## Project Details

**ROSES ID:** NNH14ZDA001N
**Selection Year:** 2014
**Program Element:** Physics of the Inner Heliosphere

**Topic:** Physics-based methods to predict connectivity of SEP sources to points in the inner heliosphere, tested by location, timing, and longitudinal separation of SEPs

**Project Title:**
Preparing for Solar Probe Plus: Probing the Solar Wind Acceleration Region with Remote Sensing of MHD Waves

**PI Name:** Craig DeForest
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**Project Member(s):**
- Vourlidas, Angelos ; Collaborator; JHU/APL
- Howard, Timothy A; Co-I; Southwest Research Institute

**Summary:**
We propose to exploit the newly discovered wave field in the outer corona to probe the wind acceleration region, Alfv n surface location, and longitudinal structure as preparation for the upcoming Solar Probe Plus mission.

## Publication References:

**Summary:** Both of these publications were supported in part by the current grant. Both of them focus on understanding the condition of the interplanetary solar wind and how the Sun affects it. This is important for the larger goal of understanding how space weather events (which originate at the Sun) are steered and modified by the interplanetary environment enroute to Earth. The turbulence result, in particualr, is the first direct imaging evidence of turbulent mixing in the solar wind in the inner heliosphere, via analysis of large-scale test particle motion in the Lagrangian (comoving) frame of the solar wind itself.

**Reference:** Tenerani A.; Velli M.; DeForest C.; (2016). Inward Motions in the Outer Solar Corona between 7 and 12 R $_?$: Evidence for Waves or Magnetic Reconnection Jets?. Astrophysical Journall, 825, L3, doi: 10.3847/2041-8205/825/1/L3

- **Investigation Type:** Data Model Comparison
- **Names of models being tested or validated:** Inbound wave model proposed by DeForest et al. (2014) for inbound fluctuations observed in the outer corona
- **Datasources:** STEREO A:COR2

**Summary:**

**Reference:**

**Summary:** This work describes, for the first time, the breakdown of coronal structured flow and development of turbulent solar wind flow in the slow solar wind, at the top of the solar corona. The transition has been theorized for some time but never measured directly. It is important to understanding how solar conditions affect the interplanetary medium, in turn modifying and steering space weather events as they propagate.

**Reference:** DeForest C. E.; Matthaeus W. H.; Viall N. M.; Cranmer S. R.; (2016). Fading Coronal Structure and the Onset of Turbulence in the Young Solar Wind. Astrophysical Journal, 828, 66, doi: 10.3847/0004-637X/828/2/66

- **Investigation Type:** Data Analysis
- **Data Sources:** STEREO A:COR2  STEREO A:HI

**Summary:** no summary

**Reference:** Howard, T. A.; DeForest, C. E.; (2015), Observations of a Solar Wind Domain Boundary Extending 1 AU from the Sun, The Astrophysical Journal Letters, Volume 800, Issue 2, article id. L25, 5 pp, doi: 10.1088/2041-8205/800/2/L25