CCI Living Planet Fellowships

Stephen Plummer (ESA) & LPF Postdocs
The CCI Postdoctoral Scheme

1. As a partial response to the call for exploitation opportunities in CCI, the Climate Change Initiative (CCI) Living Planet Fellowships (LPF) are designed to specifically target the exploitation of essential climate variable (ECV) products generated by the ESA’s CCI, for improved understanding of the climate system.

2. As well as exploitation of ECV products, other themes were on cross-ECV and multiple ECV use and enhancing interactions between CCI members and other Earth Science laboratories, research centres and universities.

3. Part of the ESA Living Planet Fellowship Scheme along with other ESA Programmes STSE, SEOM

4. Nine projects selected in 2014, with a second call under evaluation to fund up to 5 further projects.
The CCI Postdoctoral Scheme

1. The projects are equally distributed between atmosphere, terrestrial, cryosphere and ocean domains

2. Tackle aspects not covered in the main CCI projects with most providing linkage between different CCI projects.

3. All fellows are encouraged to interact between themselves and with the consortia during the 6th CCI Collocation itself.
   a. A first meeting of the CCI postdoctoral fellows took place on yesterday, 28th September to provide early feedback on experience in dealing with CCI data.
   b. Ice Breaker and Poster Session for CCI Living Planet Fellowships/Climate Office Researchers
1. Robert Parker (U. Leicester)  
Exploring the carbon cycle through atmospheric greenhouse gas variability

2. Jens Heymann (U. Bremen)  
Carbon dioxide emissions from fires

3. Adam Povey (U. Oxford)  
The environmental response to aerosols observed in CCI ECVs

4. Tero Mielonen (FMI)  
Does increasing temperature increase carbonaceous aerosol direct radiative effect over boreal forests?

5. Martin Hieronmyi (HZG)  
Ocean colour at low sun and high waves

6. Marie-Fanny Racault (PML)  
Climate impact on marine ecosystem state

7. Omar Bellprat (Barcelona SCC)  
Verification of high-resolution climate forecasts on intraseasonal-to-interannual timescales with advanced satellite datasets of the Climate Change Initiative

8. Anna Hogg (U. Leeds)  
Cryosat measurements of Antarctic ice shelf thickness change

9. Simon Munier (Estellus)  
Surface water and climate variability from a high-resolution GIEMS-SAR merged product

1. ESA Research Fellowship – Anna Maria Trofaier
2. ESA Young Graduate Trainee – Anne Stefaniak
ELEGANCE-GHG: Exploring the Global Carbon Cycle through atmospheric GreenHouse Gas variability

1) To identify and quantify the spatial-temporal anomalies in satellite remote sensing data of atmospheric $XCO_2$ and $XCH_4$ and to interpret them in the context of surface characteristics such as land-cover and vegetation.

2) To investigate the key physical climatic drivers for observed atmospheric $XCO_2$ and $XCH_4$ anomalies and to assess the representation of these coupling processes in current land system models.

3) To improve our understanding of the role of wetland inter-annual variability on the methane cycle.

4) To quantify the influence that disturbances (such as biomass burning and land-use change) have on the inter-annual variability of atmospheric $CO_2$ and the underlying carbon cycle.

Figures: Hovmoller plots of SCIAMACHY BESD $XCO_2$ and $XCO_2$ anomalies (left) and global season maps of GOSAT Proxy $XCH_4$ (above)

Rob Parker – University of Leicester
CARBOn dioxide emissions from FIRES - CARBOFIRES

Aim: Improve our knowledge about the role of fires for the carbon cycle by estimation of fire CO$_2$ emissions directly from satellite measurements.

Contribution to the CCI program:
- Reduction of uncertainties in our knowledge about the carbon cycle.
- Exploitation of different GHG-CCI products.
- Use of FIRE-CCI products.

Data sets:
- Satellite CO$_2$ observations: SCIAMACHY BESD, GOSAT datasets (planned)
- Fire CO$_2$ emissions: GFED, GFAS (planned)
- Global CO$_2$ model: CarbonTracker
- Global burned area product: FIRE-CCI product (planned)

Strategy:
- Identification of promising fire events for the analysis.
- Identification of satellite measurements affected by fires.
- Determination of background CO$_2$ concentrations to quantify how large the fire-related CO$_2$ enhancements are.
- Inversion of the satellite data to estimate the CO$_2$ emissions.
- Error analysis.
ERACE: The environmental response to aerosols observed in CCI ECVs

- Currently evaluating short and longwave radiative effects using aerosol and cloud CCI data
  - Aim is to product a post-processor for those data
- Later, localised aerosol sources to be investigated by orienting with data with direction of wind

Adam Povey, Matt Christensen, …, Don Grainger
Does Increasing Temperature Increase Carbonaceous Aerosol Direct Radiative Effect (over Boreal Forests)?

• Tero Mielonen, Atmospheric Research Center of Eastern Finland (FMI)

• PhD thesis, 2010:
  • Evaluation and application of passive and active optical remote sensing methods for the measurement of atmospheric aerosol properties

• Postdoc visit at KNMI: retrieval of tropospheric ozone with OMI

• ITICA:
  - estimate the effect of increasing temperatures on the aerosol direct radiative effect
  - investigate the causes of the positive correlation between AOD and LST using remote sensing data (AATSR) and a climate model ECHAM-HAMMOZ
    - over the Southeastern US
    - over boreal regions
  - estimate the significance of the negative feedback caused by a warming-induced increase in the aerosol direct radiative effect
Synergy between ocean colour and wind-wave observations

1. Revision of light reflection and transmission properties at realistic sea surfaces.

2. Study of wind-wave effects on the solar radiative transfer in the atmosphere and ocean.

3. Development of an ocean colour algorithm for OLCI using available wind and wave input.
CLimate Impact on MARine ECOsystem State - CLIMARECOS

Marie-Fanny Racault, Plymouth Marine Laboratory (UK)
Institution Host: Shubha Sathyendranath

Analysis of Contemporary Data Records

Pressure:
- El Niño variability
- Climate Index

Suite of Indicators from OC-CCI:
- Chlorophyll
- Primary Production
- Phenology (timing, duration)

Chlorophyll OC-CCI

Eastern Pacific El Niño
Central Pacific El Niño

Capotondi et al., JAS 2014

Analysis of Past Data Records and Ecosystem Model Outputs

Pressure:
- Climate Change
- Warmer scenario

Phenology Indicators from CZCS
Suite of Indicators from Ecosystem Model

Racault et al., In prep.
VERITAS-CCI: Verifying climate predictions

- Predicting natural variabilities and near-term climate change - a rapidly emerging field
- Predictions only useful if skill is known from past predictions
- Satellite observations played little role so far - although large potential
- Independent observations, high-resolution coping with model resolutions, estimate of observational uncertainty.

High-quality observations improve your model skill

Correlation of ENSO prediction

- ESA CCI
- ERA -Interim
- ERSST
- HadSST
Surface water and climate variability from a high-resolution SAR-GIEMS merged products

Global Inundation Extent from Multi-Satellites (GIEMS)

Downscaled using topography

Data Fusion

Global, long-term and high-resolution flood-risk database