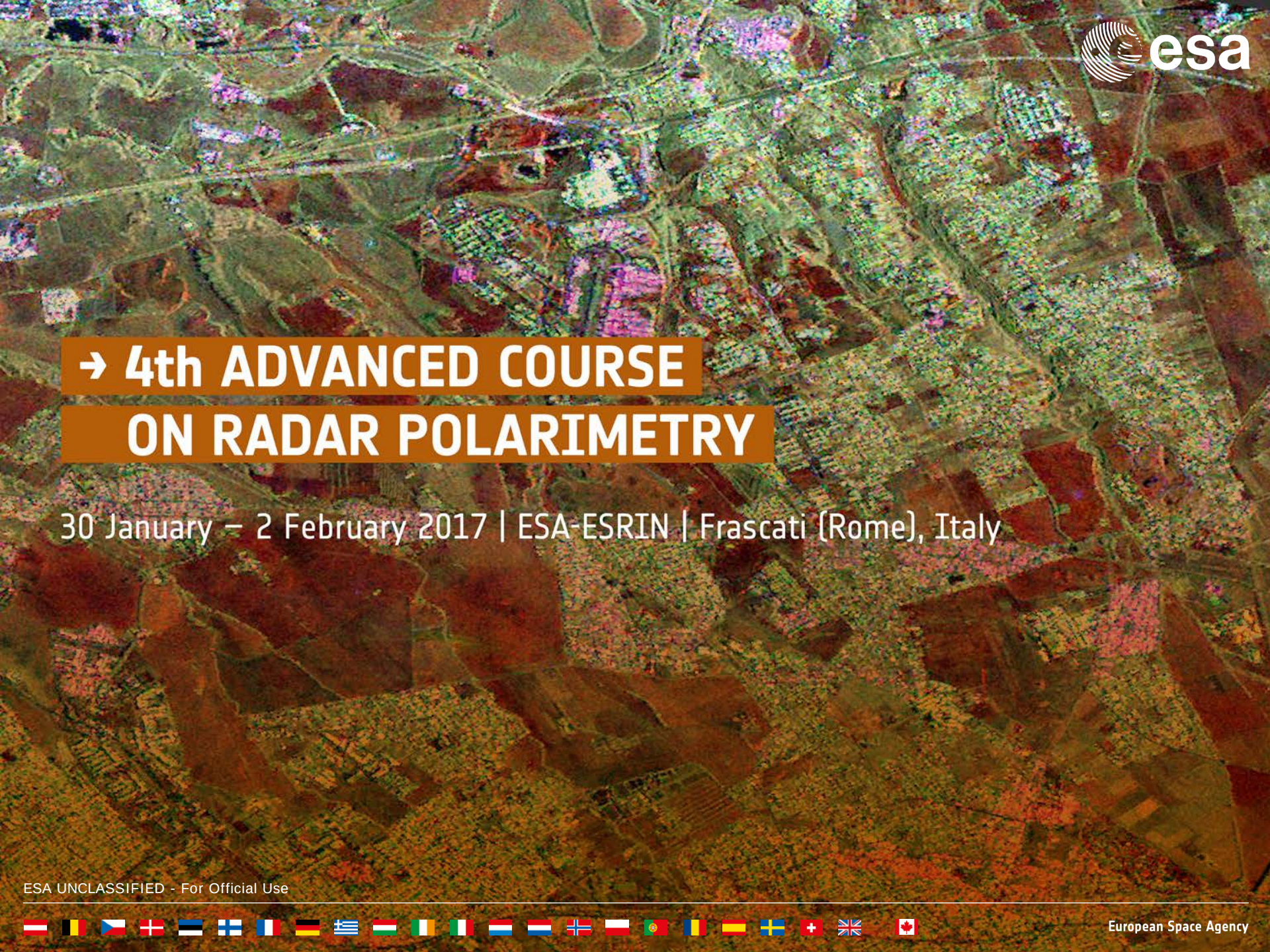


# → 4th ADVANCED COURSE ON RADAR POLARIMETRY

30 January – 2 February 2017 | ESA-ESRIN | Frascati (Rome), Italy


seom
scientific exploitation of operational missions

# Course Context

## ESA ADVANCED TRAINING COURSES

- Action of **SEOM** (Scientific Exploitation of Operational Missions) element of EOEP-4 (Earth Observation Envelope Programme)

## SEOM Action Lines:

- RESEARCH and DEVELOPMENT STUDIES

  Stimulate research and exploitation of operational missions.
- SCIENTIFIC TOOLBOXES DEVELOPMENT

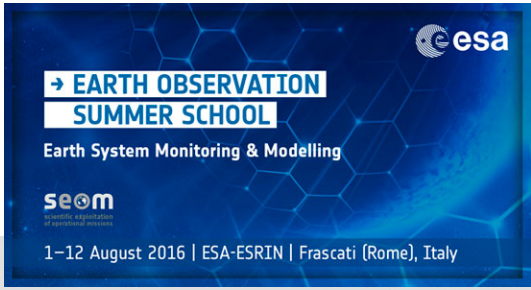
  Provide OS tools to the scientific community.
- USERS' CONSULTATIONS

  Organise thematic workshops for scientific consultation and user feedback.
- TRAINING NEXT GENERATION SCIENTISTS

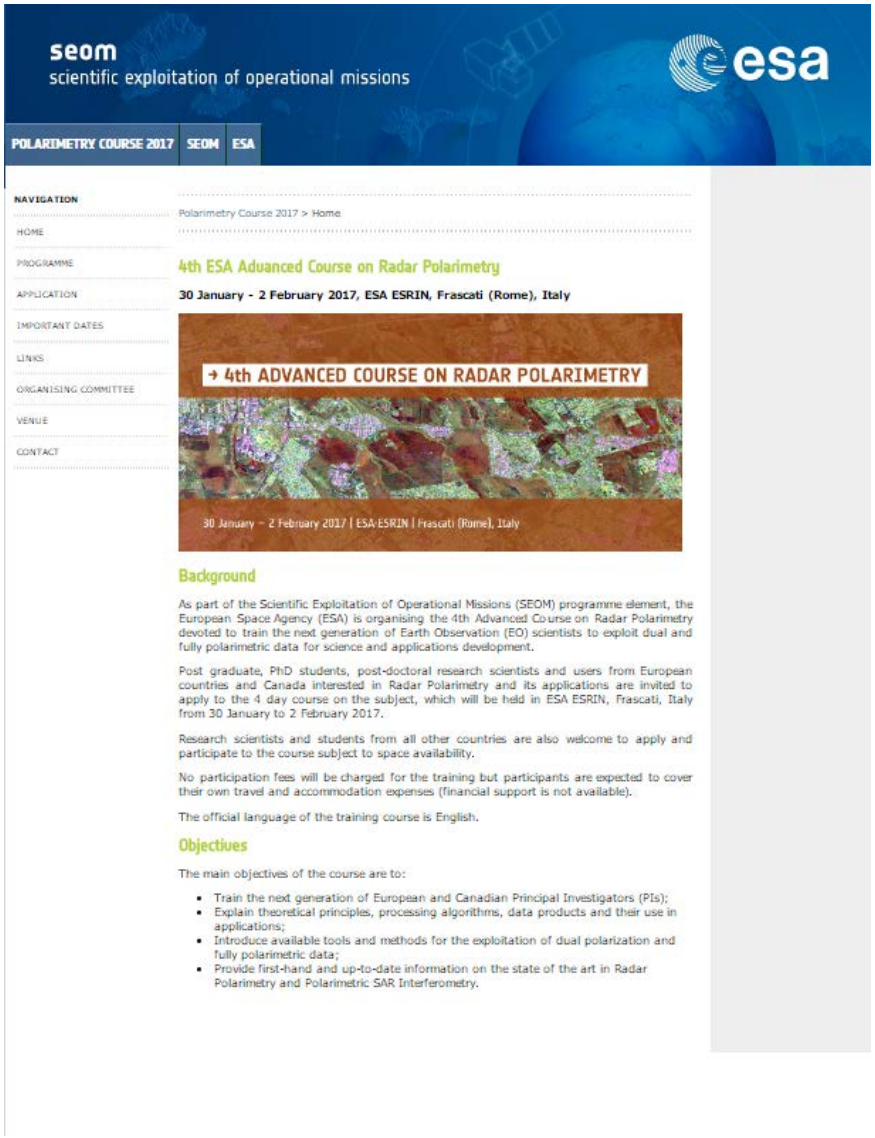
  Foster emergence of next generation EO scientists through thematic training.
- PROMOTING SCIENCE DATA USE AND RESULTS

  Promote widespread scientific use of European data and publicise results.



# http://seom.esa.int


4th in the series of Advanced Courses on Radar Polarimetry: 2015, 2013, 2011.

Always held at ESA/ESRIN in Frascati

## Training Team: theory and practical

- Prof Eric Pottier, **University of Rennes, France**
- Prof Laurent Ferro-Famil, **University of Rennes, France**
- Prof Stefano Tebaldini, **Politecnico di Milano (POLIMI), Italy**
- Prof Irena Hajnsek, **German Aerospace Center (DLR), Germany**
- Mr Chris Stewart, RSAC c/o **European Space Agency (ESA), Italy**
- Dr Michael Foumelis, RSAC c/o **European Space Agency (ESA), Italy**

## Training Team: mission presentations

- Prof Irena Hajnsek, **German Aerospace Center (DLR), Germany**
- Dr Francesco Caltagirone, **Italian Space Agency (ASI), Italy**
- Dr Klaus Scipal, **European Space Agency (ESA), Netherlands**
- Dr Malcolm Davidson, **European Space Agency (ESA), Netherlands**
- Dr Pierre Potin, **European Space Agency (ESA), Italy**

## Organising Committee

- Yves-Louis Desnos (ESA)
- Chris Stewart (RSAC c/o ESA)
- Sabrina Lodadio (Serco c/o ESA)
- Giulia Vinicola (NIKAL FM c/o ESA)

# Participants

**52 Selected Participants**

| Countries | 21 |
|---|---|
| ESA Member State (or PECS Member) | 15 |
| Non-ESA Member State | 6 |

| Female | 27 |
|---|---|
| Male | 25 |

- PhD students
- Post-Doc researchers
- Bachelor's and Master's students
- Industry, service community

| | Mon 30 Jan | Tue 31 Jan | Wed 1 Feb | Thu 2 Feb |
|---|---|---|---|---|
| 09:00-09:15 | **Registration** | **COSMO-SkyMed Second Generation** *Francesco Caltagirone (ASI, Italy)* | **TanDEM-X and TanDEM-L** *Irena Hajnsek (DLR, Germany)* | **Sentinel-1** *Pierre Potin (ESA/ESRIN, Italy)* |
| 09:15-09:30 | **Welcome from ESA** *Yves-Louis Desnos (ESA/ESRIN, Italy)* | | | |
| 09:30-10:00 | **BIOMASS** *Klaus Scipal (ESA/ESTEC, Netherlands)* | **PolSAR theory** *Eric Pottier (University of Rennes, France)* | **Pol-InSAR theory** *Irena Hajnsek (DLR, Germany)* | **Pol-TomoSAR theory** *Laurent Ferro-Famil (University of Rennes, France) and Stefano Tebaldini (POLIMI, Italy)* |
| 10:00-11:30 | **PolSAR theory** *Eric Pottier (University of Rennes, France)* | | | |
| 11:30-11:45 | Coffee Break | | | |
| 11:45-13:00 | **PolSAR theory** *Eric Pottier (University of Rennes, France)* | **PolSAR theory** *Eric Pottier (University of Rennes, France)* | **Pol-InSAR theory** *Irena Hajnsek (DLR, Germany)* | **Pol-TomoSAR theory** *Laurent Ferro-Famil (University of Rennes, France) and Stefano Tebaldini (POLIMI, Italy)* |
| 13:00-14:00 | Lunch | | | |
| 14:00-15:15 | **Practical with ESA OS toolboxes** *Eric Pottier (University of Rennes, France), Chris Stewart and Michael Foumelis (RSAC c/o ESA/ESRIN, Italy)* | **Practical with ESA OS toolboxes** *Eric Pottier (University of Rennes, France), Chris Stewart and Michael Foumelis (RSAC c/o ESA/ESRIN, Italy)* | **Pol-InSAR practical** *Irena Hajnsek (DLR, Germany)* | **Pol-TomoSAR practical** *Laurent Ferro-Famil (University of Rennes, France) and Stefano Tebaldini (POLIMI, Italy)* |
| 15:15-15:30 | Coffee Break | | | |
| 15:30-16:00 | **Practical with ESA OS toolboxes** *Eric Pottier (University of Rennes, France), Chris Stewart and Michael Foumelis (RSAC c/o ESA/ESRIN, Italy)* | **SAOCOM-CS and airborne campaigns** *Malcolm Davidson (ESA/ESTEC, Netherlands)* | **Pol-InSAR practical** *Irena Hajnsek (DLR, Germany)* | **Pol-TomoSAR practical** *Laurent Ferro-Famil (University of Rennes, France) and Stefano Tebaldini (POLIMI, Italy)* |
| 16:00-16:30 | | **Practical with ESA OS toolboxes** *Chris Stewart and Michael Foumelis (RSAC c/o ESA/ESRIN, Italy)* | | |
| 16:30-17:00 | | | | **Closure** |

**Colour code**

- Mission presentation
- Theory
- Practical


RARO
4th Polarimetry Advanced Course
31 JAN 2017
15€ p.p.
Bruschetta, Pizza and Drink

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scientific exploitation of operational missions

esa

# Course Material

**Training material will be available online through the course website**, including:

- Presentations
- Exercises
- Data


http://seom.esa.int/polarimetrycourse2017/

# Toolboxes


**http://seom.esa.int**

S1 Toolbox

S2 Toolbox

S3 Toolbox

S5P Toolbox

PolSARpro

BRAT

SEOM > Toolbox

ESA is developing, under the SEOM program element, new free open source toolboxes for the scientific exploitation of the Sentinels missions:

The **Sentinel-1**, **Sentinel-2** and **Sentinel-3 toolboxes** are based on a common architecture called the Sentinel Application Platform (SNAP) and are being developed in a coordinated joint venture of several industrial partners and scientists. The first public release of the toolboxes, under GNU GPL open source license, was in September 2014.

The **Sentinel 5P toolbox** is a collection of executable tools and an application programming interface (API) which has been developed to facilitate the utilisation, viewing and processing of ESA and Third Party atmospheric data products. The first public release of the software is available from November 2014 under a GNU GPL open source license.

The **Polarimetric SAR Data Processing and Educational Tool (PolSAR pro)** aims to facilitate the accessibility and exploitation of multi-polarised SAR datasets including those from ESA (Envisat ASAR Alternating Polarisation mode products and Sentinel-1 dual pol) and Third Party Missions (ALOS-1 PALSAR, ALOS-2 PALSAR, COSMO-SkyMed, RADARSAT-2, RISAT, TerraSAR-X and Tandem-X).

The **Broadview Radar Altimetry Toolbox (BRAT)** is a collection of tools and documents designed to facilitate the use of radar altimetry data, in particular the novel SAR-mode Altimetry on CryoSat, Sentinel-3 and Sentinel-6. It can read most distributed radar altimetry data and performs processing and data editing, extraction of statistics, and visualisation of results. BRAT is an open source software with a LGPL-3 license type. Its source code is publicly available on-line in a dedicated GitHub repository.

# PolSARpro Version 5.0

The Polarimetric SAR Data Processing and Educational Tool aims to facilitate the accessibility and exploitation of multi-polarised SAR datasets including those from ESA (Envisat ASAR Alternating Polarisation mode products and Sentinel-1) and Third Party Missions (ALOS-1 PALSAR, ALOS-2 PALSAR, COSMO-SkyMed, RADARSAT-2, RISAT, TerraSAR-X and Tandem-X).

A wide-range of tutorials and comprehensive documentation provide a grounding in polarimetry and polarimetric interferometry necessary to stimulate research and development of scientific applications that utilise such techniques; the toolbox of processing functions offers users the capability to implement them.

PolSARpro is developed under contract with ESA since 2003 where the initiative was a direct result of recommendations made during the first PolInSAR Workshop held at ESRIN in 2003. The IETR (*Institute of Electronics and Telecommunications of Rennes* - *UMR CNRS 6164*) of the University of Rennes 1, France is in charge of the development of the PolSARpro software.

All elements of the PolSARpro project are distributed by ESA free of charge, including the source code.

This website provides details of the project, giving users access to the tutorial material and software as well as information about sources of multi-polarised datasets.

## Latest News

- New PolSARpro version 5.0.4 released
- PolSARpro version 5.0.3 released
- PolSARpro version 4.2 released
- PolSARpro version 4.1.5 released
- PolSARpro version 4.0 Beta 1.3 released

## Useful Links

- Home
- Data Sources
- Overview
- Download PolSARpro 5.0
- Release Notes
- Polarimetry Tutorial
- Technical Documentation
- Results & News
- Contact

step
science toolbox exploitation platform

ESA | STEP | TOOLBOXES | DOWNLOAD | GALLERY | DOCUMENTATION | COMMUNITY | THIRD PARTY PLUGINS

- SNAP
- Sentinel 1 Toolbox
- Sentinel 2 Toolbox
- Sentinel-3 Toolbox
- SMOS Toolbox
- Download
- Community
- Useful Links

SNAP SURVEY

Search...

Home > Scientific Toolbox Exploitation Platform


ESA is developing **free open source toolboxes** for the scientific exploitation of **Earth Observation missions** under the the Scientific Exploitation of Operational Missions (SEOM) programme element. **STEP** is the ESA **community platform** for accessing the software and its documentation, communicating with the developers, dialoguing within the science community, promoting results and achievements as well as providing tutorials and material for training scientists using the Toolboxes.

The ESA toolboxes support the **scientific exploitation** for the **ERS-ENVISAT** missions, the and **Third Party** missions. The three 3 Toolboxes and share a common onalities of historical toolboxes such as er the last years.

**http://step.esa.int/main/**

SNAP Features | Download | Tutorials | Community

Documentation | Developers | Gallery | Blog

The following results have been obtained thanks to the Sentinel Toolboxes :

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## 2017


ESA POLinSAR 2017 Workshop

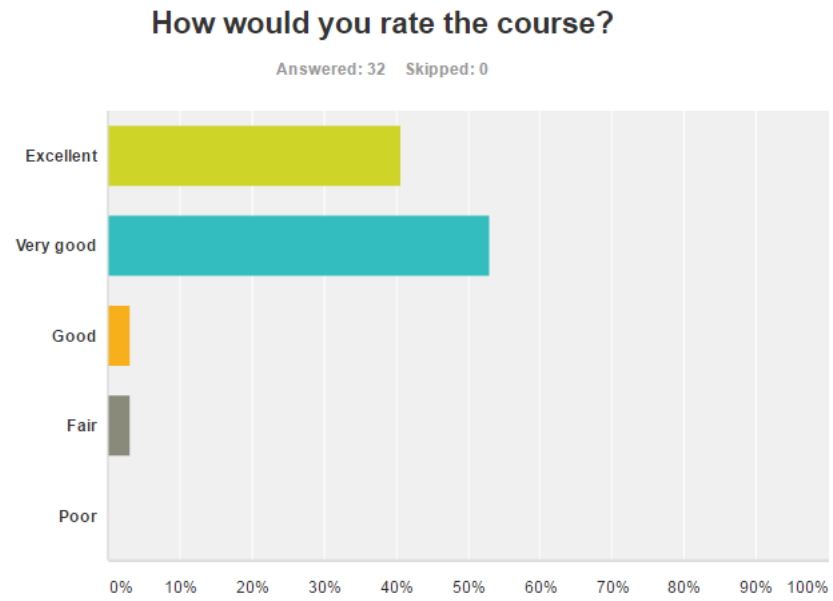
## 2016


Colour and Light in the Ocean from Earth Observation


Earth Observation Open Science 2016 Conference


ESA EO summer school on "Earth System Monitoring & Modelling"

# Online Course Evaluation




| Answer Choices | Responses | |
|---|---|---|
| Excellent | 40.63% | 13 |
| Very good | 53.13% | 17 |
| Good | 3.13% | 1 |
| Fair | 3.13% | 1 |
| Poor | 0.00% | 0 |
| Total | | 32 |

**Many thanks for your feedback!**

In general, good feedback, many new users of ESA software and European data.

Main points to improve include:

- **Maths heavy**, **insufficient time** to take in all information
- **More time needed for practical** sessions
- **Acoustics** in Big Hall
- Despite the full programme, if more time had been available, **additional topics** could include:
  - **Marine** applications
  - **Terrain motion**

# We look forward to seeing you again!