prediction is always reliable when it indicates poor resolution. It is 90% reliable when it indicates good, or excellent, resolution. The results were all that were desired, showing that SODAR is a useful tool in predicting image quality, and can be used for site testing, and at existing sites. SODAR is now permanently installed at the Canada-France-Hawaii Telescope site and at ESO in Chile.

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What did amateurs get out of it, because the campaign was conceived and arranged by professionals, and the amateurs were just the labour force. There were compensations. Not only was there the chance to work at the Pic du Midi, but there was also the incentive of having the use of the 1-m telescope for their own work after the SODAR and SYLVAIN measurements had been made.

The first teams did find reluctant acceptance by some of the professionals at the Pic, who seemed to resent amateurs being present in a professional establishment and feel that they were using the 1-m under false pretences. Relationships changed very considerably, however, over the 4 months. By the end of the campaign, SODAR was part of the fixtures at the Pic, and at the evening meal the R_o prediction was a topic of general conversation.

Although the first teams may have encountered a rather strained atmosphere, the later ones were enthusiastic about their participation. Having conducted a project, envisaged by one set of people, and carried out by another, we have learnt quite a lot. I think this applies to effective future collaboration between amateurs and professionals. Both must have something to gain.

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