



European
Solar Magnetism
Network

Third Periodic Progress Report

Network title: EUROPEAN SOLAR MAGNETISM NETWORK

Network short title: ESMN

Contract number: HPRN-CT-2002-00313

Commencement date of contract: November 1, 2002

Contract duration: 48 months

Period covered by this report: November 1, 2004 – October 31, 2005

Network coordinator: Robert J. Rutten

Organisation: Universiteit Utrecht

Address: Sterrekundig Instituut, Postbus 80 000, NL-3508 TA, Utrecht, The Netherlands

Telephone: +31-30-2535226/5200

Fax: +31-30-2535201

Email: R.J.Rutten@astro.uu.nl

Part A – Research results

A.1 Scientific Highlights

Overview: in its third year the *European Solar Magnetism Network* again fared very well. This was likely the ESMN peak year. ESMN Fellows were at work at all eight hiring partners; seven completed their stay. The ESMN is certain to fulfil its contractual manpower obligations. The science production is impressive. The various telescope developments again progressed very well. The number of collaborative observing campaigns again exceeded the projected number significantly. The third ESMN school was a huge success. The ESMN members met at many occasions. All ESMN Fellows visited partners and presented their research at conferences.

The principal highlight during the report year was the ESMN-wide get-together at the start of it, at Tatranska Lomnica (AISAS) during November 2–11 2004. It combined the Mid-Term Review with the third ESMN school “*Solar Magnetometry and Solar Magnetism*” with 60 participants. More detail is given below and was supplied (including all presentations on DVD) in the Mid-Term Review report.

The highlight of this School-plus-Review meeting was the final session orchestrated by J.M. Beckers, well-known astrophysicist and retired director of the Multi-Mirror Telescope, ESO’s VLT-I program, and the US National Solar Observatory. He split all participants except the ESMN Scientists-in-Charge into four “observatories” with ESMN Fellows as directors. They were asked to define plans for the coming years, including definition of research goals, instrumentation projects, methodology, teaching, international collaboration, and costing. After separate Observatory meetings in which they formulated these, a plenary session was held in which each of the four Observatory Directors (two of them female) reported these plans. They were formally evaluated by ESMN seniors (the ESMN ESA and UiO scientists in charge) as if they were proposals for EC funding. The four Observatories had taken their task quite seriously and came up with well thought-out and imaginative long-term plans. The ESMN seniors were most happy to see such promise, enthusiasm, and intelligence amongst the juniors in our field.

Instrumentation highlight: the GREGOR telescope project (AIP, IAC, AsU, with other solar physics groups in Germany) progresses well. First light is expected in the summer of 2006. Its UU-built foldable canopy withstood exceptionally severe storms.

Magnetometry highlight: the KVA and IAC succeeded together to establish the polarisation characteristics of the SST in detail. This opens the way for quantitative spectropolarimetry with what is presently the sharpest solar telescope in the world.

Image processing: an ESMN collaboration between OAA and UiO was started to apply UiO’s new MOMFBD (Multi-Object Multi-Frame Blind Deconvolution) version of a very sophisticated image restoration technique developed at KVA on polarimetric narrow-band images obtained with OAA’s IBIS Fabry-Perot instrument. The first results came in time for presentation at the Fourth Solar Polarization meeting in the US.

Interpretation highlight: the problem of the existence of non-thermal particles and chromospheric evaporation in flares was addressed from OP's 2003 ESMN campaign data using AsU's non-LTE radiative transfer code to construct a grid of flare ribbon models.

Theoretical highlight: the first determination of the magnetic field vector that channels dynamic jets known as spicules was made by the IAC & OAA through spectropolarimetry in He I 10830 with the Tenerife Infrared Polarimeter at the German VTT plus new quantum-theory interpretation of the Hanle and Paschen-Back effects.

Networking highlight: two young AISAS were awarded EC funding for extended stays at UU (Peter Gömöry as Marie Curie PhD student, Július Koza as EIF Fellow).

Organisational highlight: a USO Graduate School in Solar Physics was started by UU, KVA and UiO through EC FP6 EST support. The contract, encompassing 6 full PhD studentships and many shorter-duration traineeships at the three sites, was concluded on December 5, 2005 whilst this report was being prepared. The ESMN-forged intensive USO collaboration will so continue ESMN heritage in European solar physicist training.

Personal highlights: Emese Forgács-Dajka (ELTE) won the Fenja Berz Award of the Institute of Physics, London, on the recommendation of the European Physical Society. This is an annual award for an outstanding young theoretical physicist. Boris Gudiksen, presently an UiO postdoc, received the prize for the best physics thesis of the year in Sweden. He wrote that thesis as ESMN-1 Fellow at KVA.

A.2 Joint Publications and Patents

The ESMN publications which appeared during the report year are listed here in alphabetical order. As in our earlier reports, this year's list specifies:

- ESMN-acknowledging multi-partner papers
- ESMN-acknowledging single-partner papers from ESMN Fellows
- ESMN-acknowledging single-partner papers from New-Member-state partners (“Associated-State” partners from Eastern Europe in FP5 context).

We again also include some papers due to ESMN-1 Fellows, as specified, when these originated directly from ESMN-1 funding. As in our earlier reports, ESMN-acknowledging single-institute papers are added for Associated State (FP5 terminology) partners to show their ESMN affinity because they participate as minor partner without ESMN Fellow funding. The ESMN papers that are expected to appear in print after November 1, 2005 will be listed in the final report.

Web links: all papers in regular astronomy journals (*Astronomy & Astrophysics*, *Astrophysical Journal*, *Astrophysical Journal Letters*, *Solar Physics*) can be accessed at URL http://adsabs.harvard.edu/default_service.html/ by simply entering an author's name. The same holds for many proceedings papers.

There were no patent applications or awards.

Asensio Ramos, A., Landi Degl'Innocenti, E., and Trujillo Bueno, J.: 2005a, “Dichroic Masers Due to Radiation Anisotropy and the Influence of the Hanle Effect on the Circumstellar SiO Polarization”, *Astrophysical Journal* **625**, 985–995

- Asensio Ramos: OAA Fellow; Landi Degl'Innocenti: OAA Trujillo Bueno: IAC
- Objectives (f)

- Asensio Ramos, A. and Socas-Navarro, H.: 2005, “An artificial neural network approach to the solution of molecular chemical equilibrium”, *Astronomy & Astrophysics* **438**, 1021–1028
- Asensio Ramos: OAA Fellow
 - Objectives (d), (f)
- Asensio Ramos, A., Trujillo Bueno, J., and Collados, M.: 2005b, “Observation and Modeling of Anomalous CN Polarization Profiles Produced by the Molecular Paschen-Back Effect in Sunspots”, *Astrophysical Journal Letters* **623**, L57–L61
- Asensio Ramos: OAA Fellow; Trujillo Bueno: IAC Collados: IAC
 - Objectives (a), (b)
- Ataç, T., Özgüç, A., and Rybák, J.: 2005, “Overview of the flare index during the maximum phase of the solar cycle 23”, *Advances in Space Research* **35**, 400–405
- Rybák: AISAS
 - Objective (b)
- Badalyan, O. G., Obridko, V. N., Rybak, J., and Sýkora, J.: 2005, “Quasi-biennial Oscillations of the North-South Asymmetry”, *Astronomy Reports* **49**, 659–670
- Rybák: AISAS
 - Objective (b)
- Balthasar, H. and Collados, M.: 2005, “Some properties of an isolated sunspot”, *Astronomy & Astrophysics* **429**, 705–711
- Balthasar: AIP; Collados: IAC
 - Objectives (b), (f)
- Bellot Rubio, L. R., Balthasar, H., and Collados, M.: 2004, “Two magnetic components in sunspot penumbrae”, *Astronomy & Astrophysics* **427**, 319–334
- Balthasar: AIP; Collados: IAC
 - Objectives (b), (f)
- Bellot Rubio, L. R., Langhans, K., and Schlichenmaier, R.: 2005, “Multi-line spectroscopy of dark-cored penumbral filaments”, *Astronomy & Astrophysics* **443**, L7–L10
- Kai Langhans: KVA Fellow
 - Objectives (a), (d)
- Berger, T. E., Rouppe van der Voort, L. H. M., Löfdahl, M. G., Carlsson, M., Fossum, A., Hansteen, V. H., Marthinussen, E., Title, A., and Scharmer, G.: 2004, “Solar magnetic elements at 0.1 arcsec resolution. General appearance and magnetic structure”, *Astronomy & Astrophysics* **428**, 613–628
- Rouppe van der Voort: UiO Fellow; Hansteen, Carlsson, Fossum, Marthinussen, van Noort: UiO; Löfdahl, Scharmer: KVA
 - Objectives (a), (b), (c), (e)
- Berlicki, A., Heinzel, P., Schmieder, B., Mein, P., and Mein, N.: 2005, “Non-LTE diagnostics of velocity fields during the gradual phase of a solar flare”, *Astronomy & Astrophysics* **430**, 679–689
- Berlicki: OP Fellow; Heinzel: AsU; Schmieder: OP & UiO; Mein, Mein: OP
 - Objectives (b), (f)
- Berlicki, A., Schmieder, B., Vilmer, N., Mein, P., Mein, N., Heinzel, P., Staiger, J., and Deluca, E. E.: 2004, “Multi-Wavelength Observations of an M1.0 Flare on 22 October 2002”, in *IAU Symposium*, 669–+
- Berlicki: OP Fellow; Schmieder: OP & UiO; Vilmer, Mein, Mein: OP; Heinzel: AsU
 - Objectives (b)
- Bettonvil, F. C. M., Hammerschlag, R. H., Sütterlin, P., Rutten, R. J., Jägers, A. P., and Snik, F.: 2004, “DOT++: The Dutch Open Telescope with 1.4-m aperture”, in J. Oschmann (Ed.), *Astronomical Telescopes and Instrumentation*, Proc. SPIE 5489, 362–373
- Sütterlin: ESMN-1 UU Fellow; Rutten: UU & UiO
 - Objectives (d)
- Bonet, J. A., Márquez, I., Muller, R., Sobotka, M., and Roudier, T.: 2005, “Phase diversity restoration of

- sunspot images. II. Dynamics around a decaying sunspot”, *Astronomy & Astrophysics* **430**, 1089–1097
- Bonet: IAC; Sobotka: AsU
 - Objectives (b), (d)
- Carlsson, M., Rouppe van der Voort, L., and Hansteen, V.: 2004, “Observations at 0.1” Resolution of the Dynamic Evolution of Magnetic Elements”, in *IAU Symposium*, 207–210
- Rouppe van der Voort: UiO Fellow; Carlsson, Hansteen: UiO
 - Objectives (a), (b), (c), (e)
- de Wijn, A. G., Rutten, R. J., Haverkamp, E. M. W. P., and Sütterlin, P.: 2005a, “DOT tomography of the solar atmosphere IV. Magnetic patches in internetwork areas”, *Astronomy & Astrophysics* **441**, 1183–1190
- Sütterlin: ESMN-1 UU Fellow; de Wijn, Haverkamp: UU; Rutten: UU & UiO
 - Objectives (a), (c)
- de Wijn, A. G., Rutten, R. J., and Tarbell, T. D.: 2005b, “Dynamics of the solar chromosphere. V. High-frequency modulation in ultraviolet image sequences from TRACE”, *Astronomy & Astrophysics* **430**, 1119–1127
- De Wijn: UU; Rutten: UU & UiO
 - Objectives (c)
- Derouich, M., Malherbe, J. M., Bommier, V., Landi degl’Innocenti, E., and Sahal-Bréchet, S.: 2004, “Second solar spectrum observed at the Pic-du-Midi: depth probing of the turbulent magnetic field intensity in a quiet region.”, in *SF2A-2004: Semaine de l’Astrophysique Française*, 113–+
- Derouich: IAC Fellow ; Malherbe, Bommier: OP ; Landi degl’Innocenti: OAA
 - Objectives (a), (f)
- Forgács-Dajka, E., Major, B., and Borkovits, T.: 2004, “Long-term variation in distribution of sunspot groups”, *Astronomy & Astrophysics* **424**, 311–315
- Forgács-Dajka, Major, Borkovits: ELTE
 - Objective (b)
- Forgács-Dajka, E., Petrovay, K., and Erdélyi, R. (Eds.): 2003, *Contributions on Turbulence, Waves and Instabilities in the Solar Plasma*, Publications of the Astronomy Department of Eötvös University, No. 13, Budapest
- Forgács-Dajka, Petrovay: ELTE
 - Objectives (a), (b), (c)
- Gömöry, P., Rybák, J., Kucera, A., Curdt, W., and Wöhl, H.: 2004, “Dynamics of the Quiet Upper Solar Atmosphere in the Network”, in *ESA SP-575: SOHO 15 Coronal Heating*, 400–404
- Gömöry, Rybák, Kučera: AISAS
 - Objective (c)
- Gömöry, P., Rybák, J., Kučera, A., Curdt, W., and Wöhl, H.: 2005a, “Analysis of Doppler shifts of spectral lines obtained by the CDS/SOHO instrument”, in *Solar Magnetic Phenomena, Astrophysics Space Science Library, vol. 320, Springer*, 203–206
- Gomory, Rybák, Kučera: AISAS
 - Objective (c)
- Gömöry, P., Rybák, J., Kučera, A., Curdt, W., and Wöhl, H.: 2005b, “Variability and Dynamics of the Outer Atmospheric Layers in the Quiet Solar Network”, *Hvar Observatory Bulletin* **29**, 71–78
- Gömöry, Rybák, Kučera, Tomasz: AISAS
 - Objective (c)
- Hanslmeier, A., Kucera, A., Rybák, J., and Wöhl, H.: 2004, “Two-dimensional spectroscopic time series of solar granulation”, *Solar Physics* **223**, 13–26
- Kučera, Rybák: AISAS
 - Objective (a)
- Hirzberger, J., Stangl, S., Gersin, K., Jurčák, J., Puschmann, K. G., and Sobotka, M.: 2005, “The structure

- of a penumbral connection between solar pores”, *Astronomy & Astrophysics* **442**, 1079–1086
- Jurčák, Sobotka: AsU
 - Objectives (a)
- Janßen, K., Cauzzi, G., Falchi, A., Cavallini, F., and Reardon, K.: 2004, “IBIS Observations of Quiet Sun Photosphere - Velocity Structure from Fe I 7090.4 Å”, in *IAU Symposium*, 631–632
- Janßen: OAA Fellow ; Cauzzi, Falchi, Cavallini, Reardon: OAA
 - Objectives (d), (f)
- Kotrč, P., Heinzel, P., Tziotziou, K., and Tsiropoula, G.: 2004, “Parameters of dark mottles based on high resolution optical spectra”, in *IAU Symposium 223*, 275–276
- Tziotziou: UU Fellow; Kotrč, Heinzel: ASU
 - Objectives (a), (b)
- Kotrč, P., Schwartz, P., Heinzel, P., Tsiropoula, G., and Tziotziou, K.: 2005, “Diagnostics of Dark Chromospheric Mottles Based on High Resolution Spectra I - Observational Data”, *Hvar Observatory Bulletin* **29**, 289–298
- Tziotziou: UU Fellow; Kotrč, Schwartz, Heinzel: ASU
 - Objectives (a), (b)
- Koza, J. and Kučera, A.: 2005, “Response Functions of Spectral Lines Suitable for Diagnostics of Solar Rotation”, *Hvar Observatory Bulletin* **29**, 21–30
- Koza, Kučera: AISAS
 - Objective (a), (f)
- Kučera, A., Wöhl, H., Rybák, J., Gömöry, P., and Tomasz, F.: 2005, “High Resolution Observations of a M5.4 Flare”, *Hvar Observatory Bulletin* **29**, 177–186
- Kučera, Rybák, Gömöry, Tomasz : AISAS
 - Objective (b), (e)
- Langhans, K., Scharmer, G. B., Kiselman, D., Löfdahl, M. G., and Berger, T. E.: 2005, “Inclination of magnetic fields and flows in sunspot penumbrae”, *Astronomy & Astrophysics* **436**, 1087–1101
- Kai Langhans: KVA Fellow; Scharmer, Kiselman, Löfdahl: KVA
 - Objectives (a), (d)
- Li, H., Berlicki, A., and Schmieder, B.: 2005, “Thermal and non-thermal effects driven by magnetic reconnections observed in a confined flare”, *Astronomy & Astrophysics* **438**, 325–339
- Li: PMO; Berlicki: OP Fellow; Schmieder: OP & UiO
 - Objectives (b), (c)
- Lin, Y., Engvold, O., Rouppe van der Voort, L., Wiik, J. E., and Berger, T. E.: 2005a, “Thin Threads of Solar Filaments”, *Solar Physics* **226**, 239–254
- Rouppe van der Voort: UiO Fellow; Lin, Engvold, Wiik: UiO
 - Objectives (a), (c)
- Lin, Y., Wiik, J. E., Engvold, O., Rouppe van der Voort, L., and Frank, Z. A.: 2005b, “Solar Filaments and Photospheric Network”, *Solar Physics* **227**, 283–297
- Rouppe van der Voort: UiO Fellow; Lin, Engvold, Wiik: UiO
 - Objectives (a), (c)
- Major, B.: 2004, “Fine structure of the butterfly diagram revisited”, in *IAU Symposium*, 121–122
- Major: ELTE
 - Objectives (b), (c)
- Major, B.: 2005, “On the behaviour of sunspots in solar plasma: sunspot decay”, *Publications of the Astronomy Department of the Eotvos Lorand University* **15**, 27–33
- Major: ELTE
 - Objectives (b), (c)
- Sánchez Cuberes, M., Puschmann, K. G., and Wiehr, E.: 2004, “Polarimetry of a sunspot at disk centre”, *IAU Symposium* **223**, 237–238

- *Sánchez Cuberes: AIP Fellow*
 - *Objectives (a), (b), (f)*
- Sánchez Cuberes, M., Puschmann, K. G., and Wiehr, E.: 2005, “Spectropolarimetry of a sunspot at disk centre”, *Astronomy & Astrophysics* **440**, 345–356
- *Sánchez Cuberes: AIP Fellow*
 - *Objectives (a), (b), (f)*
- Özgüç, A., Ataç, T., and Rybák, J.: 2004a, “Evaluation of the short-term periodicities in the flare index between the years 1966–2002”, *Solar Physics* **223**, 287–304
- *Rybák: AISAS*
 - *Objective (b)*
- Özgüç, A., Ataç, T., and Rybák, J.: 2004b, “Evidence of the fundamental periodicity in the flare index between the years 1966–2002”, in *IAU Symposium*, 557–558
- *Rybák: AISAS*
 - *Objective (b)*
- Pariat, E., Aulanier, G., Schmieder, B., Georgoulis, M. K., Rust, D. M., and Bernasconi, P. N.: 2004, “Resistive Emergence of Undulatory Flux Tubes”, *Astrophysical Journal* **614**, 1099–1112
- *Pariat, Aulanier: OP; Schmieder: OP & UiO*
 - *Objectives (a), (c)*
- Roupe van der Voort, L. H. M., Hansteen, V. H., Carlsson, M., Fossum, A., Marthinussen, E., van Noort, M. J., and Berger, T. E.: 2005, “Solar magnetic elements at 0.1 arcsec resolution. II. Dynamical evolution”, *Astronomy & Astrophysics* **435**, 327–337
- *Roupe van der Voort: UiO Fellow; Hansteen, Carlsson, Fossum, Marthinussen, van Noort: UiO*
 - *Objectives (a), (b), (c), (e)*
- Rutten, R. J., Bettonvil, F. C. M., Hammerschlag, R. H., Jägers, A. P. L., Leenaarts, J., Snik, F., Sütterlin, P., Tziotziou, K., and de Wijn, A. G.: 2004, “The Dutch Open Telescope on La Palma”, in *IAU Symposium* **223**, 597–604
- *Tziotziou: UU Fellow; Sütterlin: ESMN-1 UU Fellow; Rutten: UU & UiO*
 - *Objectives (a), (b), (c), (d), (e)*
- Rybák, J., Kucera, A., Curdt, W., and Wöhl, H.: 2004, “Observational Evidences for Heating of the Solar Corona by Nanoflares in the Network Derived from the Transition Region Spectral Lines”, in *ESA SP-575: SOHO 15 Coronal Heating*, 529–534
- *Rybák, Kučera: AISAS*
 - *Objective (c)*
- Rybák, J., Özgüç, A., Ataç, T., and Sözen, E.: 2005, “Intermittence of the short-term periodicities of the flare index”, *Advances in Space Research* **35**, 406–409
- *Rybák: AISAS*
 - *Objective (b)*
- Schmieder, B., Berlicki, A., Vilmer, N., Aulanier, G., Démoulin, P., Mein, P., Mandrini, C., and Deluca, E.: 2004a, “Multi-wavelength flare study and magnetic configuration”, in *IAU Symposium*, 397–398
- *Berlicki: OP Fellow; Schmieder: OP & UiO; Vilmer, Aulanier, Démoulin, Mein: OP*
 - *Objectives (b), (c)*
- Schmieder, B., Mein, N., Deng, Y., Dumitrache, C., Malherbe, J.-M., Staiger, J., and Deluca, E. E.: 2004b, “Magnetic changes observed in the formation of two filaments in a complex active region: TRACE and MSDP observations”, *Solar Physics* **223**, 119–141
- *Schmieder: OP & UiO; Mein, Malherbe: OP*
 - *Objectives (a), (c)*
- Schmieder, B., Rust, D. M., Georgoulis, M. K., Démoulin, P., and Bernasconi, P. N.: 2004c, “Emerging Flux and the Heating of Coronal Loops”, *Astrophysical Journal* **601**, 530–545
- *Schmieder: OP & UiO; Démoulin: OP*

- Objectives (b), (c)
- Schmieder, B. and van Driel-Gesztelyi, L.: 2005, “Source Regions of Coronal Mass Ejections”, in *IAU Symposium*, 149–160
- Schmieder: OP & UiO; van Driel-Gesztelyi: OP
 - Objectives (b)
- Schwartz, P., Schmieder, B., Heinzel, P., and Anzer, U.: 2004, “Multiwavelength determination of the density and total mass of the EUV filament observed by SoHO/CDS, SoHO/SUMER and MSDP/VTT”, in *IAU Symposium*, 219–222
- Schwartz, Heinzel: AsU; Schmieder: OP & UiO
 - Objectives (b), (c)
- Sheminova, V. A., Rutten, R. J., and Rouppe van der Voort, L. H. M.: 2005, “The wings of Ca II H and K as solar fluxtube diagnostics”, *Astronomy & Astrophysics* **437**, 1069–1080
- Rouppe van der Voort: UiO Fellow; Rutten: UU & UiO
 - Objectives (a), (c)
- Sobotka, M. and Hanslmeier, A.: 2005, “Photometry of umbral dots”, *Astronomy & Astrophysics* **442**, 323–329
- Sobotka: AsU
 - Objectives (a)
- Socas-Navarro, H., Trujillo Bueno, J., and Landi Degl’Innocenti, E.: 2005, “Polynomial Approximants for the Calculation of Polarization Profiles in the He I 10830 Å Multiplet”, *Astrophys. J. Suppl.* **160**, 312–317
- Trujillo Bueno: IAC; Landi Degl’Innocenti: OAA
 - Objectives (d), (f)
- Sýkora, J. and Rybák, J.: 2005, “Coronal manifestations of solar variability”, *Advances in Space Research* **35**, 393–399
- Sýkora, Rybák: AISAS
 - Objective (b)
- Temmer, M., Rybák, J., Veronig, A., and Hanslmeier, A.: 2005, “What causes the 24-day period observed in solar flares?”, *Astronomy & Astrophysics* **433**, 707–712
- Rybák: AISAS
 - Objective (b)
- Tomasz, F., Rybák, J., Kučera, A., Curdt, W., and Wöhl, H.: 2005a, “Influence of Transition Region Blinker on the Surrounding Chromospheric and Coronal Plasma”, *Hvar Observatory Bulletin* **29**, 197–204
- Tomasz, Rybák, Kučera: AISAS
 - Objective (c)
- Tomasz, F., Rybák, J., Kučera, A., Curdt, W., and Wöhl, H.: 2005b, “On the behaviour of a blinker in chromospheric and transition region layers”, in *Solar Magnetic Phenomena, Astrophysics Space Science Library, vol. 320, Springer*, 207–210
- Tomasz, Rybák, Kučera: AISAS
 - Objective (c)
- Trujillo Bueno, J., Merenda, L., Centeno, R., Collados, M., and Landi Degl’Innocenti, E.: 2005, “The Hanle and Zeeman Effects in Solar Spicules: A Novel Diagnostic Window on Chromospheric Magnetism”, *Astrophysical Journal Letters* **619**, L191–L194
- Merenda: IAC Fellow; Trujillo Bueno: IAC; Collados: IAC; Centeno: IAC; Landi Degl’Innocenti: OAA
 - Objectives (a), (f)
- Tziotziou, K. and Tsiropoula, G.: 2004, “Mass and Energy Supply of Fine Structure to the Solar Corona”, in *IAU Symposium 219*, 123–129
- Tziotziou: UU Fellow

- Objectives (a), (b)

van Noort, M., Rouppe van der Voort, L., and Löfdahl, M. G.: 2005, “Solar Image Restoration By Use Of Multi-frame Blind De-convolution With Multiple Objects And Phase Diversity”, *Solar Physics* **228**, 191–215

- Rouppe van der Voort: UiO Fellow; van Noort: UiO; Löfdahl: KVA
- Objectives (d)

Part B – Comparison with the Joint Programme of Work

B.1 Research Objectives

The ESMN research objectives remain as defined in Section B.1 of Annex I of the contract. They remain relevant and achievable.

B.2 Research Method

There is no change in the ESMN research methods as defined in Section B.2 of Annex I of the contract. The Canary Island telescopes, SOHO, polarimetric diagnostics, and numerical modelling together remain the methodological ESMN backbone. As reported earlier, only the GCT (German Gregory Coudé Telescope on Tenerife) has been taken out of service, being rebuilt into GREGOR which will come on line by the end of the ESMN.

However, the solar magnetism research scene is slated to change drastically through the launch of the Solar-B mission (Japan/US/UK) scheduled for August 2006. Of the ESMN partners especially UiO plays an important formal role in Solar-B as its European data center, but virtually *all* ESMN partners will redirect their solar magnetism research to Solar-B data products through a variety of collaborations. This will start just about when ESMN ends.

B.3 Work Plan

The ESMN *task definition* remains as specified in Section B.3 of Annex I of the contract, also the task breakdown in the table given there.

The *schedule and milestone delivery* remain very well on track. An overview:

- *young researcher hiring*: see team tables below and summary table on page 25. Most ESMN Fellows have already left. There are a few short-duration slots open that are advertised at this moment. The ESMN will outperform its contract, probably significantly.
- *gender aspects*: two of the three female ESMN Fellows completed their contract; the third one (Laura Merenda) will continue until the end of the ESMN. Half of the students at the third ESMN school were female.
- *science results*: see publication list above.
- *implementation objectives (d) – (f)*: technological advances at all telescopes. They are not detailed here since none was ESMN-funded, but the pertinent websites give more information¹.

¹SST: <http://www.solarphysics.kva.se/index.html>

- *effective multi-telescope campaign coordination*: see the campaigns list below.
- *multi-telescope campaigns*: again many more than anticipated, see campaigns list below.
- *summer/winter schools*: also the third and last ESMN School was an outstanding success (see below).
- *technological, observing, analysis training*: lots, see also below.
- *industrial training*: not formally, but there are industrial contacts at multiple partners.
- *effective networking*: see selected travel lists and the networking activity matrix below.
- *presentation training*: all ESMN Fellows presented their work at the Mid-Term Review and on other occasions (see their travel lists below). They also participated frequently in public outreach.
- *public outreach*: this year's highlight was the annular solar eclipse on October 3, observed as a partial eclipse at the Canary Island ESMN telescopes with considerable media attention.

The *research effort of the participants* is detailed in the team tables below. In continuation of the reporting practice developed in consultation with the Program Officer over the past years, these tables give maximum information by splitting the effort over individual researchers identified by name and including specification of the source of their funding.

UU (Utrecht)

Name	Position	Funding	Year 1	Year 2	Year 3	Total
Felix Bettonvil	Engineer	NWO/UU	9	10	8	27
Rob Hammerschlag	Staff Engineer	UU	9	8	8	25
Július Koza ^a	Post Doc	EIF	–	–	1	1
Jorrit Leenaarts	PhD Student	UU	1	4	6	11
Rob Rutten	Senior Scientist	UU	6	5	5	16
Frans Snik	PhD Student	UU	–	–	2	2
Pit Sütterlin	Post Doc	NWO/UU	10	10	10	30
Kostas Tziotziou	Post Doc	ESMN	8	12	10	30
Alfred de Wijn	PhD Student	UU	7	5	4	16
9			50	54	54	158

NWO = Nederlandse Organisatie voor Wetenschappelijk Onderzoek

ASTRON = The Netherlands Foundation for Research in Astronomy

EIF = EC FP6 Marie Curie Intra-European Fellowship

^a Seconded from AISAS starting July 1, 2005

DOT: <http://dot.astro.uu.nl>

THEMIS: <http://www.themis.iac.es>

VTT: <http://www.kis.uni-freiburg.de/kiswww.html>

GREGOR: <http://gregor.kis.uni-freiburg.de>

SOHO: <http://sohowww.nascom.nasa.gov>

IAC (La Laguna)

Name	Position	Funding	Year 1	Year 2	Year 3	Total
Andrés Asensio Ramos	PhD Student/Post Doc	IAC	6	8	2	16
Jose Antonio Bonet	Senior Scientist	IAC	3	4	4	11
Rebecca Centeno Elliott	PhD Student	IAC	–	–	3	3
Manolo Collados Vera	Professor	ULL	6	4	6	16
Moncef Derouich	Post Doc	ESMN	–	–	4	4
Elena Khomenko	Post Doc	IAC	–	–	3	3
Rafael Manso Sainz	Post Doc	IAC	6	2	–	8
Marian Martínez González	PhD student	IAC	–	–	3	3
Valentin Martínez Pillet	Senior Scientist	IAC	3	2	2	7
Laura Merenda	PhD Student	ESMN	8	12	12	32
Ines Rodriguez Hidalgo	Associate Professor	ULL	3	3	2	8
Basilio Ruiz Cobo	Professor	ULL	3	4	2	9
Jorge Sánchez Almeida	Senior Scientist	IAC	6	7	6	19
Javier Trujillo Bueno	Senior Scientist	CSIC	6	6	6	18
14			50	52	55	157

CSIC = Consejo Superior de Investigaciones Científicas

ULL = University of La Laguna

OAA (Florence)

Name	Position	Funding	Year 1	Year 2	Year 3	Total
Andrés Asensio Ramos	Post Doc	ESMN/MIUR	–	4 ^a	10	14
Gianna Cauzzi	Res. Astronomer	OAA/MIUR/CNR	5	7	7	19
Fabio Cavallini	Ass. Astronomer	OAA/MIUR	8	8	6	22
Ambretta Falchi	Ass. Astronomer	OAA/MIUR	4	2	2	8
Cristina Gabellieri	PhD student	UF	–	4	–	4
Katja Janssen	Post Doc	ESMN/MIUR	2	12	11 ^b	25
Egidio Landi Degl'Innocenti	Professor	UF/MIUR	8	8	4	20
Marco Landolfi	Astronomer	OAA	6	6	–	12
Rafael Manso Sainz	Postdoc	MIUR	2	–	–	2
Kevin Reardon	Grad. Researcher	OAA	8	4	8	20
10			43	55	48	146

UF = University of Florence

MIUR = Ministero Istruzione Università e Ricerca

CNR = Consiglio Nazionale delle Ricerche

^a 2 months on ESMN, 2 months on MIUR funding^b 10 months on ESMN, 1 month on MIUR funding

UiO (Oslo)

Name	Position	Funding	Year 1	Year 2	Year 3	Total
Mats Carlsson	Professor	UiO	8	8	9	25
Oddbjørn Engvold	Professor	UiO	1	1	1	3
Astrid Fossum	PhD Student	NFR	12	10	10	32
Boris Gudiksen	Post Doc	NFR	–	6	10	16
Viggo Hansteen	Professor	UiO	6	6	6	18
Andrew McMurry	Post Doc	NSF	11	–	–	11
Michiel van Noort	Post Doc	NFR	12	10	10	32
Luc Rouppe van der Voort	Post Doc	ESMN/UiO	8	12	12 ^a	32
Saadatnejad Bard	PhD Student	UiO/NFR	12	10	–	22
9			70	63	58	191

NFR = Norsk Forskningsråd

NSF = National Science Foundation

^a 10 months on ESMN funding, 2 months on UiO funding

KVA (Stockholm)

Name	Position	Funding	Year 1	Year 2	Year 3	Total
Peter Dettori	Science Engineer	KVA	10	10	10	30
Boris Gudiksen	PhD student	KVA	10	4	–	14
Tomas Hillberg	PhD student	KVA/SU	–	–	10	10
Dan Kiselman	Research Associate	KVA	6	6	4	16
Kai Langhans	Post Doc	ESMN	5	10.5 ^{a,b}	8 ^a	23.5
Mats Löfdahl	Research Associate	KVA	5	5	5	15
Gautam Narayan	PhD student	KVA/SU	–	4	10	14
Göran Scharmer	Professor	KVA	8	8	8	24
8			44	47.5	55	146.5

SU: Stockholm University

^a Interrupted by paternity leave (twins!) as formally obligatory under the legislation applicable to all KVA personnel.

^b This number was rounded to 10 months in the second Periodic Report. It is corrected here.

AIP (Potsdam)

Name	Position	Funding	Year 1	Year 2	Year 3	Total
Kurt Arlt	Computer Engineer	AIP	–	3	3	6
Horst Balthasar	Scientist	AIP	8	8	9	25
Thorsten Carroll	Post Doc	AIP/DFG	–	4	6	10
Axel Hofmann	Scientist	AIP	7	6	7	20
Bernhard Kliem	Scientist	DFG	–	–	3	3
Emil Popow	Scientist/Engineer	AIP	–	2	2	4
Jürgen Rendtel	Scient. Assistant	AIP	4	4	4	12
Monica Sánchez Cuberes	Post Doc	ESMN	6	12	12	30
Jürgen Staude	Professor	AIP	3	4	5	12
Gherardo Valori	Post Doc	DFG/AIP	–	4	1	5
10			28	47	52	127

DFG = Deutsche Forschungsgemeinschaft

OP (Paris)

Name	Position	Funding	Year 1	Year 2	Year 3	Total
Guillaume Aulanier	Scientist	OP	5	5	5	15
Arkadiusz Berlicki	Post Doc	ESMN	9	12	11	32
Veronique Bommier	Scientist	CNRS	3	2	2	7
Pascal Démoulin	Scientist	OP	3	4	–	7
Jean Claude Hénoux	Senior Scientist	retired	3	1	2	6
Jean Marie Malherbe	Senior Scientist	OP	6	5	2	13
Nicole Mein	Senior Scientist	Paris VII	5	4	5	14
Pierre Mein	Senior scientist	retired	5	4	5	14
Etienne Pariat	PhD student	EN Lyon	2	2	2	6
Brigitte Schmieder	Senior Scientist	OP	10	11	11	32
Lidia van Driel-Gesztelyi	Senior Scientist	UCL (UK)	1	5	–	6
Nicole Vilmer	Senior scientist	CNRS	4	4	2	10
12			56	59	47	162

CNRS: Centre National de la Recherche Scientifique

Paris VII: Université Paris VII

EN Lyon: Ecole Normale supérieure de Lyon

UCL: University College London

ESA (Noordwijk/Greenbelt)

Name	Position	Funding	Year 1	Year 2	Year 3	Total
Danielle Bewsher	ESA Research Fellow	ESA	9	10	2	21
Paal Brekke	Scientist	ESA	2	2	–	4
George Dimitoglou	Computer Scientist	ESA	2	–	2	4
Bernhard Fleck	Scientist	ESA	3	3	3	9
Bernard Foing	Scientist	ESA	1	1	1	3
Stein Haugan	Scientist	ESA	4	4	4	12
Scott McIntosh	ESA Research Fellow	ESA	4	–	–	4
Daniel Müller	Scientist	ESA	–	–	1	1
Stéphane Régnier	Post Doc	ESMN	–	9	12	21
Luis Sanchez	Scientist	ESA	2	2	2	6
10			27	31	27	85

Most of the ESA team resides at the SOHO Experimenters Operations Facility at the Goddard Space Flight Center.

AsU (Ondřejov)

Name	Position	Funding	Year 1	Year 2	Year 3	Total
Pavel Ambrož	Senior Scientist	AsU	5	5	5	15
Stanislav Gunár	PhD student	AsU	–	–	4	4
Petr Heinzl	Senior Scientist	AsU	4.5	4.5	4.5	13.5
Jan Jurčák	PhD Student	AsU	3	3	3	9
Marian Karlický	Senior Scientist	AsU	2	3	3	8
Jana Kašparová	Post Doc	AsU	3	3	3	9
Miroslav Klvaňa	Senior Scientist	AsU	5	5	5	15
Pavel Kotrč	Senior Scientist	AsU	5	5	5	15
Pavol Schwartz	Post Doc	AsU	–	4	4	8
Michal Sobotka	Senior Scientist	AsU	5	5	5	15
10			32.5	37.5	41.5	111.5

AISAS (Tatranská Lomnica)

Name	Position	Funding	Year 1	Year 2	Year 3	Total
Katarína Brčeková	PhD Student	AISAS	8	3	–	11
Peter Gömöry	PhD Student	AISAS	6	8	8 ^a	22
Július Koza	Scientist	AISAS	8	9	8 ^b	25
Aleš Kučera	Senior Scientist	AISAS	4	3	4	11
Ján Rybák	Senior Scientist	AISAS	4	4	4	12
Július Sýkora	Senior Scientist	AISAS	3	3	3	9
František Tomasz	PhD Student	AISAS	6	8	8	22
7			39	38	35	112

^a Seconded during 10 months to UU on EC-MC funding

^b Seconded to UU from July 1, 2005 on EC-EIF funding

ELTE (Budapest)

Name	Position	Funding	Year 1	Year 2	Year 3	Total
Balazs Major	PhD Student	ELTE	6	12	12	30
Kristof Petrovay	assoc. prof.	ELTE	5	7	6	18
Emese Forgacs-Dajka	assist. prof.	ELTE	6	6	6	18
Gábor Marschalkó	PhD student	ELTE	–	–	4	4
Dániel Marik	PhD student	ELTE	5	–	–	5
Ágnes Kóspál	PhD student	ELTE	–	2	–	2
6			22	27	28	77

B.4 Organisation and Management

The ESMN *organisation and management* adheres to the practices specified in Section B.4 of Annex I of the contract. The administration and reporting are web-based, the selection and hiring of Fellows went (and still goes) fully by email, and Ing. Pieter Thijssen of the UU Finance Department controls the financial administration. The ESMN planning meetings take place during international conferences and the observing campaigns.

The *result dissemination* is primarily through the major refereed international journals and conference proceedings, as evident from the ESMN publication list above and the complete publication list to come in next year's final report. The travel lists below show at which meetings the ESMN Fellows and Associated-State members have represented and presented the ESMN.

As to *non-EU travel*, no ESMN fellow has travelled to ESA's experimenters facility at the Goddard Space Flight Center, USA, which was deemed approved in the Contract and was seen as a desirable training element for ESMN Fellows but became impractical after 9/11. Nor has prior approval been sought to fund other outside-EU travel since it is the ESMN's policy that non-ESMN funding is used for all such travel.

ESMN websites:

main site: <http://esmn.astro.uu.nl>

outreach site: <http://www.astro.uio.no/~rouppe/esmn/>

One of the ESMN scientists in charge, Prof. J. Staude at AIP, retired in the course of the year. His ESMN role has been taken over by Dr. H. Balthasar, with written notification to the Project Officer. Professor Staude's farewell ceremony included seminars by the UU and AsU scientists in charge.

ESMN School

The third ESMN school titled "Solar Magnetometry and Solar Magnetism" was organised by UU and AISAS at Tatranská Lomnica (AISAS) during November 2–11, 2004. The eleven ESMN scientists-in-charge constituted the school teachers. It was held much sooner than originally anticipated because the ESMN hired most of its complement of Fellows faster than anticipated, so that the Network will effectively outlast most of its hirings. Since it made less sense to organise this school when most Fellows left the ESMN

already, it was moved forward and made to coincide with the ESMN Mid-Term Review which already brought all ESMN Fellows and scientists-in-charge together.

The assembly consisted of the 11 ESMN scientists-in-charge, the 9 ESMN Fellows then employed by the Network, a number of other ESMN team members, UU's ESMN administrator Ing. Pieter Thijssen, and additionally 39 young researchers from many different countries, mostly postdocs but also some predocs, half of them female, and all except one working in solar physics.

The ESMN scientists-in-charge each presented their own field of expertise, each during three hours of intensive teaching concluded by a general discussion. The first three school days ended with student presentations in which all students introduced themselves and their research. More extended presentations by the ESMN Fellows were part of the ESMN Mid-term Review during the school. Almost all presentations were collected on a DVD of which a copy was included with the formal report on the Mid-Term meeting.

ESMN Mid-Term meeting

The ESMN Mid-Term Review meeting was held on November 6, 2004, embedded in the 2004 ESMN school at Tatranska Lomnica (AISAS). The full-day meeting consisted of presentations by all ESMN Fellows to all 60 School participants in the morning and a closed ESMN review session in the afternoon.

An extensive report on this meeting and the ESMN status as evaluated then and there was forwarded to the Project Officer on November 25 2004. He formally declared the ESMN mid-term review successfully concluded in April 2005, writing:

“In my opinion, the network is working very well, providing state-of-the-art and challenging training to its young researchers in solar magnetism, with them often making significant contributions to the networks’ research achievements.”

Collaborative ESMN observing campaigns

1. “The three-dimensional structure and dynamics of sunspots”, November 23 – December 6 2004, VTT, THEMIS, SST, DOT, SOHO, TRACE, Meudon Tower, partners AIP, OP, KVA, UU, ESA, IAC
2. “Second solar spectrum: molecular lines”, November 17–23 2004, THEMIS, partners OP, OAA
3. “Multi-line spectroscopy of solar magnetic elements”, May 10–23 2005, SST, partners UiO, KVA
4. “The three-dimensional structure of sunspots”, May 20 – June 9 2005, VTT, THEMIS, SOHO, TRACE, partners AIP, OP, IAC
5. “New technology tests”, June 7–8 2005, SST, partners KVA, UiO
6. “Fine magnetic structures as the origin of coronal heating and activities”, July 2–14 2005, SST, VTT, DOT, TRACE, SOHO, partners IAC, UU, KVA, UiO, ESA
7. “Molecular Spectropolarimetry”, July 15–26 2005, THEMIS, partners OAA, IAC

8. “Emerging flux”, August 10–18 2005, THEMIS, SOHO, TRACE partners AIP, OP, IAC
9. “Filaments and filament channels”, September 7–21 2005, VTT, THEMIS, SOHO, TRACE, DOT, partners AIP, OP, IAC, UiO, UU
10. “H-alpha observations of filaments in quiet and active regions”, September 23 – October 4 2005, SST, DOT, SOHO and TRACE, partners UiO, UU, KVA, ESA
11. “Measurement of scattered light during a partial eclipse”, October 3 2005, SST, partners UIO and KVA
12. “Wave propagation through the solar atmosphere”, October 5–17 2005, SST, DOT, SOHO, TRACE, partners UiO, UU, KVA, ESA
13. “Studies of chromospheric fine structures”, October 6–17 2005, THEMIS, DOT, SOLIS, SOHO, TRACE, partners ESA, OP, AsU
14. “Spectroscopy and imaging tomography of solar fibrils” October 18–31 2005, SST, DOT, SOHO, TRACE, partners AISAS, UU, UiO, KVA, ESA

ESMN planning meetings

The ESMN adheres to its policy to let its collaboration-planning sessions take place at the international conferences and workshops to which ESMN members travel anyhow. The ones where ESMN planning meetings took place are listed below. Planning meetings also take place during the many ESMN observing campaigns, listed above and not repeated here. In addition, many ESMN discussions take place during bilateral visits that are not listed here because most of these are not ESMN-funded. However, ESMN-related partner visits by Fellows and New-Member-State partners are specified in their travel lists on page 18 ff. The overall ESMN “traffic” is summarised in the table on page 24.

1. “Atelier molecules polarisés”, Paris, France, December 17 2005, partners IAC, OP, OAA
2. Conference “Many Faces of the Universe: From Solar System to Cosmology”, Slany, Czech Republic, January 30 – February 1 2005, partners AsU, AISAS
3. Prof. Staude Festkolloquium and GREGOR Project Meeting, AIP, April 14–15 2005, partners AIP, AsU, UU
4. Second Central European Solar Physics Meeting, Bairisch Kölldorf, Austria, May 19–21 2005, partners AsU, AISAS, AIP
5. Solar Physics Division meeting of the American Astronomical Society, New Orleans, USA, May 23–27 2005, partners UIO, ESA
6. Solar Wind 11/SOHO 16 meeting, Whistler, Canada, June 12–17 2005, partners UIO, ESA, IAC
7. 23rd International NSO Workshop “Solar MHD – Theory and Observations”, Sunspot NM (USA), July 18–21 2005, partners OAA, UiO, UU, ESA, AISAS
8. Conference “Chromospheric and Coronal Magnetic Fields”, Katlenburg-Lindau, Germany, August 28 – September 3 2005, partners IAC, UiO, UU, AIP, ESA, KVA, OP, AISAS

9. Eleventh European Solar Physics Meeting “The Dynamic Sun: Challenges for Theory and Observations”, Leuven, Belgium, September 12–16 2005, all partners
10. “Fourth Solar Polarization Workshop”, Boulder, USA, September 19–23 2005, partners AIP, IAC, OAA, UU, OP, KVA, AsU
11. Meeting “Programme National Soleil–Terre”, Paris, France, September 25–30 2005, partners ESA, OP
12. GREGOR project meeting, Freiburg, Germany, October 20–21 2005, partners AIP, IAC

ESMN travels

The following lists, ordered per partner per person, specify travels of ESMN nature. It is impractical to tabulate all pertinent travels of all ESMN team members, and that would represent unjust overclaim of the ESMN’s role for the many travels not funded by ESMN. For example, the IAC serves as a hub in the ESMN because many ESMN members visit there prior or after observing with a Canary Island telescope, or meet at these telescopes themselves. Although almost always ESMN science and organisational ESMN matters are discussed during such travels, they cannot be listed as ESMN-supported nor claimed as ESMN “product”. As in our earlier reports, the lists below are therefore restricted to the ESMN Fellows (but then include also their travels on other funding, for the sake of completeness in demonstrating their integration in European solar physics) and to ESMN-funded as well as non-ESMN-funded but ESMN-related travels of Associated-State team members (where all ESMN funding goes to such travel, without ESMN Fellow hiring).

Note that the activity matrix at the end of this section summarises all ESMN traffic irrespective of its source of funding.

Kostas Tziotziou (ESMN Fellow at UU March 1 2003 – August 31 2005)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- ESMN Mid-Term Review Meeting, AISAS, November 6 2004
- Collaborative visit to AsU, Ondřejov, Czech Republic, April 4–13, 2005
- Home Institute visit to National Observatory of Athens, Greece, April 21–30, 2005
- 60th Nederlandse Astronomenconferentie, Blankenberge, Belgium, May 18–20, 2005
- Collaborative visit to OP, Meudon, France, July 5–9, 2005

Laura Merenda (ESMN Fellow at IAC since March 1, 2003)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- ESMN Mid-Term Review Meeting, AISAS, November 6 2004
- Home Institute visit to OAA, January 9–19, 2005
- Observing campaign at VTT, June 15–22, 2005

- International workshop on Chromospheric and Coronal Magnetic Fields, Max-Planck Institute for Solar System Research, Lindau, Germany, August 28 – September 3, 2005

Moncef Derouich (ESMN Fellow at IAC since July 1, 2005)

- Fourth International Workshop on Solar Polarization, Boulder, Colorado, USA, September 19 – 23, 2005

Katja Janssen (ESMN Fellow at OAA September 1 2003 – August 31 2005)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- ESMN Mid-Term Review Meeting, AISAS, November 6 2004
- Collaborative visit to National Solar Observatory, Sunspot, USA, June 12–22, 2005
- Collaborative visit to University of Rome Tor Vergata, Rome, Italy, June 30, 2005
- 23rd NSO Workshop “Solar MHD Theory and Observations”, Sunspot, USA, July 18–21, 2005

Andrés Asensio Ramos (ESMN Fellow at OAA September 1 2004 – August 31 2005)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- ESMN Mid-Term Review Meeting, AISAS, November 6 2004
- Home Institute visit to IAC, December 18–23, 2004
- Collaborative visit to Department of Physics and Astronomy, University of Kentucky, Lexington, USA, March 28 – April 10, 2005
- Workshop “Le 3me Forum du GRETA: Transfert radiatif et exploitation des TGE”, Frejus, France, May 11–13 2005
- Observing campaign at THEMIS, July 15–26, 2005

Luc Rouppe van der Voort (ESMN Fellow at UiO March 1 2003 – August 31 2005)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- ESMN Mid-Term Review Meeting, AISAS, November 6 2004
- Observing campaign at SST, May 7–18, 2005
- NSO Workshop 23: “Solar MHD: theory and observations”, Sunspot, USA, July 18–25, 2005
- Observing campaign at SST, September 21 – October 5, 2005

Kai Langhans (ESMN Fellow at KVA since June 2003)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- ESMN Mid-Term Review Meeting, AISAS, November 6 2004
- Observing campaign at SST, November 23 – December 3 2004
- Observing campaign at SST, April 16 – May 2, 2005
- Collaborative visit to Astronomisches Institut Potsdam, Potsdam, Germany, August 11, 2005
- Home Institute visit to Kiepenheuer Institut für Sonnenphysik, Freiburg, Germany, September 9, 2005
- Participation in 4th Solar Polarization Workshop, Boulder, USA, September 18 – 25, 2005
- Participation in “Astronomdagar 2005”, Uppsala Astronomical Observatory, Uppsala, Sweden, October 21, 2005

Monica Sánchez Cuberes (ESMN Fellow at AIP May 1 2003 – October 31 2005)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- ESMN Mid-Term Review Meeting, AISAS, November 6 2004
- Observing campaign at VTT, November 12 – December 6, 2004
- International Conference “Advancing Science and Society Interactions”, Sevilla, Spain, February 2 – 6, 2005
- Curs de Comunicació de la Ciència “OMNIS CELLULA” Conference, Barcelona, Spain, July 11 – 17, 2005
- Collaborative visit to IAC, May 11 – 19, 2005
- Observing campaign at VTT, May 20 – June 8, 2005

Arkadiusz Berlicki (ESMN Fellow at OP February 1 2003 - September 30 2005)

- Collaborative visit to Asu, Ondrejov, Czech Republic, October 30 - November 1, 2005
- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- ESMN Mid-Term Review Meeting, AISAS, November 6 2004
- Observing campaign at THEMIS, November 23 – December 3, 2004
- Collaborative visit to MSSL, University College London Holmbury St. Mary Dorking, United Kingdom, February 3 – 6, 2005
- European SPM-11 “The Dynamic Sun: Challenges for Theory and Observations, Leuven, Belgium, September 10 – 17, 2005

Stéphane Régnier (ESMN Fellow at ESA/ESTEC February 1 2004 – November 30 2005)

- Collaborative visit to St Andrews University, St Andrews, United Kingdom, October 17–23, 2004
- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- ESMN Mid-Term Review Meeting, AISAS, November 6 2004
- SOHO-TRACE-RHESSI workshop, Sonoma, USA, December 7–12, 2004
- Home Institute visit to OP, February 13–18, 2005
- Workshop on Nonlinear Force-free Modeling, Palo Alto, USA, May 5–22, 2005
- AAS–SPD meeting, New Orleans, USA, May 23–28, 2005
- Collaborative visit and interview at the St Andrews University, St Andrews, United Kingdom, August 23–24, 2005
- Conference “Chromospheric and Coronal Magnetic Fields”, Lindau, Germany, August 30 – September 2, 2005
- 11th European Solar Physics Meeting, Leuven, Belgium, September 11–16, 2005
- Meeting Programme National Soleil–Terre, Paris, France, September 25–30, 2005

Stanislav Gunár (AsU PhD student)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- Collaborative visit to OP, October 3–22, 2005

Petr Heinzel (AsU staff)

- Collaborative visit to OP, March 7–14, 2005

Jana Kašparová (AsU postdoc)

- Collaborative visit to OP, December 5–11, 2004

Jan Jurčák (AsU PhD student)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- Collaborative visit to IAC, January 28 – February 11, 2005
- Long-term stay at IAC, March 1 – June 30, 2005

Miroslav Klvaňa (AsU staff)

- GREGOR Project Meeting, AIP, April 14–15, 2005

Hana Mészárosová (AsU staff)

- Collaborative visit to AISAS, January 17–28, 2005
- Collaborative visit to AISAS, November 4–15, 2005

Pavol Schwartz (AsU postdoc)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- Collaborative visit to OP, May 16 – June 4, 2005

Jiří Štěpán (AsU postdoc)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- Collaborative visit to OP, March 7–14, 2005
- Collaborative visit to OP, June 13–17, 2005

Michal Sobotka (AsU staff)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- ESMN Mid-Term Review Meeting, AISAS, November 6 2004
- GREGOR Project Meeting, AIP, April 14–15, 2005

Michal Švanda (AsU PhD student)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004

Aleš Kučera (AISAS staff)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004/midterm
- NSO Workshop 23: “Solar MHD: theory and observations”, Sunspot, USA, July 18–25, 2005
- 11-th European Solar Physics Meeting: “The Dynamic Sun: Challenges for Theory and Observations”, Leuven, Belgium, September 11–16, 2005
- Observing campaign SST and DOT, October 18–31, 2005

Ján Rybák (AISAS staff)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- ESMN Mid-Term Review Meeting, AISAS, November 6 2004
- “Many Faces of the Universe: From Solar System to Cosmology”, Slany, Czech Republic, January 30 – February 1, 2005
- NSO Workshop 23: “Solar MHD: theory and observations”, Sunspot, USA, July 18–25, 2005
- Observing campaign SST and DOT, October 18–31, 2005

Július Sýkora (AISAS staff)

- 11th European Solar Physics Meeting: “The Dynamic Sun: Challenges for Theory and Observations”, Leuven, Belgium, September 11–16, 2005

Július Koza (AISAS staff, UU EIF Fellow)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- Observing campaign SST and DOT, October 18–31, 2005

Peter Gömöry (AISAS PhD student, UU Marie Curie Fellow)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004 Tatranska Lomnica, Slovakia, November 1–14, 2004
- Observing campaign SST and DOT, October 18–31, 2005
- Conference: “Principles of Magnetohydrodynamics”, Leiden, The Netherland, March 21–24, 2005
- “60th Nederlandse Astronomen Conferentie”, Blankenberge, Belgium, May 18–20, 2005
- “Chromospheric and Coronal Magnetic Fields”, Katlenburg-Lindau, Germany, August 30–September 2, 2005

František Tomasz (AISAS PhD student)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- “Many Faces of the Universe: From Solar System to Cosmology”, Slany, Czech Republic, January 30 – February 1, 2005
- Collaborative visit to AsU, February 21 – March 4, 2005

Balázs Major (ELTE PhD student)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004

Emese Forgács-Dajka (ELTE staff)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- Workshop “Tachocline Dynamics”, Isaac Newton Inst., Cambridge, UK, November 2004
- Institute of Physics conference: “Physics, a Century after Einstein”, Warwick, United Kingdom, April 2005
- École d’Oléron 2005, Centre du CAES, Oléron, France, September 2005

Kristóf Petrovay (ELTE staff)

- ESMN school: “Solar Magnetometry and Solar Magnetism”, AISAS, November 2–11, 2004
- ESMN Mid-Term Review Meeting, AISAS, November 6 2004
- Workshop “Tachocline Dynamics”, Isaac Newton Inst., Cambridge, UK, November 2004
- ISSI “Solar Turbulence” collaborative project, Bern, Switzerland, January 2005

ESMN networking matrix

The *networking table* below displays the intensity matrix of interactions between ESMN partners during the report year, with as scale 0 = no collaboration, 1 = some collaboration, 2 = much collaboration, 3 = intense collaboration. The estimates include both ESMN-funded travel (primarily by ESMN Fellows and young Associated-State team members) and networking funded from other sources.

Team	UU	IAC	OAA	UiO	KVA	AIP	OP	ESA	AsU	AISAS	ELTE
UU	–	1	1	3	3	1	2	0	2	3	0
IAC	1	–	3	1	3	2	2	1	3	1	0
OAA	1	3	–	3	0	0	3	0	1	2	0
UiO	3	1	3	–	3	0	2	3	0	2	0
KVA	3	3	0	3	–	1	0	1	1	1	0
AIP	1	2	0	0	1	–	2	1	2	1	0
OP	2	2	3	2	0	2	–	3	3	1	1
ESA	0	1	0	3	1	1	3	–	1	2	1
AsU	2	3	1	0	1	2	3	1	–	3	0
AISAS	3	1	2	2	1	1	1	2	3	–	0
ELTE	0	0	0	0	0	0	1	1	0	0	–

B.5 Training

The *training programme* followed and follows the element list given in Section B.5 of Appendix I to the contract. Most ESMN Fellows took or take part in observing with

the Canary Island telescopes. However, none has worked at the SOHO EOF at Goddard because such secondments unfortunately became virtually impossible through post-9/11 security restrictions. All ESMN Fellows gained or gain experience in observing strategies, data reduction, and analysis techniques, and they all participated or participate in seminars and in international meetings. The detailed lists in Section B.4 above specify their travels as Fellow during the report period.

An updated ESMN recruitment table is given on the next page. As noted before, the change from the originally envisaged post-doc to pre-doc in the case of Laura Merenda at the IAC was explained in a letter to the Project Officer on March 27, 2003. The change at UiO was conform the original ESMN proposal (the subsequent 6/24 split was entered in the contract to accommodate a specific candidate but turned out unnecessary).

The ESMN's ESA Fellow (Stéphane Régnier) recently left the ESMN earlier than intended, when receiving an attractive offer from the University of St Andrews (UK). Candidates are presently sought to fill the remaining ESA contract months. AIP has also advertised a few more ESMN months contract availability. The IAC Fellows (Laura Merenda, Moncef Derouich) aim to continue their ESMN contract until the end of the ESMN duration on October 31, 2006, as will KVA's Kai Langhans who had paternity gaps in his employment. The eventual total of the ESMN's Fellow hiring is likely to exceed the contracted minimum significantly.

After his retirement, AIP's former scientist in charge Prof. J. Staude turned his new "free time" into ESMN benefit by giving a well-attended ESMN lecture course "Solar Magnetohydrodynamics" at AISAS during October 4–7, 2005 (http://www.ta3.sk/~choc/js_mhd.html).

During extended secondments at the SST, UU's ESMN coordinator ran a near-daily ESMN seminar series for a dozen KVA and UU summer students. Many ESMN observers (IAC, KVA, UiO, UU, AISAS) including the UiO, KVA, and UU Fellows were speakers.

Participant	Contract deliverable of Young Researchers to be financed by the contract (person-months)			Young Researchers (“Fellows”) financed by the contract so far (person-months)		
	Pre-doc (a)	Post-doc (b)	Total (a + b)	Pre-doc (c)	Post-doc (d)	Total (c + d)
1. UU	–	30	30	0	30	30
2. IAC	–	30	30	32	4	36
3. OAA	–	30	30	0	36	36
4. UiO	6	24	30	0	30	30
5. KVA	–	30	30	0	23.5	23.5
6. AIP	–	30	30	0	30	30
7. OP	–	30	30	0	32	32
8. ESA	–	30	30	0	19	19
9. AsU	–	–	–	–	–	–
10. AISAS	–	–	–	–	–	–
11. ELTE	–	–	–	–	–	–
TOTAL	6	234	240	32	204.5	236.5

B.6 Difficulties

None, fortunately.

Part C – Summary Reports by Young Researchers

The summary reports of the ESMN Fellows listed below are enclosed with this report. Note that Stéphane Régnier left the ESMN by November 30, 2005 so that his report should formally have been included with the final report, but since there was enough time between his departure and the submission of the present report, it is included now already.

- Arkadiusz Berlicki (ESMN Fellow at OP February 1 2003 - September 30 2005)
- Luc Rouppe van der Voort (ESMN Fellow at UiO March 1 2003 – August 31 2005)
- Kostas Tziotziou (ESMN Fellow at UU March 1 2003 – August 31 2005)
- Katja Janssen (ESMN Fellow at OAA September 1 2003 – August 31 2005)
- Andrés Asensio Ramos (ESMN Fellow at OAA September 1 2004 – August 31 2005)
- Monica Sánchez Cuberes (ESMN Fellow at AIP May 1 2003 – October 31 2005)
- Stéphane Régnier (ESMN Fellow at ESA/ESTEC February 1 2004 – November 30 2005)