TESS Asteroseismic Science Consortium

Hans Kjeldsen, Jørgen Christensen-Dalsgaard and Bill Chaplin

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The present document is intended to describe the organisation and structure of TASC (TESS Asteroseismic Science Consortium). The aim is to present the structure that will allow mission preparation (including target selection for asteroseismology) as well as ensuring that the asteroseismic data from TESS will be analysed in an optimized and coordinated manner. The present document defines the policies and strategies for including aspects of the publication policies ensuring that publications are accurate, that credit is fair to the authors and other contributors, and that the asteroseismic data and the science results will be provided to the scientific community and the public in a timely fashion.

While steering committees, policies and organizational rules are needed we do intend to keep the formal requirements for scientists to be part of the TESS activities at a minimum. It will be the responsibility of the Board and the Steering Committees to keep the present document up to date.

The TESS Asteroseismic Science Consortium (TASC)

Jørgen Christensen-Dalsgaard, Aarhus University Denmark is the PI of TASC with the overall responsibility for science and management. This will include setting up and ensure funding for a TASC data centre (TASOC). The TESS Asteroseismic Science Operations Center (TASOC) contains a web-based data- and information portal designed to serve the TASC. Information on scientific planning and management, TASC members, conferences and workshops, target selection, data analysis and publications will be distributed via the TASOC-webpage. TASOC is hosted by the Stellar Astrophysics Centre at Aarhus University in Denmark. The webpage for TASOC is: https://tasoc.dk.

The main components of TASC are:

- TASC is a large and unique scientific collaboration formed around the asteroseismic activities of the TESS mission. TASC aims at gathering a large fraction of the relevant research groups around the world.

- TASC will select and analyse a large number of targets that form the basis for the work done by TASC (also in the preparation phase). The TASC expertise will be kept throughout the whole mission (including activities after launch).

- TASC will maintain a database with TESS photometry data in several data forms as well as processed and analysed data. The TASC data centre (TASOC) will also analyse raw TESS data when needed (see https://tasoc.dk).

- TASC will contain an optimized collaborative working-group structure which is aimed at initiating collaboration between many individual researchers and research groups around the world. Postdocs and PhD-students will via TASC find an easy and direct way to take part in collaborations (membership can be obtained via: https://tasoc.dk).

- TASC will organize workshops aiming at target selection, science collaboration and data analysis.

- Collaboration within TASC will contain a well-defined publication strategy set by individual working groups to be consistent with overall policies (see later) and a well-defined boundary for collaborations

and TASC ensures coordination between WGs and coordination of ground-based follow-up, public outreach etc. Specifics relating to these policies will evolve as the mission progresses.

- The Management structure of TASC includes a Board with the aim of advising the PI.

TASC Board

The TASC Board contains the following members:

- Jørgen Christensen-Dalsgaard (TASC PI).
- Bill Chaplin.
- Steve Kawaler.
- George Ricker (TESS PI).
- Roland Vanderspek (TESS Team).
- Sarbani Basu selected by the US asteroseismic community.
- Hans Kjeldsen (TASC Project Scientist).

The TASC Project Scientist (Hans Kjeldsen) is the secretary for the TASC Board. The TASC Board has the following tasks:

1. Ensure and maintain an optimized collaboration with the TESS Science team.
2. Ensure that all relevant research groups around the world are invited to participate in the TASC activities in order to ensure full use of TESS opportunity.
3. Advise the TASC PI.
4. Revise and optimize the TASC policies.
5. Approve new WGs and appoint chairs for the WGs.
6. Appoint additional members to the TASC SC in relation to specific TASC tasks.
7. Solve disagreement on WG membership.

TASC Working Groups

The working groups form the basic structure of TASC. The chairs of the working groups (WG) as well as the TASC Board members form the TASC Steering Committee. The TASC Steering Committee will ensure that the TASC planning is coordinated and functional. Each working group has the following structure and will have the following responsibilities:

- A working group (WG) has clear and scientifically well-defined tasks and aims. The main tasks will be target selection, organizing ground-based observations (target classification, target selection and follow-up), coordination of data analysis and publications. Each WG will also coordinate their activities with the TESS Team and other relevant missions (e.g. Kepler, K2, PLATO or Gaia).

- Each working group has two co-Chairs.

- The chairs are appointed by the TASC Board after consultation with the community.

- Working groups with a large number of members may form sub-groups with specific tasks. The sub-group chairs could then be a member of a WG steering committee.

- Membership is open and any member of TASC can apply to become a member of a given WG (via https://tasoc.dk). It is up to the WG chairs to approve new members. In case of disagreement on WG membership the TASC Board will take the final decision.

- Each WG should define a data publication policy which is in agreement with the TASC policies (see below).

- Each WG will ensure that the work is structured and well-defined and that postdocs and PhD-students are being prioritized and we shall ensure that PhD projects can be defined and protected within the boundaries of a working group.

- New working groups can be suggested and the TASC Board can approve the formation of new groups and appoint the chair.

The TASC working groups (WGs and numbering of groups based on KASC) are listed below (including chairs).

WG0. TASOC – Basic photometric algorithms / TASC data products
Chairs: Rasmus Handberg and Mikkel Nørup Lund

WG1. Asteroseseismology of TESS exoplanet hosts
Chairs: William Chaplin and Daniel Huber

WG2. Oscillations in solar-type stars
Chair: William Chaplin and Thierry Appourchaux

WG3. Oscillating stars in clusters
Chair: Sarbani Basu and Saskia Hekker

WG4. Main Sequence AF "classical" pulsators
Chair: Victoria Antoci and Margarida Cunha

WG5. Main Sequence OB "classical" pulsators
Chair: Peter De Cat and Gerald Handler

WG6. RR Lyrae stars and Cepheids
Chairs: Katrien Kolenberg and Róbert Szabó

WG7. Red Giant oscillations
Chair: Victor Silva Aguirre and Dennis Stello

WG8. Compact pulsators
Chair: Mike Montgomery and Stéphane Charpinet

TASC Steering Committee

The TASC Steering Committee (TASC SC) contains the following members:

- The chairs of each TASC working Group.
- The TASC Board members.
- Additional members selected by the TASC Board in relation to specific TASC tasks. Tim Bedding is selected as a TASC SC member (in May 2016) with the aim of providing advice on the target selection procedures,

The TASC Project Scientist is the secretary for the TASC SC. The TASC SC has the following tasks:

1. Ensure that the TASC database and TASC membership list are maintained
2. Ensure a continuation of the TASC workshops and approve future workshops (time, place, goal)
3. Support the collaboration with the TESS Science.
4. Ensure that targets for TESS are selected in agreement with the mission requirements and that those targets are selected to serve the whole asteroseismic community.
5. Ensure maintenance of *tasc* and *tascnews* mailing lists.
6. Maintain a TASC webpage for data and information.
7. Select an editor for the TASC newsletter and ensure up to date information to the TASC.
8. Coordinate press releases and media events and decide on asteroseismic outreach and press events.

TASC Data Release, Scientific Publication Strategy and Policy

Members of TASC have access through the TASC database to all TESS data as soon as the data are made available (via https://tasoc.dk). The database contains data that can also be found via the general TESS data archive. In addition to the raw data we also store TASC-corrected/modified data, stellar models, stellar parameters (estimated by TASC), ground-based data (raw and reduced) and TASC publications.

Individual TASC members will need their private password in order to access the TASC database.

TASC members will work under a data policy described in the present document. If a person cannot accept the policy or fails to comply with it, the TASC Board can take action to cancel the TASC membership for that person. The policies for TASC are:

1. All TASC members have unrestricted access to all TASC-data (https://tasoc.dk). Access is password controlled and data downloads are logged

2. TASC is based on collaboration and we expect that all members that contribute significantly to a given data set (analysis, modelling, ground-based follow-up etc.) should have the possibility to be on publications related to that given data set. Decisions on authorship will take place at the WG-level and we encourage collaboration. Each WG should define their specific guidelines and distribute those to all WG-members. Cases of doubt may involve consultation with the TASC Steering Committee and the TASC Board.

3. All data are public and the WG-publication guidelines need to ensure that TASC-membership is a benefit compared to non-TASC members.

4. There is no formal approval of papers. Papers can be submitted at any time but any paper should go through an open TASC review before it is submitted to a journal (see below). The TASC Steering Committee may request coordinated key papers to be produced in order to create visibility. This may be done in relation to press and media events.

Paper review and submission process

Papers will need to go through a one week TASC review before submission to a journal.

A. Papers can be submitted to TASC review via the TASC webpage. Papers can be submitted at any time.

B. The TASC review will take one week and when a paper is submitted to TASC review an email will go to all members of TASC. The aim of the TASC review is primarily to allow TASC members to give comments, ask questions etc. on specific results. The authors will receive comments directly from the TASC users via the TASC webpage. Papers should not be submitted to a journal or a preprint server before the TASC review is done and the questions/comments are considered by the authors.

C. After the TASC review the authors can submit to the journal and the rest of the publication activities will be done in agreement with the journal refereeing process. The TASC Steering Committee will not be involved. Papers should not be put on astro-ph (http://arxiv.org/archive/astro-ph) during the TASC review.

TASC science program

The TESS photometric data represent a unique resource for asteroseismic investigations of the global properties and internal structure of a large number of stars having a broad range of different types. Through investigation of a broad range of stars the asteroseismic investigation will substantially improve our understanding of general stellar evolution, and hence strengthen the use of such modelling to further constrain

the properties and evolution of the stars and systems investigated in the TESS extrasolar planet program. The goal of the TASC science program is:

- Asteroseismic characterization of planet-hosting stars, including mass, age and particularly radius.
- Understanding of general stellar properties, including stellar structure modelling and contributing to stellar characterization.

TASC activities throughout the mission

TASC will work on several activities before and after launch including identification of important asterosiesmic targets. The main acitivites are:

- Organize TASC and develop, test and verify pipelines and procedures for extraction of frequencies and frequency properties from observed TESS time-series as well as procedures to derive stellar properties from frequencies.
- Identify cases suitable for asteroseismic analysis and provide the selection of targets for the asteroseismic program to be observed throughout the mission. The specific targets available for asteroseismology are:

  At any given time (for a 27 day period):
  - **60** targets with 20 sec sampling
  - **750** targets with standard 2 min sampling
- As part of the 20 sec cadence TASC will identify special targets where the cadence may need to be shorter than two minute. TASC (and TASOC) will in relation to those special targets develop a pipeline for basic analysis of this type of data.
- The TASC (through TASOC) will in addition analyse the full frames (30 min sampling) in order to detect RGB oscillations as well as SPB's, RR Lyrae, beta Cep stars, Cepheids, EB's, etc.
- Provide stellar parameters (particularly size) in a timely fashion to the TESS Project; the goal is to provide the results for planet hosting stars in three months or less after receiving time series data.
- Perform detailed asteroseismic analyses on all TESS targets where oscillations frequencies are detected.
- Update the asteroseismic target list as appropriate.
- Perform pipeline analysis of raw data from TESS for all targets.
- Ensure timely publication of the asteroseismic results.